THE IMPACT OF BABY-FRIENDLY HOSPITAL DESIGNATION, EMPLOYMENT STATUS, PARITY, AND OTHER SOCIAL-ECOLOGICAL FACTORS ON LACTATION DURATION FOR NEW MOTHERS IN UPSTATE NEW YORK

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JENNIFER BAILEY-DEJONG

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DOCTOR OF PHILOSOPHY

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ABSTRACT

Bailey DeJong, Jennifer Lynne, Ph.D., Program of Education, College of Human Development and Education, North Dakota State University, March 2011. The Impact of Baby-Friendly Hospital Designation, Employment Status, Parity, and Other Social-Ecological Factors on Lactation Duration for New Mothers in Upstate New York. Major Professor: Dr. Kathy Brock Enger.

The purpose of this study, that analyzed the existing Feeding Your Infant (FYI) dataset, was to examine the impact of Baby-Friendly (BF) Hospital designation, employment, parity, and other social-ecological factors on lactation status at three months postpartum in upstate New York. The FYI dataset was analyzed using an adapted version of the Bronfenbrenner Social-Ecological Systems Framework. A convenience sample of 842 breastfeeding mothers was surveyed at baseline between two sites – one a BF designated hospital, and one a community-based hospital with a mature breastfeeding program. Of the 515 mothers who returned the three month survey, 409 (79.4%) were still breastfeeding. Using t-tests, Chi square, multiple correspondence analysis and multiple logistic regression analysis, the following findings were reported: Maternal age of 31 to 35 years, women with 16 or more years of education, and married women, were statistically more likely to be breastfeeding at three months postpartum than younger, unmarried, and less educated women. In addition, mothers who reported a history of "mastitis and/or breast infection," and those who expected a maternity leave greater than 3 months, were also more likely to be breastfeeding. Those who had a prior live birth, who reported having a "not fussy" baby, and those who associated breastfeeding with "convenience" were more likely to be breastfeeding. A mother's race, parity status, expected amount of paid maternity leave, perception of having a "sleepy baby," experience with engorgement, experience with sore and or bleeding nipples, and a mother's delivery site, whether BF

designated or not, were not statistically significant. Within the multiple logistic regression analysis, predictors of breastfeeding status at three months postpartum were: insufficient milk, the perception of "too much time," and mothers' educational level.

In light of "The 2011 U.S. Surgeon's Call to Action to Support Breastfeeding," and the growing interest in The Ten Steps to Successful Breastfeeding and the WHO/UNICEF Baby-Friendly Hospital Initiative, these findings have important implications for education, practice, policy, and future research.

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CHAPTER 1. INTRODUCTION

Background and Nature of the Problem

The importance of breastfeeding has been well documented in the literature over the last 25 years (AAP, 1997; Gartner, 2005; Shealy, 2005; United States Department of Health and Human Services, 2000). Several national and international health organizations have developed position statements and practice guidelines supporting the importance of breastfeeding, including the American Academy of Family Physicians (AAFP); the American Academy of Pediatrics (AAP); the American College of Nurse-Midwives (ACNW); the American College of Obstetricians and Gynecologists (ACOG); the National Medical Association (NMA); the Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN); the American Public Health Association (APHA); the American Dietetic Association (ADA); the National Association of Pediatric Nurse Practitioners (NAPNP); the World Health Organization (WHO); the United Nations Children's Fund (UNICEF); and the United States Department of Health and Human Services (USDHHS).

The American Academy of Pediatrics recommends exclusive breastfeeding (i.e., no fluids or foods other than breast milk) for the first six months of life, continuing to a year or beyond, with the addition of complementary foods at six months, based on the "health, nutritional, immunologic, developmental, psychological, social, economic, and environmental benefits" for the infant (Gartner, 2005, p. 1035). In 2007, The Agency for Healthcare Research and Quality (AHRQ) published a meta-analysis of health outcomes secondary to lactation in developed countries and determined that early breastfeeding termination increases infants' risks for leukemia, childhood obesity, otitis media, gastroenteritis, necrotizing enterocolitis, severe lower respiratory tract infections, type 1 and 2 diabetes, and sudden infant death syndrome (SIDS).

Over the last decade, United States (U.S.) breastfeeding duration rates remained below the national health goals as documented in *Healthy People 2010* (*HP2010*) (i.e., Goal 16-19a, 16-19b, 16-19c) (AAP, 1997; Ryan, 1997; USDHHS, 2000). While breastfeeding initiation rates improved in North America, meeting the *HP* goals for the first time in 2007, with 75% of newly delivered mothers initiating breastfeeding in the early postpartum period, outcomes for duration have been less than benchmarks set by health professionals. The collective aim in *Healthy People 2010* (*HP2010*) was for at least 75% of newly delivered mothers to initiate breastfeeding, 50% to continue until their infant was six months of age, and 25% to maintain lactation until the infant was at least one year of age (USDHHS, 2005). Revised *HP2010* objectives also included increasing the proportion of women who breastfed exclusively to 60% at three months and 25% at six months (USDHHS, 2007).

In the final phases of the dissertation, *Healthy People 2020* (*HP2020*) objectives were released by the USDHHS (USBC, email communication, December 13, 2010). *HP2020* raised existing targets for breastfeeding initiation, duration, and exclusivity, and brought to the forefront of our nation's public health priorities worksite support and maternity care practices. According to the most recent data from the CDC, 75% of new mothers initiate breastfeeding, but only 13% of infants are breastfed exclusively for six months. HP2020 targets aim to increase these rates to 81.9% initiating breastfeeding, 23.7% breastfeeding exclusively through six months, and 34.1% continuing to one year. The USBC reports, "The new objectives will take on some of the most challenging barriers to breastfeeding success faced by U. S. mothers" (USBC, email communication, December 13, 2010).

One specific goal within newly released *HP2020* is to address worksite lactation support programs. This goal in particular has received attention of late due to the passage of the workplace breastfeeding support provision in the Patient Protection and Affordable Care Act. Two final objectives in *HP2020* address maternity care practices, including a target to reduce formula supplementation within the first two days of life. Currently, the CDC reports that over 25% of breastfed infants receive formula before two days of age, despite medical recommendations against routine supplementation with formula, glucose water, or water.

Another new goal in *HP2020* aims for 8.1% of live births to occur in facilities that provide recommended breastfeeding care. At this time, less than 4% of U.S. births occur in facilities that have earned the BF designation to provide an optimal level of breastfeeding care. Not surprisingly, the World Health Organization and United Nations Children's Fund (WHO and UNICEF) Global Strategy for Infant and Young Child Feeding and the APHA recommended action to improve breastfeeding rates (2010).

Since its inception and global debut in 2001, *The Ten Steps to Successful Breastfeeding* (Table 1), devised by the WHO and UNICEF Baby Friendly Hospital Initiative (BFHI), has been linked with increasing breastfeeding success (the term "Baby Friendly" is a trademark of the U.S. Fund for UNICEF) (Braun, 2003; Cattaneo, 2001; Kramer et al., 2001; Merewood, Phillip, Chawla, & Cimo, 2003; Merten, 2004; Phillipp et al., 2001, 2003; Saadeh, 1996; Radford, 2001; Wright, 1996). According to Merewood (2005), *The Ten Steps to Successful Breastfeeding* should operate as a model for breastfeeding promotion and support, creating breastfeeding-friendly hospital systems for all women and children.

Table 1

The Ten Steps to Successful Breastfeeding

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

* The hospital or birthing site must pay fair market price for all formula and infant feeding supplies that it uses and cannot accept free or heavily discounted formula and supplies. (Merewood, 2005, p. 630)

Although hospital maternity practices have been found to have an effect on breastfeeding initiation when implemented, research is limited when considering the long-term value of these practices on duration. For instance, the BFHI is effective at increasing breastfeeding initiation rates (Merewood et al., 2003; Phillipp et al., 2001, 2003); however, most studies have been limited to initiation rates alone, and the effect of Baby Friendly (BF) hospital designation on breastfeeding duration has typically been researched in European countries, where BF designation is more commonly sought and achieved (Cattaneo, Yngve, Koletzko, & Guzman, 2005).

Significance of the Problem

The evidence supporting the short- and long-term benefits of breastfeeding for the mother and child in predicting health outcomes is vast (AAP, 1997, 2005; Akobeng et al., 2006; Arenz et al., 2004; Blaymore et al., 2002; Caspi et al., 2007; Dewey et al., 1995; Glass et al., 1983; Horton et al., 1996; Ip et al., 2007; Kramer et al., 2007; USDHSS, 2000; WHO, 2002). Breastfeeding is a public health issue of global significance (U.S. Surgeon General, U.S. Public Health and Human Services Department, 2011; World Health Assembly, 2001). Increasing the duration of breastfeeding is recognized as a national priority (Pugh, Milligan, Frick, Spatz, & Bronner, 2002). Healthcare providers need to recognize lactation as a means of emergency preparedness in preventing unnecessary death from diarrheal disease, pneumonia, and under-nutrition during conflict and natural disaster (U.S. Breastfeeding Committee, 2009; WHO, 2009). In fact, up to 19% of all deaths of children less than 5 years of age could be prevented if infants were exclusively breastfed during the first 6 months of life, continuing with complementary feedings until 2 years of age (Jones, Steketee, Black, Bhutta, & Morris, 2003). Millions of dollars are spent annually on diseases and illnesses that could have been prevented with breastfeeding (Labbok, 1995).

Nutrition in the first weeks of life may deter infant illness and program a reduced disease risk into adulthood (Lucas, 1991), lessening the prevalence of obesity (von Kries, 1999), cardiovascular risk factors (Nommsen-Rivers, 2003; Owen, Whincup, Odoki, Gilg, & Cook, 2002; Ravelli, van der Meulen, Osmond, Barker, & Bleker, 2000; Singhal, Fewtrell, Cole, & Lucas, 2003), and type 2 diabetes (Fall et al., 1992; Pettitt, Forma, Hanson, Knowler, & Bennett, 1997; T. K. Young et al., 2002). Any infant or maternal health benefits, whether short- or long-term, should be considered of public health interest because early infant feeding patterns are potentially modifiable with increased education and support (Rudnicka, Owen, & Strachan, 2007).

Nurses play an important role in educating the public and other healthcare professionals about the significance of breastfeeding, and can empower mothers and their support systems in maintaining lactation according to the evidence-based recommendations of *HP*, the WHO, the Centers for Disease Control and Prevention (CDC), the Academy of Breastfeeding Medicine (ABM), and other leading experts in the field of lactation. To this end, research must be conducted on the factors that influence lactation termination among mothers and the effectiveness of the WHO and UNICEF BFHI in the U.S. to quantify the impact of hospital compliance with *The Ten Steps* on lactation duration.

Nurses are in a position to use research findings from robust investigations to influence and change practice, to be a voice for underrepresented populations, and to educate society about the role that breastfeeding has in sustaining health and preventing unnecessary morbidity and mortality. Assessing mothers' reasons for lactation termination will aid healthcare providers, educators, and other stakeholders in focusing attention and limited resources in determining if identified risk factors are modifiable in nature and, therefore, amenable to educational interventions that impact health.

Statement of the Problem

Breastfeeding aids infants' physiological, mental, and cognitive development (AAP, 1997, 2005; Jelliffe, 1978; USDHHS, 2000; WHO, 2001; World Health Assembly, 2001), but U.S. lactation duration rates fall short of reaching *HP* goals to (a) increase the proportion who continue to breastfeed until their babies are six months of age and to (b) increase the proportion of mothers who are breastfeeding at one year or beyond (USDHHS, 2000).

More than 19,000 international facilities have embraced the BFHI and become designated, but, as of December 3, 2010, only 102 facilities in the U. S. had achieved this status (BFUSA). Maternity centers in the U.S. commonly note difficulty with implementation of all 10 Steps (Karra, Auerbach, Olson, & Binghay, 1993; Vietas, 1995). Generally, U.S. hospitals adhere best to rooming-in (Step 7) and breastfeeding on demand (Step 8), and the least to getting newborns to the breast within 60 minutes of delivery (Step 4), offering only breastmilk and no substitutes during hospitalization (Step 6), and ensuring all staff members are aware of a written breastfeeding policy (Step 1) (Karra et al., 1993).

Schanler, O'Connor, and Lawrence (1999) and Freed (1995a) found that pediatric providers lack knowledge and training on breastfeeding topics with only 65%

recommending exclusive breastfeeding for the first month after birth; 37% recommending breastfeeding for one year; and 28% familiar with the BFHI. Lambert and Watters (1998) identified nurses and medical doctors as the primary resource of breastfeeding education, yet scored their assistance low (1.8-2.6) on a scale of 1 ("little help") to 5 ("much help"). Even when healthcare providers are educated about the benefits of lactation, they do not always indicate a strong preference for breastfeeding, nor do they inform mothers about the health advantages of maintaining lactation for 12 months' duration (DiGirolamo, Grummer-Strawn, & Fein, 2003).

The literature review demonstrates that many mothers are not made aware of the short- and long-term child and maternal health benefits and are not educated and encouraged to maintain breastfeeding according to *HP* goals. In like manner, many new mothers are not routinely referred to community resources for ongoing assistance with the potential problems of lactation, and are given free formula samples and promotional packs upon discharge from the hospital. For these reasons, and because many mothers return to employment and environments that fail to promote, sustain, and foster the breastfeeding relationship, lactation is compromised and often terminated.

Theoretical Framework for the Study

The Social-Ecological Systems Theory was selected as the primary framework for the Feeding Your Infant (FYI) study by Dr. Dozier and colleagues. The framework was modified and chosen for the dissertation because of its inclusion of the mother's perception of her immediate and remote environment and their reciprocal effect on her behavior and decision-making. Indeed, the Social-Ecological Systems Theory is a framework used to study the effects and interrelatedness of social elements in a setting

(Bronfenbrenner, 1979; McLeroy, 1988; Oetzel, Ting-Toomey, & Rinderle, 2006). The model is based on the premise that changes in individual behavior occur through a complex combination of societal, community, organizational, interpersonal, and individual efforts within a level of influence and across multiple and related levels of influence.

The most utilized version of this model is Uric Bronfenbrenner's Social-Ecological Systems Theory (1979) that divides environments into four levels, including the: (a) Microsystem, (b) Mesosystem, (c) Exosystem, and (d) Macrosystem. Bronfenbrenner's (1979) theory was founded on the person, the environment, and the ongoing, accommodating interaction of the two. Bronfenbrenner (1979) stated, "[In this theory], environments are not distinguished by reference to linear variables but are analyzed in systems terms" (p. 5) and "what matters for behavior and development is the environment as it is perceived rather than as it may exist in 'objective' reality" (p. 4).

For this work, the Bronfenbrenner's Social-Ecological Systems Theory was adapted for breastfeeding mothers. Additions and omissions were made in order to more fully represent a holistic perspective of health and development from a new mother's point of view. This newly-adapted model was named "The Bailey DeJong Adaption of Bronfenbrenner's Social Ecological Systems Framework for Breastfeeding Mothers."

Purpose of the Study

The overall purpose of this study was to examine the impact of BFH designation, employment, parity and other social-ecological factors on lactation status at three months postpartum in upstate New York. Eighteen research questions were composed to analyze selected variables of the original FYI dataset.

Research Questions

The broad research question for this analysis was as follows: What are the social-ecological factors that impact lactation status at three months postpartum in upstate New York? Eighteen research questions were written to answer the overarching research question based on factors identified in the FYI dataset. Each question was placed into its corresponding sphere of influence based on Bronfenbrenner's work (Table 2). They were:

1. Does a breastfeeding mother's race impact lactation status at three months postpartum? (Microsystem)
2. Does a breastfeeding mother's age impact lactation status at three months postpartum? (Microsystem)
3. Does a breastfeeding mother's educational level impact lactation status at three months postpartum? (Microsystem)
4. Does a breastfeeding mother's marital status impact lactation status at three months postpartum? (Microsystem and Mesosystem)
5. Does a breastfeeding mother's expected length of maternity leave at baseline impact lactation status at three months postpartum? (Exosystem)
6. Does a breastfeeding mother's expected amount of paid maternity leave at baseline impact lactation status at three months postpartum? (Exosystem)
7. Does a breastfeeding mother's employment and/or school status impact lactation status at three months postpartum? (Exosystem)
8. Does a breastfeeding mother's parity status impact lactation status at three months postpartum? (Microsystem and Mesosystem)

9. Does a breastfeeding mother's current experience with "not enough milk" impact lactation status at three months postpartum? (Microsystem)
10. Does a mother's current experience with a "fussy baby" impact lactation status at three months postpartum? (Microsystem and Mesosystem)
11. Does a mother's current experience with a "sleepy baby" impact lactation status at three months postpartum? (Microsystem and Mesosystem)
12. Does a mother's current experience with breastfeeding taking "too much time" impact lactation status at three months postpartum? (Microsystem and Mesosystem)
13. Does a mother's current experience with breastfeeding being "inconvenient" impact lactation status at three months postpartum? (Microsystem and Mesosystem)
14. Does a mother's current experience with sore and/or bleeding nipples impact lactation status at three months postpartum? (Microsystem)
15. Does a mother's current experience with engorgement impact lactation status at three months postpartum? (Microsystem)
16. Does a mother's current experience with mastitis and/or breast infection impact lactation status at three months postpartum? (Microsystem)
17. Does a mother's parity status, while controlling for the problems of breastfeeding, impact lactation status at three months postpartum? (Microsystem and Mesosystem)
18. Does a mother's delivery site (whether BF designated, or not), impact lactation status at three months postpartum? (Exosystem and Macrosystem)

Table 2 provides a reference of the research variables utilized in the analysis of the FYI dataset. It distinguishes which sphere of influence each variable is associated with in the study. Some variables are noted to be within more than one sphere because of the interaction between the breastfeeding mother and her environment. For example, for "Marital Status," the individual (Microsystem) and her partner/spouse (Mesosystem) are part of the equation; therefore, Microsystem and Mesosystem are both highlighted. This is also true wherever the "Baby" is concerned (Mother = microsystem, Baby = mesosystem).

Table 2

Research Variables and Their Respective Social-Ecological Sphere of Influence

Research Question #	Research Variable	Microsystem: The Individual	Mesosystem: The People	Exosystem: The Places	Macrosystem: The Society
1	Race	X			
2	Age	X			
3	Educational Level	X			
4	Marital Status		X		
5	Length of Maternity Leave			X	
6	Paid Maternity Leave			X	
7	Employment Status			X	
8	Parity Status		X		
9	"Not enough milk"	X			
10	"Fussy baby"	X	X		
11	"Sleepy baby"	X	X		
12	"Too much time"	X	X		
13	"Inconvenient"	X	X		
14	Sore Nipples	X			
15	Engorgement	X			
16	Mastitis	X			
17	Parity Problems	X	X		
18	Delivery Site			X	

Definitions

Recently, 11 federally funded datasets were reviewed to evaluate breastfeeding behaviors in the U.S.: the National Health and Nutrition Examination Survey, Early Childhood Longitudinal Survey, National Immunization Survey (NIS), Infant Feeding Practices Survey II, National Survey of Children's Health, National Survey of Early Childhood Health, National Survey of Family Growth, Pediatric Nutrition Surveillance System, Pregnancy Nutrition Surveillance System, Pregnancy Risk Assessment Monitoring Survey (PRAMS), and the WIC Participant and Program Characteristics survey (Chapman & Pérez-Escamilla, 2009). Inconsistent breastfeeding definitions, lack of uniformity, and limited ethnic descriptors were found in these multiple datasets.

As a result of these concerns, Chapman and Pérez-Escamilla (2009) suggested limiting the multitude of organizations obtaining datasets, expanding racial and ethnic descriptors, collecting additional relevant variables, reducing approved maternal recall timeframes, and standardizing breastfeeding definitions. For this study, the following definitions for "exclusive breastfeeding," "partial breastfeeding or mixed feeding," "bottle feeding," and "artificial feeding" will mirror those recommended by the WHO (2002) in an attempt to standardize communication among all healthcare and allied health professionals working with breastfeeding women. The terms are defined and described here to clarify their intended meanings for this study.

Artificial Feeding: Artificial feeding is defined as when "the infant is given breastmilk substitutes and is not breastfeeding at all" (Chapman, 2009, p. 139).

Baby Friendly Hospital: The BFHI is a global health program of the WHO and UNICEF, launched in 1991 following the Innocenti Declaration of 1993. The initiative is a worldwide effort for improving breastfeeding rates, removing barriers, and improving services to mothers and infants to protect, promote, and support breastfeeding, in accordance with The International Code of Marketing of Breastmilk Substitutes (WHO, 1981, 1989). Criteria for BFH designation includes having a written policy, educating all staff who come into contact with the mother and baby, informing all mothers of the benefits of breastfeeding, practicing rooming-in, banning pacifiers, and disallowing diaper bags that include free formula at discharge. The program also restricts hospitals from receiving free formula provided by formula companies (WHO, 1998).

Bonding: Bonding is defined as "development of a strong emotional tie of a parent to a newborn" (McKinney, James, Murray, & Ashwill, 2009, p. 455).

Bottle Feeding: Bottle feeding is defined as when "the infant is feeding from a bottle, regardless of its contents, including expressed breastmilk" (Chapman, 2009, p. 139).

Codex Alimentarius (The Code): The Codex Alimentarius (Table 6) is a collection of internationally recognized standards, codes for practices, guidelines and other recommendations relating to foods, food production and food safety (WHO, Codex Alimentarius, Food and Agriculture Organization of the United Nations, 2005). It is recognized by the World Trade Organization as an international reference point for the resolution of disputes concerning food safety and consumer protection (WHO, Codex Alimentarius, 2005).

Ecology/Ecological: Ecology is defined as the "science of the relationship of organisms to their environment, including the interactions among organisms" (Tabers, 2009, p. 720).

Engorgement: Engorgement is defined as "swelling of the breasts resulting from increased blood flow, edema, and the presence of milk" (McKinney, James, Smith Murray, & Weiler Ashwill, 2009, p. 455).

Exclusive Breastfeeding Exclusive breastfeeding is defined as when "the infant takes only breast milk and no additional food, water, or other fluids with the exception of medicines and vitamin or mineral drops" (Chapman, 2009, p. 139).

Exosystem: According to Bronfenbrenner (1979), "an exosystem refers to one or more settings that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by, what happens in the setting containing the developing person" (p. 25). In this study, using The Bailey DeJong Social-Ecological Systems Framework for Breastfeeding Mothers, the Exosystem contains the following components: neighborhoods, mall/businesses, hospitals/birthing centers/clinics, web-based social communities, work places/schools, transportation, restaurants, childcare settings, and parish/faith communities.

Healthy People: Healthy People is defined as: "a set of goals and objectives with 10-year targets designed to guide national health promotion and disease prevention efforts to improve the health of all people in the United States" (USDHHS, 2010).

Hospital: Within this document, the term "hospital" will include hospitals, birthing centers, and freestanding birth centers in accordance with Shealy's (2005) recommendations.

Infant Formula: Formula is a food manufactured to support adequate growth of infants under six months of age (Infant Formula Act, 1980). Nutrient content is regulated by the American Food and Drug Administration (FDA) based on recommendations by the AAP Committee on Nutrition. The WHO considers infant formula to be safe for use if it is prepared according to package instructions and formulated in accordance with the Codex Alimentarius (WHO, 2001).

International Board Certified Lactation Consultant (IBCLC): IBCLCs are health professionals who specialize in the management of breastfeeding. Consultants are certified by the International Board of Lactation Consultant Examiners, which operates under the direction of the U.S. National Commission for Certifying Agencies (Shealy, 2005).

Lactation: Lactation is the secretion of milk from the mammary glands secondary to hormonal influence by the pituitary gland as it stimulates the breast. The main function of lactation is to provide nutrition and immune protection to infants. Lactation occurs in all mammals. In humans, it is commonly referred to as "breastfeeding" (Littleton & Engebretson, 2005). Within this dissertation, the terms "lactation" and "breastfeeding" will be used interchangeably.

Lactogenesis: Lactogenesis is defined as "the process of milk production 2 to 5 days postpartum" (Littleton & Engebretson, 2005, p. 925).

Macrosystem: According to Bronfenbrenner (1979), the macrosystem refers to "consistencies, in the form and content of lower-order systems (micro-, meso-, and exo-) that exist, or could exist, at the level of the subculture or the culture as a whole, along with any belief systems or ideology underlying such consistencies" (p. 26). In this study, using The Bailey DeJong Adaptation of Bronfenbrenner's Social-Ecological Systems Framework for Breastfeeding Mothers, the macrosystem contains the following components: role models, media, free formula, public policy, advertising, culture, and social norms.

Mastitis: Mastitis is defined as an "infection of the breast, usually confined to a milk duct, characterized by influenza-like symptoms and redness and tenderness in the infected breast" (Littleton & Engebretson, 2005, p. 926) In the FYI study, "mastitis" and "breast infection" were used interchangeably.

Mesosystem: According to Bronfenbrenner (1979), a mesosystem "comprises the interrelations among two or more settings in which the developing person actively participates (such as, for a child, the relations among home, school, and neighborhood peer group; for an adult, among family, work, and social life)" (p. 25). In this study, using The Bailey DeJong Adaptation of Bronfenbrenner's Social-Ecological Systems Framework for Breastfeeding Mothers, the mesosystem contains the following components: peers and colleagues, friends and web-based social network friends, family including the current baby and other children, healthcare providers and educators, and social service providers.

Microsystem: "A microsystem is a pattern of activities, roles, and interpersonal relations experienced by the developing person in a given setting with particular physical and material characteristics" (Bronfenbrenner, 1979, p. 22). In this study, using The Bailey DeJong Adaptation of Bronfenbrenner's Social-Ecological Systems Framework for Breastfeeding Mothers, the microsystem contains the following components: psychosocial, spiritual, lifestyle, and biological.

Multipara/Multiparous: Multipara is a term for "a woman who has given birth following two or more pregnancies of at least 20 weeks' gestation each (Littleton & Engebretson, 2005, p. 927).

Newborn: Newborn is a term applied to a "human infant less than 28 days old" (Tabers, 2009, p. 1583).

Pacifier: A pacifier is defined as "an artificial nipple, usually made of plastic, provided for infants to satisfy their need to suck" (Tabers, 2009, p. 1678). In the research literature, pacifiers are occasionally referred to as "dummies" or "soothers" depending on the authors' preference and geographic locale.

Parity: Although definitions vary and some textbooks document parity as "the number of past pregnancies that have reached a gestation of viability regardless of whether the infant or infants were alive or stillborn" (Littleton & Engebretson, 2005, p. 929), the principal investigators in the FYI study defined parity as "the number of live births the mother has had" as their working definition. Parity is included because it may correspond to previous breastfeeding experience.

Partial Breastfeeding or Mixed Feeding: Partial breastfeeding or mixed feeding is defined as when "the infant is given some breast feeds and some artificial feeds, either milk or cereal, or other food or water" (Chapman, 2009, p. 139).

Postpartum: Postpartum is defined as "occurring after childbirth" (Tabers, 2009, p. 1858).

Primipara/Primiparous: Primipara is a term for "a woman who has given birth from her first pregnancy of at least 20 weeks' gestation" (Littleton & Engebretson, 2005, p. 931).

Psychosocial: Psychosocial is defined as "related to both psychological and social factors" (Tabers, 2009, p. 1933).

Rooming-In: Taber's (2009) defines rooming-in as "the practice of placing an infant in the same hospital room as the mother, beginning immediately after birth" (p. 2050).

Social Network: A social network is defined as "a group of individuals who are linked by behaviors, diseases, hobbies or lifestyles, family ties, or professions" (Tabers, 2009, p. 2149).

Spheres of Influence: For this work, when the phrase "sphere of influence" or "spheres of influence" is documented, it refers to one or more of Bronfenbrenner's Social-Ecological theoretical systems (1977, 1979). Microsystem, is the lactating mother; mesosystem, encompasses those persons in her environment; the exosystem is the environment itself, and the macrosystem, reflects components of the lactating mother's society at large (Figure 1).

Weaning: Weaning is the process of introducing an infant to foods or fluids other than breastmilk. A child is fully weaned when they no longer receive any breast milk. Although most mammals cease lactase production at the end of weaning, most humans have a mutation for lactase that allows the continuation of the production of the enzyme throughout life, making them able to drink cow or goat's milk beyond infancy (Huggins, 1999).

Assumptions

The following assumptions were presumed for this investigation of the FYI dataset.

1. Direct breastfeeding or providing human milk is the optimal choice for infant nutrition.
2. Almost all mothers have the physiologic capability to successfully breastfeed.
3. Breast milk is the best feeding option for most infants, with few exceptions (WHO/UNICEF, 2009).
4. Artificial formulas should only be used in circumstances where human milk is not available or when medically advised.
5. Lactation offers short- and long-term benefits to the mother and child that synthetic formula and cow's milk cannot.
6. The aim of nurses and other health professionals is to support individuals, families, and communities in attaining and sustaining holistic health and wellness.
7. Patients trust nurses to inform them of research findings that impact their choices.
8. Nurses, educators, and other stakeholders can influence the health of society through instruction, support, and the development of policies and procedures that change practice.

9. Patients and other consumers expect to receive care and instruction that is consistent with best practice recommendations based on sound science and not anecdotal reports.
10. Nurses must stay abreast of current recommendations in order to maintain competency in their professional role as provider, educator, and client advocate.
11. Nurses have an ethical responsibility to the individual, family, and group as "client" to discuss health promotion, risk reduction, illness management, and disease prevention based on research.

Delimitations

One delimitation of this doctoral research was working with a dataset that was six years old at the time of analysis. Other delimitations included the non-modifiable demographic characteristics of the surveyed population, such as participants' indicated race, religion, age, income, education, marital status, and parity, as well as the research setting itself in upstate New York.

Presumably, prior to taking part in the study, subjects would have autonomously chosen the hospital where they preferred to deliver their children. Whether participants deliberately choose their maternity centers based upon BF Hospital designation may have affected their likelihood to initiate and maintain the breastfeeding experience regardless of other factors. For example, mothers who inherently valued lactation prior to any hospital-based intervention may have sought out the BF Hospital more than mothers who preferred bottle or formula feeding, or vice versa.

Similarly, mothers who intended to provide formula over breast milk may have decisively chosen the hospital that they perceived to be more open and less judgmental of their decision. As a result, lactation duration may be longer for mothers who intentionally choose to deliver at a BF Hospital over one that had not met this designation based upon pre-set population characteristics that could not be altered, but may have influenced the outcome of the study. These considerations may be challenging if each population self-selected a study setting based solely upon BF or non-BF Hospital status prior to the survey assessment. Furthermore, mothers who had prior experience with breastfeeding another child, or who had partaken in a prenatal breastfeeding class offered by the facility, may have been more likely to breastfeed for longer durations than mothers who had not.

Another delimitation of the study encompassed the attitudes of the healthcare professionals who provided maternity care services to the participants at the two sites. Nurses, physicians, and lactation consultants who assessed worth to the breastfeeding experience and promoted lactation duration that reflected evidence-based recommendations, may have favored employment at either the BF designated hospital or the community hospital with the mature breastfeeding program. Therefore, knowledge of how to treat lactation problems, skills of assessment, familiarity with community resources, and support for the continuation of lactation may have existed among the professionals where practices and/or policies existed and breastfeeding was encouraged based upon *The Ten Steps to Successful Breastfeeding*.

Hypothetically, healthcare professionals who did not prefer breastmilk feedings over formula feeds; who did not endorse lactation duration to at least 12 months; and who believed their skills were insufficient to assess, diagnose, and manage lactation problems may not have been as attracted to working in a facility that had successfully achieved BF designated status, and as a result, lactation duration may be shorter for women who delivered in these maternity centers versus one that had acquired BF designation. However, the opposite may also be true. Nurses who promote breastfeeding may be more or less attracted to working in a setting that practices evidence-based breastfeeding recommendations without the checks and balances of designation, site visits, and intermittent peer review.

Finally, researcher bias may have occurred in both the FYI study and in the current study, secondary to educational, personal, and employment experiences. These factors may have influenced the researcher's perception of the strength of the rationale for significant research findings.

Organization of Chapters

Chapter 1 consisted of the Background and Nature of the Problem, the Significance of the Problem, the Purpose of the Study, the Research Questions, the Definitions, and the Delimitations for this analysis. Chapter 2 will provide the Literature Review, with a focus on the social-ecological variables throughout the microsystem, mesosystem, exosystem, and macrosystem. Chapter 2 will review the benefits of lactation for the child, mother, and community, and reflect upon the history of breastfeeding from a global and national perspective. A discussion of the social ecological factors associated with breastfeeding and common reasons for termination will follow. Chapter 3 will provide the foundation for the research itself, describing the Research Questions and Null Hypotheses; the Survey Instrument; the Population and

Sampling Procedures; Data Management, and Data Analysis Procedures. Finally, Chapter 4 will discuss the study's Findings and Results through tables and explanations, and Chapter 5 will consist of the Summary of Important Findings; Conclusions and Recommendations for Further Research; and Limitations.

CHAPTER 2. LITERATURE REVIEW

Purpose

Examining the current literature leads to an understanding of the topics under discussion and the methodologies employed to arrive at conclusions. The literature review also reveals areas that need further scrutiny and provides clarity and direction to the field (Enger, 2008). For this work, the literature review encompasses five main sections: (a) an explanation of the theoretical framework for this study, and a synopsis of other predominant theories in the breastfeeding literature; (b) a examination of the physical, psychological, economic, and environmental benefits of breastfeeding for the mother, infant, and community; (c) an appraisal of the physical, emotional, political, cultural, and societal factors that influence a mother's decision to maintain or terminate lactation based on Bronfenbrenner's (1979) Social-Ecological Systems Framework; (d) an assessment of the historical account of breastfeeding from an international and national perspective; and, finally, (e) an inspection of the history of the BFHI and impact of *The Ten Steps to Successful Breastfeeding* (Merewood, 2005). The review will also examine mothers' employment or school status; their access to healthcare and other professional services; their physical, prenatal, intranatal, and postpartum condition, as well as that of their infant's; and, finally, their personal perception of the potential problems of lactation, including pain and mastitis, engorgement, inconvenience, and insufficient milk supply.

PubMed, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Cochrane Library, and Dissertation Abstracts International (DAI) were searched to identify existing research using the term "breastfeed*" with the following search terms: lactation, Baby Friendly, duration, self-efficacy, social-ecological factors, employment, problems, barriers, policy, rates, cessation, termination, legislation, procedures, risks and benefits, as well as inclusion of a search for specific ailments (e.g., diarrhea, upper respiratory tract infection, otitis media, asthma, diabetes, necrotizing enterocolitis, cancer, and SIDS) as they related to lactation. Only English-language articles published between 1975 to January 2011 were reviewed for inclusion.

Theoretical Framework for this Study: The Social-Ecological Model

The Social-Ecological Systems Theory is a framework used to study the effects and interrelatedness of social elements in a setting (Bronfenbrenner, 1979; McLeroy, 1988; Oetzel, Ting-Toomey, & Rinderle, 2006). The model is based on the premise that changes in individual behavior occur through a complex combination of societal, community, organizational, interpersonal, and individual efforts within a level of influence and across multiple and related levels of influence.

Bronfenbrenner's Social-Ecological Systems Theory (1979) divides environments into four levels, including the: (a) Microsystem, (b) Mesosystem, (c) Exosystem, and (d) Macrosystem. Bronfenbrenner's (1979) theory was founded on the person, the environment, and the ongoing, accommodating interaction of the two. Figure 1 exemplifies the Social-Ecological Model from a lactating mother's perspective (Ann Dozier, personal communication, October 14, 2009). Some modifications to the original document from Dr. Dozier have been made by this doctoral student to further enhance its use and broaden its scope, resulting in The Bailey DeJong Adaptation of Bronfenbrenner's Social-Ecological Systems Framework for Breastfeeding Mothers.

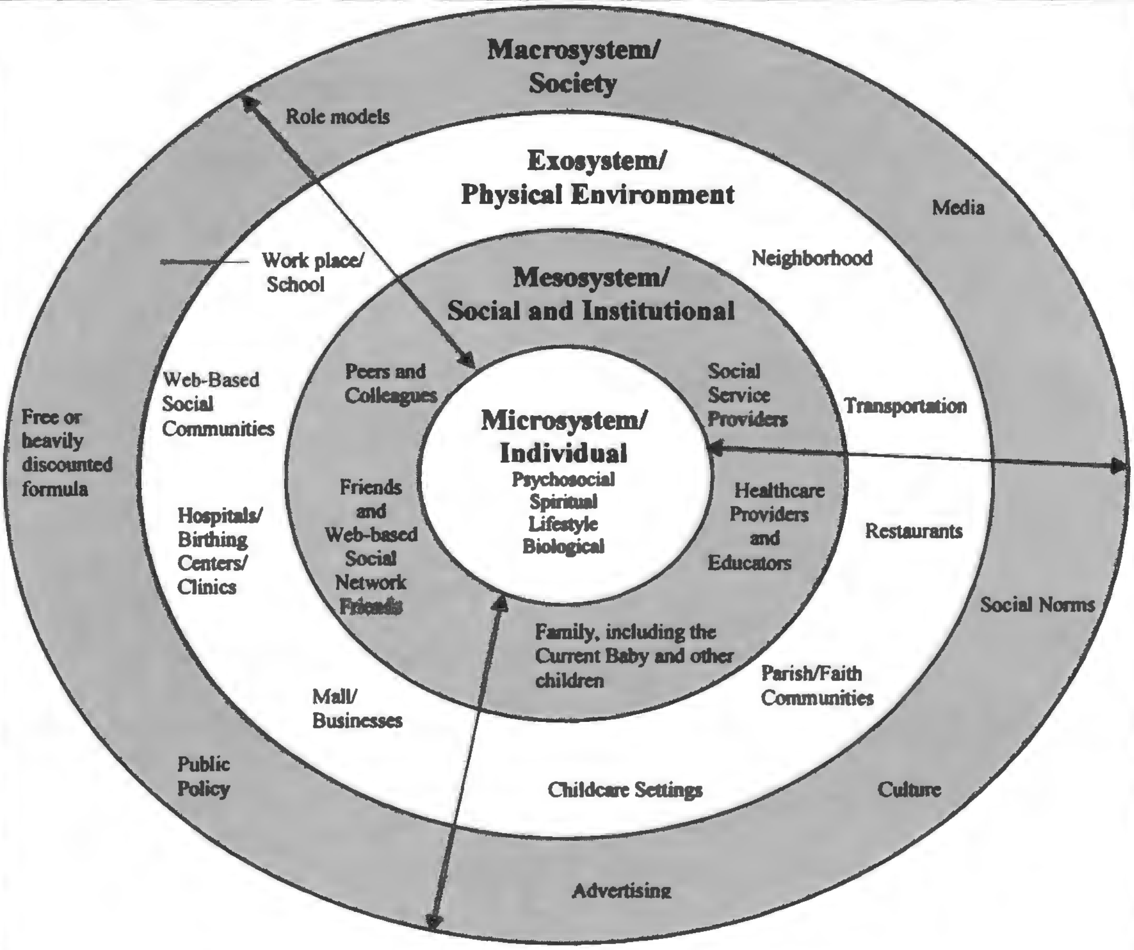

Figure 1. The Bailey DeJong Adaptation of Bronfenbrenner's (1979) Social-Ecological Systems Framework for Breastfeeding Mothers.

For this dissertation, the inclusion of the "Spiritual" self within the inner-most circle was added as a component of the microsystem to encompass a more holistic approach and reflect current nursing practice. Within the mesosystem, Healthcare Providers "and Educators" was included, and "Social Services" was altered to "Social Service Providers" to incorporate educators and service providers other than those specific to healthcare. Also within the mesosystem, "Family" was expanded to include the "Current Baby and other Children" to take into account the impact of the present child on the mother's environment as well as that of other children. Indeed, the baby who is an equal part of the mother-child dyad shall be recognized as a factor that may influence breastfeeding practices. To be inclusionary of all faith practices, "Parish/Faith Community" was inserted where "Church" was found in the original document; and, "Birthing Centers/Clinics" was included under "Hospital" within the exosystem. Finally, within the lactating mother's mesosystem, "Web-based Social Network Friends" was included under "Friends" and "Web-Based Social Communities" was added within the exosystem because of the influence technology and web-based communication have shown to impart on today's young adults.

The revised model, identified as The Bailey DeJong Adaptation of Bronfenbrenner's (1979) Social-Ecological Systems Framework for Breastfeeding Mothers, is illustrated in Figure 1. In the model, the individual is the core of the microsystem, which includes one's biological, spiritual, psychosocial, and lifestyle factors. The mesosystem, which includes social networks and institutional factors, such as peers, friends, family, healthcare providers, and social services, surrounds the microsystem. Encapsulating the mesosystem is the exosystem--the mother's physical environment--which includes child care settings, hospitals/birthing centers/clinics, and, the mother's employment or school. The final sphere--the macrosystem--is society at large and, within it, public policy, culture, and social norms. This society, especially the perception of this society, may vary from one person to the next regardless of living in the same geographical region.

In his text, Bronfenbrenner (1979) contrasts his theory with former behavioral theories, saying:

a theoretical conception of the environment extending beyond the behavior of individuals to encompass functional systems, both within and between settings, systems that can also be modified and expanded, contrasts sharply with prevailing research models. These established models typically employ a scientific lens that restricts, darkens, and even blinds the researcher's vision of environmental obstacles and opportunities and of the remarkable potential of human beings to respond constructively to an ecologically compatible milieu once it is made available. As a result, human capacities and strengths tend to be underestimated. (p. 7)

Bronfenbrenner (1979) wrote, "In short, as far as the external world is concerned, what is presented here is a theory of environmental interconnections and their impact on the forces directly affecting psychological growth" (p. 8). Each system that interconnects within the framework is defined by Bronfenbrenner as follows, according to hypotheses recorded in his text:

Microsystem

"A microsystem is a pattern of activities, roles, and interpersonal relations experienced by the developing person in a given setting with particular physical and material characteristics" (Bronfenbrenner, p. 22). Bronfenbrenner identified the term "experienced" within the definition as crucial, writing:

The term is used to indicate that the scientifically relevant features of any environment include not only its objective properties but also the way in which these properties are perceived by the persons in that environment [...] Very few of the external influences significantly affecting human behavior and development can be described solely in terms of objective physical conditions and events; the aspects of the environment that are most powerful in shaping the course of psychological growth are overwhelmingly those that have meaning to the person in a given situation. (p. 22)

According to Gregson (2001), the microsystem also consists of "individual or interpersonal features and those aspects of groups that comprise the social identity" (p. 6). This system includes the various roles a person plays, including mother, sister, and child; and consists of components such as ethnicity, gender, personality, knowledge, and beliefs. Bronfenbrenner (1979) proposed:

> An analysis of the microsystem must take into account the full interpersonal system operating in a given setting. This system will typically include all the participants present (not excluding the investigator) and involve reciprocal relations between them. (p. 66)

Mesosystem

The third definition in Bronfenbrenner's text (1979) claimed, "a mesosystem comprises the interrelations among two or more settings in which the developing person actively participates (such as, for a child, the relations among home, school, and neighborhood peer group; for an adult, among family, work, and social life)" (p. 25). Mesosystems are a system of microsystems, comprised of institutional or organizational factors within the environment where individual or interpersonal relationships exist (Gregson, 2001). Examples include companies, schools, and faith communities, and within them, the accompanying policies, expectations, rules, policies, and expected etiquette.

According to Bronfenbrenner's text (1979), this social and work-related interaction between the developing person and others within the mesosystem is vital to human development and intrapersonal growth. He discussed the psychological consequences of social and interpersonal deprivation to society, stating:

> In the United States, it is now possible for a person eighteen years of age, female as well as male, to graduate from high school, college, or any university without ever having cared for, or even held, a baby; without ever having looked after someone who was old, ill, or lonely; or without ever having comforted or assisted another human being who really needed help. The psychological consequences of such a deprivation of human experience are as yet unknown. But the possible social implications are obvious, for—sooner or later, and usually sooner—all of us suffer illness, loneliness, and the need for help, comfort, or companionship. No society can long sustain itself unless its members have learned the sensitivities, motivations, and skills involved in assisting and caring for other human beings. (p. 53)

Exosystem

According to Bronfenbrenner (1979), "an exosystem refers to one or more settings that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by, what happens in the setting containing the developing person" (p. 25). Within the exosystem exists the community sphere, containing one's established social networks, interest groups, and political affiliations (Gregson, 2001). The exosystem need not need be associated with geographic region, yet, the physical setting is frequently used within this system to illustrate a mother's exosystem. For example, a mother might refer to herself as a "Happy Cobber" (at Concordia College, Moorhead, MN), or as "Minnesota nice" in the Midwest. Within the macrosystem, this same mother may respond that she is "All American."

Macrosystem

Within the macrosystem are various cultural contexts. According to Bronfenbrenner (1979), these contexts are interculturally, emotionally, philosophically and ideologically centered while also being geographically and physically based. It is defined as such:

> The macrosystem refers to consistencies, in the form and content of lower-order systems (micro-, meso-, and exo-) that exist, or could exist, at the level of the subculture or the culture as a whole, along with any belief systems or ideology underlying such consistencies. (Bronfenbrenner, p. 26)

Within the discussion of the macrosystem, Bronfenbrenner commented on the ecological transitions that occur whenever a person's position is altered as a result of a change in role, setting, or both, saying:

> Instances of ecological transition as defined here occur throughout the life span. To name but a few: a mother is presented with her newborn infant for the first time; mother and baby return home from the hospital; [...]; changing careers, emigrating; or, to turn to even more universal themes: becoming sick, going to the hospital, getting well again; returning to work, retiring; and the final transition to which there are no exceptions – dying. (p. 26-27)

Application to Health

The Social-Ecological Framework can be readily applied within the context of health to explain the levels of bidirectional influence that affect or could potentially impact personal behavior. Numerous variables, besides microsystem-related influences, exist that may improve or impair the physical, emotional, or spiritual well-being of a patient (McLeroy, Bibeau, Steckler, & Glanz, 1988). Cultural and social norms, and one's employment or school environment may affect the degree of one's actual or perceived health status (McLeroy, et al., 1988). For example, Johnston and Esposito (2007) utilized this model in their research of working women in the U.S. to understand the central components of breastfeeding success during maternal employment. They noted the various key elements of the microsystem, the individual; the mesosystem, one's social support and relationships; and the exosystem, one's work environment as well as local, community, and healthcare support and resources in the macrosystem.

According to Johnston and Esposito's (2007) study, central components to breastfeeding success during maternal employment consisted of the individual characteristics of a mother's personal beliefs, way of being, and perception of herself in the world. Within the microsystem, mothers' behaviors were important components. Women who developed a strategic plan on how to balance breastfeeding and work reported fewer problems than those who had not. Within the mesosystem, social support was key to breastfeeding success, especially in relation to one's partner, family members, and friends, through encouragement, recommendations, and role-modeling.

McLeroy's (1988) work evaluated the ecological perspective on health promotion programs in the U.S. His article proposed an ecological model for health promotion which focused less on individuals and their innate characteristics and more so on individuals *within* social environments. McLeroy (1988) addressed the significance of health interventions aimed at changing interpersonal, organizational, community, and public policy, and encouraged the use of the social-ecological framework: a model with the assumption that changes made within an individual's environment will in turn generate alterations within individuals. McLeroy (1988) proposed an environmental model versus an individual victim-blaming ideology, stating:

> Proponents of individually-oriented behavior change strategies have been accused of supporting a victim-blaming ideology which serves as a legitimization for the retrenchment from rights and entitlements; in relation to the social causation of disease it functions as a colossal masquerade. The complexities of social causation are only beginning to be explored. The ideology of individual responsibility, however, inhibits that understanding and substitutes instead an unrealistic behavioral model. It both ignores what is known about human behavior and minimizes the importance of evidence about the environmental assault on health. (p. 352).

Theoretical Application to this Work

The effect the environment has on a nursing mother's behavior as it pertains to lactation duration was used in the design of the survey by the researchers in New York using the Social-Ecological Systems Framework (Figure 1) minus the modifications by Bailey DeJong. This approach recognizes that breastfeeding patterns are influenced by the complex interaction of individual, social/institutional, environmental, and societal factors. In this study, women were asked a variety of comprehensive questions that related not only to biological and psychosocial factors that have the potential to impact lactation duration within the microsystem, but questions that also related to lactating mothers' perception of the social-ecological factors within their mesosystem, exosystem, and macrosystem.

Bronfenbrenner (1979) commented on the appropriateness of hospital-based evaluation when he wrote "maternity ward practices affecting the relation between mother and newborn can produce effects still detectable five years later" (p. 8). In addition, Bronfenbrenner responded positively about the review of public policy, when he said, "Furthermore, an ecological approach to the study of human development requires a reorientation of the conventional view of the proper relation between science and public policy" (p. 8) concluding, "basic science needs public policy even more than public policy needs basic science" (p. 8).

Researchers who study lactation have discussed the use of an ecological approach to examining breastfeeding predictors. Tiedje, Schiffman, Omar, Wright, Buzzitta, McCann, and Metzger (2002) conducted telephone surveys with primiparous, postpartum women (n = 95) using closed and open-ended questions to assess goodness-of-fit with the ecological model. They examined factors traditionally assessed in breastfeeding, as well as mesosystem and exosystem sources of influence on families, such as the impact of healthcare delivery systems, the mother's community, and other societal and cultural variables. They found that comments from postpartum women provided a great deal of qualitative information about the factors that impact lactation. Tiedje et al. (2002) concluded that clinical implications to improve rates of breastfeeding in this country must consider the multitude of contextual factors that influence infant feeding. They wrote, "Interventions to promote breastfeeding should exceed the individual level, and occur at many layers simultaneously. The ecological model provides direction for the multiple interventions needed to increase the rates and duration of breastfeeding" (p. 154).

This comprehensive literature review will highlight the primary assertions documented throughout the breastfeeding research. The order of the review is vital to logically illustrate the pattern of evidence that has been established and to demonstrate how medical and nursing research has transformed practice and informed decision-making. The review has been organized according to Bronfenbrenner's assertions, hypotheses, and propositions from his 1979 text. Sections have been separated into spheres of influence, beginning with the Microsystem which has been divided into two main subsections – child health benefits and maternal health benefits. When appropriate, wide-ranging community and societal benefits have been included as suitable to each discussion within their respective ecological sphere. Of course, spheres intertwine frequently and dimensions overlap as humans and their environment accommodate one another. This is common and to be anticipated, as Bronfenbrenner (1979) explained:

> Finally, lying at the very core of the ecological orientation and distinguishing it most sharply from prevailing approaches to the study of human development is the concern with the progressive accommodation between a growing human organism and its immediate environment, and the way in which this relation is mediated by forces emanating from more remote regions in the larger physical and social milieu. The ecology of human development lies at a point of

> convergence among the disciplines of the biological, psychological, and social sciences as they bear on the evolution of the individual in society. (p. 13)

Additional Theories of Lactation

The primary theories utilized by lactation researchers, educators, and healthcare providers to better understand the complexities of maintaining lactation, include not only Bronfenbrenner's Social-Ecological Systems Theory (1979), but also: The Theory of Planned Behavior, Roger's Framework (1997), Bandura's Theory of Self-Efficacy (1997), and, Knowles Adult Learning Principles (Knowles, Holton, & Swanson, 2005). In their work, authors describe how these theories are pertinent to the exploration of lactation termination. A brief discussion of each theory follows.

The Theory of Planned Behavior

The Theory of Planned Behavior (TPB) examines contributing factors that might explain the intentions and behavior of lactating women. This theory suggests that breastfeeding behavior can be predicted primarily by breastfeeding intentions and that breastfeeding intentions are a function of three main factors: (a) mothers' attitude toward breastfeeding; (b) subjective norm, or the degree to which mothers believe that significant others approve or disapprove of their breastfeeding; and (c) perceived behavioral control (PBC), or the degree to which mothers feel they have control over continuing to breastfeed. The TPB also suggests that PBC may modify the effect of interventions on breastfeeding behavior. The TPB, and variants of it (i.e., The Theory of Reasoned Action [TRA]), have proven useful in breastfeeding research to explain breastfeeding initiation and duration (Avery, Duckett, Dodgson, Savik, & Henly, 1998; Dick et al., 2002; Dodgson, Henly, Duckett, & Tarrant, 2003; Duckett et al., 1998;

Janke, 1992, 1994; Manstead, Plevin, & Smart, 1984; Manstead, Proffitt, & Smart, 1983; O'Campo, Faden, Gielen, & Wang et al., 1992).

Avery et al. (1998) used the TPB to identify predictor variables of breastfeeding termination. Predictors were demographic variables, TPB variables, breastfeeding knowledge, and problems experienced during the first month after delivery. Avery et al. (1998) aimed to differentiate breastfeeding women who had weaned (a) during the first 4 weeks, (b) between 5 and 26 weeks, and (c) after 26 weeks. She concluded that women at risk for early cessation of lactation could be identified by using the TPB-based conceptual framework. Recommendations included screening methods, close postpartum follow-up, and intervention with educated professionals, to avoid unintended early weaning.

Because the TPB is less often cited in Asian lactation research, Dodgson et al. (2003) set out to evaluate cross-cultural application of the TPB among new mothers in Hong Kong to explain breastfeeding behaviors. First-time breastfeeding mothers (n = 209) provided self-reports about predictor variables at 1, 3, 6, 9, and 12 months until they weaned. Dodgson et al. (2003) concluded that the TPB in perceived control and duration was high in all models; yet, reported cross-cultural measurement issues and the need for further designs in breastfeeding research.

Roger's Framework

According to Roger's (1997) framework, individual resources and environmental supports influence a person's defenses and vulnerability to outside forces. For instance, a lactating woman's personal resources may include variables such as mood (her absence of anxiety and depression), age, and self-efficacy or confidence with her ability to breastfeed. Her environmental supports include factors such as access to healthcare services and education, degree of social and emotional support, and WHO/UNICEF BFHI feeding practices. Roger's model implies that mothers with few or very few personal resources and environmental support are exposed and vulnerable to the likelihood of premature weaning.

Roger's (1997) framework indicates that the threshold and degree of individual vulnerability will vary from mother to mother. If the mother's vulnerability threshold is not violated, she will cope, and termination will not occur. In contrast, if the mother is vulnerable, with few supports or defenses in place, she will not cope, and lactation termination will prematurely transpire. Using Roger's (1990) framework, Mersmann's (1993) doctoral research studied 18 Caucasian, Hispanic, and Black mothers (M age = 31 years) expressing breastmilk for their preterm infants (M = 3.7 pounds) using a crossover design. In supplementary analyses, researchers found that mothers who received therapeutic touch immediately prior to expressing breastmilk expressed more milk than those who received no treatment ($p < .05$).

Bandura's Social Cognitive Theory of Self-Efficacy

Self-efficacy has been described as the belief that one is capable of performing in a certain manner to attain specific goals. In general, people avoid undertakings where their self-efficacy is nominal and gravitate to ones where their self-efficacy is high. Psychologist Albert Bandura's Theory of Self-Efficacy (1997) shows that people of differing self-efficacy perceive the world in different manners. People with a high self-efficacy believe they are in control of their own lives, and believe their personal choices shape their lives. People with low self-efficacy believe their lives are designed by destiny or fate.

Self-efficacy is different than self-esteem and self-concept, in that self-efficacy relates to one's perception or judgment of his or her own ability to perform to a set standard, taking into account previously mastered content. Self-esteem relates to a person's overall sense of self-worth, whereas self-concept relates to a general evaluation of competence associated with a particular behavior. Bandura (1997) made the distinction between self-efficacy and self-confidence, stating:

> Confidence is a nonspecific term that refers to strength of a belief but does not necessarily specify what the certainty is about. I can be supremely confident that I will fail at an endeavor. Perceived self-efficacy refers to belief in one's agentive capabilities that one can produce given levels of attainment. A self-efficacy belief, therefore, includes both an affirmation of a capability level and the strength of that belief. Confidence is a catchword rather than a construct embedded in a theoretical system. (Bandura, 1997, p. 4)

Bandura (1997) proposed four factors that influence self-efficacy: (a) mastery experience or performance accomplishment, (b) modeling or vicarious learning, (c) social/verbal persuasion or encouragement/discouragement from others, and (d) emotional/physiological arousal. In their randomized controlled research, Noel-Weiss et al. (2006) used Bandura's Theory of Self-Efficacy to understand self-efficacy in order to predict lactation outcomes of primiparous women who were planning to breastfeed. Results indicated that participants who utilized videos, simulation, and discussion had increased breastfeeding self-efficacy scores. In addition, women with the intervention (n = 41) who attended a 2.5 hour prenatal breastfeeding workshop based on adult learning principles and self-efficacy theory had higher self-efficacy scores and were more likely to breastfeed exclusively than mothers who did not attend the workshop (n = 51).

In short, social-cognitive models of health in lactation research include the construct of perceived self-efficacy as a predictor or mediator of breastfeeding behavior. Breastfeeding self-efficacy determines whether lactation will be initiated, how much effort will be expended, and how long lactation will be sustained despite obstacles and difficulties. Lactation self-efficacy influences the degree of persistence and the effort a mother will apply.

In the literature, breastfeeding self-efficacy or maternal confidence with breastfeeding has been shown to predict breastfeeding duration and patterns in Canadian women (Dennis & Faux, 1999), Australian women (Blyth et al., 2002), Puerto Rican women (Torres et al., 2003), Chinese women (Dai & Dennis, 2003), Polish women (Wutke & Dennis, 2007), and American women (Blyth, Creedy, Dennis, Moyle, Pratt, et al., 2002, 2004; Dennis, 1999; Ertem, Votto, & Leventhal, 2001; O'Brien, Buikstra, & Hegney, 2008; Pollard & Guill, 2009; Semenic, Loiselle, & Gottlieg, 2008; Taveras, Capra, Braveman, Jensvold, Escobar, et al., 2003; Wilhelm, Rodehorst, Stepans, Hertzog, & Berens, 2008). These studies suggested that breastfeeding self-efficacy is likely to be predictive of breastfeeding outcomes.

Knowles Adult Learning Principles

Adult learning principles assume that adults are self-directed, self-motivated, and come to learning with past experiences that impact their acquisition of knowledge

(Brookfield, 1991; Knowles, 2005; Noel-Weiss et al., 2006). Knowles asserted that andragogy should be distinguished from pedagogy, and that teaching methodologies should be different for adult learners. Historically, the word "pedagogy" is Greek for "child-led" and focuses on developing learning strategies for children; and "andragogy" is Greek for "man led" and centers on engaging and stimulating the adult learner who has different learning needs (Knowles, Holton, & Swanson, 2005).

The principles of andragogy were originally used by Alexander Kapp, a German educator, in 1833. Eventually, however, they were developed into a theory of adult education by the American educator Malcolm Knowles. Knowles asserted that six assumptions were necessary and related to the motivation of adult learners. In accordance with this theory, these assumptions implied that:

- Adults need to know the reason for learning something (Need to Know);
- Experiences (including error) provide the basis for learning activities (Foundation);
- Adults need to be responsible for their decisions on education and need to be involved in the planning and evaluation of their instruction (Self-concept);
- Adults are most interested in learning subjects having immediate relevance to their work and/or personal lives (Readiness);
- Adult learning is problem-centered rather than content-oriented (Orientation); and
- Adults respond better to internal versus external motivators (Motivation). (Knowles, et al., 2005)

The next section of the Literature Review will examine the physical, psychological, economic, and environmental benefits of breastfeeding for the mother, infant, and community according to the four spheres of influence within the Bronfenbrenner's Social-Ecological Systems Framework. The review will begin with the inner core of the framework – the Microsystem.

Microsystem Analysis: Individual Benefits of Breastfeeding

Breastfeeding and lactation management have been studied for decades, both nationally and internationally, with considerable recent clinical advances being made in the scientific knowledge of the short- and long-term benefits of breastfeeding. As documented in the 1997 AAP Policy Statement on Breastfeeding, "Extensive research using improved epidemiologic methods and modern laboratory techniques, documents diverse and compelling advantages for infants, mothers, families, and society from breastfeeding and the use of human milk for infant feeding" (p. 496).

It is noteworthy that the AAP breastfeeding recommendations in the 2005 Policy Statement are consistent with the goals and objectives of *HP2010*, the USDHHS' (2000) *Blueprint for Action on Breastfeeding*, and the USBC's *Breastfeeding in the United States: A National Agenda*. In addition, the AAPs' (1997) statement provides the foundation for issues related to breastfeeding and lactation management for other publications, including *The New Mother's Guide to Breastfeeding* and chapters dealing with breastfeeding in the AAP/ACOG *Guidelines for Perinatal Care*, the *Red Book*, the *Pediatric Nutrition Handbook*, and *The Handbook of Pediatric Environmental Health*. All of these sources concur that breast milk, being species-specific, is the optimal feeding choice when that choice can be made.

Microsystem Analysis: Biological and Psychosocial Child Health Benefits

Although controversy exists surrounding some of the assertions made by lactation researchers (Labbok, 2001), the importance of breastfeeding in the prevention of disease is well known. The benefits of direct lactation or receiving human milk within an individual's microsystem include a decreased incidence of morbidity and mortality related to diarrhea (Beaudry et al., 1995; Bhandari et al., 2003; Dewey et al., 1995; Howie et al., 1990; Kramer et al., 2003; Popkin et al., 1990); bacteremia, sepsis, and bacterial meningitis (Cochi et al., 1986; Heinig, 2001; Hylander et al., 1998; Istre et al., 1985; Schanler et al., 1999); upper and lower respiratory tract infections (Bachrach et al., 2003; Lopez-Alarcon et al., 1997; Oddy et al., 2003b); necrotizing enterocolitis; otitis media (Dewey, 1995; Duncan et al., 1993; Owen et al., 1993; Saarinen, 1982); urinary tract infections (Barone et al., 2006); diabetes mellitus (Mayer-Davis et al., 2008; Owen, 2006); cancer (Bener, 2001; Davis, 1998; Smulevick, 1999); overweight and obesity (Arenz, 2004; Armstrong & Reilly, 2002; Dewey, 1993; Grummer-Strawn, 2004; Singhal et al., 2003; Stettler, 2002); high cholesterol (Harit et al., 2008; Owen et al., 2002; Reiser & Seilman, 1972); cardiovascular risk (Law, Wald, & Thompson, 1994; Owen et al., 2002; Ravelli et al., 2000; Singhal et al., 2003); asthma; and SIDS (Chen, 2004; Ford et al., 1993; Horne et al., 2004; Mitchell et al., 1992; Scragg et al., 1993). Cognitive benefits, commonly measured by a child's intellectual quotient (IQ) (Anderson, Johnstone, & Remley, 1999; Caspi et al. 2007; Drane, 2000; Horwood, Darlow, & Mogridge, 2001; Jain, Concat, & Leventhral, 2002; M. M. Smith, Durkin, Hinton, Bellinger, & Kuhn, 2003), and an enhanced analgesic effect for infants experiencing painful medical procedures have also been reported (Carbajal, 2003; Gray, 2002; Shah, Aliwalias, & Shah, 2006). The health benefits are dose-dependent with infants who breastfeed for longer durations demonstrating a greater reduction in disease states (AAP, 2005; Lawrence, 1997; WHO, 2002). Table 3 serves to highlight some of these benefits. Although some researchers discuss the potential risks of not breastfeeding to the mother-infant dyad, this paper will highlight benefits of lactation rather than discuss the possible harms in the literature related to formula supplementation.

Table 3

Literature Review: A Summary of the Microsystem Benefits

Microsystem Benefits for Breastfed Babies	Microsystem Benefits for Mothers who Breastfeed
Reduced diarrhea	Enhanced infant bonding
Reduced bacterial infections	Enhanced child spacing and lactational amenorrhea
Reduced otitis media	Reduction of postpartum weight retention
Reduced asthma	Reduced cancer
Reduced nocturnal enuresis	
Reduced diabetes	
Reduced overweight and obesity	
Reduced hypercholesteremia	
Reduced ischemic heart disease	
Reduced sudden infant death syndrome	
Reduced cancer	
Enhanced cognitive development	
Enhanced analgesia	

Diarrhea (Microsystem: Biological). A predominant health benefit within the child's microsystem is a risk reduction for death secondary to diarrhea. Research in both developed and developing countries provides strong evidence that diarrhea and deaths secondary to diarrhea (e.g., dehydration) are significantly reduced secondary to lactation (Beaudry et al, 1995; Bhandari et al, 2003; Dewey et al., 1995; Howie et al., 1990; Kramer et al., 2003; Popkin et al., 1990). Using a quasi-experimental opportunistic design, Horton et al. (1996) found that breastfed infants' death rates in Brazil, Honduras, and Mexico were lower secondary to diarrhea, irrespective of the infants' environment or the countries development, when compared to their formula-fed counterparts. They concluded, "The results show that breastfeeding promotion can be one of the most cost-effective health interventions for preventing cases of diarrhea, preventing deaths from diarrhea, and gaining disability-adjusted life years" (p. 156).

The importance of exclusive breastfeeding in the prevention of infectious diseases during infancy is well known, yet rates of exclusive breastfeeding remain low in many countries where these threats pose imminent danger (Mihrshahi, Oddy, Peat, & Kabir, 2008). For example, following the earthquake in Haiti in 2010, those mothers who continued to exclusively breastfeed their children, regardless of the amount of stress they reported, reduced their children's risk of developing waterborne illness. In October 2010, cholera – a diarrheal disease from contaminated water sources – began to threaten Haiti's people, and of those mothers who were exclusively breastfeeding, the risk of death secondary to dehydration were less than if they were supplementing (UNICEF, 2011).

Another issue in developing countries, in particular, are the serious concerns of diarrheal disease that cause mortality in HIV-exposed, impoverished infants who are fed with formula prepared by mixing formula or milk powder with contaminated local water sources (Shearer, 2008). Recent clinical trials of 4 to 6 months duration of breastfeeding followed by formula-feeding have produced mixed results, with just as many infants dying from HIV infection as from dehydration secondary to diarrheal illness (Coovadia & Coutsoudis, 2007; Doherty et al., 2007; Holmes & Savage, 2007; Iliff et al., 2005; John-Stewart, 2007; Leroy et al., 2005; Shapiro et al., 2007; Taha et al., 2007; Thior et al., 2006).

Onyango-Makumbi et al. (2009) found an association between early weaning of HIV-exposed, uninfected infants and the risk of serious gastroenteritis in Uganda, revealing higher rates of serious gastroenteritis among the HIV hyperimmune globulin/nevirapine (HIVGLOB/NVP) group in which breastfeeding cessation occurred almost five months earlier (breastfed for four months), compared with infants enrolled in the HIV Network for Prevention Trials (HIVNET 012) where breastfeeding continued to a median duration of just over nine months. Onyango-Makumbi et al. (2009) documented an urgent need for clinical practice guidelines in caring for HIV-positive, lactating women and their children.

Slater, Stringer, and Stringer (2010), at the Centre for Infectious Disease Research in Zambia, released recommendations for breastfeeding in HIV-positive women. They evaluated and compared the latest clinical research trials that encouraged exclusive breastfeeding to trials of antiretroviral therapy (ART) for either the mother or infant in an attempt to decipher evidence-based recommendations in preventing the transmission of HIV through breastmilk. Exclusive breastfeeding was found to be much safer than mixed feeding even in settings where ART for either the mother or infant is not readily available. As indicated by Slater et al. (2010), the hope is that perinatal HIV transmission may be greatly reduced in high-risk populations through a combination of lifestyle and behavioral interventions that encourage exclusive breastfeeding and pharmacologic interventions with anti-retrovirals for mothers and/or their infants.

Bacterial infections (Microsystem: Biological). In developing countries, infectious diseases resulting in diarrhea and acute respiratory infections were the main cause of morbidity and mortality in infants less than one year of age (Mihrshahi et al., 2008). Lopez-Alarcon et al. (1997), Bachrach et al. (2003), and Oddy et al. (2003) examined rates of both upper and lower respiratory tract infections, and found infections such as bronchitis and pneumonia to be less in the breastfed child. Specifically, Oddy et al. (2003), in a prospective birth cohort study of 2602 Australian children, found that medical visits for four or more respiratory tract infections, including tonsillitis, otitis media, bronchiolitis, asthma, croup, and pneumonia, were significantly greater if predominant breastfeeding was discontinued before two months or if partial breastfeeding was terminated before six months. Using logistic regression for analysis, they concluded that predominant breastfeeding for at least six months and partial breastfeeding for up to one year may reduce the prevalence and subsequent morbidity of respiratory illness and infection in infancy.

For the premature infant born before 38 weeks gestation, Blaymore et al. (2002) found that breastfeeding reduced the severity of symptoms of upper respiratory tract infections (URI) for up to seven months following hospital discharge. Among very low birth weight (VLBW) infants, Hylander et al. (1998) noted decreased rates of infection among infants receiving human milk. Schanler et al. (1999) found similar findings, reporting the beneficial outcomes of feeding fortified human milk versus preterm formula to premature infants.

Mihrshahi et al. (2008) assessed Bangladesh women, where breastfeeding is culturally endorsed and almost universal, and found infants ($n = 272$) who were exclusively breastfed for six months had a significantly lower prevalence of acute respiratory infection and diarrhea than infants not exclusively breastfed. However, between exclusively breastfed children and predominantly breastfed children, there was no statistical difference in diarrheal rates. These findings suggested that exclusive and predominant breastfeeding patterns can reduce the morbidity rates in rural Bangladesh over partial or no breastfeeding.

The benefits of lessened bacterial infections are even more significant for premature or ill newborns than term infants (Uraizee & Gross, 1989). Meier, Brown, Hurst, Spatz, Engstrom, et al., (2000) showed that preterm infants receive "highly specific health benefits" when they are fed their own mothers' milk as compared to commercial formula (p. 351). According to Barness (1981), the variability of human milk often improves the composition of breastmilk as part of a "complex adaptation to the infant's specific needs" (p. 435).

Microsystem benefits for the preterm infant include greater enteral feed tolerance (Armand et al, 1996; Gross, 1983; Simmer, Metcalf, & Daniels, 1997; Uraizee & Gross, 1989); reduced risk and/or severity of infection (El-Mohandes et al., 1993, 1997; Narayanan, Prakash, & Gujral, 1981; Narayanan et al., 1982, 1984; Peterson et al., 1998; Uraizee & Gross, 1989); and atopic disease (Chandra, 1997; Lucas et al., 1990), enhanced retinal maturation (Carlson, Rhodes, & Ferguson, 1986; deAndraca & Uauy, 1995; Faldella et al, 1996), neurocognitive outcome (Carlson & Rhodes, 1986; deAndraca & Uauy, 1995; Lucas et al., 1990, 1994, 1996, 1998; Morley, 1988, 1996;

Pierrat et al., 1996), and a greater physiologic stability during breastfeeding than during bottle feeding (Affonso & Wahlberg, 1995; Blaymore-Bier et al., 1997; Meier, 1988, 1996; Meier & Anderson, 1987). Finally, for premature infants at risk for necrotizing enterocolitis, which leads to bowel hypoxia and death, the consumption of breast milk offered protective measures to the neonate (Albanese & Rose, 1995; Buescher, 1994, DeCurtis et al., 1987; Gross, 1983; Hamosh, 1998; Kleigman, Pittard, & Fanaroff, 1979; Lucas & Cole, 1990, 2000; Neu, 1996; Schanler et al., 1999, 2000).

In spite of the added benefits of breastfeeding, however, premature infants with poor health are breastfed less than healthy, term infants over 38 weeks gestation (Barbas & Kelleher, 2004). The health of an infant immediately following delivery influences a mother's preferred feeding method, with many infants, particularly high-risk infants, receiving formula feeds over breast milk if they are born premature (Ryan, 1991; Starbird, 1991). Even in Sweden, where breastfeeding initiation rates are 98% and where 72% of women are still nursing their babies at six months, mothers of premature infants breastfeed for shorter durations when compared to mothers of term infants, even after adjusting for socioeconomic status and other confounding variables (Flacking, Nyqvist, & Ewald, 2007).

Otitis media (Microsystem: Biological). Infections of the tympanic membrane are common in children under the age of one. Breastfeeding decreases a child's risk for ear infections in the first 12 months of life (Dewey, 1995). Prolonged breastfeeding acts as prophylaxis for recurrent or chronic otitis media (Saarinen, 1982). Duncan et al. (1993) found that exclusive breastfeeding for at least four months protected against otitis media, and Owen et al. (1993) documented reduced rates of otitis media with effusion in the first two years of life for children, regardless of secondhand smoke exposure and attendance in group childcare. Paradise (1994) concluded that breast milk protected infants with cleft palates against otitis media, and Aniannsson et al. (1994) observed similar findings in their study of otitis media among Swedish infants receiving breast milk.

Asthma (Microsystem: Biological, Psychological, and Lifestyle). Since the 1930s, many studies have examined the benefits of breastfeeding on the statistical prevalence of atopic disease. The pervasiveness of atopic diseases, such as atopic dermatitis, asthma, and food allergies, has increased over past decades (Greer, 2008). The incidence of asthma, in particular, in children up to age four has increased 160%, and atopic dermatitis has had an almost threefold increase (Eichenfiled, 2003). Moreover, peanut allergies have doubled over the last 10 years (Sicherer, 2003). Although atopic disease etiology includes a genetic component, environmental factors, including infants' nutritional intake, may have a significant influence on their development and pattern. Therefore, according to Greer (2008), lactation may offer a profound opportunity to prevent or postpone atopic disease.

The clinical report, cited by Greer (2008) and developed by the Committee on Nutrition and Section on Allergy and Immunology, reviewed the effect that pregnancy and lactation had on the development of atopic disease in early life, including atopic dermatitis, asthma, and food allergies. Recommendations were to serve as a replacement of an earlier policy statement from the AAP that addressed the use of hypoallergenic infant formulas for the prevention of atopic disease.

In its final report, the committee cited evidence that breastfeeding for at least four months, compared with providing formula made from cow's milk-protein, prevented or delayed the occurrence of wheezing, atopic dermatitis, and cow's milk allergy in early childhood (Greer, 2008). For infants who were not exclusively breastfed for 4 to 6 months, evidence existed that the onset of atopic disease for infants at high risk (i.e., infants with at least one first-degree relative [parent or sibling] with allergic disease) may be deferred or prevented by the utilization of hydrolyzed infant formulas compared to formulas created with cow milk protein.

Nocturnal enuresis (Microsystem: Biological). A lesser-known microsystem-based benefit of lactation is the reduction of the occurrence and frequency of childhood nocturnal enuresis. According to Byrd (1996), bedwetting occurs in 15% of 5-year-olds, 5% of 10-year-olds, and 1% of 13-year-olds. Several causes have been proposed for bed-wetting, including immature bladder function, developmental delay, insufficient nocturnal anti-diuretic hormone, and immature sleep pattern (DiMichele et al., 1996; Goin, 1998; Mammen & Ferrer, 2004; Von Gontard, Schmelzer, Seifen, & Pukrop, 2001).

Barone et al. (2006) tested the hypothesis that children who exhibited bed-wetting during childhood were less likely to have been breastfed during infancy. A case-control study was conducted on 117 subjects. Participants were children 5 to 13 years of age who experienced lifetime unintentional voiding of urine during nighttime rest at least two times a week in the absence of physiological deficiencies of the central nervous system or urinary tract. After adjusting for family size, income, and race, it was shown that breastfeeding longer than three months may protect against childhood enuresis. Of interest, breastmilk supplemented with formula did not make a difference in the rate of bedwetting.

Barone et al. (2006) hypothesized that breastfeeding during infancy could defend against bed-wetting during childhood by providing neurodevelopmental benefits to the child, but cautioned that causality should not be inferred from this type of study, writing:

> There is biological plausibility in inferring that breastfeeding protects against bed-wetting, and our results show a strong statistical association between the two variables. Despite this, causation cannot be directly inferred. We can state that our case-control study supports the hypothesis that breastfeeding during infancy protects against the development of nocturnal enuresis in childhood. If a prospective cohort study further supports this hypothesis, breastfeeding could be viewed as the first true preventative approach toward bed-wetting. (Barone et al., 2006, p. 259)

Diabetes (Microsystem: Biological, Psychological, and/or Lifestyle). Evidence suggests a reduction in the incidence of insulin-dependent (type 1) and non-insulin dependent (type 2) diabetes mellitus among children who were breastfed as infants. According to Perez-Bravo et al. (1996) in their assessment of Chilean children (n = 165; 85 diabetic and 80 non-diabetic children), exclusively breastfed infants possessed a smaller risk of developing diabetes mellitus type 1 than those who were breastfed for a shorter duration, or who were given cow's milk or solid foods earlier in life. In addition, due, in part, to breastfeeding's effect on obesity, breastfeeding also appeared to protect against diabetes mellitus type 2 (Owen, 2006; Mayer-Davis et al., 2008).

Overweight and obesity (Microsystem: Biological, Psychosocial, and Lifestyle). A link exists between overweight and obesity among children who were not breastfed as infants (Dewey, 1993; Grummer-Strawn, 2004; Singhal, 2002; Stettler, 2002). Armstrong and Reilly (2002) researched a sample of 32,200 Scottish children and found that a history of breastfeeding reduced the overall risk of extreme obesity in children aged 39 to 42 months. According to Arenz (2004), the protective effect against obesity increased with not only the initiation of breastfeeding, but also the overall duration of receiving human milk.

However, studies of breastfeeding and childhood obesity have the potential to be laden with confounding variables, including analyses at different timeframes, maternal recall bias, and the prevalence of mixed feeding methods, and may not give clear associations between breastfeeding and normal childhood weight (Jevitt, 2007). For instance, Owen et al. (2005), in a systematic review of 70 eligible published studies, found mean BMIs to be smaller among infants who were breastfed, however reported the difference to be small and "likely to be strongly influenced by publication bias and confounding factors" (p. 1298). He concluded, "Promotion of breastfeeding, although important for other reasons, is not likely to reduce mean BMI" (p. 1298). For some, however, including the USBC, this evidence suffices to support breastfeeding's risk reduction for future obesity (Jevitt, 2007).

Nutrition in the first weeks of life may program disease risk into adulthood (Rudnicka et al., 2007). Rudnicka et al. (2007) examined a total of 9,377 persons born during one week in 1958 in England, Scotland, and Wales to assess the influence of initial infant feeding on cardiorespiratory risk factors in adulthood and found that breastfeeding for more than one month was associated with reduced waist circumference, waist/hip ratio, as well as lower odds of obesity compared with formula feeding after adjustment for birth weight, pre-pregnancy maternal weight, maternal smoking during pregnancy, socioeconomic position in childhood and adulthood, region of birth, gender, and current smoking status. With this said, the authors did not make claims to a substantial long-term protective effect of breastfeeding for more than one month on other cardiorespiratory risk factors in adult life, writing, "The association between breastfeeding and waist circumference, waist/hip ratio, and obesity is of interest and needs to be replicated by other studies that have information on exclusive breastfeeding for longer durations (> one month)" (p. 1113).

Hypercholesteremia (Microsystem: Biological). In 1991, Lucas coined the term "nutritional programming" for describing how chronic diseases progress into adulthood. He wrote how early nutrition influences health outcomes into adulthood by either (a) "induction, deletion or impaired development of a somatic structure resulting from a stimulus or insult during a critical period" or by (b) "physiological setting by an early stimulus or insult at a critical period, with long-term consequences for function" (p. 38).

Differences in the nutritional intake of breast- and formula-fed infants have led researchers to question the degree to which early feeding choices influence adult programming. The effect of infant feeding on total cholesterol (TC) varied with the age of the participant in a systematic review of 52 studies of cholesterol status during infancy, childhood, adolescence, and adulthood. When each participant was analyzed by age, the results indicated that cholesterol level depended on life phase. Among infants less than one year of age, the serum TC was higher among breastfed infants than those receiving formula; among children and adolescents (between 1 and 16 years), there was no statistical difference; and among adults (between 17 and 64 years), TC was lower for those who were breastfed as infants. Researchers speculated that the higher cholesterol levels in the infant group are directly related to the higher levels of cholesterol found in breast milk itself and that low serum levels of total cholesterol in the adult group are directly related to the programming effect of which Lucas (1991) hypothesized.

Reiser and Seilman (1972) proposed an interesting hypothesis based on studies of rats, suggesting that newborn infants exposed to high levels of dietary cholesterol would be better able to manage dietary cholesterol in later years. To test this hypothesis, Harit et al. (2008) conducted a study of 400 healthy, term infants. Results showed that breastfed babies had significantly higher TC and LDL-C levels when compared to mixed-fed babies in the first six months of life, with improving high density lipoprotein-cholesterol (HDL-C)/low density lipoprotein-cholesterol (LDL-C) ratio at six months. Harit et al. (2008) suggested this shift in the cholesterol ratio of breastfed infants demonstrated an early, yet significant, inclination toward establishing a healthy lipid profile in adulthood.

Ischemic heart disease (Microsystem: Biological). When compared to formula feeding, breastfeeding has been associated with an improved cardiovascular risk profile and fewer negative cardiovascular outcomes later in life (Law et al., 1994; Owen et al., 2002; Ravelli et al., 2000; Singhal et al., 2003), including ischemic heart disease and type 2 diabetes (Fall, 1992; Pettitt et al., 1997; T. K. Young et al., 2002). Since cardiorespiratory disorders are a major cause of death in both developed and developing countries (WHO, 2002), it has been suggested that nutrition in the first weeks of life may minimize disease risk into adulthood (Lucas, 1991).

Using a randomized prospective experimental design to study infant nutrition, Singhal, Cole, Fewtrell, and Lucas (2004) researched the long-term effects of breastmilk on cholesterol concentrations of adolescents (n = 216) who had received either donated breastmilk or preterm formula as infants. They compared breastfed children (ages 13 to 16) to those who had received formula and found that breastfed children had lower ratios of HDL compared to LDL, apoA-1, apoB, and C-reactive protein (CRP), all of which are markers for atherosclerosis risk. Researchers concluded that infant nutrition affects the lipoprotein profile in later life. With a diminished inflammatory response, atherosclerosis and coronary vascular disease may be altered by breastfeeding.

Sudden Infant Death Syndrome (Microsystem: Biological). Although rates have decreased worldwide, SIDS remains the leading cause of infant death from 1 to 6 months in the developed world (Heinig & Banuelos, 2006). Hypotheses proposed to explain SIDS include deficiencies or problems related to a defect in the infant's sleep or breathing control, infections, reactions to immunizations, severe botulism, hypersensitivity to cow's milk, infant thiamine deficiency, maternal health, lower socioeconomic status, and maternal smoking status.

Because the syndrome occurs less frequently in breastfed infants, it is speculated that breastfeeding protects against infant death (Bernshaw, 1991). McVea, Turner and Peppler (2000) reviewed the literature regarding the risk of SIDS in bottle-fed infants compared to those who were breastfed, conducting a meta-analysis and metasynthesis of 23 studies, and found that bottle-fed infants were twice as likely to die from SIDS than their breastfed counterparts. Horne et al. (2004) observed improved arousability from sleep among breastfed babies and decreased rates of SIDS in the first year of life among breastfed infants. Chen (2004) and Ford et al. (1993) reported a decreased risk of post-neonatal death in the U.S. among breastfed babies. Internationally, Mitchell et al. (1992) and Scragg et al. (1993) researched major risk factors for SIDS and also found a decreased risk for infant death of babies who were breastfed.

Cancer (Microsystem: Biological). Lymphoma, leukemia, and Hodgin's Disease show decreased rates of occurrence in infants who had been breastfed (Bener, 2001; Davis, 1998; Smulevick, 1999). Kwan, Buffler, Abrams, and Kiley (2004) used a fixed effects model and meta-analytic technique to quantify the evidence of an association between duration of breastfeeding and risk of childhood acute lymphoblastic leukemia (ALL) and acute myeloblastic leukemia (AML). Results of 14 case-control studies indicated a significant negative association between long-term breastfeeding, defined as greater than six months' duration, and both ALL and AML risk. In addition, short-term breastfeeding, defined as less than or equal to six months' duration, was similarly protective for both ALL and AML.

Bener, Hoffman, Afify, Rasul, and Twefik (2008) through the Department of Medical Statistics and Epidemiology, studied patients with ALL, Hodgkin's lymphoma, and non-Hodgkin's lymphoma who were equal to or less than 15 years of age. Of the healthy control population, the mean number of months male patients were breastfed was 9.1 months; in female patients, and controls – 8.4 months. As in Kwan et al.'s (2004) study, results indicated that a shorter period of breastfeeding (0 to 6 month duration) was associated with an increased odds ratio for cancer development for both male and female patients, as compared to breastfeeding longer than six months. Additional factors associated with an elevated risk of malignancy were low age and low education of the mother.

Using a case-control study design, Altinkaynak, Selimoglu, Turgut, Kilicaslan, and Ertekin (2006) studied a population of Turkish children (n = 137) aged 1 to 16 years to investigate cancer rates in relation to breastfeeding. They found the median duration of breastfeeding among patients with ALL and AML to be shorter (10 versus 12 months; p = .001) when compared with healthy children. The shortest duration of breastfeeding was noted in children with AML. Breastfeeding for a duration longer than six months, was, again as in Bener et al.'s (2008) study, associated with increased odds ratios for ALL, AML, Hodgkin's lymphoma, non-Hodgkin's lymphoma, and overall cancer occurrence.

Cognitive development (Microsystem: Biological and Psychosocial). Within the child's microsystem, improved individual cognitive ability, academic performance, and mental differences of breastfed children are reported in the literature (Anderson et al., 1999; Drane, 2000; Jain et al., 2002; M. M. Smith et al., 2003). According to Caspi et al. (2007), who examined gene-environment interactions in two birth cohorts (n = 1037 first cohort; n = 2232 second cohort), breastfed babies who had a specific variant of the FADS2 gene, which comprises approximately 90% of all infants worldwide, demonstrated an IQ, on average, of seven points higher than their formula-fed counterparts. Researchers concluded that breastfed babies have higher IQs because of the fatty acids uniquely available in breastmilk.

Horwood, Darlow, and Mogridge (2001) examined the correlations between breast milk feeding and verbal and performance IQ of 280 subjects. They found that children seven and eight years of age who were breastfed for more than eight months after being diagnosed as low-birthweight upon delivery demonstrated significantly higher IQ scores than comparable children breastfed for lesser durations, suggesting that breastfeeding may grant long-term intellectual benefits in some populations. Likewise, M. M. Smith et al. (2003) found a difference of 3.6 IQ points between breastfed children and those who did not receive any breast milk feedings for overall intellectual functioning and a difference of 2.3 IQ points for verbal ability, after adjusting for the mother's verbal ability, home environment, length of hospitalization, and a composite measure of parental education and occupation.

In a prospective study of 83 infants, Innis (2001) discovered that, in infants exclusively breastfed for more than three months, red blood cell levels of long-chain fatty acids were related to improved visual acuity and cognitive development. Barone et al. (2006) concurred, stating that breastfeeding enhances the role that long-chain fatty acids have in brain development. Similarly, in a study of 439 school-age children weighing <1500 g when born in the U.S., Smith (2002) noted that breast milk feedings were associated with higher unadjusted test scores for each domain of cognitive function except memory, with the greatest advantages in cognitive performance for those who received direct breastfeedings compared to those children who did not receive any breast milk feedings. In addition, children who were directly breastfed demonstrated a 10.7-point advantage in overall intellectual function and scored 10 to 14 points higher on measures of verbal ability compared with children who never received breast milk

(Smith, 2002). Finally, breastfeeding has also been reported to mitigate the impact of congenital hypothyroidism and its negative effects on infant cognitive and mental development (Bode, 1978; Montalvo, 1974; Sack, 1979).

Enhanced analgesia for infants (Microsystem: Biological). Lago et al. (2009) emphasized the need to reach a consensus on neonatal pain management, considering pharmacological, non-pharmacological, behavioral, and environmental measures to help improve health professionals' attentiveness to managing procedural pain in neonates. According to Lago et al. (2008), despite evidence that pain experienced by infants may have acute and possibly long-term neurological consequences; the topic of infant pain control remains a controversial issue.

Infants experiencing acute pain during medical procedures may benefit from suckling or breastfeeding during the event (Gray, Miller, Phillip, and Blass, 2002). Because physiological alterations caused by pain may contribute to the development of neonatal morbidity, clinical studies have investigated the role that breastfeeding has in minimizing its effects. Gray, Miller, Philipp, and Blass (2002) found that breastfeeding acts as an analgesic in healthy newborns. In a randomized, controlled trial, Carbajal (2003) concurred, noting a comparable analgesic effect of breastfeeding in term neonates experiencing acute pain. Similarily, in a systematic review of 11 randomized or quasi-randomized controlled studies, Shah, Aliwalas, and Shah (2006) reported the benefit of non-pharmacological measures, such as swaddling or breastfeeding (or the providing of supplemental breast milk), in reducing procedural pain in neonates, highlighting a significant reduction in crying time for the neonates in the breastfeeding group compared to the fasting (no intervention) group.

Breastfed neonates had a statistically significant smaller increase in heart rate and reduced proportion of crying duration while the procedure was taking place than either the swaddled or pacifier group (Shah et al., 2006). Moreover, neonates who received supplemental breast milk had a significantly smaller increase in heart rate compared to the placebo group. However, when glucose/sucrose was utilized, researchers found it had a similar effect as breastfeeding for reducing pain. Regardless, Shah et al. (2006) concluded that breastfeeding or breast milk should be used to lessen procedural pain in neonates experiencing a solitary painful procedure versus positioning or no intervention at all.

Microsystem Analysis: Biological and Psychosocial Maternal Health Benefits

Aside from the apparent health benefits of breastfeeding for infants and children, research supports maternal health benefits within the lactating mother's microsystem, as well. The individual health benefits for mothers include decreased postpartum bleeding (Chua, 1994), enhanced infant bonding (Dettwyler & Stuart-Macadam, 1995; Ekstrom & Nissen, 2006), effective child spacing through lactational amenorrhea (Rosner & Schmlman, 1990), earlier return to pre-pregnancy weight with a reduction in postpartum weight retention (Dewey, 1993), decreased risk of breast cancer (Byers, 1985; Chilvers, 1993; Katsouyanni et al., 1986, 1996; Layde et al., 1989; Lubin, 1982; McTiernan, 1986; Newcomb et al., 1994; Romieu, Hernandez-Avila, Lazcano, Lopez, & Romero-Jaime, 1996; Rosero-Bixby, 1987; Sisking, 1989; Tao, 1988; Yang, 1992; Yoo et al., 1992; Yuan, Yu, Ross, Gao, & Henderson, 1988), decreased risk of endometrial cancer (Newcomb & Trentham-Dietz, 2000; Rosenblatt, 1995), and decreased risk of ovarian cancer (Gartner et al., 2005).

Infant bonding (Microsystem and Mesosystem). During lactation and the act of breastfeeding, the hormones oxytocin and prolactin are released from the pituitary. This biological event enhances a mother's capacity to relax and feel nurturing toward her baby (Dettwyler & Stuart-Macadam, 1995). Researchers' interest in supporting and analyzing variables related to maternal-infant bonding is evident in the literature. In a study of Swedish mothers, Ekstrom and Nissen (2006) found that breastfeeding mothers who were cared for by midwives and nurses who had completed a lactation education program (n = 540) perceived stronger maternal feelings for their infants than mothers who had received standardized care. With support from professionals who participated in a breastfeeding counseling program, mothers' self-esteem and their ability to bond and care for their infants was strengthened.

Ekstrom and Nissen (2006) also showed that at three days postpartum, those mothers who had received the intervention thought their understanding of their infants was better; they perceived more strongly their infants as their own; and they enjoyed more breastfeeding and resting with their newborns. In addition, at nine months' observation, mothers in the intervention group perceived their newborns to be more attractive than other infants, conversed more with their infants, and perceived more strongly that their infants were their own than did the mothers in the control group. Finally, mothers in the intervention group felt significantly more confident with their infants. This finding led Ekstrom and Nissen (2006) to conclude that a breastfeeding training program for midwives and postpartum nurses improved the maternal-infant bond by increasing positive feelings toward the newborns.

Child spacing and lactational amenorrhea (Microsystem: Biological). Within the mother's microsystem, frequent breastfeeding can delay the return of fertility through lactational amenorrhea. The lactational amenorrhea method (LAM) for full breastfeeding women has received worldwide approval across various cultures and socioeconomic levels as a means of natural suppression of fertility (Hight-Laukaran et al., 1997; Labbok et al., 1997). However, many providers question its reliability (WHO, 1999). Sooi-Ken Too (2002, citing Labbok, 1990) writes, "The reluctance and skepticism may be because breastfeeding is seen as a traditional method or 'old wives' tale lacking the rigour of the medical model of contraception" (p. 302).

The efficacy of lactational amenorrhea has been studied extensively as an effective contraceptive method (Clubb & Knight, 1996; Hight-Laukaran et al., 1997; International Medical Advisory Panel, 1996; Kennedy, 1988; Labbok, 1990; Labbok et al., 1997; Newton & Newton, 1967; Ramos, Kennedy, & Visness, 1996; Rodriguez-Garcia & Frazier, 1995; Van Look, 1996; Walton, 1994; WHO, 1999). According to a study by Rosner and Schulman (1990) on birth intervals among breastfeeding women (n = 236) and formula-feeding women (n = 30) not using contraceptives, analyses indicated that mothers who breastfed had longer birth intervals than those who did not. For mothers who breastfed, there was a significant positive correlation between duration of breastfeeding, the length of lactational amenorrhea, and total birth interval. Ramos et al. (1996) reported LAM to be 99% effective when used correctly during the first six months postpartum; after 12 months, the effectiveness dropped to 97%. In this study, LAM provided as much protection from pregnancy as barrier methods and intrauterine devices (Ramos et al., 1996). Caution is advised for mothers who do not exclusively breastfeed, however, as lactational amenorrhea cannot be advised for mothers who give the occasional bottle of formula or for those who go for greater than five hours between breastfeeding sessions.

Reduction of postpartum weight retention (Microsystem: Biological). According to Ogden et al. (1999-2004), U.S. women of reproductive age are alarmingly heavy, with 52% of women overweight, 29% obese, and 8% with BMI index scores (BMI: in kg/m2) more than 40. In North America, a BMI greater than 25 is considered "obese" and cause for concern.

Lactation has higher energy requirements than pregnancy, utilizing approximately 500 calories per day, and although weight loss is highly variable among breastfeeding mothers, some studies indicate that breastfeeding for at least six months can assist lactating mothers to lose weight (Dewey, 1993). Baker et al. (2008) aimed to uncover whether breastfeeding reduced postpartum weight retention (PPWR) in a Danish population where exclusive breastfeeding is common and breastfeeding duration is long due to extended maternity leave practices and a culture that supports breastfeeding. Results of 36,030 six-month and 26,846 eighteen-month postpartum interviews, after adjusting for maternal pre-pregnancy BMI and gestational weight gain (GWG), indicated that breastfeeding was associated with lower PPWR in all categories of pre-pregnancy BMI. These results suggest that, when combined with GWG values of approximately 12 kg, breastfeeding as recommended could eliminate weight retention by six months postpartum in many women. Researchers caution that mothers who are overweight or obese and who do not initiate breastfeeding, who breastfeed for short periods of time and then terminate, or who have reduced physical activity may not return to their pre-gravid weights during the first six months postpartum (Dorea, 1997).

In addition, lactating women who intentionally increased their physical activity by exercising for 45 minutes four days a week and restricting their caloric intake by 500 calories per day lost four times more weight and fat mass than the control group who exercised no more than once a week for 10 weeks (Dugdale & Eaton-Evans, 1989). Most professionals, however, recommend that mothers restrict caloric intake to no lower than 1500 calories a day to lose weight and postpone weight-loss measures until lactation is well established (Barbosa, Butte, Villalpando, Wong, & Smith, 1997; Dugdale & Eaton-Evans, 1989; Lovelady, Garner, Moreno, & Williams, 2000; McCrory, 2001).

Maternal cancer (Microsystem: Biological). Breast cancer affects 1 in 8 women in the U.S. (Spencer-Cisek, 1998). Although the evidence of a reduced risk of breast cancer among women who have ever breastfed is far from universal with several studies showing no protective effect (Coogan, Rosenberg, Shapiro, & Hoffman, 1999; Lipworth, Bailey, & Legoretta, 2000; Parker, Rees, Leung, & Legoreta, 1999; Purwanto, Sadjimin, & Dwiprahasto, 2000), there is still accumulating evidence suggesting that increasing the duration of lifetime breastfeeding reduces the risk of premenopausal breast cancer in the mother (Labbok, 2001; Newcomb et al., 1994). There is a weak, yet protective, effect against breast cancer with prolonged lactation (Byers, 1985; Chilvers, 1993; Katsouyanni et al., 1986; Layde et al., 1989; Lubin, 1982; McTiernan, 1986; Newcomb et al., 1994; Romieu et al., 1996; Rosero-Bixby, 1987; Wang et al., 1992; Wu, 1996; Yoo et al., 1992; Yuan et al., 1988).

Although the exact means by which breastfeeding reduces breast cancer risk is not well understood, there are several possible hypotheses for the protective effect, including the reduction of the lifetime number of ovulatory cycles that occur while breastfeeding (Clavel-Chapelon, 2002; Freund, Mirabel, Annane, & Mathelin, 2005; Gray et al., 1990; McNeilly, Tay, & Glasier, 1994; Russo & Russo, 1994; Vogel, 2000), the reduced amounts of estrogen in the body during lactational amenorrhea, and the differentiation of mammary cells during lactation (Freund et al., 2005; Russo & Russo, 1994). According to Vogel (2000) and Russo (2005), the cell differentiation within breast tissue transpires during a woman's first full-term pregnancy and may contribute to an overall decreased breast cancer risk, especially when she is young.

There are some indications that lactation may be protective for only pre-versus post-menopausal breast cancers (Byers, 1985; McTiernan, 1986; Newcomb et al., 1994; Yoo et al., 1992), that maternal age at first lactation may be significant (Brinton et al., 1995; Newcomb et al., 1994), and that duration of lactation is important (Byers, 1985; Chilvers, 1993; Katsouyanni, 1996; Layde et al., 1989; McTiernan, 1986; Newcomb et al., 1994; Romieu et al., 1996; Rosero-Bixby, Oberle, & Lee, 1987; Tau, 1988; Yang et al., 1993; Yoo, 1992). In cancers that affect post-menopausal women, the protective effect of breastfeeding is less certain. A longer duration of lactation has been found to be protective in some studies (Layde et al., 1989; Romeiu et al., 1996; Yoo et al., 1992) as carcinogens may be excreted and removed through the very act of breastfeeding.

According to Enger, Ross, Henderson, and Bernstein (1997); Romeiu et al. (1996); and Siskind (1989), a long duration (13 to 25 months) of breastfeeding the first child was found to offer protection to both premenopausal and post-menopausal women.

Similarly, Hollander (1996), in her case-control study of Mexican women (n = 349), found long-term breastfeeding of the first baby to substantially reduce a woman's odds of getting breast cancer. The relative risk fell from 0.7 among those women who had breastfed their first infant for 1 to 3 months to 0.2 for those women who had done so for longer than 12 months. The results were roughly the same for pre-menopausal and post-menopausal women, and the findings remained unchanged in analyses adjusting for confounding factors (Hollander, 1996). In a population-based case control study of five counties in New Jersey, 2203 women were studied to ascertain lifetime total breastfeeding duration. A three times lower risk of developing breast cancer was found in women who breastfed between 37 to 60 months, or a 3 to 5 years, lifetime total (Brinton et al., 1995).

Life-threatening gynecological cancers may be reduced for women with a breastfeeding history. According to Rosenblatt (1995) and, more recently, Newcomb and Trentham-Dietz (2000), mothers with a history of lactation have a decreased risk of developing endometrial cancer compared to mothers who have never breastfed. Similarly, Gartner et al. (2005) reported a decreased rate of ovarian cancer among women who had ever breastfed.

The potential role lactation has in the prevention of cancer is important. Because the choice to breastfeed is a modifiable variable for most childbearing women, understanding the role that lactation could contribute to a greater understanding of cancer prevention has important public health implications (Freudenheim et al., 1997).

Microsystem Variables: Biological, Psychosocial, Lifestyle, and Spiritual Factors that Impact Lactation Status

Although legislation has been influential in removing barriers to the initiation and duration of breastfeeding for many women across several interrelated spheres, the literature suggests a number of social determinants that negatively correlate with breastfeeding initiation and duration that are difficult to manage from a pure individual or political standpoint. Factors associated with premature cessation of lactation include lower levels of education (Buxton et al., 1991); inconsistency of information (Vogel & Mitchell, 1998a, 1998b); lack of continuity of care (Logsdon, 2000; Riordan & Auerbach, 1999); maternal history of abuse or postpartum depression (Acheson, 1995); inconsistency of information (Vogel & Mitchell, 1998a, 1998b); support (Gill, 2001; Sikorski, Renfrew, Pindoria, & Wade, 2002); confidence (Blyth et al., 2002, 2004); inaccurate expectations around breastfeeding; decreased mother-infant contact; incorrect position and latch; smoking in the postpartum period (Edwards, Sims-Jones, & Breithaupt, 1998; Horta, Kramer, & Platt, 2001); hospital practices, such as analgesia, pacifiers, separation, and routine feeding schedules (Enkin et al., 2000); and the use of supplemental formula feeding in the early postpartum period (Schwartz et al., 2002).

Age, socioeconomic status, income, race, smoking status, and education affect a woman's preferred feeding method and length of duration (Callen & Pinelli, 2005; Chin, Myers, & Magnus, 2008; Dennis, 2002; Scott & Binns, 1999), with the highest rates of breastfeeding observed among non-smoking (Smith, 2002), higher-income, college-educated women over 30 years of age living in the Mountain and Pacific regions of the U.S. (Stein, 2004). In contrast, breastfeeding decreases as socioeconomic status and education increase in developing countries because those who are financially stable are able to pay for formula. In many parts of the world, the ability to purchase formula is seen as a privilege for the well-to-do. Even in the U.S., some cultures view formula feeding as a status symbol of prosperity (Abbott Laboratories, 2003; Callen & Pinelli, 2004; Rogers, Emmett, & Golding, 1997).

Table 4 provides a brief overview of the variables identified in the literature that impact lactation duration according to Bronfenbrenner's Social-Ecological Systems Framework.

Race (Microsystem: Biologic). Currently in the U.S., 3 of 4 (75%) of all mothers breastfeed their infants in the early postpartum period and 29% report feeding any human milk to their infants at six months. However, racial disparities exist with Black women breastfeeding at a rate much lower than that of White women.

Of course, among Black women, many ethnic origins are represented, including Cape Verdean, Haitian, West Indian/Caribbean, African, and African American, with many people describing themselves as multiracial (Black, 1996). Yet national statistics only report breastfeeding rates by race and not ethnic category (USDHHS, 2002), and this clearly may result in incorrect assumptions of breastfeeding practices of these subpopulations.

According to the USDHHS (2010), only 45% of Black women initiate lactation postpartum. At six months, the breastfeeding rate is 31% for White women compared with 19% for Black women and 28% for Hispanic women. At one year, these rates drop dramatically to 17%, 9%, and 19%, respectively (USDHHS, 2000).

Table 4

Negatively Associated Factors That Impact Lactation Status Within the Literature According to Bronfenbrenner's Theoretical Framework

Microsystem	Black race
	Overweight/obesity
	Lack of confidence
	Maternal medication usage
	Less educated women
	Pain/Mastitis
	Engorgement
	Sore nipples
	Maternal stress
	Lack of self-efficacy
	Perception of insufficient milk supply
	Difficulty with latch
	Cesarean delivery
	Enrollment in public health programs
	Inconvenience
Mesosystem	Difficulty managing other roles
	Lack of support from healthcare providers
	Suboptimal educational delivery methods
	Single status/No support from partner
	No support from grandmother
	No support from friends/social network
	No support from peers/colleagues
Exosystem	Employed outside of home
	No rooming-in provided by hospital
	No support to breastfeed in public
	No support from workplace
	No support from school
	No support from childcare setting
Macrosystem	U.S. born women
	Noncompliance with The Code
	Media support of formula
	Advertising of formula
	Discharge "gift" bags/coupons
	Free formula from hospitals
	Noncompliance with The Ten Steps

According to Forste, Weiss, and Lippincott (2001), who researched this trend using the National Survey of Family Growth of 1088 women, the likelihood to breastfeed was least for Black women, with the primary reason indicated as "preferring to bottle feed." Similarly, McCann, Baydar, and Williams (2007) found, in their sample of 1,095 eligible WIC participants, that Black mothers were generally most likely to agree with the statement of perceived barriers. For instance, the statement that elicited the strongest agreement (76%) was, "With bottle feeding, the mother knows that the baby is getting enough to eat." The second highest agreement was for the question about the mother not wanting to breastfeed in public (61%), and the next most common barrier had to do with the practicalities of breastfeeding (e.g., no one else could feed the baby; mother was fearful that milk would leak onto garments; breastfeeding ties the mother down; breastfeeding is painful; or breastfeeding takes too much time).

On the other hand, three-fourths of mothers agreed with the statement, "Breastfeeding helps protect the baby from diseases," and 61% agreed with the statement, "Breastfed babies are healthier than bottlefed babies." However, agreement was lower for the specific inquiries about the protective effect of breastfeeding against ear infections (46%) and diarrhea (36%). Hispanic mothers had much higher rates of agreement with these health-related items than White and Black mothers. Only half of the respondents thought breastfeeding was less complicated or easier than bottle feeding - 77% of Hispanic mothers, compared with 43% of Whites and 40% of Blacks (McCann, Baydar, & Williams, 2007).

To further examine racial disparities in breastfeeding, Forste et al. (2001) analyzed birth interval files from 1988 and 1995 to examine racial differences in breastfeeding and rates of infant survival (n = 1088). Census Bureau Statistics for 1995 reported the infant mortality rate for blacks to be 15.2 deaths before age one per 1000 live births compared with 6.3 per 1000 live births for whites (U.S. Census Bureau, 1999), revealing that black infants were almost 1.5 times more likely to die before the age of one than were nonblack infants. Knowing this, Forste et al. controlled for low birth weight in their analysis of breastfeeding and found that low birth weight infants were 4.3 times more likely to die before age one than were normal-weight infants, with breastfed infants 80% less likely to die before age one than were never breastfed infants.

Former Surgeon General for the USDHHS, Satcher (2001) highlighted the concern about race and breastfeeding duration rates in the U.S. Almost ten years ago, he wrote, "We cannot realistically promote breastfeeding without making comprehensive, up-to-date, and culturally tailored lactation services available to all women" (p. 72). Furthermore, it is apparent that we must do so without making broad generalizations to subpopulations from nondescript racial categories.

Current U.S. Surgeon General, Regina Benjamin, made a pledge on January 20, 2011 to continue to work toward the protection and promotion of breastfeeding. In her first ever "Call to Action" since she assumed the role of the Surgeon General, Benjamin reaffirmed her commitment to reduce the obstacles faced by women who want to breastfeed in our communities.

Cultural Background and Social Norms (Microsystem and Macrosystem). The WHO recommends women living in developing countries to breastfeed for two years to reduce the incidence of morbidity and mortality, and the AAP statement on breastfeeding summarizes, "It is recommended that breastfeeding continue for at least

12 months, and thereafter for as long as mutually desired." Breastfeeding beyond one year of age is termed "extended" breastfeeding in the U.S., and as the term implies, its practice is not routine in most Western cultures. The age of weaning in many societies around the world, however, other than the U.S., ranges from anywhere between 2 and 4 years of age. For example, in Guinea Bissau, West Africa, the median time for lactation duration is 22.6 months (Jakobsen, 1996), and mothers in India frequently breastfeed their infants for 3 to 4 years. Historically, Greeks, Hebrews, and Muslims all breastfed for 2 to 3 years as documented in the ancient writings of the Talmud, Koran, and Aristotle (Fildes, 1986; Huggins & Ziedrich, 1994; Piovanetti, 2001).

Educational Preparation (Microsystem and Exosystem). According to Humphreys, Thompson, and Miner (1998); Roe et al. (1999); Smith (1985); Starbird (1991); Winikoff (1980); and Wright (1988), women in the U.S. who have graduated from college are more likely to breastfeed than their less-educated counterparts. Studies report that more highly educated women in the U.S. recognize the benefits of breastfeeding and are more likely to choose breastfeeding as opposed to bottle feeding. In particular, Wright (1988) concluded that better-educated women are more likely to breastfeed, to breastfeed exclusively, and to postpone introducing formula compared to less-educated women. In addition, Joffe and Radius (1987) found that higher education increased the likelihood that women in the U.S. will breastfeed, regardless of race, which emphasizes that breastfeeding promotion and education impact women's choices.

Overweight and Obesity Issues (Microsystem). Another public health issue that affects breastfeeding duration is overweight and obesity. According to a recent article by Jevitt, Hernandez, and Groer (2007), research indicates that mothers in the

U.S. who are obese (defined as those who have a BMI more than 30) are less likely to initiate lactation, have delayed onset of lactation, and are more prone to early termination of breastfeeding than mothers who are not overweight. To illustrate, Black women, who have the highest rates of obesity in America (49.6%), have the lowest initiation rates (45.3%) and the shortest duration of breastfeeding to three months (33.7%) when compared to Hispanic duration rates (38.9%) and Caucasian women (31%), who have higher rates of breastfeeding initiation (Hispanic 76% and Caucasian 68.7%) and are more likely to be breastfeeding at three months postpartum (54.3% and 48.7%, respectively) (CDC, 2008).

Several studies support the hypothesis of a diminished initiation rate by mothers who are obese (Donath & Amir, 2000; Hilson, Rasmussen, & Kjolhede, 1997; Kugyelka, Rasmussen, & Frongillo, 2004). For example, an Australian National Health Survey compared women with pre-pregnancy BMIs between 20 and 25 to women with BMIs greater than 30 and noted that 89.2% of normal weight women initiated breastfeeding, compared with 82.3% of women who were obese, even after adjusting for maternal age, smoking, and other sociodemographic factors (Jevitt, 2007).

Likewise, an earlier study that used multiple logistic regression to adjust for maternal smoking; parity; length of gestation; mother's age and education; economic background; cesarean birth; gestational diabetes (GDM); and participation in WIC found that women who were obese had higher rates of GDM, higher birth weights and longer gestations as well as increased cesarean deliveries compared to women of normal weight (Hilson, Rasmussen, & Kjolhede, 1997). Although, in this particular study, initiation rates were similar between the two groups, overweight and obese women were significantly less likely to be breastfeeding at the time of hospital discharge than women of normal weight (Jevitt, 2007).

Mothers who are overweight and obese terminate lactation earlier than women of normal weight (Donath & Amir, 2000; Hilson et al., 1997; Li, Jewell, & Grummer-Strawn, 2003). According to Li et al. (2007), the mean duration of lactation for mothers who are obese was almost two weeks less than mothers of normal pre-gravid weight, after adjusting for low maternal education, poverty, unmarried status, young maternal age, infant birth weight, and smoking status (Jevitt, 2007). Of interest, a later study conducted by Hilson et al. (2004) found that obese women who were surveyed prior to delivery even *intended* to breastfeed for three fewer months than mothers who were of normal weight or overweight (Hilson et al., 2004).

Lack of Confidence (Microsystem). Women have diverse experiences with breastfeeding (Schmied & Barclay, 1999). A woman's perception of the experience may influence her decision of how long she will breastfeed, regardless of her original intentions. A lack of maternal confidence has been a factor reported to predict early weaning (Blyth et al., 2002; Buxton et al., 1991; Ertem, Votto, & Leventhal, 2001; O'Campo et al., 1992; Papinczak & Turner, 2000; Taveras et al., 2004). Buxton and colleagues (1991) found that, among mothers who initiated breastfeeding, significant predictors of failure to breastfeed for more than seven days included lower confidence in the ability to breastfeed, delayed first breastfeeding experience, and lack of rooming-in with the baby after delivery. Conversely, maternal self-assurance has been suggested as a psychosocial variable that has influenced positive breastfeeding outcomes (Ertem et al., 2001; Taveras et al., 2003).

Rempel (2004) reported mothers' perceptions about the degree of power that wielded over breastfeeding had a significant explanatory effect on duration. The more control participants indicated they had over the span of time they would breastfeed, the longer they projected they would (and ultimately did) breastfeed. Moreover, according to McCann et al. (2007), mothers can develop higher breastfeeding self-efficacy by watching other mothers breastfeeding; by receiving support from friends, family, and professionals; and by learning to be comfortable and certain about their choice to breastfeed.

Avery, Zimmermann, Underwood, and Magnus (2009) reported "confident commitment" as key for sustained breastfeeding among Caucasian and African-American women, writing:

> Contrary to popular conceptions, breastfeeding appears to be a learned skill. If mothers achieved a level of "confident commitment" before the birth, they were able to withstand lack of support by significant others and common challenges that occurred as they initiated breastfeeding. Without the element of "confident commitment," a decision to breastfeed appeared to fall apart once challenged. (p. 146)

Cesarean Delivery and Maternal Medication Usage (Microsystem and Mesosystem). According to Da Vanzo, Starbird, and Leibowitz (1990) and Samuels, Margen, and Schoen (1985), mothers having a cesarean section are less likely to breastfeed than are mothers who deliver vaginally. In a study by Nissen et al. (1996), maternal blood samples of oxytocin, prolactin, and cortisol were measured at 20 and 30 minutes after first suckling. Infants born vaginally in the U.S. averaged 75 minutes of age before their first breastfeed, whereas infants born by cesarean section averaged 240 minutes before first consumption (Jevitt, 2007). Results indicated that method of delivery and first suckling were the two most important influences on oxytocin levels and lactogenesis. However, potential confounding variables, such as reduced skin-to-skin contact with the newborn immediately following birth and increased use of pain-relieving medications, may have also influenced hormonal levels, (Jevitt, 2007) therefore cesarean delivery in and of itself could not be solely implicated.

A number of studies have documented that narcotics given intravenously or intramuscularly for pain relief during the intrapartum period decrease neonatal alertness (Belsey, Rosenblatt, Lieberman, et al., 1981), inhibit suckling (Kron, Stein, & Goddard, 1966), lower neurobehavioral scores (Hodgkinson, Bhatt, & Wang, 1978), and delay effective feeding (Crowell, Hill, & Humenick, 1994; Matthews, 1989). Riordan, Gross, Angerson, Krumwiede, and Melin (2000) examined the relationship of labor pain relief medications with neonatal suckling and breastfeeding duration in mothers (n = 129) delivering vaginally, using the Infant Breastfeeding Assessment Tool (IBFAT), and found that breastfeeding duration did not differ between unmedicated and medicated groups; however, mother-infant dyads with low assessment scores weaned earlier than those with medium or high scores (Riordan et al., 2000).

Regarding the use of medications postpartum, Schanler et al. (1999) found that pediatricians often advocate weaning because of treatable diagnoses known not to preclude breastfeeding. In light of this, the AAP Committee on Drugs (2001) published guidelines for pharmacological treatment of nursing mothers, stating that advice to terminate breastfeeding may be unwarranted in some cases. According to Lanza di

Scalea and Wisner (2009) who evaluated 31 empirical papers on the topic, breastfeeding and antidepressant treatments need not be mutually exclusive. To date, nortriptyline, sertraline, paroxetine, and imipramine consistently yield the most evidence for safety with lactation (Lanza de Scalea, et al., 2009). For a comprehensive list of "acceptable reasons for use of breast-milk substitutes," health providers are referred to the WHO/UNICEF 2009 document that discusses galactosemia, maple syrup urine disease, phenylketonuria, and those at risk of hypoglycemia due to impaired metabolic adaptation. Maternal conditions such as HIV, hepatitis, tuberculosis, and herpes simplex virus type 1 (HSV-1) are reviewed, as well as the taking of psychotherapeutic, anti-epileptic, chemotherapeutic, and opiod drugs (WHO/UNICEF, 2009).

Other Factors (Microsystem: Spiritual, Microsystem and Mesosystem: Parity). Other variables that relate to lactation termination among American women have been reported in Western publications. Protestant women are less likely to breastfeed than Catholic women (Hirschman & Butler, 1981; Humphreys et al., 1998; Joffe & Radius, 1987). U.S.-born women are less likely to breastfeed than foreign-born women (Bevan, 1984), and single women are less likely to breastfeed than married women (Hirschman & Butler, 1981). Fein and Roe (1998) reported that mothers who have breastfed other children are more likely to breastfeed again, with longer durations if they have breastfed two or more children. According to Hirschman and Butler (1981) and Martinez and Dodd (1983), first-born children are more likely to be breastfed than are higher parity children, and women are less likely to breastfeed their last child if they state that they do not want any more children (Forste, 2001). According to Simopoulos and Grave (1984) and Pesa and Shelton (1999), women with a positive self-image and women who are health conscious are more likely to breastfeed than are their less-positive and less health-conscious counterparts. Finally, women whose partners have professional executive occupations are more likely to breastfeed (Heck, Braveman, Cubbin, Chavez, & Kiely, 2006). In contrast, increased maternal income negatively affects the likelihood that a mother will breastfeed her child. Some authors suggest that this finding is because maternal income is linked to a mother's employment status, which has been found to negatively affect breastfeeding rates, especially if she works full-time (Roe et al., 1999).

Problems of Breastfeeding (Microsystem)

Successful initiation and long-term maintenance of breastfeeding is influenced by many variables, including cultural factors, the mother's communication patterns, family influences, social history, health behaviors, political and religious practices, and beliefs (Riordan & Auerback, 1998; Stevenson & Allaire, 1991), as well as the infant's health status, psychomotor development, disposition, behavior, physiological function, and orofacial configuration (Stevenson & Allaire, 1991).

According to Simopoulos and Grave (1984), the reasons for unsuccessful breastfeeding and early termination are important concerns. They state:

> So far only vague and rudimentary answers have been identified, e.g., "the milk dried up" or "lack of satisfaction." The decision-making process involved in early weaning has yet to be carefully analyzed. Certainly, biologic variables are involved, such as maternal nutritional status, maternal nutrient intake, and volume and quality of milk produced. These factors have not been well studied.

and they are presumably influenced by psychological, social, cultural, and economic factors. (p. 603)

According to Shealy et al. (2005), intrapartum breastfeeding education is to focus on the immediate issues of breastfeeding, such as fostering appropriate latch and positioning, adequate milk removal, stability of the infant, and comfort of the mother. Education gives nurses and other healthcare providers an opportunity to reassure and support the client and family members, provides them with referral information for further postpartum support, and alerts clients regarding signs and symptoms of problems that may occur secondary to lactation.

Mothers who experience breastfeeding difficulties often have psychological feelings of discontent, disempowerment, and frustration, and many times, the consequence is an early and unwanted cessation of lactation (Harper, 1998). According to Ertem et al. (2001), the tribulations experienced by mothers during the first two weeks of breastfeeding are characteristically classified into five groups: (a) problems of breastfeeding, such as cracked and sore nipples, pain, and leaking (reported by 26.6% of mothers in Ertem et al.'s [2001] study); (b) problems related to the infant, such as reflux or spitting up, fussing, and crankiness (reported by 35.9%); (c) a perception of inadequate milk supply (reported by 28.1%); (d) inconvenience for the mother, such as being too tired, or preventing the mother from leaving the home (reported by 28%); and (e) problems that required medical management, such as maternal illness or infant jaundice (reported by 10.9%).

Ertem (2001) discovered that factors forecasting the premature cessation of breastfeeding for WIC-eligible mothers in an urban northeastern area of the U.S.

(n = 64) were not related to these common physical ailments but, rather, to maternal reports of low confidence. Results of the study indicated that two main variables, (a) maternal age < 20 years and (b) lack of confidence about continuing to breastfeed until the infant was two months of age, were both significantly linked with discontinued breastfeeding both at two weeks and at two months (Ertem, 2001).

Mitra, Khoury, Hinton, & Carothers (2004) found similar findings in their study of Mississippi women. When WIC-certified women were given a closed-ended questionnaire that collected data about breastfeeding intention, knowledge, self-efficacy, and barriers to breastfeeding (including time constraints, embarrassment, social limitations, and lack of social support), results indicated that mothers who intended to breastfeed were women who had higher levels of breastfeeding knowledge, self-efficacy, and perceived social support.

Pain and Mastitis (Microsystem: Biological). Termination of breastfeeding in the first six months postpartum is frequently caused by individual microsystem-related biological problems of the breast, such as pain, sore and cracked nipples, and mastitis and/or breast infection (Abou-Dakn, Schafer-Graf, & Wockel, 2009). Classification of these physiological problems is essential for treatment and ongoing support. Assessing for the presence or absence of erythema, edema, engorgement, mastitis, and abscess formation is an important function of healthcare providers when working with postpartum women (Centuori et al., 1999).

Centuori et al. (1999) examined nipple care, sore nipples, and breastfeeding duration; they found that between the control group, who used no nipple ointment, and the intervention group, who used an ointment, there was no difference in the incidence of sore and cracked nipples and in breastfeeding duration. However, the use of a pacifier and a bottle in the hospital were both associated with sore nipples at discharge ($p = 0.02$ and $p = 0.03$). In this population, full breastfeeding up to four months postpartum was significantly associated with breastfeeding on demand, rooming-in at least 20 hours/day, non-use of formula and pacifiers, and no pre and post-feeding weight checks at each breastfeed (Centuori et al., 1999).

Abou-Dakn et al. (2009) evaluated the relationship between psychological stress and the occurrence of breastfeeding disorders in the U.S., and reported a significant relationship between maternal stress and breast disease. In contrast, women with diminished levels of psychological stress reported less breast-associated disorders. The majority of women who reported breast problems terminated lactation sooner than those who did not.

In order to allay and prevent nipple pain, several assessment tools have been developed to evaluate the ability of the baby to suckle. Some of the more commonly used tools are the Infant Breastfeeding Assessment Tool (IBFAT) (Matthews, 1993), the Mother-Baby Assessment Tool (MBA) (Mulford, 1992), and the LATCH Scoring System (Jensen, Wallace, & Kelsay, 1994). Each letter of the acronym denotes a category, where "L" represents latch, "A" represents audible swallow, "T" represents mother's nipple type, "C" represents mother's degree of breast or nipple discomfort, and "H" evaluates the amount of help the mother needs to position her baby at the breast.

Riordan, Bibb, Miller, and Rawlins (2001) researched the validity of the LATCH breastfeeding assessment tool on 133 dyads and found that women who were breastfeeding at six weeks postpartum had higher total LATCH scores than those who had weaned. All means for LATCH measures were higher in the group still breastfeeding at six weeks, with one exception; the women who weaned before six weeks reported greater breast or nipple discomfort than those who were still breastfeeding ($p < .05$).

Finally, Rempel (2004) researched factors that influenced breastfeeding decisions of long-term breastfeeders ($n = 80$) in a longitudinal infant feeding study where "long-term" was defined as any mother who had breastfed from 9 to 12 months postpartum. Rempel (2004) found that reasons for weaning in this population were infants' perceived readiness to wean; mothers felt they had breastfed long enough to give their infants the benefits of breastfeeding; infant biting, leading to nipple soreness and pain; insufficient milk supply; and mothers' desire to engage in behavior believed to be incompatible with breastfeeding, such as losing weight, smoking, or taking certain medications.

Lack of Self-Efficacy (Microsystem: Psychosocial). Low levels of maternal self-efficacy within a mother's microsystem have been associated with delayed onset of lactation and perceived poor milk supply (Hill, Humenick, Brennan, & Wolley, 1997; Segura-Millan, Dewey, & Perez-Escamilla, 1994). In their descriptive, longitudinal, cohort study of women ($n = 125$), McCarter-Spaulding (2009) reported that breastfeeding self-efficacy could be a more important variable in predicting breastfeeding outcomes than previously reported demographic variables in the literature.

Because the onset of lactation does not occur for many women before hospital discharge, women who do not perceive breast fullness may lack confidence in their capacity to produce milk (Jevitt et al., 2007). Particularly for macrosomic infants (weighing over 10 pounds) delivered to obese patients, even a four-hour delay in lactogenesis could affect energy and hydration levels of the newborn, spurring mothers to choose artificial formula to satisfy perceived infant needs (Jevitt, 2007).

McCarter-Spaulding and Gore (2009) set out to determine whether breastfeeding self-efficacy could predict duration and pattern of breastfeeding in a sample of Black women ($n = 125$) of African descent in a large urban teaching hospital in New England. They concluded that theory-based interventions to enhance self-efficacy would help improve breastfeeding outcomes. Results also indicated that higher levels of breastfeeding self-efficacy predicted longer duration and a more exclusive pattern of breastfeeding at one and six months postpartum, consistent with prior research ($p < .01$).

In 2008, Otsuka, Dennis, and Jimba, examined the relationship between breastfeeding self-efficacy and perceived insufficient milk among Japanese mothers in the U.S., and found that, of their cross-sectional study of breastfeeding mothers ($n = 262$), only 40% were still nursing at 4 weeks postpartum, with 73% citing perceived unsatisfactory milk supply as the principal reason for supplementation or completely discontinuing breastfeeding. Mothers' perception of insufficient milk at four weeks postpartum was significantly related to lactation self-efficacy in the maternity center during the immediate postpartum period ($r = .45$, $p < .001$). Multiple regression revealed that breastfeeding self-efficacy explained 21% of the variance in maternal perceptions of insufficient milk, with results independent of sociodemographic variables (Otsuka, Dennis, & Jimba, 2008).

Perception of Insufficient Milk Supply (Microsystem). Perceived insufficient milk supply is the most common reason cited in the U.S. for the early supplementation and/or discontinuation of breastfeeding across cultural, socioeconomic, rural, and urban settings (Arora, McJunkin, Wehrer, & Kuhn, 2000; Blyth et al., 2002, 2004; Hill & Humenick, 1989, 1996; Marandi, Afzali, & Hossaini, 1993; Martines, Ashworth, & Kirkwood, 1989; McCann & Bender, 2006). Concern over milk supply can lead to early weaning (Binns & Scott, 2002; McCann et al., 2007). Conversely, perception of adequate milk supply boosts maternal confidence (Hill & Humenick, 1996).

In McCann et al.'s (2007) study of breastfeeding attitudes and reported problems in a national sample of WIC participants, breastfeeding mothers were asked about their own problems with breastfeeding at the one-month interview; 70% said that they had experienced at least one of the specific problems listed. Thirty-four percent of mothers said they thought they did not have enough milk for the infant, and 10% thought there was something wrong with their milk. Although 71% of mothers agreed that "breast milk alone gives a new baby all he/she needs to eat" and 80% agreed that "any woman who wants to can breastfeed," fewer (55%) agreed that they had enough breast milk. In this study, concern about insufficient breast milk was the second-most frequently reported problem at the one month interview and the most common problem at three and five months. Apprehension about breast milk sufficiency was strongly related to breastfeeding cessation and formula supplementation.

Horne (2001) reported that regular formula feeds were commonly started because the mother assumed that the infant required more food than she was able to provide. Solids, however, were initiated when a mother believed that her infant had reached an appropriate age. In Quandt's (1984) study, solids had no negative consequence on breastfeeding duration for infants introduced to solids at four months or later, yet for infants introduced to solids before four months of age, a decrease in breastfeeding frequency was demonstrated after solids were initiated. In contrast, Hornell (2001) reported no association between the decline of breastfeeding and the introduction of solids, nor did Jackson (1992) in her study in Thailand, where rice is traditionally introduced early into a newborn's diet and where lactation is long.

Difficulty with Latch (Microsystem and Mesosystem). One of the major factors leading to lactation termination is difficulty with latch. In order to breastfeed successfully, infants must learn to attach and suckle at the breast properly (Righard, 1996; Righard & Alade, 1992). Protractility of nipple tissue is required for proper latch and efficient suckling; therefore, mothers with inelastic tissue, or flat and inverted nipples may encounter breastfeeding difficulties (Biancuzzo, 1999; Fisher, 1994; Walker, 1989; Woolridge, 1986).

Other breastfeeding attachment issues discussed in the literature include the physiologic problems of ankyloglossia (Berg, 1990; Notestine, 1990; Wiessinger & Miller, 1995), short labial frena (Wiessinger & Miller, 1995), bubble palate (Snyder, 1997), and the presence or absence of the extrusion reflex (Stephens & Kotowski, 1994) in the newborn. In addition, exposure to artificial nipples, pacifiers, or dummies within the child's environment is believed to contribute to breastfeeding problems and early weaning (Neifert, Lawrence, & Seacat, 1995; Righard, 1998; Righard & Alade, 1997; Victora, Tomasi, Olinto, & Barros, 1993). According to Newman (1990), the early introduction of bottles may render infant sucking less effective or may result in breast refusal, resulting in failure to thrive, hyperbilirubinemia, colic and crying, prolonged and frequent feedings, sore and cracked nipples for the mother, and mastitis.

Mesosystem, Exosystem, and Macrosystem Analysis

Social, Institutional, and Community Benefits

The physiological, cognitive, and emotional benefits of lactation for the mother and child within the microsystem are well established in peer-reviewed research. The next portion of the literature review will focus on the meso-, exo-, and macrosystem-related benefits that lactation confers to the community, including increased cost savings for breastfeeding mothers and families; decreased costs for health maintenance organizations (HMOs) and public health programs, including the U.S. Department of Agriculture's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); decreased absenteeism and loss of income for employers; and decreased environmental burden. Table 5 outlines the various aspects of the next section.

Table 5

Literature Review: A Summary of the Mesosystem, Exosystem, and Macrosystem Benefits

Social, Institutional, and Community Benefits
Increased cost savings for mothers and babies
Decreased costs for hospitals and public health programs
Decreased absenteeism and loss of income for employers
Decreased environmental burden

Increased cost savings for mothers and families (Mesosystem). Breastfeeding women and their infants have lower healthcare costs compared with those who formula feed (Pugh et al., 2002). According to Ball and Wright (1999), infants who are not breastfed incur up to $471 more health costs in the first year compared with infants who are exclusively breastfed for three months ($671 in 2008 dollars) (U.S. Bureau of Labor Statistics. Inflation calculator, 2009). The U.S. Breastfeeding Committee (2009) reports that for every $1 invested to support and protect breastfeeding, employers receive a cost savings of $3. This has major financial implications for employers.

Former U.S. Surgeon General David S. Satcher, in the 2001 Public Health Report from the DHHS, wrote:

> We must send the message that breastfeeding saves money for families. In a year's time, families can save several hundred dollars they might otherwise spend on breast substitutes. They can also save on medical care costs since breastfed infants typically require fewer sick care visits. (p. 72)

Infants who are fed formula have higher health expenditures for certain acute illness (Pugh et al., 2002). Chronic pediatric illnesses are very expensive, as are maternal cancers and diabetes. According to Bartick, Stuebe, Shealy, Walker, and Grummer-Strawn (2009), financial enticements alone may persuade healthcare organizations to seek BF designation. In a current era of increasing prevalence of uninsured Americans, this finding is especially noteworthy.

Decreased costs for hospitals and public health programs (Exosystem). Tuttle and Dewey (1996) compared breastfeeding to formula feeding from the perspective of the U.S. WIC program among low-income Hmong women in California (n = 838); they projected increased cost savings of approximately $3 million to $5 million for WIC programs in just one California county if women were to breastfeed their children at least six months. Likewise, in medical insurance organizations (Medicaid) and health maintenance organizations (HMOs), Ball and Wright (1999) concluded that for every 1000 infants never breastfed, there were 2033 surplus office visits, 212 additional hospitalization days, and 609 excess prescriptions written that were ascribed to lower respiratory tract illness, diarrhea, and otitis media among never-breastfed infants when contrasted to breastfed infants. In their analysis of two data sets (n = 966 in the Tucson Study; n = 644 Scottish study), it was determined through Chi square analysis that these additional health care services cost the managed care health system between $331 and $475 per never-breastfed infant during the first year of life (Ball & Wright, 1999). The authors also note:

> This analysis, which has considered only direct medical costs, underestimates substantially the burden to society as a whole associated with our low level of exclusive breastfeeding. The family with a formula-fed infant incurs direct costs for care, if uninsured, or for co-payments if insured, as well as nonmedical costs such as family care and transportation to and from the doctor's office. Parental absence from work is expensive for both employee and employer. If a parent misses 2 hours of work for the excess illness attributable to formula-feeding, >2000 hours, the equivalent of 1 year of employment, are lost per 1000 never-breastfed infants. (p. 875)

It has been speculated that in the near future, endorsement of breastfeeding may arise from entire HMOs, the U.S. government, and insurance companies, who are likely to increasingly distinguish the costs of women *not* breastfeeding to their institutions (Wright, 2001). According to the AAP (2005), increasing the percentage of children breastfed in the early postpartum period from 64% in 2000 to the *HP2010* goal of 75% would save an estimated $3.6 billion in health-care costs annually. This economic point is further emphasized by Bartick, Stuebe, Shealy, Walker, and Grummer-Strawn (2009) when they discussed the leverage accrediting organizations have in modifying hospital practice. For example, the Joint Commission, which accredits most U.S. hospitals, has set quality measures in many areas over the last decade. These measures are publicly reported and the subject of considerable attention by hospital staff and administrators across the U.S. Until recently, the Joint Commission did not have quality metrics relating to lactation. However, on July 20, 2009, the Commission made the announcement that it was adding "Exclusive breast milk feeding" as a new hospital Core Measure for prenatal care, effective April 2010 (The Joint Commission, 2009).

According to Baby-Friendly U.S.A (2009), full implementation of *The Ten Steps to Successful Breastfeeding* profits all children--even those infants not breastfed--by improving mother-baby physical contact and nurse-client educational contact following delivery. HMOs are also finding that women who are well supported during the susceptible postpartum period are more likely to become long-term clients of the health institution. In turn, these mothers are also more likely to refer other family members and peers to the facility, further benefiting the economic outlook of maternity centers within the exosystem that consistently endorse breastfeeding.

According to Baby-Friendly U.S.A (2009), a substantial community benefit of breastfeeding is that fewer tax funds are required to provide assistance to children. Families who breastfeed have increased available funds to purchase goods and services, thereby directly benefiting the local economy. Breastfed children have lower health-care costs as well, which reduces the financial load on families, third-party payers, and community- and government-run medical plans.

Decreased absenteeism and loss of income for employers (Mesosystem and Exosystem). Not only do employers benefit from decreased employee healthcare costs, but they also profit directly from breastfeeding because lactating workers have lower rates of absenteeism as a result of an ill child (AAP, 2005; Association of Women's Health, Obstetric, and Neonatal Nurses, 2008; Brown, Poag, & Kasprzycki, 2001; Dunn et al., 2004; Libbus & Bullock, 2002; USDHHS, 2008; Witters-Green, 2003). Mothers who continue to breastfeed while working report fewer lost work days due to infant illness, even if the infant is in daycare (Visness, Kenendy, & Labbok, 1995). Supported mothers have improved morale, decreased stress, and increased productivity which increases the financial benefits to employers (Brown et al., Dunn et al., Lippus & Bullock; Ortiz, McGilligan, & Kelly, 2004).

Decreased environmental burden (Exosystem). Wright (2001) discussed that a plausible explanation for the resurgence of breastfeeding since the 1970s is the pervasive influence of the natural-childbirth movement. Breastfeeding proponents remind individuals about the similarities of lactation and "going green" because the use of human milk results in no waste product.

Breastfeeding, by its very nature, protects society and the environment from pollution and disposal problems, eliminating the need for discarding tin, paper, and plastic cans and bottles, as well as diminishing the energy demands and expenditures for preparing, packaging, and transporting artificial feeding products (Baby Friendly U.S.A. 2009).

Mesosystem Variables: Social and Institutional Factors that Impact Lactation Status

Enrollment in public health programs (Mesosystem). Both the initiation and duration of breastfeeding in industrialized countries has been strongly associated with indicators of social advantage (Pesa & Shelton, 1999; Pollack, 1994; Silva, Buckfield, & Spears, 1978; M. M. Smith et al., 2003). According to Mitra, Khoury, Hinton, and Carothers (2004), the WIC population is a high-risk one. The WIC Program in the U.S. provides supplemental nutritious foods, nutrition counseling, and referrals to health and social services for low-income pregnant, postpartum, and breastfeeding women; infants; and children up to age five who are determined to be at nutritional risk (WIC Program, 2006). WIC currently serves more than eight million women, infants, and children. It is documented that almost half of the babies born in the U.S. are enrolled in WIC, with infant formula accounting for almost 50% of the WIC food costs before formula manufacturers' rebates and 22% of all WIC food costs after the rebates (USDA, 2003).

In the U.S., the six-month, non-WIC participant breastfeeding rate in 1998 was 29.2% compared with the WIC participation rate of 12.7% (Ryan, 1997). According to McCann et al. (2007), 48% of the infants born in 2005 who participated in WIC; Lawrence (1999) reported that less than 1% of the WIC budget was allocated for breastfeeding initiatives. Furthermore, lower-class women tended not to consult anyone about breastfeeding while women of higher class standing appeared more likely to seek advice from doctors or relatives, resulting in higher rates of duration among those with higher socioeconomic status (J. M. Smith, 1986).

The federal agency of the USDA responsible for administering the WIC Program is the Food and Nutrition Service (FNS). In 2002, the FNS began to combat low rates of breastfeeding among WIC participants by providing training and technical support to aid states in developing a comprehensive, community-based breastfeeding program. The goal of the project was to raise public awareness, acceptance, and support of breastfeeding using social marketing principles. The project included a plan to mobilize staff, provide client and family education, increase public awareness, provide outreach to health professionals, and develop community partnerships.

To encourage breastfeeding among WIC participants in her state, Representative Carolyn Maloney of New York included a measure in the WIC reauthorization bill that allows state agencies to use WIC food program funds to provide educational materials on breastfeeding. In addition, the measure allows state agencies to use additional WIC funds to purchase pumps.

Inconvenience and difficulty managing other roles (Microsystem and Mesosystem). Goldade et al. (2008) researched breastfeeding and smoking among low-income women, using an ethnographic, longitudinal qualitative approach of 44 mothers, and found that exclusive breastfeeding was a reported barrier to women's efforts to complete household responsibilities, care for other children, leave the house to run errands, look for employment, and work outside the home. More than 40% of participants noted that exclusive breastfeeding placed a burden on the mother as the only one who could feed the baby. A participant spoke of this feeling of being tied down, saying:

> She nurses . . . too much I think . . . she goes in spurts, she'll have days where she eats . . . every couple hours, but then she'll have days where she'll nurse for an hour, sleep for 20 minutes, wake up and nurse for another hour! It's like 'Okayyy.' Instead I've given her formula a couple of times, but it's like . . . 'Honey, I can't do this anymore' . . . "Mommy needs a shower'. . . I have to feed the rest of the family. So two or three times now I've given her something besides breast milk. (p. 235)

According to McCann et al. (2007) in their one-year longitudinal study of WIC mothers trying to manage multiple roles, about one-third of mothers believed that "a man feels left out if a woman breastfeeds" regardless of racial or ethnic group (p. 320). Likewise, mothers in the Goldade et al. (2008) longitudinal qualitative study (n = 44) of low-income mothers spoke of their desire to involve the baby's father so they could begin looking for employment, saying:

> Now I'm formula feeding too. I only breastfeed at night because I'm trying to so I could go get a job. He was getting very attached. He wouldn't go to my husband. He wouldn't go with nobody. He wanted just to stay with me. My husband said 'well, we need to get him on a bottle.' So, that's what we did. (p. 236)

Lack of educational and emotional support for breastfeeding from healthcare professionals (Mesosystem). The lack of support for breastfeeding within The Social Ecological Framework for Breastfeeding Mothers may be found within many spheres. Within the mesosphere, mothers may experience a lack of support from healthcare professionals, their partner or grandmother, and their social network. Within the exosystem and beyond as influenced by society and public policies devised within the macrosystem, mothers may experience a lack of support from their community, and within it, their childcare setting, parish or faith community, hospital and clinic, workplace or school.

Although the decision to breastfeed is a personal one for every mother, the choice not to breastfeed often results from a lack of material, informational, or emotional support (Kong & Lee, 2004; Logsdon, Usui, Birkimer, & McBride, 1996). The use of supplemental formula feeding prior to discharge, or in the first month postpartum when milk supply is being established, has been associated with breastfeeding failure and premature weaning (Barber, Abernathy, Steinmetz, & Charlebois, 1997; Chezem, Friesen, Montgomery, Fortman, & Clark, 1998; Hill et al., 1997; Perez-Escamilla et al., 1993; Sheehan et al., 1999). There appears to be a negative impact of distributing formula samples to vulnerable mothers (i.e., those who are primiparious [first-time mothers], nonwhite, less educated, or ill during the immediate postpartum period) (Donnelly, Snowden, Renfew, & Woolridge, 2004). Indeed, the likelihood of not breastfeeding, according to Blomquist, Jonsbo, Serenius, and Persson (1994), is almost four times greater when supplementary feeds or formula are used in maternity centers than when supplements are not used. In Hornell's (2001) descriptive longitudinal, prospective study of 506 mother-infant pairs in Sweden, the main reason (38.1%) for the start of regular formula feeds was that the mother believed she was not able to provide enough milk to satisfy infant needs. As a result, as soon as habitual formula feeds were begun, a dramatic decrease in the frequency of breastfeeding and suckling duration was observed.

Early feeding of fluids other than breast milk wields a negative effect on breastfeeding. In a self-weighted nationally representative survey of 2,380 Honduras women, Perez-Escamilla, Segura-Millan, Canahuati, and Allen (1996) concluded that prelacteal feedings, whether water- or milk-based, negatively affected breastfeeding results during the first six months of life. Similarly, Chezem et al. (1998) conducted a prospective design of 53 participants that examined the influence of breast milk replacement and receipt of formula samples on lactation duration among women planning postpartum employment. According to Chezem et al. (1998), results indicated that, of the 19% of infants who received formula, the incidence of breastfeeding at six weeks and the duration of breastfeeding were significantly shorter in formula-fed infants. Of this population, 59% of participants received formula packets from the hospital; 30% received samples from a physician's office; and 51% received complimentary mailings. The authors noted that receipt of formula samples by mail was associated with a reduced incidence of breastfeeding at six weeks and a shortened duration of lactation overall.

Bartick et al. (2009) reported that, in some maternity centers, greater than 99% of breastfed infants receive formula. To combat this growing trend, certain progressive hospitals now handle infant formula the same way as medications: available only with a provider order. Formula is locked in a medication machine and strictly regulated. Meanwhile, some hospitals require parents and legal caregivers to sign a consent form, indicating they understand the inherent risk to their infant's health, before providing formula for non-medical reasons (Bartick et al., 2009). When such measures have been undertaken, the results speak for themselves. For instance, one hospital-based intervention to reduce formula supplementation of breastfed newborns found that breastfeeding at six months' duration increased from 66% to 87% when supplementation was discouraged (Nylander, Lindemann, Helsing, & Bendvold, 1991).

Suboptimal emotional and educational support (Mesosystem). Healthcare providers' advice and support have a considerable influence on a mother's decision to breastfeed and on her ability and desire to maintain breastfeeding (Arora et al., 2000; DiGirolamo, Grummer-Strawn, and Fein, 2003; Perez-Escamilla, Pollitt, Lonnerdal, & Dewey (1994). Phillipp, Merewood, & O'Brien, 2001; Register, Eren, Lowdermilk, Hammond, & Tully, 2000; Ryan, 1997). Because of this, Satcher (2001), former U.S. Surgeon General, advised, "To encourage breastfeeding, the health care system should support the training of health care professionals on the basics of lactation counseling and management, and establish hospital and maternity center practices that promote breastfeeding" (p. 72). The current Surgeon General., Dr. Regina Benjamin, concurs with her predecessors' remarks on the importance of provider support, writing, "Hospitals, work sites, and communities should make it easy for mothers to initiate and sustain breastfeeding as this practice has been shown to prevent childhood obesity" (USDHHS, Office of the Surgeon General, p. 1).

In a study of 2,017 parents, Lu, Lang, Slusser, Hamilton, and Halfon (2001) found that women were four times more likely to breastfeed if they were encouraged to do so by a nurse or physician. Regrettably, in a recent study, Feldman-Winter, Schanler, O'Connor, and Lawrence (2008) found that 45% of surveyed pediatricians agreed with the statement that breastfeeding and formula feeding "are equally acceptable methods" for feeding infants. Moreover, research suggested that some clinicians lack the skills to manage problems with breastfeeding (Freed et al. 1995; Schanler et al., 1999), with a number of providers viewing infant feeding as a consumer choice rather than a modifiable health behavior (Bartick et al., 2009) that can be influenced by nurses' support.

Women's early experiences with breastfeeding considerably affect whether and how long they will continue to breastfeed (Caulfield et al., 1998; Taveras et al., 2004). Lack of support from professionals who report reluctance to "push" mothers to breastfeed (Bartick et al., 2009) has been identified as a major barrier to breastfeeding, especially among African-American women. The inherent conflict between offering advice and overstepping patient boundaries is illustrated in Bartick et al's (2009) study when they reflected, "Efforts to change breastfeeding practices will have to address this tension between reinforcing medical recommendations and respecting patient autonomy" (p. 796).

McInnes and Chambers (2008) conducted a 15-year, qualitative study of socioeconomically disadvantaged women in an urban community (n = 49). Researchers studied mothers' and healthcare professionals' experiences and perceptions of breastfeeding support, and found that, despite increasing evidence supporting lactation, many mothers report dissatisfaction with their breastfeeding experiences. Mothers rated social support as more important than health service support due to time pressures, lack of availability, lack of guidance, promotion of unhelpful practices, and conflicting advice from different professionals (McInnes & Chambers, 2008).

One reason that high-risk infants receive formula and wean from breastfeeding early may be the perceived lack of support for breastfeeding that mothers sense from hospital nurses (Barbas & Kelleher, 2004). In England, Pantazi, Jaeger, and Lawson (1998) surveyed pediatric (n = 122) and neonatal (n = 55) nurses and midwives regarding their support for breastfeeding mothers; they found that 53% of pediatric staff had no relevant training in breastfeeding. In addition, they demonstrated inadequate knowledge of lactation in spite of the frequency nurses and midwives assisted mothers with breastfeeding. However, when mothers expressed milk for their ill infants, it gave them a sense of participation in their children's care that they would not have achieved with formula feeding alone. Mothers also self-reported increased satisfaction in their parental role when they were able to provide breast milk for their high-risk infants (Barbas & Kelleher, 2004).

Renfrew et al. (2009) conducted a systematic review of 48 articles to evaluate the effectiveness of interventions that promoted or inhibited breastfeeding of neonatal infants, and found "strong evidence that short periods of kangaroo skin-to-skin contact increased the duration of any breastfeeding for one month after discharge . . . and for more than six weeks among clinically stable infants" (Nov 2, Epub ahead of print). They also reported "strong evidence for the effectiveness of peer support at home . . . for mothers of term, low birthweight infants . . ." (Nov 2, Epub ahead of print).

According to *The Ten Steps to Successful Breastfeeding*, nurses, physicians, and others must have access to lactation services in order to receive BF designation. Baby Friendly U.S.A.'s External Review Board, composed of knowledgeable experts in the fields of medicine, public health, and nursing, has determined that any pediatrician, obstetrician, or family practice physician with a practice including breastfeeding families who has staff privileges at a hospital or birthing center, must be trained in the advantages and management of breastfeeding (Baby Friendly U.S.A, 2009).

There are many educational opportunities for healthcare professionals interested in gaining lactation training. Educating hospital staff through a three-day training program has been shown to enhance compliance with best practices and increase rates of breastfeeding (Cattaneo & Buzzetti, 2001). The following organizations provide options for those wanting to increase their knowledge: The Academy of Breastfeeding Medicine (ABM); The American Academy of Family Physicians (AAFP); The American Academy of Nursing (AAN); The American Academy of Pediatrics (AAP); The American College of Nurse-Midwives (ACNM); The American College of Obstetricians and Gynecologists (ACOG); The American College of Osteopathic Pediatricians (ACOP); The American Dietetic Association (ADA); The American Nurses Association (ANA); the Association of Military Surgeons of the United States (AMSUS); the Association of Teachers of Maternal and Child Health (ATMCH); the Association of Women's Health, Obstetrics, and Neonatal Nurses (AWHONN); the National Association of Pediatric Nurse Practitioners (NAPNAP); the National Black Nurses Association (NBNA); and Wellstart International (USBC, 2009).

According to Baby-Friendly U.S.A (2010), nurses who assist lactating mothers at any designated BF site should have a minimum of 21 hours of training as identified by UNICEF (In 2009, this number was 18). Physicians must have a minimum of three hours of continuing education. Other staff members should have a level of preparation appropriate to their workplace exposure to breastfeeding mothers and children.

Suboptimal educational delivery methods (Mesosystem and Exosystem). Breastfeeding support is provided by professionals (e.g., physicians, nurses, lactation consultants, and other allied health professionals) to mothers and their partners both during and after they return home. According to the CDC Guide to Breastfeeding Interventions by Shealy et al. (2005), lactation support, either in person at a clinic or in a home, over the telephone, or in a group setting, includes counseling, behavioral interventions, encouragement, and the management of lactation problems.

The U.S. Preventive Services Task Force found fair evidence that providing ongoing professional support to mothers through in-person visits or telephone contact increased the proportion of women who continued breastfeeding for up to six months (Guise et al., 2003). According to Shealy et al. (2005), the task force's meta-analysis of randomized controlled trials examining the impact of both in-person and telephone support on breastfeeding practices found that support alone, no matter the method, significantly increased breastfeeding duration by 11% for mothers who breastfed 2 to 4 months and by 8% for those who breastfed 4 to 6 months. Combined breastfeeding support and education programs were superior (but not significantly so) to support alone in initiation (mean difference of 6% to 21%) and short-term duration (mean difference 11% to 37%). According to Sikorski, Renfrew, and Pindoria (2003), a Cochrane review indicated that a mostly in-person intervention significantly increased breastfeeding duration while an intervention using mainly telephone contact did not. This is consistent with Bronfenbrenner's (1979) hypothesis on the importance of the teacher being present as a mentor over a period of time to foster support toward personal independence:

> Learning and development are facilitated by the participation of the developing person in progressively more complex patterns of reciprocal activity with someone with whom that person has developed a strong and enduring emotional attachment and when the balance of power gradually shifts in favor of the developing person. (p. 60)

No rooming-in provided by healthcare providers (Mesosystem and Exosystem). Breastfeeding is a demand/supply system, but this is dependent on whether the infant is appropriately latched and whether the infant is allowed to decide on the frequency and duration of feeds within their own microsystem. Insufficient contact between mothers and infant is a known barrier to lactation success (Gussler & Briesemeister, 1980). Immediate skin-to-skin contact between the mother and infant and practicing rooming-in has been associated with longer duration of breastfeeding (Anderson, Moore, Hepworth, & Bergman, 2004).

According to Hales, Kennell, and Sosa (1976), not only was breastfeeding enhanced by immediate and continued contact between the mother and child, but the relationship between the two was fostered in its entirety over time. Bronfenbrenner (1979) commented on this study's findings, writing:

> Mothers who had contact with their neonates immediately after birth showed significantly more affectionate behavior ("en face," looking at the baby, talking to the baby, fondling, kissing, smiling at the infant) when compared to the mothers in the delayed and control groups [...] No significant differences were noted between the delayed and control groups. This study indicates that the maternal sensitive period is less than twelve hours in length, suggests the

importance of skin to skin contact, and compels reconsideration of hospital practices that even briefly separate mother and infant. (p. 63)

Lack of educational and emotional support from partner or grandmother (Mesosystem). Longitudinal qualitative research suggests a social coercion for weaning. According to Morse and Harrison (1987), the attitudes of others toward the breastfeeding mother and the support she received are among the most important determinants of breastfeeding duration. Bronfenbrenner (1979) discussed the impact of an individual's mesosystem on behavior and decision-making when he defined a primary dyad, stating:'

> A primary dyad is one that continues to exist phenomenologically for both participants even when they are not together. The two members appear in each other's thoughts, are the objects of strong emotional feelings, and continue to influence one another's behavior even when apart. [...] Such dyads are viewed as exerting powerful force in motivating learning and steering the course of development, both in the presence and in the absence of the other person. (p. 58)

In a study by Mitra, Khoury, Hinton, and Carothers (2004), who assessed low-income women in 18 county health departments in Mississippi, researchers found that "intenders," versus those who had decided not to breastfeed, were more knowledgeable about breastfeeding benefits, faced fewer barriers to breastfeeding, and had more confidence in their ability to breastfeed. According to Mitra et al. (2004):

> The two groups differed the most with regard to the following questionnaire items: "I would be very proud of myself if I breastfed," "I feel that my baby's father encourages breastfeeding," "I would be able to breastfeed my baby and go

> to school or work." and "I feel that my mother wants me to feed my baby formula." (p. 67)

Support from the father within the mother's mesosystem and exosystem is associated with increased breastfeeding rates nationally and abroad (Alikasifoglu, Erginoz, Gur, Beker, & Arvas, 2001; Bar-Yam & Darby, 1997; Humphreys et al., 1998; Isabella & Isabella, 1994; Khoury, Mitra, Hinton, Carothers, & Sheil, 2002; Littman, Medendorp, & Goldfarb, 1994; Mahoney & James, 2000; Matich & Sims, 1992; Scott & Binns, 1999). According to Stein, Colarusso, McKenna, and Powers (1997), in most cultures before the 20th century, breastfeeding and bed-sharing were the norm, but changes in social, economic, and sexual expectations altered how fathers and society at large viewed lactation.

The *Blueprint for Action on Breastfeeding* discussed the importance of family and community support for women making decisions about breastfeeding. As with the father, support from the maternal grandmother is associated with increased breastfeeding rates (Khoury, Mitra, Hinton, Carothers, & Sheil, 2002; Mahoney & James, 2000; Riva, Banderali, Agostoni, Silano, Radaelli, & Giovannini, 1999). According to Satcher (2001), former U.S. Surgeon General:

> During prenatal and postnatal visits, we should be educating women, their partners, and other significant family members on the benefits of breastfeeding. We must find creative ways to encourage fathers and other family members to be actively involved throughout the breastfeeding experience. (p. 72)

This educational recommendation is consistent with Bronfenbrenner's (1979) hypothesis that specified the dyadic properties conducive to learning and development that states:

> Observational learning is facilitated when the observer and the person being observed regard themselves as doing something together. Thus the developmental impact of an observational dyad tends to be greater when it takes place in the context of a joint activity dyad (a child is more likely to learn from watching a parent cook a meal when the activity is structured so that the two are acting together). (p. 60)

From social network (Mesosystem). Research suggests that the opinions of others significantly affect the breastfeeding decisions of mothers. During structured interviews with 154 mothers from an urban low-income multiethnic population in the U.S., Guttmann and Zimmerman (2000) reported that a fear of mockery was one reason women chose to formula feed even though they expressed remorse over their choice. Ludington-Hoe, McDonald, and Satyshur (2002) reported that breastfeeding was not viewed positively among African-American women and that early formula and cereal supplementation was common as early as two weeks of age. Corbett's (2000) research using unstructured interviews of lactating women reported similar findings. In the sample of 10 low-income Black women, breastfeeding was not viewed positively, and mothers who chose to breastfeed did not receive support for breastfeeding from their social network.

Losch, Dungy, Russell, and Dusdieker (1995) proposed that members of a woman's social network must be educated on breastfeeding in order to encourage the mother. More recent research by Mitra, Khoury, Hinton, & Carothers (2004) mirrored this recommendation, suggesting that breastfeeding interventions should focus not only on education of the mother alone, but also on enhancing clients' confidence and overcoming the problem caused by a lack of social support, especially among low-income women.

In a longitudinal infant feeding study of 80 participants breastfeeding 9-month-old infants, Rempel (2004) noted that the longer mothers continued to breastfeed, the less support they perceived from others. These results strongly supported the findings from retrospective research such as that by Kendall-Tackett and Sugarman (1995) suggesting increasingly less social approval for long-term breastfeeding past the newborn stage. In their study of 179 women who were recruited from La Leche League, the percentage of women who cited "social stigma" as a negative feature of breastfeeding increased significantly as the age of their child increased (44% for breastfeeding past 12 months and 64% for breastfeeding past 24 months).

Tarrant, Dodgson, and Choi's (2004) research in China, however, found that, while a substantial proportion of breastfeeding women prematurely terminated lactation, some women were able to breastfeed for longer periods. The aim of their research was to explore the experience of breastfeeding in Hong Kong and to ascertain the characteristics of women who breastfed for longer than six months. In-depth qualitative interviews were conducted of women (n = 17) who were recruited from a larger infant-feeding study of 360 women. Data analysis revealed four themes that encompassed the mother's experiences: (a) making the decision, (b) maintaining family harmony, (c) overcoming barriers, and (d) sustaining lactation. While pregnant, women anticipated that nursing a baby would be cumbersome and described how the practice did not fit with the image of a "professional woman" in Hong Kong. Despite a lack of societal acceptance, difficulties were overcome in this setting by what the Chinese people call "hung-sum" or determination.

Exosystem Analysis: How the Physical Environment Impacts Lactation Status

The Exosystem is the third sphere within the Bronfenbrenner theoretical framework. Within this context, the Exosystem consists of a lactating mother's community or neighborhood, her employment, school setting, and childcare setting.

Community or Neighborhood (Exosystem)

In Goldade et al.'s (2008) longitudinal qualitative study of 44 low-income, smoking women in the U.S., an issue reported by more than three-fourths of the sample (79%) was the stigma of breastfeeding in public. Results showed that despite 36 (82%) of respondents stating that they intended to breastfeed for an average of eight months, rates of initiation and duration were much lower than intentions. By six months postpartum, only two women were breastfeeding exclusively. Authors noted that low-income mothers spent a lot of time in public places, such as healthcare offices, on public transportation, and in grocery stores that they frequented often to buy small purchases that they could carry home without the use of a car. One woman explained her motives for supplementation, stating, "It's like when you're at home, it's more convenient, but when you're out, it's really not convenient at all. It's kind of embarrassing."

In McCann et al.'s (2007) WIC Infant Feeding Practices Study, which was a one-year longitudinal national study of WIC participants, 61% of mothers reported concern about not wanting to breastfeed in public. One reason for this response from lactating mothers may be reflected by the national HealthStyles surveys conducted in 1999 and 2003, where one-third of the general population agreed that "mothers who breastfeed should do so in private places only," and just under half agreed that "I am comfortable when mothers breastfeed their babies near me in a public place, such as a shopping center, bus station, etc."

McCann et al. (2007) voiced concern, saying, "It is disturbing that the national HealthStyles surveys of the general population indicate that support for breastfeeding may be declining" (p. 113). To illustrate, Shealy et al. (2005) documented that public agreement with the statement "Infant formula is as good as breast milk" increased significantly from 14.3% in 1999 to 25.7% in 2003 and increased further to 28.3% in 2005. This perception was universal in all three ethnic groups analyzed; yet, the increase was greatest for Blacks (16.7% in 1999 to 30.0% in 2003), intermediate for Whites (13.4% to 25.1%), and lowest for Hispanics (19.5% to 27.1%; Li et al., 2007).

In 2009, Fairbrother and Stanger-Ross reported their findings of an experimental design that assessed the knowledge, attitudes, and infant feeding intentions of Canadian, female undergraduate students (n = 285). Surveys were randomly distributed to students. One version contained a snapshot of a woman breastfeeding an infant (n = 131) and the other a woman bottle feeding (n = 154). Although findings indicated that the majority of the respondents had themselves been breastfed (84%) and they intended to breastfeed their own infants (97%), and that participants reported more positive attitudes toward the photographs of the breastfeeding woman when compared to the bottle feeding visual depiction, they expressed less positive views of the woman who breastfed in public compared with the woman who bottle fed in public. The authors concluded that these findings highlight a knowledge deficit that may contribute to premature cessation of breastfeeding among Canadian women. Further education was advised.

A similar study by Tarrant and Dodgson (2007) explored the relationship among university students' infant feeding knowledge, attitudes, exposure to breastfeeding, and future infant feeding intentions of male and female Chinese university students in Hong Kong. Participants were young (94.4% were less than 25 years old), undergraduate students (92.2%) who were unmarried (99.2%) and without children (100%). Results indicated that 63% of the 403 total participants wanted their future children to be breastfed, with those intending to breastfeed scoring higher on knowledge of breastfeeding (71.1%) and reporting that they had been breastfed or that they knew of someone who had breastfed. The authors concluded that future infant campaigns should be directed at the societal level to change negative attitudes more than increasing educational efforts specifically aimed at childbearing couples who have likely already made their decision.

Employment, School, and Childcare Setting (Exosystem)

Returning to work is one of the greatest barriers to breastfeeding (Auerbach & Guss, 1984; Fein & Roe, 1998; Gielen et al., 1991; Roe et al., 1999; Ryan & Martinez, 1989; Visness & Kennedy, 1997). Often, Western cultures associate the act of breastfeeding with the home environment (Schewel, 1997). For some people, breastfeeding or expressing milk outside this private domain threatens traditional views of women's roles. Some fear that the gender-specific behavior of breastfeeding will contradict the equality framework in the American workplace (Schewel, 1997).

McKinley and Hyde (2004) discussed this dilemma in their research comparing a personal attitudes model (i.e., infant feeding choices are based on individual mind-sets) and a structural factors model (i.e., feeding choices are produced by the structural contexts of women's lives as much as personal attitudes), stating:

> Breastfeeding has been neglected in feminist analyses, probably because breastfeeding poses significant dilemmas for feminists (Blum, 1993; Galtry, 1997; Laws, 2000). One dilemma derives from the issue of whether women and men should be treated equally (this is, identically) or differently (Blum, 1993; Galtry, 1997) although one might argue that equal treatment should include treatment according to one's needs. Reproductive behaviors, such as pregnancy, childbirth, and breastfeeding all pose a challenge to the concept of equal treatment espoused by U.S. feminists. (pp. 388-389)

Working women are aware that breastfeeding provides numerous health benefits to their children (Ball & Wright, 1999; Beaudry, Dufour, & Marcoux, 1995; Dewey, Heinig, & Nommsen-Rivers, 1995; Duffy, Faden, Wasielewski, Wolf, & Krystofik, 1997), and many women want to continue to provide breast milk while being employed. Because of real or perceived threats in their exosystem, many women anticipate an unsupportive workplace following their return from maternity leave and terminate breastfeeding while preparing mentally and physically for their return to work (Mills, 2009).

For women who continue to breastfeed, managing milk expression during work may prove cumbersome in finding time and physical space. While many states and countries around the world have passed laws to ensure protection for nursing mothers who choose to express breast milk at work, many others have not. As a result, many women either quit breastfeeding or attempt to secretly modify their places of work in order to make them more conducive to the expression of milk without the assistance of mandated accommodation (Mills, 2009).

The percentage of women in the U.S. workforce has increased from 29% in 1975 to 65% in 2000 (Galtry, 2003); it is estimated that 25% of all women in the U.S. with a child younger than one year will be concurrently breastfeeding and employed for at least one month (Zinn, 2000). Although the U.S. enacted legislation in 1993 with the passage of the Family and Medical Leave Act (FMLA) that provides up to 12 weeks of unpaid leave for both men and women, the U.S. has been relatively sluggish in developing policies to support parents. In comparison, families in Ireland receive 18 weeks of leave at 70% of pay and families in Sweden receive up to 480 days of leave at 90% pay (Galtry, 2003). Their high breastfeeding rates reflect their policies.

The decrease in the breastfeeding rate before the 1970s is often attributed to the difficulty of combining breastfeeding with maternal employment (Hirschman & Butler, 1981). Indeed, numerous studies have found a negative relationship between maternal employment and breastfeeding duration (Barber-Madden, Petschek, & Pakter, 1987; Gabriel, 1986; James, 2004; Lindberg, 1997; Raju, 2006; Roe et al., 1999; Wright, 1998). Results from these studies concluded that women who were employed are not as likely to breastfeed as are unemployed women, primarily because of time constraints and job requirements (Bryant, 1982; Hirschman & Butler, 1981; Roe et al., 1999; Ryan, 1989).

Although studies support that employment no longer decreases lactation initiation, research suggests that employment significantly decreases the duration of breastfeeding, especially at three and six months postpartum (Kimbro, 2006; USDHHS, 2000; Wright, 2001). For instance, Ortiz (2004) found that women in the U.S. who reported awkwardness about expressing breast milk at work weaned their infants an average of 10 weeks sooner than those who felt at ease (Roe et al., 1999). Similarly, Arlotti, Cottrell, Lee, and Curtin (1998), in their descriptive, longitudinal study comparing infant feeding practices of women who received peer support during the first three months postpartum with women who did not, found that a mother's career plans had the greatest effect on the duration of breastfeeding. In this study, women who intended to return to work, attend school, or both, breastfed 6 to 9 weeks less than mothers who intended to stay home.

Duberstein and Hermalin (1994) completed a dissertation that examined breastfeeding and maternal employment in the U.S. from 1968 to 1986 and found that most postpartum women stopped breastfeeding before they entered employment. Women were most likely to quit breastfeeding in the month prior to their return to work. Duberstein and Hermalin (1994) found part-time employment to be a method of balancing the demands of breastfeeding and employment for many women, with part-time employees showing a higher incidence and longer duration of breastfeeding than women employed full time.

Utilizing data from the Sri Lankan demographic and Health Survey, Zaki (1998) wrote a doctoral dissertation researching the mechanisms through which maternal employment affected child development and survival in Sri Lanka. Zaki (1998) found that maternal employment negatively affected the health status of children in large households and that non-breastfeeding status contributed negatively to the nutritional status of the children.

Lastly, J. M. Smith's (1986) dissertation examined the impact of socioeconomic status and other factors, including employment and counseling available to mothers, on the breastfeeding behavior of urban Tunisian women. It is common for those women to initiate and continue to breastfeed for longer durations than in the U.S. According to J. M. Smith (1986), 95% of Tunisian women breastfeed after delivery, and 70% continue to at least 6 months' duration. Among Tunisian women in this study, work appeared to have little effect on breastfeeding duration, secondary to the widespread rights of maternity leave and breastfeeding breaks. Unlike many mothers in the U.S., Tunisian women often continue to breastfeed after they return to work, with non-working women weaning at intervals similar to those of working women.

According to former U.S. Surgeon General Satcher (2001):

> We need to address the breastfeeding challenges for mothers who return to the workplace. . . . We should establish family and community programs that enable breastfeeding continuation when women return to work, and facilitate on-site breastfeeding or breast milk expression. Employers should offer flexible work hours, job sharing, adequate breaks, and education for personnel about why their breastfeeding co-workers need support. The workplace can also provide private "Mothers' Rooms" for expressing milk in a secure and relaxing environment, and refrigerators for storage of breast milk. (p. 72)

According to Bar-Yam (1997) and Cohen, Mrtek, and Mrtek (1995), as cited in the CDC Guidelines by Shealy et al. (2005), several studies indicated that support for lactation at work profits individuals and families, as well as their employers, via improved productivity and staff loyalty; enhanced public image of the employer; and decreased absenteeism, healthcare costs, and employee turnover.

In a study of resident physicians in postgraduate study, Miller (1996) researched how employment affected the breastfeeding practices of physicians in training. Questionnaires (n = 1500) were mailed to females in the 1990 graduating class of American-based medical schools (45% return rate), in which 60 female students had delivered a child during their residency. Of the 60, 48 (80%) of the residents initiated breastfeeding, and continued for the duration of their maternity leave. In this study, the mean duration was 7 weeks. Returning to residency, half (n = 24) of those who had initiated breastfeeding discontinued, and at 6 months, 15% (9 of the 60) had quit. The most common reason (80%) for lactation termination was reported as work schedule. Of the 24 who continued breastfeeding upon returning to work, 83% pumped during their shift; 79% reported insufficient time to pump; and 42% reported no appropriate place at work to express milk. According to this group, only 54% of those who continued to breastfeed and/or express milk felt supported by their attending physician for their efforts to breastfeed, and 67% felt colleagues were supportive (Miller, 1996).

According to Libbus and Bullock (2002), only 30% of employers in the U.S. provide a private place to express milk, and only 25% believe that there is value in promoting breastfeeding in the workplace. Even in hospital and childcare settings, where one would imagine the physical environment to be conducive to breastfeeding, research suggests otherwise (Dodgson, Chee, & Yap, 2004; McPhillips et al., 2007). According to Satcher (2001):

> With a large number of infants enrolled in childcare, it is important that childcare facilities be supportive of breastfeeding. Childcare centers should make accommodations for mothers who wish to come in and breastfeed, or be supportive of mothers who want their children to be fed expressed milk. (p. 73)

Satcher (2001) concluded, "Above all, we must send a message that breastfeeding is normal, desirable, achievable, and a natural part of community life" (p. 73).

Macrosystem Analysis: How Society Impacts Lactation Status

The final sphere in Bronfenbrenner's theoretical framework is the Macrosphere. This part of the Literature Review encompasses four main sections, including a) a review of the history of lactation, including the research pioneers who have laid the foundation for this work; b) an evaluation of the impact of a mother's culture and social norms; c) an examination of public policy and current legislation; and d) an analysis of the impact of advertising, media, and free formula.

Breastfeeding World History: Research Pioneers

Throughout history, many women and men have served in roles that have developed and advanced lactation research and evidence-based care. One such pioneer in the field of human milk was Icie Gertrude Macy (Williams, 1984). Under Dr. Macy's 31-year leadership as head of Nutrition Research at the Merrill-Palmer School for Motherhood and Child Development in the Children's Hospital of Michigan, her laboratory conducted fundamental research into the metabolism of women during the reproductive cycle, nutrition and infant growth and development, and research on the secretion and composition of human milk. In addition to many published journal articles, she and her colleagues published several key books on the subject, including *The Composition of Milks* (1953). Macy's achievements have led to much recognition in the field of lactation (Williams, 1984).

Another pioneer in the field of human milk research was Dr. Paul Gyorgy (Barness & Tonarelli, 1979). Dr. Gyorgy was born in Hungary in 1893. He attended the Budapest Medical School and received a Doctor of Medicine degree in 1915. He was one of the first people to recognize the predominance of *Bifidobacilli* in the large intestinal tract of breastfed infants (Barness & Tonarelli, 1979). While working as Chief of Pediatrics at Philadelphia General Hospital, Gyorgy discovered the anti-staphylococcal properties and polyamines in human milk. He was active in field studies to improve nutrition in developing countries and was an organizer of the Protein Advisory Group of the WHO/UNICEF, where he was president from 1960 to 1964. Dr. Gyorgy authored or co-authored 13 books and more than 450 peer-reviewed scientific articles. He was one of the first scientists to discuss the superiority of human milk for infants. As a pediatrician, he attempted to document the social-ecological factors of disease and their inverse relationship to breastfeeding. Dr. Grorgy received many distinguished awards for his scientific and humanitarian accomplishments in the field of nutrition and human milk (Barness & Tonarelli, 1979).

Advertising, Media, and Free Formula (Macrosystem)

In the 1970s, increased global attention was directed at breastfeeding when questionable advertising strategies of formula companies in disadvantaged countries led to an international boycott of *Nestle* products (Phillip et al., 2001). In response, the

WHO/UNICEF organized a global assembly on infant and young child nutrition, with scientific experts, governmental and nongovernmental organizations, and infant food industry representatives in attendance (Baumslag, 1995; Palmer, 1993). From this gathering, *The International Code of Marketing of Breastmilk Substitutes*, also known as "The Code" (Table 6), was developed to control inappropriate marketing practices of infant formula and other products used as breast milk substitutes.

Almost 10 years later, on May 21, 1981, the World Health Assembly voted to adopt *The Code* with a 118 to 1 vote. The lone "no" vote was cast by the U.S., whose representatives claimed *The Code* would violate free speech and infringe on free trade practices. Two officials of the Agency for International Development resigned in response to the United States' vote (Phillip et al., 2001). Meanwhile, the U.S. House of Representatives condemned the Administration's position by a vote of 301-100, and the Senate expressed its concern with a vote of 89-2 (Phillip et al., 2001).

In 1994, the "no" vote cast by the U.S. was reversed by President Clinton when he signed a follow-up amendment that included an endorsement of the original code. This reversal was called symbolic at best, however, (Phillip et al., 2001) because, as of 1997, only 16 countries had achieved "full compliance" with *The Code* by adopting laws aimed at enforcing all or nearly all of its provisions; some countries had taken "some action" (i.e., Israel, Norway, and Spain had officially prohibited formula donations to hospitals.); and nine countries had taken "no action" (e.g., the U.S., Croatia, Chad, Central African Republic, Estonia, Romania, Kazakstan, Republic of Moldova, and Somalia) (The Progress of Nations, 1997).

Table 6

Summary of the International Code of Marketing of Breast Milk Substitutes

1. No advertising of breast milk substitutes to families.
2. No free samples or supplies in the healthcare system.
3. No promotion of products through healthcare facilities, including no free or low-cost formula.
4. No contact between marketing personnel and mothers.
5. No gifts or personal samples to health workers.
6. No words or pictures idealizing artificial feeding.
7. Information to health workers should be scientific and factual only.
8. All information on artificial feeding, including labels, should explain the benefits of breastfeeding and the costs and hazards associated with artificial feeding.
9. Unsuitable products should not be promoted for babies.
10. All products should be of high quality and take account of the climate and storage conditions of the country where they are used.

Merewood (2005)

According to the UNICEF website accessed January 2011, some innovative strategies that have been developed to implement the purpose of *The Code* have been:

- In Iran, the Government restricts the import and sale of breastmilk substitutes. Formula is available only by prescription, and all tins must be generically labeled. No brand names, pictures, or promotional materials are allowed.

- In India, legislation requires that tins of infant formula carry a warning label about the potential risks of artificial feeding.
- In Papua New Guinea, the sale of feeding bottles, cups, teats and dummies is strictly controlled. No advertising of formula or these items is allowed.

Recently, Cattaneo et al. (2005), on behalf of the Promotion of Breastfeeding in Europe Project, sent questionnaires to key informants in member states and countries in order to gather data on the current situation regarding the protection, promotion, and support of breastfeeding in Europe. The goal was to employ data to develop a blueprint for action on breastfeeding that countries could use as a model for planning initiatives at national and local levels. Through this investigation, Cattaneo et al. (2005) found that European countries did not fully comply with the recommendations and policies of the Global Strategy on Infant and Young Child Feeding that they endorsed during the 55th World Health Assembly in 2002. Similarly, the BFHI was found to be well developed in only four countries (e.g., Switzerland, where 40% of births occur in Baby-Friendly Hospitals [BFHs]; Norway, where 75% of births occur in BFHs; Sweden, where 100% of births occur in BFHs; and Slovenia, where 85% of births occur in BFHs), with less than 15% of births occurring in BFHs in 19 countries.

Another noteworthy event in lactation history occurred in 1993 in Spedale degli Innocenti, Florence, Italy, at a summit co-sponsored by the U.S. Agency for International Development and the Swedish International Developmental Authority. The result of the meeting was the construction and adoption of the *Innocenti Declaration* which sought to protect, promote, and sustain breastfeeding through the development of goals identified for all governments to attain by 1995. The four recommendations were

(a) to assign a national breastfeeding coordinator and found a national breastfeeding committee, (b) to assure that hospitals and birthing centers fully practice *The Ten Steps to Successful Breastfeeding* (Table 2), (c) to take action to uphold *The International Code of Marketing of Breast Milk Substitutes*, and (d) to enact and enforce legislation protecting the breastfeeding rights of employed women (Cadwell, 1999).

Public Policy: Worldwide Campaign of the Baby Friendly Hospital Initiative (Macrosystem)

In 1991, the WHO/UNICEF cooperatively launched a worldwide campaign to improve the care of mothers and babies in response to feedback from the Convention on the Rights of the Child; the Declaration of the World Summit for Children; and the recommendations of the *Innocenti Declaration* -- the Baby Friendly Hospital Initiative (WHO, 1991).

"Baby Friendly" is a designation a hospital or birthing site can achieve if it can demonstrate full compliance with the guidelines and standards summarized in *The Ten Steps to Successful Breastfeeding* (Table 2). According to Shealy et al. (2005), the term "baby friendly" was chosen, in part, because it could be appropriately converted into multiple languages all over the world. Indeed, the BFHI *Ten Steps* have been accepted globally as the "gold standard" for breastfeeding practices (Lazarov, 1993; Saadeh, 1996). Data, showing that adherence to *The Ten Steps* predicts breastfeeding duration and exclusivity long after hospital discharge, continues to accumulate (DiGirolamo, Grummer-Strawn, & Fein, 2001; Kramer, et al., 2008; Merewood, Mehta, Chamberlain, Philipp, & Bauchner, 2005; Murray, Ricketts & Dellaport, 2007; Rosenberg, Stull, Adler, Kasehagen, & Crivelli-Kovach, 2008; WHO, 1998).

Although UNICEF approached governmental officials about the possibility of implementing the BFHI in the U.S. early after its inception, the U.S. determined that execution of the BFHI would be best undertaken by a non-governmental agency. According to Gartner (1995), The Healthy Mother-Healthy Baby Coalition was awarded the BF contract, and beginning in 1993, an expert work group was established to study the feasibility of the initiative in the U.S.

The BF Expert Work Group's final recommendations, released in 1994, were to revise *The Ten Steps*, change the name, have hospitals assess themselves without external assessment of compliance, and not prohibit the availability and promotion of infant formulas in hospitals and birthing centers. As a result, seven organizations as well as the AAP refused to endorse the work group's final report, and at least one physician questioned the influence formula manufacturers may have had on the work group's final recommendations (Young, 1993, 1995).

According to Phillipp et al. (2001), it was then that Wellstart International and Dr. Audrey Naylor, who were involved in the initial development of the international BFHI concept, were approached and asked to cultivate a U.S. on-site evaluation tool and external assessment criteria. With this completed in 1997, the accountability for Baby-Friendly U.S.A was assumed by a group overseen by Dr. Karin Cadwell using the original UNICEF guidelines, except for a minor revision of Step four to recommend the commencement of breastfeeding within one hour of life, instead of the international guideline of within one-half hour of birth.

To receive BF designation, which is known as the oldest and most scrupulous form of recognition for breastfeeding excellence in the world (Bartick, Stuebe, Shealy, Walker, & Grummer-Strawn, 2009), a hospital or birthing site must apply for a certificate of intent, implement *The Ten Steps to Successful Breastfeeding*, and complete an on-site evaluation visit. Finally, multiple chart reviews as well as staff and patient interviews are undertaken prior to official designation (Shealy et al., 2005).

Since early 2010, to achieve the BF designation, facilities must register with BFUSA; complete all of the requirements using the new "4-D Pathway;" and ultimately demonstrate during an on-site assessment that they have correctly integrated all ten steps into their practice. The new 4-D Pathway maintains all of the high standards of global health experts but breaks down the process into manageable steps. The first step is called the Discovery Phase where facilities register with BFUSA to learn more about the process. The second step is the Development Phase where facilities make a commitment to the process by providing a registry of intent. The third step is the Dissemination Phase where facilities implement the plans they have developed during the prior phase, and the finally step, is the Designation Phase where facilities review their implementation of the steps and implement a quality assurance program. When they are ready, they undergo an on-site assessment conducted by the BF team and a review by an external review board.

In 2004, of the approximately 18,000 BF Hospitals worldwide, only 42 were located in the U.S. Research studies conducted in U.S. BF facilities found that BF designation was associated with elevated breastfeeding rates (Phillipp et al., 2001, 2003; Merewood et al., 2003). In other nations (Braun, 2003; Cattaneo, 2001; Kramer et al., 2001), BF designation results in increased breastfeeding duration and improved health outcomes (Kramer et al., 2001). Other studies have indicated a causal effect between BF status and elevated breastfeeding rates (Kramer et al., 2001; Merewood et al., 2003;

Phillip et al., 2001). Nevertheless, Bartick et al. (2009) warn, "The paucity of U.S. Baby-Friendly hospitals reflects an endemic problem throughout American health care: there is a significant gap between evidence-based recommendations and actual practice" (p. 794).

Culture and Social Norms: United States Perspectives (Macrosystem)

In the early 1900s, more than two-thirds of mothers in the U.S. breastfed their infants (Hirschman & Butler, 1981). Decreasing rates of breastfeeding began to occur following World War II when more women of child-bearing age remained in the workforce (Wright & Schanler, 2001), and in 1972, breastfeeding initiation rates reached an all-time low when only 22% of women breastfed. Rates began to increase again, from 33.4% in 1975, to 54% in 1980, and 59.7% in 1984 (Martinez & Krieger, 1985) with increased education and support for breastfeeding.

Although a rise in national breastfeeding rates has occurred since the mid 1970s, rates remain low when compared to other developed countries like Sweden where there is a >98% initiation rate and a 6-month breastfeeding duration rate of 80%. In contrast, approximately 60% of women in the U.S. breastfeed either exclusively or in combination with formula feeding at the time of hospital discharge; only 25% of mothers breastfeed their babies at 6 months (often supplementing with formula); and, only 12% of mothers breastfeed to one year (USDHHS, 2000).

According to Phillipp et al. (2001), the history of monitoring lactation initiation and duration rates in the U.S. along with implementing the BFHI includes controversy. Obtaining accurate and unbiased national breastfeeding prevalence rates has been reported as flawed by lactation experts because breastfeeding-related data are collected and analyzed by Ross Products Division, Abbott Laboratories, a U.S.-based formula company (Cadwell, 1999). Researchers suspect these data may represent exaggerated conclusions about national breastfeeding initiation frequencies, especially when any newborn who has received even a "sip" or more of human milk before hospital discharge is classified as a "breastfed newborn" according to current definitions. It is alleged that national initiation rates may be far less than currently reported (Phillipp, Merewood & O'Brien, 2001).

According to BFUSA (2009), by December 1998, more than 13,000 hospitals worldwide were designated as BF Hospitals by UNICEF, most of which were in developing countries. Although 70 or more hospitals in the U.S., including one hospital in Minnesota (Dodgson, 1999), had filed letters of intent to become BF-designated institutions, only 20 had completed this process by August 1999. As of 2001, greater than 16,000 sites worldwide had received BF designation, but as of June 2000, only 25 of these sites were located in the U.S. (Phillip et al., 2001). Yet progress is being made. Since October 2010, there were 84 documented BF Hospitals in the U.S. and since December 3, 2010, there were 102.

According to the Shealy et al. (2005), there are many different types of facilities that have achieved BFHI status in the U.S., including very small facilities serving low-risk, high-income, privately insured clients as well as very large facilities serving mostly high-risk, low-income, publicly insured, or uninsured clients. Even military facilities and freestanding birth centers have achieved BFHI status. Regardless of facility type, however, one finding is consistent: those facilities that have achieved BFHI designation have seen improved outcomes for their newborns and mothers as well as greater patient and staff satisfaction (Kramer et al. 2001).

Studies of the Baby Friendly Hospital Initiative in the United States (Macrosystem). Baby-Friendly Hospitals (BPHs) in the U.S. have elevated rates of breastfeeding initiation and exclusivity regardless of demographic factors (Merewood et al., 2005). Merewood (2005) analyzed breastfeeding data from U.S. BFHs in 2001 (n = 32) to establish whether breastfeeding rates at BFHs differed from standard U.S. rates. Findings revealed that the mean breastfeeding initiation rate in 2001 was 83.3% among BFHs compared with 69.5% elsewhere. In addition, the mean rate of exclusive breastfeeding during the hospitalization (16 of 29 hospitals) was 78.4%, compared with a national mean of 46.3%. Breastfeeding rates were not associated with the number of births per birth center or with the number of low-income or Black clients. In this study, geographical location was considered a possible confounder for elevated breastfeeding rates (Ross Mothers Survey, Cleveland, OH, 2002; Ryan, 2002).

The Merewood (2005) study reported Steps two, six, and seven as the most difficult Steps of *The Ten Steps to Successful Breastfeeding* for U.S. BF institutions. The most common reason mentioned for not meeting Step six, in particular, was the requirement that BF-designated hospitals pay fair market value for all infant formula. Conversely, initiating breastfeeding within the first hour of life, promoting exclusive in-hospital breastfeeding, and having a printed breastfeeding policy are the Steps generally found to have the greatest determination on success (DiGirolamo, Grummer-Strawn, & Fein, 2001, 2008; Grizzard, Bartick, Nikolov, Griffen, & Lee, 2006).

Vietas and Henly (1995) conducted research in which all North Dakota obstetric services were questioned using the Newborn Feeding Survey (NFS) to determine breastfeeding-related practices compared with the BFHI *Ten Steps*. They observed poor adherence to nearly all components of *The Ten Steps*, with only 15% of participants reporting adherence to at least 5 of the 10 criteria. Degree of implementation was highest (39%) for Step 4, breastfeeding no greater than 60 minutes after delivery, and lowest for Steps 1, policy (2.4%); 9, non-pacifier usage (4.9%); and 10, community referral to support groups (0%).

Dodgson (1999) evaluated 79 (83%) Minnesota-based hospitals and reported an average breastfeeding rate of 59%. In 1994, it was determined that four of *The Ten Steps* were implemented in Minnesota with a low adherence rate (0-49%), that five were implemented with a moderate rate (50-89%), and that none were implemented with a high rate (90-100%). Specifically, Steps 1, 2, 4, 5, and 8 were implemented in over one-half of the surveyed hospitals, but Steps 6, 7, 9, and 10 had less than 50% adherence statewide. According to Phillipp et al. (2001):

> A major obstacle to the Baby Friendly Initiative in the United States has been the reliance on free formula and other formula company products and gifts that are accepted by many hospitals. When compliance with The Ten Steps is achieved, the results are dramatic. The first Baby-Friendly Hospital in the United States, Evergreen Hospital in Kirkland, Washington, has a breastfeeding initiation rate of >90%. (p. 677)

DiGirolamo, Grummer-Strawn, and Fein's (2001) longitudinal research of 1085 women revealed that, of women who experienced varying degrees of *The Ten Steps*, mothers who experienced none of the Steps were almost eight times more likely to terminate lactation before six weeks postpartum. Conversely, the greater number of Steps the mother encountered, the greater the continuation of breastfeeding at and beyond six weeks postpartum. In this study, the strongest factors for premature breastfeeding cessation were late breastfeeding initiation and supplementation of the infant with substances other than breast milk.

When all of the recommendations of *The Ten Steps* are followed, the impact is profound. Philipp, Malone, Cimo, and Merewood (2003) discussed lactation outcomes at Boston Medical Center (BMC), which became the 22nd BF-designated hospital in the U.S. in 1999, and found significantly increased breastfeeding initiation rates, ranging from 58% in 1995 to 86.5% in 1999. Two hundred medical records of full-term, healthy infants who were born at BMC in 2000 and 2001 were reviewed. All infant feedings during the hospital postpartum stay were totaled, and each infant was then classified into one of four groups: (a) exclusive breastfeeding, (b) mostly breast milk, (c) mostly formula, and (d) exclusive formula. Breastfeeding initiation rates remained at high levels--87% (1999), 82% (2000), and 87% (2001)--with infants who received more breast milk than formula sustaining lactation for longer periods of time: 73% (1999), 67% (2000), and 67% (2001). The authors concluded that at hospitals where all of *The Ten Steps to Successful Breastfeeding* were followed as a stipulation of BF designation, the greater the extended positive impact on breastfeeding rates in a U.S. setting (Philipp et al., 2003).

Studies of the Baby Friendly Hospital Initiative Abroad (Macrosystem). The geographical macrosystem for the mothers participating in this study was the U.S.;

however, the literature review will permit international studies as necessary to the discussion, considering that many policies and recommendations for lactation and evidence-based practice originated abroad.

According to Hornell (2001), lengthening of breastfeeding duration has been observed for several decades in Sweden, with a marked increase since 1992 when the BFHI was launched. At present, 100% of Swedish hospitals and maternity centers are BF designated. According to Flacking et al. (2007), breastfeeding is regarded as the cultural norm in Sweden, with a high breastfeeding frequency of 98% of infants being breastfed at one week of age and 72% of infants being breastfed at six months of age (The National Board of Health and Welfare, 2003).

After two years of BFHI implementation in China, UNICEF reports that exclusive breastfeeding rates have doubled in rural areas and increased from 10% to 47% in city regions. In Nicaragua, breastfeeding rates have increased from 47% prior to implementation of BFHI to nearly 100% in 1999. In Poland, between 1995 and 1998, BFHI implementation resulted in increased rooming-in rates from 19% to 60%, and supplementation of infants with formula diminished from 54% in 1988 to 22% in 1998. In Zambia, BFHI implementation was recognized for increasing the exclusive breastfeeding rate of 16% in 1992 to 35% in 1997 (UNICEF, Programme-Division, 1999). In the Republic of Belarus, a randomized trial examined the outcome of implementing *The Ten Steps to Successful Breastfeeding* in 31 Belarussian maternity units and clinics. Results indicated that infants born at the BF sites were more likely than control infants to be breastfed to any degree at 12 months, were more likely to be exclusively breastfed 3 months and 6 months, and had a significant reduction in the risk of one or more gastrointestinal tract infections and atopic eczema (Kramer et al. 2001).

In 1993, the BFHI was introduced in Switzerland with similar results observed. Merten, Dratva, Ackermann-Liebrich (2005) reported findings for a national study about the prevalence and duration of breastfeeding in 2003 throughout Switzerland to assess compliance with WHO/UNICEF guidelines of hospitals, comparing breastfeeding results between hospitals that were designated as BF with those that were non-BF health facilities. Findings revealed increased rates and duration of breastfeeding nationwide for the last 10 years, with children born at BF health facilities breastfeeding longer, especially if the hospital complied with WHO/UNICEF guidelines.

Abolishing hospital-based promotion of infant formula and paying fair market value for formula would aid hospitals and birthing centers to implement evidence-based care (Phillipp et al., 2001, 2003). Typically, most hospitals in the U.S. receive their well-infant formulas free of charge (or significantly discounted) from name brand manufacturers and, in return, are expected to dispense commercial discharge bags that advertise that brand, thereby implying both active and passive endorsement from the health facility. In BF designated hospitals, the cost of acquiring formula is charged to the patient as a component of a room and board fee, the same way food for other patients is handled. Finally, proponents note that implementing *The Ten Steps* as part of BFHI designation decreases HMO costs of unused products, such as pacifiers, nipples, and discharge packs, and saves on labor costs and storage space necessary for discharge items (Phillipp et al., 2001, 2003). Brennan et al. (2006) and Rothman et al. (2009) encouraged best practices in their writings, suggesting hospital leaders and other health professionals distance themselves from formula industries to circumvent conflicts of interest that could compromise patient care.

United States Breastfeeding Legislation (Macrosystem)

While numerous health organizations have policy statements that address their position on breastfeeding, the AAP's recommendations are some of the most frequently cited. The AAP issued a policy statement first in December 1997 and most recently in February of 2005 strongly supporting the "physiological benefits conferred by human milk." This comprehensive statement reports human milk to be "uniquely superior" for infant feeding and advises that all substitute feeding options differ distinctly from it (Gartner, 2005, p. 1035). Along with outlining the numerous benefits of human milk, the AAP also included the recommendation that infants be breastfed for 12 months or beyond and that workplaces support women's efforts to breastfeed.

Because of the many scientifically documented benefits of breastfeeding from nursing, medical, and nutrition-based organizations, specific national and state objectives have been devised to increase breastfeeding initiation and duration rates. Legislators who recognize the importance of breastfeeding have enacted legislation to remove potential barriers that affect a mother's decision to initiate or maintain lactation in the U.S.

According to the U.S. Breastfeeding Committee (2009), most breastfeeding legislation in the U.S. relates to a mother's right to breastfeed in public places. Forty-four states, the District of Columbia, and the Virgin Islands have laws with language specifically allowing women to breastfeed in any public or private location. Twenty-eight states, the District of Columbia, and the Virgin Islands exempt breastfeeding from public indecency laws. Additional legislation relates to a mother's ability to express milk at her place of work. Twenty-four states, the District of Columbia, and Puerto Rico have laws related to breastfeeding in the workplace.

Examples of state legislative measures (Macrosystem). In 1995, Texas enacted legislation to standardize basic mechanisms of workplace support for mothers who breastfeed. Employers that ensure these components are in place are entitled to receive Mother-Friendly Workplace designation from the Texas Department of Health. The major workings of this legislation are access to a private location for the expression of milk; flexible work schedules to provide adequate time for milk expression; access to a nearby clean, safe water source; and access to hygienic options for the storage of breast milk (Shealy et al., 2005).

In 1998, California approved the Breastfeeding at Work Law which encourages all employers to ensure that workers are given sufficient access to a facility where they can breastfeed or express milk. In 2002, the state passed Lactation Accommodation, with a violation fine of $100, which expanded prior workplace provisions to necessitate adequate break time and a clean area for breastfeeding or milk expression.

In the summer of 2009, the state of North Dakota enacted legislation that specified "the act of a woman discreetly breastfeeding" her child is not in violation of indecent exposure laws. According to the ND WIC office, although the word *discreetly* was controversial in the language of the bill, this legislation for North Dakota women is long-awaited (Hinnenkamp, personal communication, June 15, 2009).

The law also:

- allows a woman to breastfeed her child in any public or private location where the woman and child are otherwise authorized to be; and,
- allows an employer to use the designation "infant friendly" on its promotional materials if the company adopts a workplace breastfeeding policy that includes a flexible work schedule that provides time for expression of breast milk; a convenient, sanitary, safe, and private location other than a restroom to allow privacy for breastfeeding or expressing breast milk (Hinnenkamp, personal communication, June 15, 2009).

A Closer Look at the Healthy People 2020 Goals (Macrosystem)

The USBC Task Force (2009) closely followed the ongoing development of *HP2020* since 2008. The purpose of the meetings was to collect public input on the draft objectives and topic areas.

According to the USBC (2009), there were organizational players in the construction of the document who were key to its development. The Office of Disease Prevention and Health Promotion (ODPHP) in the Department of Health and Human Services (DHHS) was charged with developing the *HP2020* plan. The Secretary's Advisory Committee (SAC) is made up of a panel of experts who advised the Secretary of Health about all aspects of the document. In the first year, they developed the mission, vision, overarching goals, framework, and guiding principles of *HP2020*.

According to Barbas and Kelleher (2004), 16 of the 28 maternal-infant health objectives identified in the *HP2020* document could be impacted by breastfeeding. The first objective noted by the USBC is the same as in *HP2010*; however, for *HP2020*, targets are expected to be raised, especially since the U.S. has now achieved 75% initiation rates nationally, which had been a target goal since 1979.

Objectives #2-4 were needed to build an infrastructure in the health care system and the community that supports breastfeeding. These objectives include some of the social determinants that underlie the healthy behavior of breastfeeding. Objective #1 is about the behavior of individual women and babies, and Objectives #2-4 are about the behavior of people who affect what those women and babies do (USBC, 2009).

USDHHS Blueprint for Action on Breastfeeding (Macrosystem)

For over 20 years, the Office of the Surgeon General has highlighted the public health importance of breastfeeding. In 2000, the office released a science-based action plan specifically aimed to increase breastfeeding rates in the U.S. This plan, titled *The Blueprint for Action on Breastfeeding*, petitioned for heightened awareness, education, support, and research to change breastfeeding patterns (USDHHS, 2000).

The Blueprint recommended, "Infants should be exclusively breastfed during the first 4 to 6 months of life, preferably for a full six months. Ideally, breastfeeding should continue through the first year of life" (USDHHS, 2000, p. 3). It also recommends specific action steps to be taken by the health care system, the family, the workplace, and the community to support women in their decision to breastfeed.

Some of these action steps included the following:

- Conduct research that identifies the social, cultural, economic, and psychological factors that influence infant feeding behaviors, especially among African American and other minority and ethnic groups;

- Improve the understanding of the health benefits of breastfeeding, especially in reducing the risk for chronic childhood diseases among disadvantaged infants and children;
- Monitor trends on the incidence and duration of exclusive, partial, and minimal breastfeeding, including among minority and ethnic groups;
- Compare the cost-effectiveness of different programs that promote, protect, and support breastfeeding to ensure optimal use of resources;
- Conduct research to better understand the role of fathers in promoting breastfeeding;
- Evaluate the influence of brief postpartum hospital stays on the initiation and duration of breastfeeding; and
- Determine the safety of over-the-counter and prescription products taken by lactating women. (USDHHS, 2000)

According to Satcher (2001), development of *The Blueprint* began in 1998 when the Environmental Health Policy Committee asked the USDHHS Office on Women's Health to lead the Subcommittee on Breastfeeding. Subcommittee members included representatives of several federal health agencies as well as private sector healthcare professional organizations. Upon reviewing the available research studies on breastfeeding, the Subcommittee recommended the USDHHS gain a better understanding of the social, cultural, economic, and psychological factors that influence infant feeding behaviors, especially among African American and other minority and ethnic groups.

Finally, *The Blueprint* recommended monitoring the breastfeeding incidence and duration trends to help judge success (Satcher, 2001). In *Public Health Reports*, Satcher (2001) concluded:

> As medical technologies advance at breathtaking speed, *The Blueprint* reminds us that so far there is little that can improve on what nature intended for the nurture and sustenance of the human infant. We can, however, improve the way we deliver that message to all segments of society, and we can create a national environment that better facilitates and encourages breastfeeding. (p. 73)

As of January 20, 2011, the U. S. Surgeon General, Regina Benjamin, released a Call to Action for breastfeeding, by encouraging the entire nation to support the removal of barriers to breastfeeding. "The Surgeon General's Call to Action to Support Breastfeeding" is the first of its kind and indentifies 20 concrete action steps and implementation strategies to support mothers in reaching their personal breastfeeding goals. True to the social-ecological framework, Benjamin addressed six major sectors of society, including, providing support and education for a variety of persons in a assortment of settings. According to the USBC, actions, in the form of education and increased emotional and physical support, shall be directed to:

- Mothers and their families: Benjamin (2011) emphasizes the need to educate and inform on the importance of breastfeeding, and provide the ongoing support mothers need to continue.
- Communities: Benjamin (2011) calls upon the entire community to support breastfeeding mothers, including the provision of peer-counseling support, promotion of breastfeeding through community-based organizations and

traditional and new media venues, and the removal of commercial barriers to breastfeeding.

- Health Care: Benjamin (2011) urges the health care system to adopt evidence-based care system to adopt evidence-based practices as outlined in the Baby-Friendly Hospital Initiative, provide health professional education and training, ensure access to skilled, professional lactation care services, and increase availability of banked donor milk.
- Employment: Benjamin (2011) calls for paid maternity leave and worksite and child care accommodations that support women when they return to work.
- Research and Surveillance: Benjamin (2011) emphasizes the need for additional research, especially regarding the most effective ways to address disparities and measure the economic impact of breastfeeding, and calls for a national monitoring system.
- Public Health Infrastructure: Benjamin (2011) calls for enhanced national leadership, including creation of a federal interagency work group, and increasing the capacity of the United States Breastfeeding Committee and affiliated state coalitions.

The review of the literature encompassed five main sections: (a) an explanation of the theoretical framework for this study, and a synopsis of other predominant theories in the breastfeeding literature; (b) a examination of the physical, psychological, economic, and environmental benefits of breastfeeding for the mother, infant, and community; (c) an appraisal of the physical, emotional, political, cultural, and societal factors that influence a mother's decision to maintain or terminate lactation based on Bronfenbrenner's Social-Ecological Systems Framework; (d) an assessment of the historical account of breastfeeding from an international and national perspective. In addition, an inspection of the history of the BFHI and impact of *The Ten Steps to Successful Breastfeeding* was reviewed. Chapter 3 will discuss the Methodology, Population, and Sampling Procedures for the analysis of the FYI dataset.

CHAPTER 3. METHODOLOGY AND PROCEDURES

The 2004 Feeding Your Infant research (FYI) study was conducted by Centers for Disease Control (CDC) grant recipient Dr. Ann Dozier, RN, Ph.D., Associate Professor and Director of the Research Services Group in Community and Preventive Medicine at the University of Rochester Medical Center in Rochester, New York, between September 2004 and June 2006. Specific aims of Dozier's comprehensive research were program evaluation of two hospital-based breastfeeding programs, one Baby-Friendly (BF) designated, the other not; cost-effectiveness evaluations of two hospital-based breastfeeding programs, one BF designated, the other not; and longitudinal case studies of women at risk for early breastfeeding termination.

The primary research question of the FYI program evaluation of two hospital-based breastfeeding programs was as follows: "Is breastfeeding duration longer and exclusivity longer in a hospital implementing BF's *Ten Steps* compared to a hospital with a mature breastfeeding program but not Baby-Friendly Hospital (BFH) or implementing all of BF's ten steps?" The current quantitative descriptive and inferential research study for this dissertation was based on the survey data that were collected from the FYI research by Dr. Dozier and associates in 2004. The purpose statement and research questions for the current study related to the original research question in that they focused on what other variables may impact lactation duration from a Social-Ecological framework.

Dozier has been involved with Maternal-Child Health (MCH) in upstate New York since 1980 as a nursing administrator and, most recently, through her work with The University of Rochester's federally funded Healthy Start project. Dozier served as interim project director and program evaluator through a contract with the Perinatal Network. She oversees the regional perinatal birth registry for one of New York's regional perinatal centers and advises the region's forum of Maternal Child Health and Human Service organizations. Dozier and her team have conducted analyses of MCH data for presentations at CDC-sponsored conferences on a variety of topics. She has collaborated with numerous primary investigators with funding through the National Institutes of Health, the CDC, and other sources. Because of Dozier's wide expertise in the area of lactation research, she was chosen as a contact person for the purposes of intercollegiate collaboration.

Initial contact with Dozier and her chief research assistant, Ms. Widanka, was made during the fall of 2008 through introductory conference calls between parties. Consent to perform an analysis of Dozier's 2004 FYI survey data was granted by the College of Human Development and Education at North Dakota State University (NDSU) and the University of Rochester (UR). After completion of training (Appendix A), approval from the NDSU Institutional Review Board (IRB) was obtained to gain access to the study's existing variables, codes, available protocol, and data set in Statistical Analysis System (SAS) format. A Data Use Agreement Form (Appendix B) was signed by NDSU and the UR after agreed upon amendments were made to ensure confidentiality of subjects and to safeguard information between both parties. The Data Use Agreement passed legal inspection at both institutions during the summer of 2009. Data were transmitted to the degree-granting institution (NDSU) for statistical testing of selected variables December 2009.

Population and Sampling Procedures

A cohort of 842 mothers was recruited into the Feeding Your Infant (FYI) study in 2004– 422 women from the Baby-Friendly Hospital and 420 women from the community-based hospital with a well-established breastfeeding support program. Inclusion criteria consisted of pregnant women who intended to breastfeed and deliver at either study site in upstate New York. All women who planned to breastfeed were asked to participate in the research study. Only women who delivered singleton infants and term births of at least 38 weeks gestation were included. Ill mothers or women whose infants transferred to the Special Care Nursery (SCN) were not recruited and excluded from the study. No one under 18 years of age was recruited, and only women who could read and speak English were enrolled.

For the FYI study, women were enrolled from a county where on average over 8,200 women give birth each year. Of these women, nearly 3,000 (35%) were low income and 2,800 were WIC participants. Among Medicaid-eligible women, breastfeeding initiation rates were much less compared to women who were not low income (57% compared to 79%). Based on combined 2004-2005 statistics, 57% of the nearly 3,500 Black women initiated breastfeeding compared to 69% of Hispanic women and 78% of white women.

According to Beck et al. (2002) who cited the Pregnancy Risk Assessment and Monitoring Survey (PRAMS), the prevalence of breastfeeding at 4 weeks postpartum in upstate New York in 1999 was 51.8% overall; 31.7% for women under 20 years of age; 42.5% for mothers aged 20 to 24; and 55.5% for women aged 25 to 34. Of those surveyed, 52.1% were White; 45.8% were Black; 58.5% were Hispanic; 41.9% were

Medicaid recipients; 34.2% had less than 12 years of education; and 41.7% had at least 12 years of education.

According to Dozier, the racial makeup of the county in 2005 was 77.42% White, 17.33% Black, 1.21% Mixed, and 4.04% Other (Table 7), with the U.S. Census Bureau (2000) reporting 0.27% Native American, 2.44% Asian, 0.03% Pacific Islander, 2.44% from other races, and 1.94% from two or more races. Hispanic or Latino of any race comprised 5.31% of the population. Almost 19% were Italian, 15.3% German, 11.3% Irish, and 8.3% English ancestry. There were 286,512 households out of which 31.8% had children under the age of 18 living with them; 47.40% were married couples living together. Thirteen percent had a female householder with no husband present. The average household size was 2.47 and the average family size was 3.08. Table 7 presents the data for the county's hospitals' frequency of mothers' race in 2005. It shows that of the total 10,155 births, the vast majority, or three-fourths of the population, were White.

Table 7

County Hospitals Frequency of Mother's Race in 2005 of Total Population Expressed in Frequencies and Percentages

Mother's Race*	Frequency	%
White	7862	77.42
Black	1760	17.33
Other	410	4.04
Mixed	123	1.21
Total	10155	100.0

*Note: Mother's race was self-reported.

Hospital A-BF

The first study site (Hospital A-BF) had been a BF designated hospital since 2000. It functioned as a multi-service community teaching hospital with more than 500 inpatient beds. The hospital's 2,498 annual deliveries were cared for in a 33-bed (rooming-in) mother and baby unit. A 14-isolette Level II Special Care Nursery existed for premature and ill newborns.

Hospital B

The second study site (Hospital B) was a multi-service community hospital, well known for its comprehensive women's services since the 1960s. Although Hospital B had a mature breastfeeding program and followed many of *The Ten Steps to Successful Breastfeeding*, Hospital B had not obtained Baby-Friendly designation. The hospital was a 268-bed facility with a 31-bed Family Maternity Center.

Table 8 presents the data analysis for the frequency of mothers' race between the two study sites. Almost 81% of the women at Hospital A-BF were White. At Hospital B, 77.32% of the women were White. Black women were the second most common race to deliver at both sites with 14.6% at Hospital A-BF and 18.45% at Hospital B.

Table 8

Mother's Race Between Hospital A-BF and Hospital B in 2005 of Total Population Expressed in Frequencies and Percentages

Hospital Code	White	Black	Other	Mixed	Total
Hospital A-BF	2014	366	89	29	2498
	80.62%	14.65%	3.56%	1.16%	100%
Hospital B	2489	594	111	25	3219
	77.32%	18.45%	3.45%	0.78%	100%
Total	4503	960	200	54	5717

The following tables further define the population from which the study sample derived. Table 9 illustrates the county's frequency of annual births in the year 2005; Tables 10 and 11 report parity status; Tables 12, 13, and 14 report the data about the mother's educational level across the population; and, Table 15 documents the mean age of the mothers at both study sites.

Table 9

Five County Hospitals Annual Births in 2005 of Total Population Expressed in Frequencies and Percentages

Hospital Code	Frequency	%	Cumulative Frequency	Cumulative %
Hospital A-BF	2498	24.6	2498	31.7
Hospital B	3219	31.7	5717	56.3
Other C	3195	31.46	8912	87.76
Other D	210	2.07	9122	89.93
Other E	1033	10.17	10155	100
Total	10155	100		

Table 9 provides the data for the county's five area hospitals in 2005. It shows that Hospital A-BF delivered 24.6% of the county's births, and Hospital B delivered 31.7% of the county's births. At a combined total of 56.3% (n = 5717), the two study sites birth frequencies encompassed more than half the deliveries for the county (n = 10,155).

Table 10 presents the parity data for the five county hospitals in 2005. Almost 41% of the women who delivered at 1 of the 5 county's hospitals had no history of a previous live birth, whereas 59.27% of the mothers who delivered within the county reported a previous live birth.

Table 10

Five County Hospitals Parity Status in 2005 for Total Population Expressed in Frequencies and Percentages

Parity	Frequency	%	Cumulative Frequency	Cumulative %
Primiparous	4136	40.73	4136	40.73
Multiparous	6019	59.27	10155	100

Table 11 presents the data for parity status between the two study sites. At Hospital A-BF, 38.95% of the mothers were primiparous and 61.05% of the mothers were multiparous. At Hospital B, the percentages were 43.49% and 56.51% respectively.

Table 11

Parity Status Between Hospital A-BF and Hospital B in 2005 of Total Population Expressed in Frequencies and Percentages

Hospital Code	Primiparous	Multiparous	Total
Hospital A-BF	973 38.95%	1525 61.05%	2498
Hospital B	1400 43.49%	1819 56.51%	3219
Total	2373	3344	5717

Table 12 provides the data for the five county hospitals' frequency of mothers' educational level in 2005. Nearly 22% of mothers who delivered in the county had a high school diploma or GED. Nearly 20% had a bachelor's degree and 14.68% had a master's degree. In total, nearly half the mothers who delivered within the county had an associate's degree or higher. As evidenced in Table 13, more than 86% of women who delivered within the county had completed high school or more.

Table 12

Mother's Educational Level at Five County Hospitals in 2005 of Total Population Expressed in Frequencies and Percentages

Mother's Educational Level	Frequency	%	Cumulative Frequency	Cumulative %
None	1	0.01	1	0.01
8th grade or less	206	2.03	207	2.04
12th grade, no diploma	1395	13.74	1602	15.78
High School Grad or GED	2207	21.73	3809	37.51
Some college credit, no degree	1358	13.37	5167	50.88
Associate degree	1159	11.41	6326	62.29
Bachelor's degree	2019	19.88	8345	82.18
Master's degree	1491	14.68	9836	96.86
Doctorate degree	223	2.2	10059	99.05
Unknown	96	0.95	10155	100

Table 13

Mother's Educational Level at Five County Hospitals in 2005: Condensed of Total Population, Expressed in Frequencies and Percentages

Mother's Educational Level	Frequency	%	Cumulative Frequency	Cumulative %
> 18 and Less than HS*	1173	12.18	1173	12.18
>18 and HS or more	8369	86.88	9542	99.06
>18 and Unknown	91	0.94	9963	100

*Note: HS = High School

Table 14 presents the baseline data for the frequency of mothers' educational status for the two study sites. It is noted that Hospital A-BF and Hospital B had similar findings when compared to the data of all of the county's five hospitals with 86.52% of the mothers at Hospital A-BF (n = 2067) and 88.21% (n = 2644) of the mothers at Hospital B having completed high school (HS) or more of the 5409 total cases that year.

Table 14

Mother's Educational Status Between Hospital A-BF and Hospital B in 2005 of Total Population Expressed in Frequencies and Percentages

Hospital Code	>18 and Less than HS	>18 and HS or more	>18 and Unknown	Total
Hospital A-BF	303	2067	19	2389
	12.68%	86.52%	0.8%	100%
Hospital B	289	2644	67	3000
	9.57%	88.21%	2.22%	100%
Total	592	4711	86	5389
	10.98%	87.42%	1.59%	100%

Finally, Table 15 presents the data for the mean age of the mothers who delivered at the two study sites in 2004. At Hospital A-BF, the mean age was nearly identical to the mean age at Hospital B at 28.869 years and 28.646 years respectively.

Table 15

Mean Age of Mother at Hospital A-BF and Hospital B in 2005 of Total Population

Hospital Code	N	Mean Age	SD	Minimum	Maximum
Hospital A-BF	2498	28.869	6.022476	14	46
Hospital B	3219	28.646	6.231333	13	49
Total	5717	28.757			

Research Questions and Null Hypotheses

The purpose of this study, that analyzed the existing 2004 FYI dataset, was to examine the impact of BFH designation, maternal employment, parity and other social-ecological factors on lactation status at three months postpartum in upstate New York. The following research questions and null hypotheses were proposed in order to answer the broad research question identified in Chapter 1: "What are the social-ecological factors that impact lactation status at three months postpartum in upstate New York?"

1. Does a breastfeeding mother's race impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's race and a formerly breastfeeding mother's race, and lactation status at three months postpartum.

2. Does a breastfeeding mother's age impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's age and a formerly breastfeeding mother's age, and lactation status at three months postpartum.

3. Does a breastfeeding mother's educational level impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's educational level and a formerly breastfeeding mother's educational level, and lactation status at three months postpartum.

4. Does a breastfeeding mother's marital status impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's marital status and a formerly breastfeeding mother's marital status, and lactation status at three months postpartum.

5. Does a breastfeeding mother's expected length of maternity leave at baseline impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's expected length of maternity leave at baseline and a formerly breastfeeding mother's expected length of maternity leave at baseline, and lactation status at three months postpartum.

6. Does a breastfeeding mother's expected amount of paid maternity leave at baseline impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's expected amount of paid maternity leave and a formerly breastfeeding mother's expected amount of paid maternity leave, and lactation status at three months postpartum.

7. Does a breastfeeding mother's employment or school status impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's employment or school status and a formerly breastfeeding mother's employment/school status, and lactation status at three months postpartum.

8. Does a breastfeeding mother's parity status impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's parity status and a formerly breastfeeding mother's parity status, and lactation status at three months postpartum.

9. Does a breastfeeding mother's current experience with "not enough milk" impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's experience with "not enough milk" and a formerly breastfeeding mother's experience with "not enough milk," and lactation status at three months postpartum.

10. Does a mother's current experience with a "fussy baby" impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's experience with a "fussy baby" and a formerly breastfeeding mother's experience with a "fussy baby," and lactation status at three months postpartum.

11. Does a mother's current experience with a "sleepy baby" impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's experience with a "sleepy baby" and a formerly breastfeeding mother's experience with a "sleepy baby," and lactation status at three months postpartum.

12. Does a mother's current experience with breastfeeding taking "too much time" impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's experience with breastfeeding taking "too much time" and a formerly breastfeeding mother's experience with breastfeeding taking "too much time," and lactation status at three months postpartum.

13. Does a mother's current experience with breastfeeding being "inconvenient" impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's experience with breastfeeding being "inconvenient" and a formerly breastfeeding mother's experience with breastfeeding being "inconvenient," and lactation status at three months postpartum.

14. Does a mother's current experience with sore or bleeding nipples impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's current experience with sore or bleeding nipples and a formerly breastfeeding mother's experience with sore/bleeding nipples, and lactation status at three months postpartum.

15. Does a mother's current experience with engorgement impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's current experience with engorgement and a formerly breastfeeding mother's experience with engorgement, and lactation status at three months postpartum.

16. Does a mother's current experience with mastitis or breast infection impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's current experience with mastitis or breast infection and a formerly breastfeeding mother's experience with mastitis/breast infection, and lactation status at three months postpartum.

17. Does a mother's parity status, while controlling for the problems of breastfeeding, impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's parity status and a formerly breastfeeding mother's parity status, while controlling for the problems of nursing, and lactation status at three months postpartum.

18. Does a mother's delivery site (whether Baby-Friendly designated, or not), impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a mother who delivers at a baby-friendly designated site and a mother who delivers at a non-baby-friendly designated site, and lactation status at three months postpartum.

Survey Instrument

The 2004 Feeding Your Infant (FYI) study was a program evaluation of two hospital-based breastfeeding programs in upstate New York. The first study site

(Hospital A-BF) was a BF designated hospital since 2000, and the second site (Hospital B) was a community-based hospital with a well-developed breastfeeding program since the 1960s.

The development of the survey tool for the FYI study consisted of various phases by the principal investigators, Dr. Dozier and Dr. Howard. First, researchers reviewed the literature for existing surveys and determined the necessity of items. The 37-item Baseline Survey (Appendix C) was adapted from a survey used by Dr. Howard, pediatrician and assistant editor-in-chief of *Breastfeeding Medicine*, in two prior studies: the last - a randomized trial about the effect of cup feeding and pacifier use on breastfeeding (Howard et al., 2003). The Two-week (Appendix D), Three-month (Appendix E), and Six-month (Appendix F) postpartum follow-up surveys were adapted from Dr. Howard's study as well and were nearly identical in content and length, with the exception of questions that related to mothers' hospital experiences in the Two-week survey. These questions were adapted from the PRAMS survey to assess implementation of *The Ten Steps* from the mothers' perspective.

. Second, all of the mothers' surveys in the FYI study were reviewed for construct, face, and content validity by the principal investigators and two co-investigators. One of the co-investigators was the renowned Dr. Ruth Lawrence who was the founder of the breastfeeding program at Hospital B. Although she retired from direct patient care in 1990, Lawrence continues to serve as Editor-in-Chief of the peer-reviewed journal *Breastfeeding Medicine* – a journal devoted exclusively to breastfeeding and lactation research. Both physicians, Dr. Howard and Dr. Lawrence, are internationally known and considered longstanding experts in the field of lactation.

The survey instrument was tested when it was first designed for a trial published in 2000 by Howard, Howard, Lawrence, Andresen, DeBlieck, and Weitzman on the effects of office prenatal formula advertising on breastfeeding patterns. According to Howard, a co-investigator in the FYI study, it was tested on 25 mothers on the mother-baby unit, perfected and then retested on another 20 mothers. During the trial, answers for some of the questions were expanded to include types of responses they had not anticipated before the trial began. The same survey was again used, with minimal changes to the format and flow of the questions, in an infant study that was published in 2003 that was a randomized clinical trial of pacifier use and bottle-feeding or cupfeeding and their effect on breastfeeding. According to Howard, the survey was used for more than 500 women, and then more than 800 women between the two studies before use in the FYI trial. According to Dozier via personal communication, Cronbach alpha reliability testing was not performed on the FYI survey tool, as the survey was not a tool that would lend itself to doing that type of reliability testing.

The third phase ensured the surveys were tested with breastfeeding mothers before their use with the convenience sample. The surveys were piloted at a local WIC office with 10 breastfeeding mothers who were not involved in the study. Revisions were made and submitted and approved by the university's IRB.

Approval was obtained from the primary researchers of the FYI study to utilize the dataset obtained from the three-month FYI surveys. Analysis of a portion of the three-month data is the focus of this dissertation. The independent variables (Table 16) chosen for the analysis related to factors that were thought to impact lactation termination with an emphasis on employment, length of maternity leave, parity, and the potential problems of lactation for the mother and infant at three months postpartum. These factors were identified in the Social Ecological Systems Framework for Breastfeeding Mothers After several conference calls and revisions to research questions and null hypotheses, the following variables (Table 16) were recommended by the principal researcher because the potential problems of lactation and parity's influence on duration had yet to have been thoroughly reviewed in previous analyses of their dataset.

Table 16

Variables and Their Level of Measurement to Assess Lactation Termination at Three Months Postpartum

Variables	Measurement
Independent Variables	
Demographic Variables	
Mother's race	Nominal
Mother's marital status	Nominal
Mother's age	Ratio
Mother's educational level	Ordinal
Mother's employment/school status	Ordinal
Mother's parity	Ratio
Predictor Variables	
Mother's expected length of maternity leave	Ratio
Mother's expected amount of paid maternity leave	Ratio
Problems of breastfeeding at 3 months (Baby)	Nominal
Problems of breastfeeding at 3 months (Mom)	Nominal
Parity	Ratio
Baby Friendly hospital designation status	Nominal
Dependent Variable	
Breastfeeding status (Y/N) at three months postpartum	Nominal

Table 16 identifies the independent variables that were analyzed that may influence the dependent variable -- lactation status, and also categorizes the levels of measurement for each selected variable. In the analysis of the FYI dataset, nominal data consisted of the mother's race, marital status, the problems of breastfeeding at three months, breastfeeding status (Y/N) at three months, and BF Hospital designation status. The data that were ordinal were mother's highest educational level achieved and mother's employment or school status. Ratio data consisted of mother's age, parity status, mother's expected length of maternity leave, mother's expected amount of paid maternity leave, and lactation termination date. However, the dataset of this information was organized by categories, where, for example, expected length of maternity leave was broken down into ranges. For instance, the categories may have been: 3 to 6 weeks, or 6 to 10 weeks. While two of questions on the Three Month FYI Survey would produce interval data from Likert scale responses, there was no interval or continuous data within the dataset obtained through the Data Sharing Agreement between the UR and NDSU.

Table 17 lists each of the research questions written for the dissertation. Each question is followed by the specific survey item identified to analyze that question, as well as the location of the item within either the Baseline or Three-Month FYI Survey developed by the researchers in New York.

Although overlap exists between spheres of influence, Table 18 identifies where each variable could fit into The Bailey DeJong Adaptation of Bronfenbrenner's Social-Ecological Theoretical Framework for Breastfeeding Mothers. Each research question is identified by RQ followed by the number.

Table 17

Survey Questions to Assess Lactation Status and Answer Research Questions

Initial FYI Survey Questions Assigned to Dissertation Research Questions

1. Does a breastfeeding mother's race impact lactation termination at three months postpartum? Survey questions: Indicate race with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

2. Does a breastfeeding mother's age impact lactation termination at three months postpartum? Survey questions: Indicate age with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

3. Does a breastfeeding mother's educational level impact lactation termination at three months postpartum? Survey questions: Indicate educational level with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

4. Does a breastfeeding mother's marital status impact lactation termination at three months postpartum? Survey questions: Indicate marital status with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

5. Does a breastfeeding mother's expected length of maternity leave at baseline impact lactation termination at three months postpartum? Survey questions: "If yes, how old will your baby be when you return to work or school?" (Baseline Survey, Question 1-b-1) with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

6. Does a breastfeeding mother's expected amount of paid maternity leave at baseline impact lactation termination at three months postpartum? Survey questions: "How much paid maternity leave do you expect to receive from your employer?" (Baseline Survey, Question 1a) with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

7. Does a breastfeeding mother's employment/school status impact lactation termination at three months postpartum? Survey questions: "Were you employed or in school during this pregnancy?" (Baseline Survey, Question 1); "Are you planning to return to work or school within the next 6 months?" (Baseline Survey, Question 1-b) and "Have you started working or going to school since your baby was born?" (Three-Month Survey, Question 20) with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

Table 17 (continued)

8. Does a breastfeeding mother's parity status impact lactation termination at three months postpartum? Survey questions: "How many other children have you had?" (Baseline Survey, Question 4) with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

9. Does a breastfeeding mother's current experience with "not enough milk" impact lactation termination at three months postpartum? Survey questions: "Have you had any of the following problems: not enough milk, (Three-Month Survey, Question 14-a-1); Refusal to nurse (14-a-2); Fussy baby (14-a-3); Sleepy baby (14-a-4); Too much time (14-a-5); Inconvenient (14-a-6); Don't enjoy breastfeeding (14-a-7) with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

10. Does a mother's current experience with a "fussy baby" impact lactation termination at three months postpartum? Same as #9.

11. Does a mother's current experience with a "sleepy baby" impact lactation termination at three months postpartum? Same as #9.

12. Does a mother's current experience with breastfeeding taking "too much time" impact lactation termination at three months postpartum? Same as #9.

13. Does a mother's current experience with breastfeeding being "inconvenient" impact lactation termination at three months postpartum? Same as #9.

14. Does a mother's current experience with sore/bleeding nipples impact lactation termination at three months postpartum? Survey questions: "Since your baby was born, have you had any of the following conditions?" (Three-Month Survey, Question 17-b) with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

15. Does a mother's current experience with engorgement impact lactation termination at three months postpartum? Same as #14.

16. Does a mother's current experience with mastitis/breast infection impact lactation termination at three months postpartum? Same as #14.

17. Does a mother's parity status, while controlling for the problems of breastfeeding, impact lactation termination at three months postpartum? Same as #8, while controlling for #9 with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

18. Does a mother's delivery site (whether Baby-Friendly designated, or not), impact lactation termination at three months postpartum? Hospital status with "Are you still breastfeeding?" (Three-Month Survey, Question 4) and "If you have stopped breastfeeding, how old was your baby when you stopped?" (Three-Month Survey, Question 6).

Table 18

Variables Associated With Bronfenbrenner's Social-Ecological Systems Theory, According to Sphere of Influence

Sphere of Influence	Variable and Research Question
Microsystem	Mother's Race (RQ1)
	Mother's Age (RQ2)
	Mother's Parity Status (RQ8)
	Current Experience with Problems (RQ9-RQ17)
	Mother's Educational Level (RQ3)
Mesosystem	Mother's Marital Status (RQ4)
Exosystem	
	Mother's Expected Length of Maternity Leave (RQ5)
	Mothers' Expected Amount of Paid Maternity Leave (RQ6)
	Mother's Employment/School Status (RQ7)
Macrosystem	Mother's Delivery Site (RQ18)

Data Collection Procedures

Phase I: Enrollment Procedures of Initial FYI Study

During the enrollment period in 2004, all postpartum women who planned to breastfeed at both study sites were asked by 1 of 7 research assistants, not including the principal or co-investigators, if they would like to participate in a research study. Ill mothers or women whose infants transferred to the Special Care Nursery (SCN) were not recruited. According to Dozier, only low-risk individuals who would not have other risk factors that may preclude or complicate breastfeeding, or make it difficult for mothers to complete the survey (e.g. read English), were included (Dozier, personal communication, January 3, 2011). No one under 18 years of age was asked to participate, and only women who could read and speak English were enrolled. No subject recruitment or enrollment began prior to approval from the IRBs at each hospital and at the University of Rochester to assure that all human subjects' issues were considered and addressed.

Enrollment of participants occurred simultaneously over a three-month period of time at both study sites. Based on the breastfeeding initiation rates reported by each hospital, over 70% of mothers were expected to initiate breastfeeding. A population of at least 352 mothers at each research site was needed to achieve adequate power for analysis to ensure deferment of a Type 1 statistical error. With 422 women recruited from Hospital A-BF and 420 women recruited from Hospital B, an appropriate sample size was attained to prevent a "false positive" error of analysis.

During the recruitment timeframe, the birth registrar visited each hospital on a daily basis and dropped off an informational flyer with each mother alerting her to the breastfeeding study (Appendix G). The flyer briefly described the post-discharge study and gave women who were not interested in being approached by one of the research assistants the option to indicate this by putting her name, room number, and baby's birth date on the flyer and giving it to her nurse or the front desk.

Maternity nurses were made familiar with the study through staff meetings and contact with research assistants. Research assistants informed maternity staff that a folder would be kept at the front desk to house the returned flyers. The research assistants checked the folder daily. Women who were not interested in hearing about the study were not approached. A log of mothers who had been approached or who refused to be approached was maintained to avoid asking mothers more than once. Women who expressed interest were contacted by research assistants who relayed specifics of the research design to potential participants. Two primary research assistants used a script designed by the principal investigator to ensure consistency in relaying information to potential participants (Appendix H).

One research coordinator was hired to oversee the project, prepare the data for statistical analysis, compute basic statistical analysis, prepare reports, and hiring. Two of seven research assistants participated in recruitment, data cleaning and coding, and follow up. Five students performed data entry, cleaning and coding.

Pregnant women were also enrolled through prenatal offices. Clinics distributed flyers to potential participants who were between 32 and 37 weeks pregnant. Flyers with simple tear-off phone numbers were posted in prenatal examination rooms. Women who expressed interest in the project were encouraged to call the research assistants, at which point they were asked a series of questions to determine eligibility. If the study appealed to them, mothers were mailed a consent and contact information form, and asked to return the form to study staff. After delivery of a healthy, term, low-risk infant, the women were contacted, and the baseline survey was conducted in the hospital.

Phase II: Informed Consent of Initial FYI Study

All women who agreed to participate in the study provided written consent (Appendix I). The research assistants explained what mothers' participation would involve; asked them to sign the consent form; and solicited contact information for follow-up, including home address, phone number, and intended pediatrician. Women were assured that participation was strictly voluntary and would not affect their care. To help increase response rates after discharge, each mother self-addressed an envelope for use with the Two-Week Survey. Only those mothers who completed a Two-Week Survey, and were still breastfeeding at that time, were sent a Three-Month Survey.

Phase III: Survey Timeframe of Initial FYI Study

Each enrolled breastfeeding mother (N = 842, from both sites combined) was to be surveyed at baseline, two weeks, three months, and six months postpartum. The two-week window was selected because rates of breastfeeding discontinuation are considered to be high during the immediate postpartum period. The three-month timeframe was selected as it is after the typical six- or eight-week, short-term disability period for women who return to work after delivery.

The Baseline Survey was an interviewer-administered survey that lasted approximately 15 to 20 minutes in length. The Baseline Survey began with a list of demographic questions (Appendix J). Interviewers asked the questions depicted on the Demographic sheet and Baseline Survey and mothers' responses were recorded by a research assistant on a hard copy of the survey. There were two main research assistants who performed the interview-administered survey at baseline. The principal investigators used the interviewer-administration method for several reasons – it helped to assure complete data, helped to assure that participants understood each question, and it reaffirmed that participants met all of the inclusion criteria. The research assistants were trained to administer the baseline interviews through practice interviews with Dr. Dozier and observed interviews with the team's coordinators.

All surveys were coded using a unique ID assigned at enrollment to ensure consistency in linking the follow-up surveys after baseline data was obtained. The 2-week, 3-month and 6-month surveys were mailed three days before the time to be assessed. Mothers were asked to return the survey within one week of receipt to be eligible for the incentive. Additional contact methods were employed for individuals not responding to the mailed survey within 10 days. Contact attempts were made through telephone by research assistants, followed by contact through the alternative address (by mail or home visit), and attempted through the infant's pediatrician (with the mother's permission). Individuals completing the survey after the designated time period were asked to answer the questions as if they were completing it within the indicated window.

Phase IV: Analysis Procedures for the Current Study

Upon preliminary confirmation of consent to work with Dr. Dozier, approval from the North Dakota State University (NDSU) Institutional Review Board (IRB) was obtained to gain access to the study's existing variables, available protocol, and dataset in Statistical Analysis System (SAS) format. A Data Use Agreement Form (Appendix B) was signed by NDSU and the University of Rochester (UR) after amendments were made to ensure confidentiality and anonymity of subjects and to safeguard information between both parties. The Data Use Agreement passed legal inspection at both institutions during the summer of 2009. Data were transmitted to the degree-granting institution (NDSU) for statistical testing of selected variables in December 2009.

Although the original FYI dataset included baseline, two- week, three-month, and six-month survey results, the three-month timeframe was selected for the dissertation's analysis for the same reason it was selected initially by the principal investigator. This is because the three-month timeframe is typically after the six- or eight-week, short-term disability period for women who return to work after delivery, and this variable in particular was of interest to the doctoral student.

Potential Risks and Benefits

Risks for women who chose to participate in the 2004 FYI study were negligible. Psychological harm could have resulted from completing the mailed survey if reflecting on the breastfeeding experience, especially if it was a negative one, resulted in emotional distress.

All participants' confidentiality and anonymity were strictly preserved. Trained research assistants in the initial study collected the data, and all data were stored on password-protected computers to which only to one principal investigator (Dozier), the Research Coordinator, two Research Assistants, and six students had right of entry. All primary investigators completed Healthcare Insurance Portability Accountability Act (HIPAA) certification as required by the University of Rochester and were IRB certified through the university's mandatory training for the protection of human subjects. All researchers met these requirements before enrollment of participants. Drs. Dozier and Howard trained the research assistants on all human subject issues and enrollment processes to ensure consistency. Once the specified dataset was extracted and sent to NDSU's statistician, all data were, once again, stored on password-protected computers to which only Dr. Enger, the doctoral candidate's advisor; Mr. Doetkott, statistician; Dr. Yanchun Zhao (Mr. Doetkott's research assistant); and the doctoral candidate had access.

Benefits to individual participants in the initial FYI study were nominal. An informational newsletter focusing on infant health and tips for new parents was included with each survey as part of a "thank you" for participation. In addition, at each survey period, those women who returned usable surveys within the specified window were eligible for drawings. Each time mothers participated by answering the 2004 FYI survey, they were entered into a raffle for a gift certificate for developmentally appropriate infant toys. After every 100 surveys were received, one of the women returning a survey was selected at random to receive a gift certificate for use at a local retailer. Gift certificates were worth $25 at the 2-week drawing, $35 at the 3-month drawing, and $50 at the 6-month drawing. There was a 1 in 100 chance of being selected for each survey, or a 1/33 chance of winning a gift certificate if participants completed all surveys.

Benefits at both study sites included a thorough assessment of their current maternity care practices and their effect on breastfeeding duration. Changes implemented by each hospital secondary to the primary and secondary evaluation could benefit the community by increasing breastfeeding duration rates and the health throughout the county.

Data Analysis Procedures

Data was entered and analyzed using the SAS system by NDSU's statistician. Variables were identified and labeled according to the four spherical systems of Bronfenbrenner's framework. Demographic and breastfeeding characteristics of the mother and infant were analyzed to determine if there was a significant statistical difference between the independent variables (IV) and the dependent variable (DV) of breastfeeding status at three months duration. Descriptive statistics, using Means (M) as a measure of central tendency, and Standard Deviations (SD) as a measure of variability, were calculated for demographic data. Characteristics of the mothers at birth and three months were compared using t-tests for inferential parametric data to test for the significance of difference between the means of two independent samples. Chi square tests (χ^2) were used for inferential non-parametric data to test for the strength of the relationship between two categorical variables. For this analysis, a probability level of .05 or less was considered statistically significant. Possible covariates included demographic variables (age, race, education, parity, and marital status), BF designation, mothers' return to work, plan to return to work, and return to work within three months of delivery.

Once chi square analyses were completed, a multivariate approach was taken with the data using Multiple Correspondence Analysis (MCA). MCA is a data analysis technique for use with categorical data with multiple variables. It is analogous to factor analysis of continuous variables. In this case, its purpose was to determine if associations between variables existed within breastfeeding mothers' social-ecological systems.

MCA is performed by researchers to effectively determine if associations exist between and among variables using discrete data. These associations are then represented graphically as maps in Euclidean space which eases the interpretation of the data. The direction of the data are tabulated using Burt block matrices and represented in a graphical display of the variables in symmetrical or asymmetrical plots representing the data. The plots are examined in two-dimensional space and variables are interpreted to determine the relationships between them. Analysis of the MCA graphical display tends to support earlier analysis using chi square tests of independence on cross-tabulated data (Curt Doetkott, personal communication, January 13, 2011). According to Greenacre and Hastie (1987), the interpretation is based on points found in approximately the same region of space. Distances between points do not have a straightforward interpretation, and the geometry (or shape of the positioning of the points) is not a simple generalization.

The use of MCA is a more sophisticated form of analysis and has been used in the social sciences since its application by Bordieu in 1979. One major reason for including it in this study beyond the inferential capabilities of chi square tests of independence is that only pair-wise associations (between one independent variable and one dependent variable) can be inferred with Chi square. However, by utilizing MCA, the researcher can interpret the meaning of multiple variables and their relationship to one another to determine if associations exist.

Assumptions of correspondence analysis are:

- Homogeneity: assumes homogeneity between the column variable of the analysis.
- Category: assumes that the discrete data has many categories.
- Negative values: assumes that negative values are not considered.
- Continuous data: assumes that discrete data is used. If continuous data, then the data must be categorized into ranges. (Adachi, 2003)

The final step by Dr. Enger and the doctoral student in the data analysis of selected variables from the FYI dataset consisted of Multiple Logistic Regression (MLR). Curt Doetkott, NDSU statistician, determined that logistic regression was well suited for this analysis of selected FYI variables because the purpose of MLR is to describe and test hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables. Chao-Ying, Pend, Lee, and Ingersoll (2002) reported the usefulness of this specific type of analysis for educational research when they wrote: "Many educational research problems call for the analysis and prediction of dichotomous outcome" through use of logistic regression (p. 3). They stated:

> Logistic regression was proposed as an alternative in the late 1960s and early 1970s and it become routinely available in statistical packages in the early 1980s. Since that time, the use of logistic regression has increased in the social sciences (e.g., Chuang, 1997; Janik & Kravitz, 1994; Tolman & Weisz, 1995) and in educational research – especially in higher education (Austin, Yaffee, & Hinkle, 1992; Cabrera, 1994; Peng & So, 2002; Peng, So, Stage, & St. John, 2002). With the wide availability of sophisticated statistical software for high-speed computers, the use of logistic regression is increasing. (p. 3)

Simply put, the purpose of multiple logistic regression is to predict the probability of the occurrence of an event. In this case, the said "event" is breastfeeding status (yes/no) at three months postpartum. The researcher in this scenario is attempting to predict the set of variables that correspond to breastfeeding event "yes" at three months postpartum. Conversely, one might also like to investigate those variables that predict the event "breastfeeding no" at three months postpartum in order to aim resources and educational programming toward those most likely to have the predictors associated with early termination.

Data Management

Principal investigators of the FYI study designed a data dictionary of all variables, a coding system, and forms to secure data quality. All chart and survey data were recorded into an ACCESS database and linked longitudinally through each mother's unique identifier. All survey data were logged twice and verified by research assistants to ensure accuracy. Laptop computers were used to enter enrollment and medical record data that were then transferred electronically into a central database. Participants were provided a unique identifier that allowed for linkage of data across data collection junctures and data sources. To ensure confidentiality, electronic data were preserved in a secure, password-protected site. Only Dozier, the research coordinator, two research assistants, and six students had access to the data.

Once data were transferred to NDSU in SAS format for analysis during the summer of 2009, data continued to be secured on a password-protected site accessible only to the statisticians, Mr. Curt Doetkott and Dr. Yanchun Zhao, MD; Dr. Kathy Brock Enger, Ph.D.; and the doctoral student for statistical analysis.

Chapter 3 provided the Methodology and Procedures for the current study. Analysis will occur using Chi square, t tests, multiple correspondence and multiple logistic regression analysis. Chapter 4 will discuss the Findings and Results of these analyses. A description of the tabulated data will follow each table.

CHAPTER 4. FINDINGS AND RESULTS

The purpose of this study was to examine the impact of BF Hospital designation, employment, parity, and other social-ecological factors that impact lactation status at three months postpartum in upstate New York. Eighteen research questions and null hypotheses were proposed in order to answer the broad research question identified in Chapter 1: "What are the social-ecological factors that impact lactation status at three months postpartum in upstate New York?" They were:

1. Does a breastfeeding mother's race impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's race and a formerly breastfeeding mother's race, and lactation status at three months postpartum.

2. Does a breastfeeding mother's age impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's age and a formerly breastfeeding mother's age, and lactation status at three months postpartum.

3. Does a breastfeeding mother's educational level impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's educational level and a formerly breastfeeding mother's educational level, and lactation status at three months postpartum.

4. Does a breastfeeding mother's marital status impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's marital status and a formerly breastfeeding mother's marital status, and lactation status at three months postpartum.

5. Does a breastfeeding mother's expected length of maternity leave at baseline impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's expected length of maternity leave at baseline and a formerly breastfeeding mother's expected length of maternity leave at baseline, and lactation status at three months postpartum.

6. Does a breastfeeding mother's expected amount of paid maternity leave at baseline impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's expected amount of paid maternity leave, and a formerly breastfeeding mother's expected amount of paid maternity leave and lactation status at three months postpartum.

7. Does a breastfeeding mother's employment or school status impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's employment or school status and a formerly breastfeeding mother's employment or school status, and lactation status at three months postpartum.

8. Does a breastfeeding mother's parity status impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's parity status and a formerly breastfeeding mother's parity status, and lactation status at three months postpartum.

9. Does a breastfeeding mother's current experience with "not enough milk" impact lactation status at three months postpartum?

   H0: There is no significant statistical difference between a breastfeeding mother's experience with "not enough milk" and a formerly breastfeeding mother's experience with "not enough milk," and lactation status at three months postpartum.

10. Does a mother's current experience with a "fussy baby" impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's experience with a "fussy baby" and a formerly breastfeeding mother's experience with a "fussy baby," and lactation status at three months postpartum.

11. Does a mother's current experience with a "sleepy baby" impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's experience with a "sleepy baby" and a formerly breastfeeding mother's experience with a "sleepy baby," and lactation status at three months postpartum.

12. Does a mother's current experience with breastfeeding taking "too much time" impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's experience with breastfeeding taking "too much time" and a formerly breastfeeding mother's experience with breastfeeding taking "too much time," and lactation status at three months postpartum.

13. Does a mother's current experience with breastfeeding being "inconvenient" impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's experience with breastfeeding being "inconvenient" and a formerly breastfeeding mother's experience with breastfeeding being "inconvenient," and lactation status at three months postpartum.

14. Does a mother's current experience with sore or bleeding nipples impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's current experience with sore or bleeding nipples and a formerly breastfeeding mother's experience with sore or bleeding nipples, and lactation status at three months postpartum.

15. Does a mother's current experience with engorgement impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's current experience with engorgement and a formerly breastfeeding mother's experience with engorgement, and lactation status at three months postpartum.

16. Does a mother's current experience with mastitis or breast infection impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's current experience with mastitis or breast infection and a formerly breastfeeding mother's experience with mastitis or breast infection, and lactation status at three months postpartum.

17. Does a mother's parity status, while controlling for the problems of nursing, impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a breastfeeding mother's parity status and a formerly breastfeeding mother's parity status, while controlling for the problems of nursing, and lactation status at three months postpartum.

18. Does a mother's delivery site (whether Baby-Friendly designated, or not), impact lactation status at three months postpartum?

    H0: There is no significant statistical difference between a mother who delivers at a Baby-Friendly designated site and a mother who delivers at a non-Baby-Friendly designated site, and lactation status at three months postpartum.

Survey Method

The purpose of this study was to analyze data from the 2004 FYI dataset that related to mothers' lactation experiences, to determine lactation status at three months postpartum, and to assess factors within the Social-Ecological Systems Framework that may have contributed to lactation decisions. Information was also gathered as to the frequency of perceived barriers experienced by mothers and the occurrence of problems. Data from nine survey questions during the analysis of the 2004 FYI dataset were used to answer the current study's 18 research questions. They were as follows:

1. Were you employed or in school during this pregnancy?
2. How much paid maternity leave do you expect to receive from your employer?
3. Are you still breastfeeding?
4. If you are no longer feeding any breast milk to your baby, what were your reasons for stopping?
5. If you have stopped breastfeeding, how old was your baby when you stopped?
6. Have you had any of the following problems? Not enough milk; Fussy baby; Sleepy baby; Too much time; Inconvenient.
7. In the past three months, have you had any of the following conditions? Sore/bleeding nipples; Engorged breasts; Mastitis/breast infection.
8. Have you started working or going to school since your baby was born?
9. If yes, how old was your baby when you returned to work or school?

Findings and Results from this Analysis

Simple t-tests, Chi square, Multiple Correspondence Analysis (MCA), and Multiple Logistic Regression (MLR) were computed for this analysis. Descriptive statistics, computing the mean (M) and standard deviation (SD), and inferential statistics, computing degrees of freedom (df), Chi squares (χ^2), and R-squared results (R2), revealed the current study's findings with a thorough assessment of how the independent variables (a lactating mother's race, age, employment and school status, marital status, educational level, and parity) impacted the dependent variable (lactation status: yes/no) at three months postpartum. Alpha levels (indicated by p) were computed as statistically significant at the .05 level. Research questions and their respective statistical tests will be identified. A description of the tabulated data will follow each table.

A total of 587 eligible mothers at the Baby-Friendly designated hospital (Hospital A-BF) were approached at baseline and 422 women consented (28.1% refusal rate). At the Community-based Hospital (Hospital B), recruitment was similar. Of the 580 eligible mothers who were approached, 420 women consented (27.6% refusal rate).

Baseline Characteristics

Table 20 presents baseline characteristics of the mothers surveyed between the Baby-Friendly hospital (Hospital A-BF) and the Community-Based hospital (Hospital B) using frequencies expressed in percentages and means. The mean age in years of the participants at both sites was 29 years. All demographic data were obtained from Dozier.

According to Dozier, baseline characteristics were nearly identical with the exception of greater percentages of women indicating that they had adequate prenatal care at Hospital B. – the community-based, non-BF-designated hospital. This finding was statistically significant ($p = .02$) at the $<.05$ level.

Of the 755 three-month surveys sent out, 515 (68%) were returned (Hospital A-BF: 257 of a possible 422; Hospital B: 258 of a possible 420). Table 20 begins to

Table 19

Baseline Characteristics of Population Between Hospital A-BF and Hospital B Reported in Frequencies and Percentages (N = 842)

Mothers' Baseline characteristics	Hospital A-BF (N = 422)	Hospital B (N = 420)
Some HS	29.5 (7%)	54.6 (13%)
HS	54.9 (13%)	54.6 (13%)
Some college	105.5 (25%)	109.2 (26%)
White	341.8 (81%)	344.4 (82%)
Minority	75.9 (18%)	75.6 (18%)
Lives with father of baby	379.8 (90%)	378 (90%)
Single	71.7 (17%)	79.8 (19%)
Married	329.2 (78%)	327.6 (78%)
On WIC	54.9 (13%)	75.6 (18%)
Prior live birth	215.2 (51%)	210 (50%)
Pre/during pregnancy smoking	42.2 (10%)	46.2 (11%)
Resides in inner city	88.6 (21%)	67.2 (16%)
Had adequate prenatal care	329.2 (78%)	357 (85%)
Maternal depression	135 (32%)	138.6 (33%)
Normal pre-pregnancy weight	202.6 (48%)	172.2 (41%)

Note: Multiple responses from each participant were recorded.

present the three-month demographic data of the 515 participants who answered the Three-Month FYI Survey. The data presents the demographic data via simple t-tests for the equality of average age by the race of mothers completing the three-month survey. Means and SDs were performed to determine if there was a significant difference between the average ages by racial status of mothers completing the survey at three months postpartum.

The simple t-test for equality of average age by minority status at three months postpartum in Table 20 was statistically significant at the .05 level. At three months postpartum, the mean age of white women completing the three-month survey was 30.59 years compared to 28.87 years for minority women ($p = .0426$).

Table 20

Simple t-Test for Equality of Average Age by Minority for Period=3 Months Postpartum

Race	*N*	M Age	SD
White	451	30.59	4.80
Other	64	28.87	6.41
Total	515		

$p = .0426$, $df = 73$

Research Question One: Race (Microsystem)

Table 21 presents the data analysis for Research Question One: Does a breastfeeding mother's race impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between white mothers and black mothers at three months postpartum.

Table 21

Race of Mother and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

Race of mother	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
Other	14 (21.88%)	50 (78 13%)	64 (100%)
White	92 (20.4%)	359 (79.6%)	451 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = 0.0747$, $p = .7846$

No statistical significance was found between race and lactation termination at three months postpartum ($p = .7846$). The analysis failed to reject the null hypothesis that the proportions were equal. "Other" women ($n = 50$, 78.13%) were just as likely to be breastfeeding their children at three months postpartum as White women (n = 358, 79.6%).

When minority status was differentiated to expand "Other" into the categories of Asian, Black, Hispanic, and Other, results of a Chi square test indicated similar findings with no statistical significance between race and breastfeeding status at three months postpartum (p = .5446) (See Table 22). The analysis failed to reject the null hypothesis that the proportions were equal.

Table 22

Breakdown of "Other" Race of Mother and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

Race of mother	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
White	92 (20.4%)	359 (79.6%)	451 (100%)
Asian	8 (30.77%)	18 (69.23%)	26 (100%)
Black	2 (12.5%)	14 (87.5%)	16 (100%)
Hispanic	4 (21.05%)	15 (78.95%)	19 (100%)
Other	0 (0%)	3 (100%)	3 (100%)
Total	106 (20.58%)	409 (79.42%)	515 (100%)

$\chi^2(4) = 3.0793$, p = .5446

Research Question Two: Age (Microsystem)

Table 23 presents the data analysis for Research Question Two: Does a breastfeeding mother's age impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between five age categories (range = 18 to 47) and whether the mother was still breastfeeding at three months postpartum.

Table 23

Age of Mother and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

Mother's age (in years)	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
18-20	7 (53.85%)	6 (46.15%)	13 (100%)
21-25	26 (34.67%)	49 (65.33%)	75 (100%)
26-30	31 (18.34%)	138 (81.66%)	169 (100%)
31-35	28 (15.91%)	148 (84.09%)	176 (100%)
36-47	14 (17.07%)	68 (82.93%)	82 (100%)
Total	106 (20.58%)	409 (79.42%)	515 (100%)

$\chi^2(4) = 21.3890$, $p = .0003$

The Chi square test for the difference between the ages of the mothers who were still breastfeeding and mothers who had terminated in Table 23 was significant at the .05 level ($p = .0003$). Mothers who were 26 to 30 years of age were more likely to be breastfeeding at 3 months postpartum than mothers who were 21 to 25 years of age, and mothers who were 31 to 35 years of age were even more likely to still be breastfeeding than the 26 to 30 age group. Finally, mothers aged 36 to 47 years were just slightly less likely to still be breastfeeding than the 31 to 35 age group, with findings similar to the 26- to 30-year old group.

Table 24 presents data analysis for Research Question Two: Does a breastfeeding mother's age impact lactation status at three months postpartum? A simple t-test for equality of average age by breastfeeding status at three months postpartum was calculated. Means and SDs were performed to determine if there was a significant difference between the average ages by breastfeeding status of mothers completing the survey at three months postpartum.

Table 24

Simple t-Test for Equality of Average Age by Breastfeeding Status for Period=3 Months

Breastfeeding Status	*N*	M Age	SD
Are you still breastfeeding = No	106	28.8019	5.8463
Are you still breastfeeding = Yes	409	30.7897	4.7604
Total	515		

p = .0015, df = 143

The simple t-test for equality of average age by breastfeeding status at three months postpartum in Table 24 was statistically significant at the .05 level. At three months postpartum, the mean age of the mother who was still breastfeeding was 30.78 years compared to 28.80 years for mothers who were not (p = .0015), meaning that mothers who were still breastfeeding at three months were older than those who had terminated breastfeeding. The analysis rejected the null hypothesis that the means were equal.

Research Question Three: Educational Level (Microsystem)

Table 25 presents the data analysis for Research Question Three: Does a breastfeeding mother's educational level impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between educational levels of mothers who were breastfeeding at three months compared to mothers who had terminated lactation.

At three months postpartum, mothers who had completed more years of schooling were statistically more likely to be breastfeeding than their less-educated counterparts (p = .0001) with women having 16 years or more of education breastfeeding more than women who had less than 12 to 15 years of schooling. The analysis rejected the null hypothesis that the proportions were equal.

Table 25

Educational Level of Mother Across Five Categories and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

Mother's education (in years)	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
<12	7 (33.33%)	14 (66.67%)	21 (100%)
12	14 (33.33%)	28 (66.67%)	42 (100%)
13-15	38 (30.4%)	87 (69.6%)	125 (100%)
16	27 (17.53%)	127 (82.47%)	154 (100%)
>16	20 (11.56%)	153 (88.44%)	173 (100%)
Total	106 (20.58%)	409 (79.42%)	515 (100%)

χ^2 (4) = 23.1274, p = .0001

Research Question Four: Marital Status (Microsystem and Mesosystem)

Table 26 presents the data analysis for Research Question Four: Does a breastfeeding mother's marital status impact lactation status at three months postpartum? A Chi square test was performed to determine if there were statistical differences between mothers who were married and lactation status compared to mothers who were not married at three months postpartum.

Table 26

Marital Status of Mother Across Three Categories and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

Marital status	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
Single	28 (37.33%)	47 (62.67%)	74 (100%)
Married	78 (17.73%)	362 (82.27%)	440 (100%)
Total	106	409	514

χ^2(1) = 15.0686, p = .0002

At three months postpartum, marital status was found to be statistically significant at the .05 level. Mothers who were married were more likely to be breastfeeding than unmarried "other" respondents ($p = .0002$). The analysis rejected the null hypothesis that the proportions were equal.

Table 27 presents the findings when race and marital status were compared to breastfeeding status at three months postpartum.

The majority of respondents were married white women, followed by white single women. Thereafter, black married women, Asian single women, and Hispanic married women were represented. With a p level of .0056 there are significant differences between these categories; however, small sample size of those categories of Hispanic single, and especially Black single, are to be recognized for their lack of representation. These results are not generalizable.

Table 27

Race Across Four Categories and Marital Status Across Three Categories Compared to Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

Race and Marital Status	Are you still breastfeeding= No	Are you still breastfeeding = Yes	Total
Asian-Married	1(90%)	9(90%)	10 (100%)
Asian-Single	7(43.75%)	9(56.25%)	16 (100%)
Black-Married	1(6.67%)	14(93.33%)	15 (100%)
Black-Single	1(100%)	0(0%)	1 (100%)
Hispanic-Married	2(18.18%)	9(81.82%)	11 (100%)
Hispanic-Single	2(25%)	6(75%)	8 (100%)
White-Married	74(18.45%)	327(81.55%)	401 (100%)
White-Single	18(36%)	32(64%)	50 (100%)
Total	106	406	512 (100%)

$\chi^2(7) = 19.9998$, $p = .0056$

Research Question Five: Length of Maternity Leave (Exosystem)

Table 28 presents the data analysis for Research Question Five: Does a breastfeeding mother's expected length of maternity leave at delivery (Baseline Survey) impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who expected a longer maternity leave and lactation status at three months postpartum compared to mothers who expected a shorter maternity leave.

At baseline, the mothers who expected a maternity leave at delivery of 0 to 1 month and 3 to 6 months were statistically more likely to be breastfeeding at three months than those who expected a shorter maternity leave at delivery ($p = .0414$). The analysis rejected the null hypothesis that the proportions were equal.

Table 28

Expected Length of Maternity Leave Across Four Categories and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

How old will your baby be when you return to work or school (in months)?	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
0-1	3 (15%)	17 (85%)	20 (100%)
1-2	38(33.04%)	77(66.96%)	115(100%)
2-3	29 (22.83%)	98(77.17%)	127 (100%)
>3	11 (14.47%)	65 (85.53%)	76 (100%)
Don't Know (DK)	3 (23.08%)	10 (76.92)	13 (100%)
Total	84	267	351 (100%)

$\chi^2(2) = 9.9449$, $p = .0414$

Research Question Six: Paid Maternity Leave (Exosystem)

Table 29 presents the data analysis for Research Question Six: Does a breastfeeding mother's expected amount of paid maternity leave at delivery (Baseline Survey) impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who expected greater amount of paid maternity leave and lactation status at three months postpartum compared to mothers who expected a lesser amount of paid maternity leave.

Table 29

Mother's Expected Amount of Paid Maternity Leave at Baseline Across Four Categories and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

How much paid maternity leave do you expect to receive (in weeks)?	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
0	20 (20%)	80 (80%)	100 (100%)
1 - 4	6 (28.57%)	15 (71.43%)	21 (100%)
5 - 8	47 (24.74%)	143 (75.26%)	190 (100%)
>8	7 (17.50%)	33 (82.50%)	40 (100%)
Don't Know (DK)	4 (9.52%)	38 (90.48%)	42 (100%)
Total	84	209	393 (100%)

$\chi^2(3) = 5.9049$, $p = .2064$

There was no statistical significance between breastfeeding status at three months and a mother's expected amount of paid maternity leave at baseline. The Chi square test yielded a p value of .2064, so the analysis failed to reject the null hypothesis that the proportions were equal.

Research Question Seven: Employment or School Status (Exosystem)

Table 30 presents the data analysis for Research Question Seven: Does a breastfeeding mother's employment or school status impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who had returned to employment or school and lactation status compared to mothers who had not returned to employment or school at three months postpartum.

Table 30

Employment or School Status and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

Have you started working or going to school since your baby was born?	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	37 (14.45%)	219 (85.55%)	256 (100%)
Yes	67 (26.17%)	189 (73.83%)	256 (100%)
Total	104	408	512 (100%)

$\chi^2(1) = 10.8597$, $p = .001$

The Chi square test for the difference between mothers who had started working or going to school since their baby was born and mothers who had not was significant at the .05 level in Table 30. Mothers who had started working or going to school were significantly less likely to be breastfeeding than mothers who had not ($p = .001$). The Chi square test yielded a p value $<.05$, so the analysis rejected the null hypothesis that the proportions were equal.

Research Question Eight: Parity Status (Microsystem and Mesosystem)

Table 31 presents the data analysis for Research Question Eight: Does a breastfeeding mother's parity status influence lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who had other children and lactation status compared with mothers who were having their first child at three months postpartum.

Table 31

Parity Across Two Categories and Lactation Status at Three Months Postpartum Reflected in Frequencies and Percentages

Parity	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
Primiparous	56 (23.24%)	185 (76.76%)	241 (100%)
Multiparous	50 (18.32%)	223 (81.68%)	273 (100%)
Total	106	408	514 (100%)

$\chi^2(1) = 1.8940$, p = .1688

When parity was examined at three months postpartum, mothers who had other children were no more likely to be breastfeeding than mothers who had delivered their first child (p = .1688). The analysis failed to reject the null hypothesis that the proportions were equal.

Research Question Nine: "Not Enough Milk" (Microsystem)

Table 32 presents the data analysis for Research Question Nine: Does a breastfeeding mother's current experience with "not enough milk" impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who reported "not enough milk" and lactation status compared to mothers who did not report this problem at three months postpartum.

At three months postpartum, mothers who reported experiencing the problem of "not enough milk" were statistically less likely to be breastfeeding than mothers who did not report that problem ($p = <.0001$). The Chi square test yielded a p value <.05, so the analysis rejected the null hypothesis that the proportions were equal.

Table 32

Mother's Current Experience With the Problems of Breastfeeding and Lactation Status at Three Months Postpartum: Baby: Not Enough Milk, Reflected in Frequencies and Percentages

Not enough milk	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	58 (14.11%)	353 (85.89%)	411 (100%)
Yes	48 (46.15%)	56 (53.85%)	104 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = 52.1303$, $p = <.0001$

Research Question 10: "Fussy Baby" (Microsystem and Mesosystem)

Table 33 presents the data analysis for Research Question 10: Does a mother's current experience with a "fussy baby" impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who reported having a "fussy baby" and lactation status compared to mothers who did not report a "fussy baby" at three months postpartum.

Table 33

Mother's Current Experience With the Problems of Breastfeeding and Lactation Status at Three Months Postpartum: Baby: Fussy Baby, Reflected in Frequencies and Percentages

Fussy baby	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	92 (20.86%)	349 (79.14%)	441 (100%)
Yes	14 (18.92%)	60 (81.08%)	74 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = .1463$, $p = .7021$

At three months postpartum, mothers who reported experiencing the problem of a "fussy baby" were statistically more likely to be breastfeeding than mothers who did not report having a fussy baby (p = .7021). The Chi square test yielded a p value >.05, so the analysis failed to reject the null hypothesis that the proportions were equal.

Research Question 11: "Sleepy Baby" (Microsystem and Mesosystem)

Table 34 presents the data analysis for Research Question 11: Does a mother's current experience with a "sleepy baby" impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who reported having a "sleepy baby" and lactation status compared to mothers who did not report this problem at three months postpartum.

At three months postpartum, mothers who reported experiencing the problem of a "sleepy baby" were no more likely to be breastfeeding than mothers who did not report having a sleepy baby (p = .0425). The Chi square test yielded a p value <.05, so the analysis rejected the null hypothesis that the proportions were equal.

Table 34

Mother's Current Experience With the Problems of Breastfeeding and Lactation Status at Three Months Postpartum: Baby: Sleepy Baby, Reflected in Frequencies and Percentages

Sleepy baby	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	92 (19.49%)	380 (80.51%)	472 (100%)
Yes	14 (32.56%)	29 (67.44%)	43 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = 4.1164$, $p = .0425$

Research Question 12: "Too Much Time" (Microsystem and Mesosystem)

Table 35 presents the data analysis for Research Question 12: Does a mother's current experience with lactation taking "too much time" impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who reported breastfeeding taking "too much time" and lactation status compared to mothers who did not report that problem at three months postpartum.

At three months postpartum, mothers who reported experiencing the problem of lactation taking "too much time" were statistically less likely to be breastfeeding than mothers who did not report that problem ($p = <.0001$). The Chi square test yielded a p value $<.05$, so the analysis rejected the null hypothesis that the proportions were equal.

Research Question 13: "Inconvenient" (Microsystem)

Table 36 presents the data analysis for Research Question 13: Does a mother's current experience with lactation being "inconvenient" impact lactation status at three months postpartum? A Chi square test was performed to determine if there were

Table 35

Mother's Current Experience With the Problems of Breastfeeding and Lactation Status at Three Months Postpartum: Baby: Too Much Time, Reflected in Frequencies and Percentages

Too much time	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	88 (18.18%)	396 (81.82%)	484 (100%)
Yes	18 (58.06%)	13 (41.94%)	31 (100%)
Total	106	409	515

$\chi^2(1) = 28.3501$, $p = <.0001$

significant differences between mothers who reported breastfeeding being "inconvenient" and lactation status compared to mothers who did not report this problem at three months postpartum.

Table 36

Mother's Current Experience With the Problems of Breastfeeding and Lactation Status at Three Months Postpartum: Baby: Inconvenient, Reflected in Frequencies and Percentages

Inconvenient	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	86 (17.95%)	383 (82.05%)	479 (100%)
Yes	20 (55.56%)	16 (44.44%)	36 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = 28.9618$, $p = <.0001$

At three months postpartum, mothers who reported experiencing the problem of lactation being "inconvenient" were statistically less likely to be breastfeeding than mothers who did not report that problem (p = <.0001). The Chi square test yielded a p value <.05, so the analysis rejected the null hypothesis that the proportions were equal.

Research Question 14: Sore and/or Bleeding Nipples (Microsystem)

Table 37 presents the data analysis for Research Question 14: Does a mother's current experience with sore and/or bleeding nipples impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who reported having sore and/or bleeding nipples and lactation status compared to mothers who did not report sore and/or bleeding nipples at three months postpartum.

Table 37

Mother's Current Experience With the Problems of Breastfeeding and Lactation Status at Three Months Postpartum: Mom: Sore or Bleeding Nipples, Reflected in Frequencies and Percentages

Sore/bleeding nipples	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	85 (19.19%)	358 (80.81%)	443 (100%)
Yes	21 (29.17%)	51 (70.83%)	72 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = 3.7732$, $p = .0521$

At three months postpartum, mothers who reported experiencing the problem of "sore/bleeding nipples" were no more likely to terminate breastfeeding than mothers who did not report this problem. The Chi square test yielded a p value >.05, so the analysis failed to reject the null hypothesis that the proportions were equal.

Research Question 15: Engorgement (Microsystem)

Table 38 presents the data analysis for Research Question 15: Does a mother's current experience with engorgement impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who reported engorgement and lactation status compared to mothers who did not report this problem at three months postpartum.

Table 38

Mother's Current Experience With the Problems of Breastfeeding and Lactation Status at Three Months Postpartum: Mom: Engorged Breasts, Reflected in Frequencies and Percentages

Engorged breasts	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	87 (20.05%)	347 (79.95%)	434 (100%)
Yes	19 (23.46%)	62 (76.54%)	81 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = .4858$, $p = .4858$

At three months postpartum, mothers who reported experiencing the problem of "engorgement" were no more likely to terminate breastfeeding than mothers who did not report engorgement ($p = .4858$). The Chi square test yielded a p value >.05, so the analysis failed to reject the null hypothesis that the proportions were equal.

Research Question 16: Mastitis and/or Breast Infection (Microsystem)

Table 39 presents the data analysis for research question 16: Does a mother's current experience with mastitis and/or breast infection impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who reported mastitis and/or breast infection and lactation status compared to mothers who did not report this problem at three months postpartum.

Table 39

Mother's Current Experience With the Problems of Breastfeeding and Lactation Status at Three Months Postpartum: Mom: Mastitis and/or Breast Infections, Reflected in Frequencies and Percentages

Mastitis and/or breast infection	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
No	104 (21.22%)	386 (78.78%)	490 (100%)
Yes	2 (8%)	23 (92%)	25 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = 2.5449$, $p = .1107$

At three months postpartum, mothers who reported experiencing the problem of mastitis and/or breast infection were statistically more likely to be breastfeeding than mothers who did not report that problem ($p = .1107$); however, it is noted that the sample size for "not breastfeeding" is small ($n = 2$), and this may have skewed the result. The Chi square test yielded a p value >.05, so the analysis failed to reject the null hypothesis that the proportions were equal.

Research Question 17: Parity Controlling for Problems (Microsystem and Mesosystem)

Tables 40, 41, 42, 43, and 44 present the data analysis for Research Question 17: Does parity status, while controlling for the problems of breastfeeding, impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between primiparous and multiparous mothers and the problems of nursing and lactation status compared to mothers who did not report experiencing a problem at three months postpartum.

Table 40

Lactation Status at 3 Months Postpartum, Parity Controlling for Problem of "Fussy Baby," Reported in Frequencies and Percentages

Parity	Not fussy Not bf	Not fussy* Breastfeeding	Fussy Not bf	Fussy** Breastfeeding
No prior live birth	37 (39.78%)	56 (60.22%)	6 (16.67%)	30 (83.33%)
Prior live birth	24 (26.09%)	68 (73.91%)	8 (21.05%)	30 (78.95%)

*χ^2 = 3.9265, p = .0475
**χ^2 = 0.2318, p = .6302

At three months postpartum, mothers who reported a prior live birth, and those who reported a "not fussy" baby were statistically more likely to be breastfeeding than mothers who did not report that problem ($p = .0475$). The Chi square test yielded a p value <.05 so the analysis rejected the null hypothesis that the proportions were equal. There was no statistical significance between the two parity groups for "fussy baby" ($p = .6302$). The Chi square test yielded a p value >.05 so the analysis failed to reject the null hypothesis that the proportions were equal.

At three months postpartum, mothers who reported a prior live birth, and those who reported "convenient" were statistically more likely to be breastfeeding than mothers who did not report "convenient" ($p = .0219$). The Chi square test yielded a p value <.05 so the analysis rejected the null hypothesis that the proportions were equal. There was no statistical significance between the two parity groups for "not convenient"

Table 41

Lactation Status at 3 Months Postpartum, Parity Controlling for Problem of "Inconvenient" Reported in Frequencies and Percentages

Parity	Convenient Not bf	Convenient* Breastfeeding	Not convenient Not bf	Not convenient** Breastfeeding
No prior live birth	35 (31.25%)	77 (68.75%)	8 (47.06%)	9 (52.94%)
Prior live birth	20 (18.02%)	91 (81.98%)	12 (63.16%)	7 (36.84%)

*χ^2 = 5.2532, p = .0219
**χ^2 = 0.9418, p = .3318

(p = .3318). The Chi square test yielded a p value >.05 so the analysis failed to reject the null hypothesis that the proportions were equal.

Table 42

Lactation Status at 3 Months Postpartum, Parity Controlling for the Problem of "Not Enough Milk" Reported in Frequencies and Percentages

Parity	Enough milk Not bf	Enough milk* Breastfeeding	Not enough milk Not bf	Not enough milk** Breastfeeding
No prior live birth	16 (20.78%)	61 (79.22%)	27 (51.92%)	25 (48.08%)
Prior live birth	11 (14.1%)	67 (85.9%)	21 (40.38%)	31 (59.62%)

*χ^2 = 1.2008, p = .2732
**χ^2 = 1.3929, p = .2379

At three months postpartum, mothers who reported a prior live birth, and those who reported "enough milk" were no more likely to be breastfeeding than mothers who did not report "enough milk" (p = .2732). The Chi square test yielded a p value >.05 so the analysis failed to reject the null hypothesis that the proportions were equal. Similarly, there was no statistical significance between the two parity groups for "not enough milk" (p = .2379). The Chi square test yielded a p value >.05 so the analysis failed to reject the null hypothesis that the proportions were equal.

Table 43

Lactation Status at 3 Months Postpartum, Parity Controlling for the Problem of "Sleepy Baby" Reported in Frequencies and Percentages

Parity	Not sleepy baby Not bf	Not sleepy baby* Breastfeeding	Sleepy Baby Not bf	Sleepy Baby** Breastfeeding
No prior live birth	33 (33.33%)	66 (66.67%)	10 (33.33%)	20 (66.67%)
Prior live birth	28 (23.93%)	89 (76.07%)	4 (30.77%)	9 (69.23%)

*χ^2 = 2.3390, p = .1262
**χ^2 = 0.0272, p = .8691

At three months postpartum, mothers who reported a prior live birth, and those who reported a "not sleepy" baby were no more likely to be breastfeeding than mothers who did not report a "not sleepy" baby (p = .1262). The Chi square test yielded a p value >.05 so the analysis failed to reject the null hypothesis that the proportions were equal. Similarly, there was no statistical significance between the two parity groups for "sleepy baby" (p = .8691). The Chi square test yielded a p value >.05 so the analysis failed to reject the null hypothesis that the proportions were equal.

At three months postpartum, mothers who reported a prior live birth, and those who reported lactation to "not" take "too much time" were statistically more likely to be breastfeeding than mothers who did not report this (p = .0558). The Chi square test yielded a p value <.05 so the analysis rejected the null hypothesis that the proportions were equal. There was no statistical significance between the two parity groups for "too much time" (p = .2843). The Chi square test yielded a p value >0.05 so the analysis failed to reject the null hypothesis that the proportions were equal.

Table 44

Lactation Status at 3 Months Postpartum, Parity Controlling for the Problem of "Too Much Time" Reported in Frequencies and Percentages

Parity	Not too much time Not bf	Not too much time* Breastfeeding	Too much time Not bf	Too much time** Breastfeeding
No prior live birth	34 (30.63%)	77 (69.37%)	9 (50.00%)	9 (50.00%)
Prior live birth	23 (19.66%)	94 (80.34%)	9 (69.23%)	4 (30.77%)

*χ^2 = 3.6575, p = .0558
**χ^2 = 1.1464, p = .2843

Research Question 18: Delivery Site (Exosystem and Macrosystem)

Table 45 presents the data analysis for Research Question 18: Does a mother's delivery site (whether Baby-Friendly designated, or not) impact lactation status at three months postpartum? A Chi square test was performed to determine if there were significant differences between mothers who delivered at the BF designated hospital and lactation status compared to mothers who delivered at the community-based hospital at three months postpartum.

At three months postpartum, mothers who delivered at the BF designated hospital (n = 257) were no more likely to be breastfeeding than mothers who delivered at the community-based hospital with the mature breastfeeding program (n = 258, p = .2858). At three months postpartum, 209 mothers of 257 (81.32%) were still breastfeeding at Hospital A-BF, and 200 mothers of 258 (77.52%) were still

Table 45

Mother's Delivery Site and Lactation Status at Three Months Postpartum Reported in Frequencies and Percentages

Hospital	Are you still breastfeeding = No	Are you still breastfeeding = Yes	Total
Not Baby-Friendly	58 (22.48%)	200 (77.52%)	258 (100%)
Baby-Friendly	48 (18.68%)	209 (81.32%)	257 (100%)
Total	106	409	515 (100%)

$\chi^2(1) = 1.1395$, $p = .2858$

breastfeeding at Hospital B. The Chi square test yielded a p value >.05, so the analysis failed to reject the null hypothesis that the proportions were equal.

Research Questions 1 – 18 Combined: Multiple Correspondence Analysis

Figure 2 presents the data analysis for all of the variables available to the researcher through the Data Sharing Agreement with the UR. A multiple correspondence analysis was performed to investigate or explore the associations or relationships among multiple variables of interest in this study. From top left to bottom left, the plots will be herein labeled. "A" will represent the figure's top left quadrant, and following clockwise, "B" will correspond to the top right quadrant, "C" the bottom right quadrant, and "D" the bottom left quadrant.

In a MCA map, levels of variables close to the origin (the intersection between the two axes at the 0/0 coordinate) occur with greater frequency than levels of variables with more extreme coordinates. Also, levels of variables that are relatively close together in either the X or Y dimensions are more strongly associated than if they are farther apart.

Beginning in quadrant C, Figure 2 shows that women who were 18 – 20 years of age, who had less than a high school education, who were single, primiparous, and who were Asian, and Hispanic were the least represented in the total sample, and were too

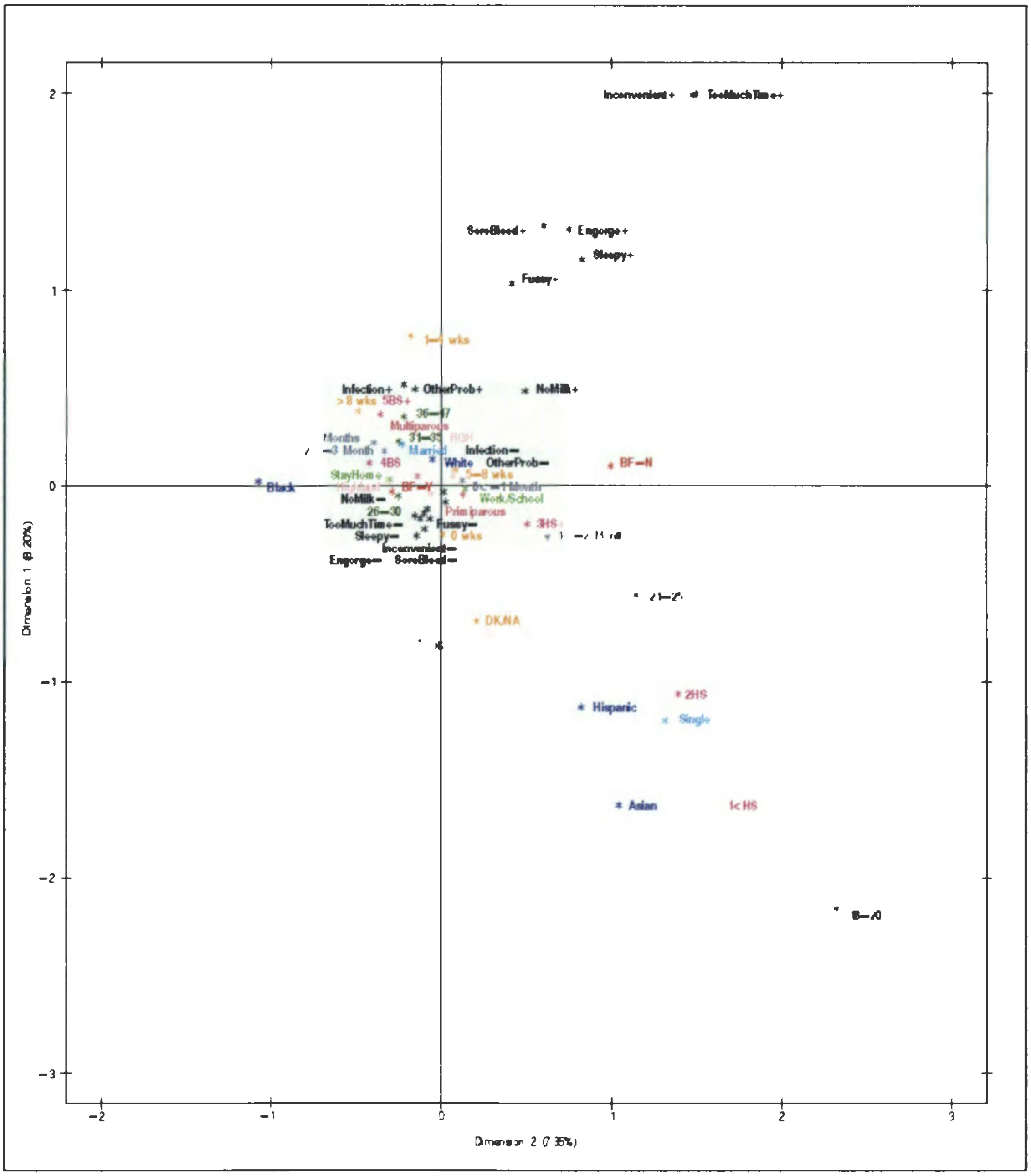

Figure 2. Multiple Correspondence Analysis of Variables at Three Months Postpartum.

the least likely to be breastfeeding (BF-N) at three months postpartum. Regarding the problems of nursing, mothers who were not breastfeeding reported insufficient milk, fussy baby, sleepy baby, engorgement, sore and/or bleeding nipples, inconvenience and "too much time" as indicated by a (+) within the Figure, at generally higher rates than the mothers who were still breastfeeding. Those problems at the perimeter of the map were those that were less commonly reported. It appears from the graphical representation that inconvenient and "too much time" were associated to one another, as well as engorgement and sleepy baby. Insufficient milk was most commonly reported in the BF-N group as indicated by its close proximity to the origin.

Moving to Quadrant D and the inferior portions of A, the Figure shows that women who were breastfeeding (BF-Y) at three months postpartum, were most likely those who were either in the 26 – 30 or the 31 – 35 age category, married, white, and more highly educated. These mothers generally did not report the problems of insufficient milk, too much time, fussy, sleepy baby, inconvenient, engorgement, and sore and/or bleeding nipples.

Research Questions 1 – 18 Combined: Multiple Logistic Regression Analysis

Table 46 presents the data analysis for all independent variables at three months postpartum. Multiple logistic regression analysis was computed to assess predictors of breastfeeding status at three months postpartum.

The multiple logistic regression analysis for all independent variables shows that educational level, paid maternity leave, perception of insufficient milk, and too much time as predictors of lactation status at three months postpartum at the .05 alpha level.

Table 46

Multiple Logistic Regression Analysis for All Mothers at Three Months Postpartum (n = 338): Predictors of Lactation Status at Three Months Postpartum

Predictor	χ^2	*df*	*p*
Race	4.1551	3	0.2452
Age category	7.1858	4	0.1264
Educational Level	11.2989	4	0.0234
Marital Status	0.1772	1	0.6738
Maternity Leave	4.0628	4	0.3976
Paid Maternity Leave	10.0315	4	0.0399
Return to Work/School	2.905	1	0.0883
Parity Status	3.7102	1	0.0541
Insufficient Milk	23.9858	1	<.0001
Fussy	1.1347	1	0.2868
Too Much Time	5.9806	1	0.0145
Sleepy	0.1631	1	0.6863
Inconvenient	1.7846	1	0.1816
Other Problems	0.4222	1	0.5159
Sore/Bleeding	2.3457	1	0.1256
Engorgement	1.9641	1	0.1611
Infection	0.8429	1	0.3586
Delivery Site	1.0255	1	0.3112
Test	χ^2	*df*	*p*
Likelihood ratio test	103.751	32	<.0001
Goodness-of-fit test	11.2999	8	0.1853

The second step of the MLR analysis includes removing the extraneous variables from analysis. Results may be inaccurate or inconsistent if the number of variables is a relatively large proportion of the number of observations. In the end, when results are similar between analyses, it implies stability and heightens confidence in the model. Table 47 presents the data for a reduced multiple logistic regression analysis on the six variables that remained after running stepwise logistic regression using the variables in Table 46 as the initial model.

Table 47

Reduced Multiple Logistic Regression 1st Iteration: Predictors of Lactation Status at Three Months Postpartum

Predictor	χ^2	*df*	*p*
Educational Level	25.063	4	<.0001
Paid Maternity Leave	7.0336	4	0.1341
Return to Work	3.1914	1	0.074
Parity Status	0.5838	1	0.4448
Insufficient Milk	27.3384	1	<.0001
Too Much Time	12.2783	1	0.0005
Test	χ^2	*df*	*p*
Likelihood ratio test	83.8709	12	<.0001
Goodness-of-fit test	6.2005	8	0.6248

Table 48 shows that when variables are reduced further through another iteration using an alpha level of .05, educational level, insufficient milk, and perception of "too much time," are the most likely to predict breastfeeding status at three months postpartum. The consistency of the performance of these variables through the iterations of model selection gives confidence in this model.

Table 48

Reduced Multiple Logistic Regression 2nd Iteration: Predictors of Lactation Status at Three Months Postpartum (n = 515)

Predictor	χ^2	*df*	*P*
Educational Level	27.8116	4	<.0001
Insufficient Milk	37.8893	1	<.0001
Too Much Time	20.7121	1	<.0001
Test	χ^2	*df*	*P*
Likelihood ratio test	91.3572	6	<.0001
Goodness-of-fit test	1.6331	5	0.8972

The analysis demonstrates that the final three independent variables: educational level, perception of insufficient milk supply, and perception of "too much time" are the primary predictors of breastfeeding status at three months postpartum.

The final section of analysis focuses on the spheres of influence within the Bronfenbrenner framework and identifies which sphere (or spheres combined) has the greatest relationship between the outcome and the possible predictors. If the relationships are strong, it may indicate which sphere wields the greatest influence on lactation status at three months postpartum. Table 50 presents the data analysis for groupings of selected microsystem-related independent variables according to the Bronfenbrenner Social-Ecological Model. Logistic regressions were performed using backward selection to obtain R-squared (R2) and Max-rescaled R-square (MR2) values for the model. R-square measures are indicators of the overall amount of variability explained by the models. Whether or not a specific variable is kept in the model is assessed using a chi square test as shown in the summary after the last variable is deleted (Table 49). Throughout each step of the analysis, those variables that do not meet the level of significance set at 0.15 are omitted. The less restrictive 0.15 alpha level will be used in these phases so analyses do not prematurely dismiss variables that may prove useful in later stages of modeling.

According to Doetkott (personal communication, February 17, 2011), in linear models, like linear regression, the R2 value can range between 0 and 1 and can be thought of as representing the proportions of the variability in the data that are explained by the model. When the response variable is discrete (as in binary logistic regression as shown here), then R2 may be somewhat biased. The MR2 value attempts to adjust for this bias so that it can be interpreted like the R2 value in linear regression analyses.

Table 49

Logistic Regression Backward Elimination Summary for Bronfenbrenner's Microsystem Variables Reported in R2, Max-Rescaled R2, and Wald Chi Square Values

Microsystem-Related Variable Removed	R2	MR2	$\chi 2$	*df*	*P*
Race Removed	0.1995	0.3043	2.1274	3	0.5464
Sleepy Removed	0.1988	0.3033	0.2765	1	0.599
Other Removed	0.1977	0.3016	0.4424	1	0.5059
Fussy Removed	0.1953	0.2979	0.9674	1	0.3253
Age Removed	0.1836	0.2801	4.8518	4	0.3028
Sore/Bleeding Removed	0.181	0.2761	1.0947	1	0.2954
Mastitis Removed	0.1767	0.2696	1.4707	1	0.2252
Inconvenient Removed	0.1728	0.2635	1.6793	1	0.195
Engorgement Removed	0.17	0.2593	1.0795	1	0.2988
All Microsystem Present	0.2045	0.3121	55.8196	20	<.0001

Note: No additional effect met the 0.15 significance level for removal from the model.

Table 49 illustrates that when all microsystem variables are present (final row), the MR2 value is the highest at 0.3121. Consistent with prior analyses using Chi square, no significant change is noted when Race is removed; the MR2 level changes only slightly (0.3043). This finding shows that race has little effect on predicting lactation status at three months postpartum. Again, when "sleepy" is removed, little effect is noted. The MR2 continues to drop with each variable deleted from the model with the lowest value seen when the problem of "engorgement" is removed (0.2593).

When all are reduced, the remaining three microsystem variables are the same as those determined in the stepwise analysis for the entire model. The three primary predictors of lactation status at three months postpartum within the microsystem sphere are: educational level, the problem of insufficient milk, and the problem of "too much time".

Table 50 presents the data analysis for the mesosystem-related variables in the logistic regression backward elimination summary. There were only two mesosystem variables available. No additional effects, with the exception of parity status, met the 0.15 significance level for removal from the mesosystem model.

Table 50

Logistic Regression Backward Elimination Summary for Bronfenbrenner's Mesosystem Variables Reported in R2, Max-Rescaled R2, and Wald Chi Square Values

Mesosystem-Related Variable Removed	R2	MR2	$\chi 2$	*Df*	*p*
Parity Removed	0.0254	0.0387	0.5714	1	0.4497
All Mesosystem Present	0.027	0.0412	9.685	2	0.0079

With a MR2 value of 0.0412, Table 51 illustrates that there is a poor relationship between the mesosystem-related variables and the response. Meaning, the mesosystem-related variables are not highly predictive of breastfeeding behavior at three months postpartum in this population of women.

Table 51 presents the data analysis for the exosystem-related variables in the logistic regression backward elimination summary. In this case, four variables were available and two were options. No additional effects, with the exception of Paid Leave and Delivery Site, met the 0.15 significance level for removal from the mesosystem model.

Table 51

Logistic Regression Backward Elimination Summary for Bronfenbrenner's Exosystem Variables Reported in R2, Max-Rescaled R2, and Wald Chi Square Values

Exosystem-Related Variable Removed	R2	MR2	$\chi 2$	*Df*	*p*
Paid Leave Removed	0.0428	0.0653	4.0643	4	0.3974
Delivery Site Removed	0.0558	0.0851	0.2612	1	0.6093
All Exosystem Present	0.0565	0.0862	16.9532	10	0.0754

Table 51 illustrates that the exosystem-related factors do not relate well to the outcome of lactation status at three months postpartum. This conclusion is identified by the low MR2 value less than 10% (0.0862). In addition, it is obvious that removing "Delivery Site" has virtually no effect on the MR2 value (from 0.0862 to 0.0851), so this supports the idea that this exosystem-related variable is not significantly related to the response variable. Meaning, delivery site does not significantly relate to lactation status at three months postpartum in this population of women. Similarly, the MR2 value drops only slightly when Paid Leave is removed (from 0.0862 to 0.0653). Therefore, this exosystem-related variable is also unrelated to the response.

Table 52 presents the data analysis when all of the independent variables from the full model (microsystem, mesosystem, and exosystem) are analyzed using logistic regression to determine R2 and MR2 values. With three sets of variables, there are various combinations that can be considered. In this case, the analysis looked at (a) the full model with all three sets, (b) at reduced models with two sets included and one set removed, and finally, (c) reduced models with two sets removed (or one set present).

With a MR2 value of 0.3121 for "Mi alone", the reduced model in Table 52 illustrates that the microsystem variables alone are the most useful in predicting

Table 52

Logistic Regression Using Full MCA and Reduced Models, All Mothers (n = 338): Influence of Groupings of Spheres of Influence According to Bronfenbrenner Social-Ecological Model

Sphere of Influence	R2	Max-rescaled R2	$\chi 2$	*df*	*p*
Mi + Me + Ex	0.2643	0.4032	61.2802	32	0.0014
Mi + Me	0.2094	0.3195	56.6549	22	<.0001
Mi + Ex	0.2558	0.3901	60.1625	30	0.0009
Me + Ex	0.0805	0.1228	24.2382	12	0.0189
Mi alone	0.2045	0.3121	55.8196	20	<.0001
Me alone	0.027	0.0412	9.685	2	0.0079
Ex alone	0.0565	0.0862	16.9532	10	0.0754

Note: Mi = Microsystem, Me = Mesosystem, Ex = Exosystem

lactation status at three months postpartum. The mesosystem variables (with MR2 values of 0.0412 for "Me alone" and 0.1228 for "Me + Ex") appear to be the least useful in predicting lactation status in this study.

Tables 53 and 54 present data analysis using a subset of 338 mothers with complete data at three months postpartum. The logistic regression identified 400 possible combinations of six selected variables (the problem of "perception of insufficient milk production," marital status, the problem of "too much time," return to work or school, educational level, and amount of paid maternity leave).The following table will identify the estimated probabilities expressed in percentages. These results are the predicted rates of breastfeeding at three months postpartum with various combinations of variables reported. Under each problem, a "No" indicates that the problem was not reported by the mother. Conversely, a "Yes" indicates that the problem was reported. Marital status is reported as either No (for single) or Yes (for married).

The two educational levels are indicated by either high school (HS) or college degree (C). To limit the number of values, only mothers who were planning on returning to work or school were included in the following analysis. The data serves to make predictions of combinations of variables to determine which mothers are more likely to be breastfeeding at three months postpartum. As always, caution is advised during interpretation for cells with low numbers of occurrences.

Table 53 illustrates that educational level is a good predictor of breastfeeding status at three months postpartum. This occurred in all cases when high school (HS) was compared to college(C) regardless of problems experienced. Although this trend is reported, however, it is vital to note that in numerous cases, cell sizes for many of these combinations were small in size.

Table 54 presents the data analysis of a reduced model using the two primary microsystem problems ("perception of insufficient milk production" and "too much time") with the mother's educational level. Again, the five educational levels were: did not graduate from high school (<HS), high school degree (HS), high school degree plus some college (HS+), college degree (C), and college plus (C+). "No" indicates that the problem was not reported by the mother. Both estimated percentages and actual results are noted.

Using a reduced model comparing the two primary problems from the microsystem and a mother's educational level, Table 54 illustrates that level of education is a key factor in predicting lactation status at three months postpartum. For example, in observations 5, 10, 15, and 20, where C+ is the mother's highest reported educational level attained, all estimated predictor percentages are greater than that of

Table 53

Logistic Regression Using Subset of Mothers With Complete Data at 3 Months: Estimated Probabilities From Final Complete Model (n = 338) Reported in Percentages

Observation	Insufficient Milk	Marital Status	Too Much Time	Return to Work/ School	Educational Level	Paid Maternity Leave	Estimated Probability
31	No	No	No	Yes	HS	No	68.5635
41	No	No	No	Yes	C	No	88.5264
131	No	Yes	No	Yes	HS	No	49.8225
141	No	Yes	No	Yes	C	No	77.8399
231	Yes	No	No	Yes	HS	No	30.8364
241	Yes	No	No	Yes	C	No	61.1989
331	Yes	Yes	No	Yes	HS	No	16.8728
341	Yes	Yes	No	Yes	C	No	41.7946
81	No	No	Yes	Yes	HS	No	24.0754
91	No	No	Yes	Yes	C	No	52.8696
181	No	Yes	Yes	Yes	HS	No	12.615
191	No	Yes	Yes	Yes	C	No	33.8054
281	Yes	No	Yes	Yes	HS	No	6.0875
291	Yes	No	Yes	Yes	C	No	18.6539
381	Yes	Yes	Yes	Yes	HS	No	2.8665
391	Yes	Yes	Yes	Yes	C	No	9.4529
34	No	No	No	Yes	HS	>8 weeks	76.5776
44	No	No	No	Yes	C	>8 weeks	92.042
134	No	Yes	No	Yes	HS	>8 weeks	59.814
144	No	Yes	No	Yes	C	>8 weeks	84.0396
234	Yes	No	No	Yes	HS	>8 weeks	40.0601
244	Yes	No	No	Yes	C	>8 weeks	70.2765
334	Yes	Yes	No	Yes	HS	>8 weeks	23.3286
344	Yes	Yes	No	Yes	C	>8 weeks	51.8394
84	No	No	Yes	Yes	HS	>8 weeks	32.2189
94	No	No	Yes	Yes	C	>8 weeks	62.7085
184	No	Yes	Yes	Yes	HS	>8 weeks	17.7903
194	No	Yes	Yes	Yes	C	>8 weeks	43.3604

HS, HS+ and C. For observations 1, 6, 11, and 16, where <HS is the mother's reported educational level, there is a noted discrepancy with percentages greater than HS and HS+; however, total numbers of mothers who fall into these categories are too small in

Table 54

Logistic Regression Using Subset of Mothers With Complete Data at 3 Months: Estimated Probabilities and Actual Findings From Final Microsystem Model (n = 338) Reported in Percentages

Observation	Insufficient Milk	Too Much Time	Educational Level	Estimated Probability	Actual Finding
1	No	No	<HS	81.0038	85.71
2	No	No	HS	63.1882	63.16
3	No	No	HS+	78.6974	76.79
4	No	No	C	88.2973	89.47
5	No	No	C+	94.366	93.18
6	No	Yes	<HS	38.86	100
7	No	Yes	HS	20.3727	0
8	No	Yes	HS+	35.5104	0
9	No	Yes	C	52.9324	66.67
10	No	Yes	C+	71.4002	80
11	Yes	No	<HS	47.0564	0
12	Yes	No	HS	26.3503	33.33
13	Yes	No	HS+	43.5029	52.63
14	Yes	No	C	61.1293	57.14
15	Yes	No	C+	77.7338	83.33
16	Yes	Yes	<HS	11.6981	-
17	Yes	Yes	HS	5.0628	-
18	Yes	Yes	HS+	10.2954	0
19	Yes	Yes	C	18.9892	0
20	Yes	Yes	C+	34.226	28.57

number to make accurate predictions (<HS n = 7 for combination No/No; <HS n = 1 for combination No/Yes; <HS n = 2 for combination Yes/No; and, <HS n = 0 for combination Yes/Yes). Likewise, while HS n = 19 was reported for combination No/No, when other combinations were assessed, lower values were found (HS n = 1 for combination No/Yes; HS n = 3 for combination Yes/No; and HS n = 0 for combination Yes/Yes).

While it is fitting to make predictions based on large numbers of participants, it is not appropriate when those numbers are small. For instance, for participants who reported neither problem (n = 246), education as a predictor of breastfeeding status at three months is remarkable, but for those instances where numbers are minute (where participants reported the combination No/Yes (n = 11); or both problems, Yes/Yes (n = 11), predictions of breastfeeding status at three months postpartum may be less than appropriate.

This point is again emphasized when comparing estimated probabilities and actual findings. The model is strong when assessing combinations with large numbers but weak when those values are small or absent. For instance, observation 6 indicates an actual finding of 100% and an estimated probability of 38%. This appears to be a large discrepancy until the data is more closely scrutinized. When crosstabs are assessed, it is then discovered that only one person had this combination and was still breastfeeding at three months postpartum, thus 1 of 1 or 100% was reported. In like manner, where a 0 or a (-) was documented in the table, numbers within these crosstabs were also 0, meaning there were no women who reported this particular combination of variables or no women who fit the criteria within that educational category (-).

In conclusion, simple t-tests, Chi square tests, Multiple Correspondence Analysis, Multiple Logistic Regression, and Logistic Regression Backwards Elimination Summaries were computed for this analysis. Descriptive statistics, computing the mean (M) and standard deviation (SD), and inferential statistics, computing degrees of freedom (df), Chi squares, and R2/MR2 values, revealed the current study's findings with a thorough assessment of how the independent variables (a lactating mother's race, age, employment and school status, marital status, educational level, and parity) impacted the dependent variable (lactation status at three months postpartum) on mothers' decision to maintain lactation to three months duration. Alpha levels (indicated by p) were computed as statistically significant at the .05 level.

Tables 55, 56, and 57 serve to summarize this study's earlier findings. Table 55 identifies each research question by number along with the variables assessed and their respective alpha levels acquired through the analysis of the FYI dataset.

Table 56 reports the variables that were statistically significant at the .05 level within the left-hand column. Those found not to be statistically significant at the .05 level fell into the right-hand column.

Table 57 reports the statistically significant factors that impact lactation status according to Bronfenbrenner's Social-Ecological theoretical framework used for this study.

Chapter 4 reviewed the study's Findings and Results from t-tests, Chi square analysis, Multiple Correspondence Analysis, and Multiple Logistic Regression Analysis testing. Chapter 5 will summarize this study's important findings and provide recommendations for education, policy, practice, and future research based on the Bronfenbrenner's Social-Ecological Framework. Limitations are discussed.

Table 55

Research Questions, Variables, and Alpha Levels

Research Question #	Research Variable	p value
Q1	Race (White and Other)	.7846
Q1	Race (Other specified)	.5446
Q2	Age	.0003***
Q2	Age	.0015*
Q3	Educational Status	.0001***
Q4	Marital Status	.0002***
Q5	Length of Maternity Leave	.0192*
Q6	Paid Maternity Leave	.399
Q7	Employment/School Status	.001***
Q8	Parity	.1688
Q9	Not enough milk	<.0001***
Q10	Fussy Baby	.7021
Q11	Sleepy Baby	.5687
Q12	Too Much Time	.0001***
Q13	Inconvenient	.0001***
Q14	Sore/Bleeding Nipples	.0521
Q15	Engorged Breasts	.188
Q16	Mastitis/Breast Infections	.0151*
Q17a	Parity with Not Fussy Baby	.0475*
Q17b	Parity with Fussy Baby	.6302
Q17c	Parity with Convenient	.0219*
Q17d	Parity with Not Convenient	.3318
Q17e	Parity with Enough Milk	.2732
Q17f	Parity with Not Enough Milk	.2379
Q17g	Parity with Not Sleepy Baby	.1262
Q17h	Parity with Sleepy Baby	.8691
Q17i	Parity with Not Too Much Time	.0558
Q17j	Parity with Too Much Time	.2843
Q18	Delivery Site	.2858

*$p = \leq .05$, **$p = \leq .01$, ***$p = \leq .001$

Table 56

Statistically Significant and Not Statistically Significant Variable Findings

Statistically Significant Variables at the p < .05 Level	Not Statistically Significant Variables at the p < .05 Level
Age (+)	Race
Education (+)	Paid Maternity Leave
Marital Status (+)	Parity
Length of Maternity Leave (+)	"Sleepy Baby"
Employment/School Status (-)	Sore/Bleeding Nipples
"Not enough milk" (-)	Engorged Breasts
Parity with "Convenient" (+)	"Fussy Baby"
"Too Much Time" (-)	Parity with "Not Convenient"
"Inconvenient" (-)	Parity with "Enough Milk"
Mastitis or Breast Infections (+)	Parity with "Not Enough Milk"
Parity with "Not Fussy Baby" (+)	Parity with "No Sleepy Baby"
	Parity with "Sleepy Baby"
	Parity with "Not Too Much Time"
	Parity with "Too Much Time"
	Parity with "Fussy Baby"
	Delivery Site (Baby-Friendly or not)

Note: The (+) indicates a significant positive relationship. and a (-) indicates a significant negative relationship with lactation status at three months postpartum.

Table 57

Factors That Impact Lactation Status Within This Research Study According to Bronfenbrenner's Theoretical Framework (p < .05)

Sphere of Influence	Statistically Significant Variables in this Study
Microsystem	Maternal age (RQ2) Educational level (RQ3) Mastitis (RQ16)
Mesosystem	Marital Status (RQ4) Parity with "Not Fussy Baby" (RQ17a) Parity with "Convenient" (RQ17c)
Exosystem	Length of maternity leave (RQ5) Employment/School Status (RQ7)
Macrosystem	None identified in this study

CHAPTER 5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Discussion

The importance of breastfeeding has been well documented in the literature over the last 25 years (AAP, 1997; Gartner, 2005; Shealy, 2005; USDHHS, 2010). National and international health organizations have developed policy statements or practice guidelines supporting the importance of breastfeeding, including the AAFP; AAP; ACNW; ACOG; ADA; APHA; AWHONN; NAPNP; NMA, UNIDEF, WHO; and the USDHHS. Most recently, on January 20, 2011, the U.S. Surgeon General released "The Call to Action to Support Breastfeeding" which outlines evidence-based steps that all sectors of a community can take to remove obstacles faced by women who want to breastfeed their babies.

Since its inception in 2001, *The Ten Steps to Successful Breastfeeding* (Table 1), devised by the WHO UNICEF Baby Friendly Hospital Initiative (BFHI), has been linked with increasing breastfeeding success (Braun, 2003; Cattaneo, 2001; Kramer et al., 2001; Merewood, Phillip, Chawla, & Cimo, 2003; Merten, 2004; Phillipp et al., 2001, 2003; Saadeh, 1996; Radford, 2001; Wright, 1996). According to Merewood (2005), *The Ten Steps to Successful Breastfeeding* should operate as a model for breastfeeding promotion and support, creating breastfeeding-compatible systems for all women and children.

Nurses play an important role in educating the public and other healthcare professionals about the significance of breastfeeding by empowering mothers and their support systems to maintain lactation according to the evidence-based recommendations of *HP2010*, the WHO, the CDC, the Academy of Breastfeeding Medicine (ABM), and other leading health experts. Assessing mothers' reasons for lactation termination aids healthcare providers, educators, and other stakeholders in focusing attention and limited resources in determining if identified risk factors are modifiable in nature and, therefore, amenable to educational interventions that impact health.

If mothers are not made aware of the short- and long-term child and maternal health benefits and are not educated and encouraged to maintain breastfeeding according to the *HP* goals, they may either never initiate or prematurely terminate breastfeeding. Likewise, if mothers are not referred to community resources for ongoing assistance with the potential problems of lactation and are given free formula samples and promotional packs upon discharge, they may also wean and terminate. Finally, returning to an employment setting that discourages lactation and the expression of breastmilk on site, can also compromise and sabotage mothers' breastfeeding intentions.

The present study was designed to address gaps in the existing research related to the social-ecological factors that impact lactation duration for new mothers. The Bailey DeJong Adaptation of Bronfenbrenner's Social-Ecological Systems Framework for Breastfeeding Mothers (Figure 1.) was utilized based on the premise that changes in individual behavior occur through a complex combination of societal, community, organizational, interpersonal, and individual factors, within a level of influence and across multiple and related levels of influence. The four levels, from a lactating mother's perspective were, the Microsystem, including psychosocial, spiritual, lifestyle, and biological factors; the Mesosystem, including peers, friends, family, healthcare providers, and social services; the Exosystem, including a mother's workplace/school, hospital/birthing center/clinic, mall/business, childcare setting, parish/faith community, restaurants, transportation, and neighborhood; and, finally, the Macrosystem, including a mother's role models, the availability of free formula, public policy, advertising, culture, social norms, and the media.

The purpose of the study was to examine the impact of BFH designation, employment, parity and other social-ecological factors on lactation status at three months postpartum in upstate New York. The overarching research question for the study was as follows: "What are the social-ecological factors that impact lactation status at three months postpartum in upstate New York?"

The literature review encompassed five main sections: (a) an explanation of the theoretical framework for this study, and a synopsis of other predominant theories in the breastfeeding literature; (b) an examination of the physical, psychological, economic, and environmental benefits of breastfeeding for the mother, infant, and community; (c) an appraisal of the physical, emotional, political, cultural, and societal factors that influence a mother's decision to maintain or terminate lactation based on Bronfenbrenner's Social-Ecological Systems Framework; (d) an assessment of the historical account of breastfeeding from an international and national perspective; and, finally, (e) an inspection of the history of the BFHI and impact of *The Ten Steps to Successful Breastfeeding*. Factors that influence the lactation decision include, but are not limited to, her employment or school status; her access to healthcare and other professional services; her physical, prenatal, intranatal, and postpartum condition as well as that of her infant; and, finally, her personal experience with the potential problems of lactation, including pain, lack of self-efficacy, and perception of insufficient milk supply.

The findings of this study presented in Chapter 4 through tables and narratives. are summarized and discussed in Chapter 5. Implications of the findings and recommendations for future research are also discussed in relation to nursing practice. education. research. and policy. Finally. limitations of this study are reported.

Summary

A descriptive survey design was developed by the FYI principal investigators in 2004. The survey went through various phases of development by a panel of experts. The final three-month FYI questionnaire was mailed to 755 breastfeeding mothers in upstate New York who had signed informed consent at baseline and were willing to participate. Only those mothers who were still breastfeeding at two weeks postpartum received a Three-Month Survey.

Of the 755 surveys mailed at three months. 515 (68%) were returned (Hospital A-BF: 257: Hospital B: 258). The racial breakdown of breastfeeding mothers was – 5% (n = 26) Asian. 3% (n = 16) Black. 3.6% (n = 19) Hispanic. and. 88% (n = 451) Caucasian. Eighty-five percent (n = 440) of the mothers were married. The average age of the mothers was 30 years. Forty-seven percent (n = 242) of the mothers were primiparous and fifty-three percent (n = 273) of the mothers were multiparous.

From an examination of the frequency and Chi square data alone. this study showed that age. education. marital status. length of maternity leave. and employment/school status all had an impact on lactation status at three months postpartum. In addition. there was a difference between the mothers who reported: "not enough milk." "too much time." "inconvenient." "mastitis or breast infections." "parity with 'not fussy baby'", and "parity with 'convenient,'" and lactation status at three months postpartum.

This study showed no differences between race, mothers with paid maternity leave, or parity status. In addition, mothers who reported having a "sleepy baby," sore and/or bleeding nipples," "engorged breasts," "parity with 'fussy baby,'" "parity with 'not convenient,'" "parity with 'enough milk,'" "parity with "no sleepy baby,'" "parity with 'sleepy baby,'" "parity with 'not too much time,'" "parity with 'too much time,'" and delivery site were no more or less likely to be breastfeeding at three months postpartum compared to mothers who reported these findings.

The following material will identify the research questions reported in Chapter 1 followed by a discussion of the data presented in Chapter 4. Following the review of the research questions, implications and recommendations for future research will be discussed in greater detail according to the theoretical framework.

Research Question One: Race (Microsystem)

Research Question One was as follows: Does a breastfeeding mother's race impact lactation status at three months postpartum?

There was no significant difference between race and lactation termination at three months postpartum. At three months postpartum, race and breastfeeding status were independent of one another. "Other" women were just as likely to be breastfeeding their children at three months postpartum as White participants. When minority status was differentiated to expand "Other" to specify Asian, Black, and Hispanic, results indicated similar findings with no significance identified between race and breastfeeding status at three months postpartum.

This finding, in particular, came as a surprise to the researcher because the current literature of U. S. women supports the contrary (Flower, Willoughby, Cadigan, Perrin, & Randolph, 2008; Sparks, 2010). Research indicates that Black mothers born and living in the U.S. breastfeed at a significantly lower rate than White mothers and even moreso if they are WIC recipients (Flower et al, 2008) and residing in rural settings (Sparks, 2010). This was illustrated in a mixed-methods research study by Flowers et al. (2008) that consisted of a longitudinal cohort study (n = 1292) of infants born between 2003 and 2004, and an ethnographic study (n = 30) of families in rural communities in North Carolina and Pennsylvania. Researchers found that internalized social norms commonly affected Black women's intentions regarding lactation with many women reporting never considering breastfeeding.

Because some Black mothers associate breastfeeding with a different ethnic or income level than their own, further exploration of internalized cultural norms was cited as a recommendation for future research in Flower's (2008) study. Remember, however, that national statistics fail to report findings by ethnic category (USDHHS, 2000), and this oversight may result in incorrect assumptions of these subpopulations. This statement about Black mothers breastfeeding less than mothers of a different race, without taking into account their specific ethnicity, may offer at least one explanation of the current study's findings where race did not significantly impact lactation status at three months duration.

Another explanation for this finding may be that the urban community where the FYI research took place had internalized breastfeeding as a societal norm that valued health promotion, education, and prevention. It is quite possible that women in this county had been surrounded by positive breastfeeding messages from the various elements within their social-ecological environment for a period of time. This internalization of "who" breastfeeds then becomes one of community rather than of a particular race. Perhaps women in this particular setting felt more supported in their efforts because of New York Representative Carolyn Maloney's legislative actions to encourage breastfeeding accommodation for working women. It is indeed likely that women feel supported by a society that has normalized breastfeeding for all segments of civilization regardless of race. When these elements exist in a society, breastfeeding status between races would not show a significant difference because all persons receive equal, encouraging, and consistent messages that they breastfeed. It is possible that these macrosystem-related societal messages had a positive impact on breastfeeding intention and behavior in New York. Once mothers see persons like themselves breastfeeding successfully, perhaps they are more likely to consider it as an option for their own circumstances, regardless of race.

Another explanation for this finding may be that Black mothers who were breastfeeding at three months postpartum were married (90%) and marital status, in this study, was found to positively impact breastfeeding status.

Research Question 2: Age (Microsystem)

Research Question Two was as follows: Does a breastfeeding mother's age impact lactation status at three months postpartum?

Mothers who were 26 to 30 years of age were more likely to be breastfeeding at 3 months postpartum than mothers who were 21 to 25 years of age, and mothers who were 31 to 35 years of age were even more likely to still be breastfeeding than the 26 to

30 age group. Finally, mothers aged 36 to 47 years were just slightly less likely to still be breastfeeding at three months postpartum than the 31 to 35 age group, with findings similar to the 26-to 30-year old group.

This came as no surprise to the researcher. Previous research supports this finding. Age, socioeconomic status, income, and education affect a woman's preferred feeding method and length of duration (Callen & Pinelli, 2005; Chin, Myers, & Magnus, 2008; Dennis, 2002; Scott & Binns, 1999), with the highest rates of breastfeeding observed among college-educated women over 30 years of age (Stein, 2004).

An explanation for this finding may be that women who are older, who are deciding whether or not to breastfeed, have fewer insecurities than their younger counterparts. Reasons for this may be many. It is possible that older-than-average mothers who have had other children, benefit from prior feeding experiences and make more informed choices as they mature.

It is also likely that new mothers, who fed formula to prior children, experience feelings of grief and regret over their previous feeding choices. Perhaps they make different feeding decisions with subsequent children based upon those emotions. Whether feelings of guilt influence mother's behaviors may be an appealing construct to study. Perhaps guilt impacts breastfeeding initiation but not duration to WHO and UNICEF recommendations or vice versa. Finally, it is feasible to suggest that as mothers age they are more likely to be cognizant of the impact of their prior decisions on the health of their family. Perhaps as mothers age they choose breastfeeding because they have seen the negative effects of not breastfeeding on their own (or other people's) children and they want to breastfeed to prevent illness. Also reasonable to suggest is the possibility that older mothers have been made aware of the benefit of earlier return to pre-pregnant weight. Because older women who have recently delivered have metabolisms that are slower than healthy 20-year-olds, perhaps this benefit is incentive to attempt and maintain breastfeeding.

Research Question Three: Educational Level (Microsystem)

Research Question Three was as follows: Does a breastfeeding mother's educational level impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who had completed more years of schooling were more likely to be breastfeeding than their less-educated counterparts with women having 16 years or more of education breastfeeding more than women who had less than 12 to 15 years of schooling.

This finding came as no surprise to the researcher. The literature review supports the finding that women in the U.S. who have graduated from college are more likely to breastfeed than their less-educated counterparts (Humphreys, Thompson, & Miner, 1998; Roe et al., 1999; Smith, 1985; Starbird, 1991; Winikoff, 1980; & Wright, 1988). Further studies have reported that more highly educated women in the U.S. recognize the benefits of breastfeeding and are more likely to choose breastfeeding as opposed to formula feeding.

Research Question Four: Marital Status (Microsystem and Mesosystem)

Research Question Four was as follows: Does a breastfeeding mother's marital status impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who were married were more likely to be breastfeeding than unmarried "other" respondents.

This finding is consistent with the literature that indicates that paternal support within the mother's exosystem is associated with increased breastfeeding rates nationally and internationally (Alikasifoglu, Erginoz, Gur, Beker, & Arvas, 2001; Bar-Yam & Darby, 1997; Humphreys et al., 1998; Isabella & Isabella, 1994; Khoury, Mitra, Hinton, Carothers, & Sheil, 2002; Littman, Medendorp, & Goldfarb, 1994; Mahoney & James, 2000; Matich & Sims, 1992; Scott & Binns, 1999). One explanation for this finding may be that married mothers feel more social support than single mothers. Married mothers may also feel more capable of sustaining breastfeeding because they have a "helping hand" to complete other necessary tasks.

Research Question Five: Length of Maternity Leave (Exosystem)

Research Question Five was as follows: Does a breastfeeding mother's expected length of maternity leave at baseline impact lactation status at three months postpartum?

At baseline, the mothers who expected a maternity leave of 0 – 1 month and >3 months were statistically more likely to be breastfeeding at three months than those who expected a maternity leave between 1 and 3 months.

The >3 month finding did not come as a surprise to the researcher. A possible explanation is that a longer maternity leave allows a mother who has chosen to breastfeed to continue to hone her skills and overcome obstacles that may arise before returning to work or school. Perhaps, mothers who are able to take a longer maternity leave are those same mothers who have a higher education, a spouse who supports their efforts, with a higher income – all of which have been shown in the literature to support lactation.

This rationale, however, contradicts the finding that mothers who expected a maternity leave of 0 – 1 month were statistically more likely to be breastfeeding at three months postpartum. Perhaps mothers who expected to have to return to work within one month of delivery were the same mothers who had a higher education and who were returning to employment where they functioned in leadership, administrative, or managerial roles. Mothers who work in professional roles, especially those who work in offices as lawyers or administrators, breastfeed longer than mothers who work in industrial or minimum-wage positions.

Research Question Six: Paid Maternity Leave (Exosystem)

Research Question Six was as follows: Does a breastfeeding mother's expected amount of paid maternity leave at baseline impact lactation status at three months postpartum? In this analysis, there was no difference between breastfeeding status at three months postpartum and a mother's expected amount of paid maternity leave at baseline.

This finding came as a surprise to the researcher. Although previous research does not support a positive association between paid maternity leave and breastfeeding at three months, it was expected that a lesser amount of paid maternity leave would be associated with a shorter duration of breastfeeding. One would think that less paid leave would be equated with a shorter duration of breastfeeding because mothers who return to work are less likely to maintain lactation after their return to work. Yet, perhaps those mothers never initiated at the onset. This sample was comprised solely of mothers who at baseline had already made the decision to breastfeed.

Research Question Seven: Employment or School Status (Exosystem)

Research Question Seven was as follows: Does a breastfeeding mother's employment or school status impact lactation status at three months postpartum? In this analysis, it was found that mothers who had started working or going to school were less likely to be breastfeeding than mothers who had not.

This finding was not unforeseen. The literature review substantiates that returning to work is one of the greatest barriers to breastfeeding (Auerbach & Guss, 1984; Fein & Roe, 1998; Gielen et al., 1991; Roe et al., 1999; Ryan & Martinez, 1989; Visness & Kennedy, 1997). Because many Western cultures associate breastfeeding with the home environment (Schewel, 1997), knowledge of social expectations within the breastfeeding mother's exosystem may likely offer an explanation for this result.

Research Question Eight: Parity Status (Microsystem and Mesosystem)

Research Question Eight was as follows: Does a breastfeeding mother's parity status impact lactation status at three months postpartum? In this analysis, when parity was examined at three months postpartum, mothers who had other children were no more likely to be breastfeeding than mothers who had delivered their first child.

This finding was also expected. Although parity has been studied by researchers within lactation demographic data, it is not, on its own accord, commonly found to impact lactation status at three months postpartum. When parity status is associated with years of breastfeeding experience, however, then parity status is positively associated with breastfeeding status at three months postpartum of subsequent children.

Research Question Nine: "Not Enough Milk" (Microsystem)

Research Question Nine was as follows: Does a breastfeeding mother's current experience with "not enough milk" impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who reported experiencing the problem of "not enough milk" were less likely to be breastfeeding than mothers who did not report that problem.

This finding supported previous research. Perceived insufficient milk supply is the most common reason cited in the U.S. for the early supplementation and/or discontinuation of breastfeeding across cultural, socioeconomic, rural, and urban settings (Arora, McJunkin, Wehrer, & Kuhn, 2000; Blyth et al., 2002, 2004; Hill & Humenick, 1989, 1996; Marandi, Afzali, & Hossaini, 1993; Martines, Ashworth, & Kirkwood, 1989; McCann & Bender, 2006). Concern over milk supply can lead to early weaning (Binns & Scott, 2002; McCann et al., 2007).Women who perceive "not enough milk" are statistically less likely to be breastfeeding than mothers who do not report that problem. Clearly, without knowledge of how to address common lactation problems, these women are likely to terminate breastfeeding.

An explanation for this finding may be that mothers misinterpret their body's ability to fully meet another human being's needs without supplementation. Perhaps mothers' self-efficacy and self-confidence in their body's ability to naturally produce milk without the ability to measure or visualize the amount of milk their child ingests produces feelings of inadequacy and uncertainty.

Similarly, in a society that devalues and over-sexualizes women's bodies, perhaps women who believe these societal messages, choose formula supplementation in order to lessen the attention their body receives postpartum. It is likely that women who feel uncomfortable talking about their bodies are less likely to breastfeed.

Research Question 10: "Fussy Baby" (Microsystem and Mesosystem)

Research Question 10 was as follows: Does a mother's current experience with a "fussy baby" impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who reported experiencing the problem of a "fussy baby" were no more likely to be breastfeeding than mothers who did not report having a fussy baby.

This finding was neither surprising nor anticipated. This finding suggests that a baby's temperament does not impact a mother's lactation status at three months postpartum. One would imagine, however, that mothers who reported having a "fussy" baby would either perceive this as a sign that something was wrong (food intolerance, insufficient milk supply), or as a sign that she was needed as the primary food source. In the latter, one would imagine that the mother who had a fussy baby, would nurse for longer durations, and in the former example, that she would terminate earlier than recommended.

Research Question 11: "Sleepy Baby" (Microsystem and Mesosystem)

Research Question 11 was as follows: Does a mother's current experience with a "sleepy baby" impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who reported experiencing the problem of a "sleepy baby" were no more likely to be breastfeeding than mothers who did not report having a sleepy baby.

This finding is not surprising because the dataset for this dissertation examined mothers' behavior at three months postpartum when the problem of sleepiness is not likely to impede lactation. Although "sleepiness" may pose a barrier to new mothers in the very early postpartum period, a "sleepy" baby does not typically influence a mother's decision to terminate lactation at three months postpartum when lactation is well-established. It is probable that the problem of "sleepiness" would have eliminated participants prior to two weeks postpartum. In that case, mothers would not have been evaluated at three months.

Research Question 12: "Too Much Time" (Microsystem and Mesosystem)

Research Question 12 was as follows: Does a mother's current experience with breastfeeding taking "too much time" impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who reported experiencing the problem of lactation taking "too much time" were less likely to be breastfeeding than mothers who did not report that problem.

This finding is consistent with the literature and anticipated (Dimico, 1990). Mothers who report that breastfeeding takes "too much time" are less likely to breastfeed than mothers who do not report this problem. One explanation for this finding may be that mothers who have multiple demands on their time feel unable to complete everything they are required to do. Perhaps, those who feel ill-equipped to successfully complete several breastfeeding sessions every day to satisfy their baby's needs terminate lactation sooner than mothers who do not report this problem. These mothers may be the same mothers who have other children, and who are employed outside the home.

From another vantage point, perhaps mothers perceive time differently based on culture, race, their age, and place of residence. It is also certainly plausible that today's mothers perceive breastfeeding to be incongruent with their fast-paced lifestyle. Perhaps mothers who are younger and have unrealistic expectations about the length of time required to feed a baby are more likely to terminate the breastfeeding relationship than mothers who enter the breastfeeding role knowledgeable about lactation norms.

Research Question 13: "Inconvenient" (Microsystem, Mesosystem, and Exosystem)

Research Question 13 was as follows: Does a mother's current experience with breastfeeding being "inconvenient" impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who reported experiencing the problem of lactation being "inconvenient" were less likely to be breastfeeding than mothers who did not report that problem.

This finding is consistent with the existing literature (Dimico, 1990). Mothers who perceive breastfeeding to be inconvenient are less likely to breastfeed. A possible explanation for this finding is that mothers who terminate lactation encounter greater barriers within their Social-Ecological Framework than mothers who maintain breastfeeding. Perhaps mothers who view breastfeeding as incongruent with their other roles, perceive breastfeeding as more "inconvenient" than mothers who encounter fewer obstacles within their social environments. It would be worthwhile to examine women's definitions of "inconvenient" and "convenient" as they relate to the breastfeeding experience. Perhaps more mixed method inquires would undercover rationale for mothers' choices.

Research Question 14: Sore and/or Bleeding Nipples (Microsystem)

Research Question 14 was as follows: Does a mother's current experience with sore or bleeding nipples impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who reported experiencing the problem of "sore and/or bleeding nipples" were no more likely to terminate breastfeeding than mothers who did not report this problem.

Upon first glance, this particular finding came as a surprise to the researcher. Termination of breastfeeding is frequently caused by individual microsystem-related biological problems of the breast, such as pain, sore and cracked nipples, and mastitis (Abou-Dakn, Schafer-Graf, & Wockel, 2009). One explanation for this incongruent finding may be that in many instances, the literature addressing this specific problem chooses to examine newly-delivered mothers who have just initiated lactation. Perhaps those who experienced a significant degree of sore and/or bleeding nipples in the current study, dropped out and terminated lactation prior to two weeks postpartum. If this is indeed the case, their responses would not have been recorded at three months.

A possible explanation for this finding is that mothers who successfully breastfeed to three months who reported sore and/or bleeding nipples, may have higher levels of self-efficacy than mothers who terminated lactation. Perhaps these mothers were determined to continue to breastfeed, regardless of perceived physical or emotional barriers.

Another explanation for this finding may be that breastfeeding mothers have a higher pain tolerance than mothers who have terminated lactation prior to three months postpartum. Perhaps the longer a breastfeeding mother nurses, the larger the amount of oxytocin (the "feel good" hormone) that is emitted from the posterior pituitary gland. Research to examine a possible relationship that may exist linking higher levels of oxytocin in mothers with longer lactation durations is warranted.

Research Question 15: Engorgement (Microsystem)

Research Question 15 was as follows: Does a mother's current experience with engorgement impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who reported experiencing the problem of "engorgement" were no more likely to terminate breastfeeding than mothers who did not report engorgement.

This finding came as no surprise to the researcher. A possible explanation for this finding may be that mothers who have initiated breastfeeding in the very early postpartum period, have likely experienced engorgement at one time or another, and have successfully learned to manage the microsystem-related physical issue. Perhaps these mothers are less likely to be deterred by something they do not perceive as a major barrier to their breastfeeding decision. Another possible explanation for this finding may be that the mothers who experience engorgement and continue to breastfeed, use breastfeeding as a means to control the engorgement. Finally, perhaps the engorgement is experienced moreso in mothers who have returned to work before three weeks postpartum. An explanation may exist that the mothers who report engorgement faced the barrier of not being allowed to pump at work, in order to empty their breasts sufficiently to deter the signs and symptoms of engorgement. The desire to continue to breastfeed coupled with the return of employment may make these women more prone to physical ailments that predispose them to engorgement.

Research Question 16: Mastitis and/or Breast Infection (Microsystem)

Research Question 16 was as follows: Does a mother's current experience with mastitis and/or breast infection impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who reported experiencing the problem of mastitis and/or breast infection were more likely to be breastfeeding than mothers who did not report that problem; however, it is noted that the sample size for "not breastfeeding" was small (n = 2), and this may have skewed the result especially considering that there were no differences for the two other uncomfortable issues of engorgement, and sore and/or bleeding nipples.

Though seemingly contradictory, an explanation for this finding may be that women who breastfeed choose to continue to breastfeed even when problems arise. Perhaps these mothers experience mastitis and/or breast infections, but persevere through their symptoms by getting help from their healthcare providers and continuing to breastfeed. It is important to note that maintenance of breastfeeding during mastitis, while on an approved medical regimen, is recommended by leading health professionals in order to treat the infection, prevent engorgement, and avoid re-occurrence.

Research Question 17: Parity Controlling for Problems (Microsystem and Mesosystem)

Research Question 17 was as follows: Does a mother's parity status, while controlling for the problems of breastfeeding, impact lactation status at three months postpartum? The problems of breastfeeding were the variables of: not fussy (17a) and fussy (17b), convenient (17c) and not convenient (17d), enough milk (17e) and not enough milk (17f); not sleepy baby (17g) and sleepy baby (17h); and finally, not too much time (17i) and too much time (17j). In this analysis, at three months postpartum, mothers who reported a prior live birth, and those who reported a "not fussy" baby were more likely to be breastfeeding than mothers who did not report that problem.

One explanation for this finding may be that mothers who have had a prior live birth who do not perceive their baby as "fussy" feel able to breastfeed even though they likely have other demands for their attention, whereas, for the mother who has not had a prior live birth the perception of not having a "fussy baby" may indicate to a mother that she is not needed. She may believe that any one can take care of her child, and that person need not be her.

At three months postpartum, mothers who reported a prior live birth, and those who reported "convenience" were more likely to be breastfeeding than mothers who did not report convenience. One explanation for this finding may be that mothers who have had a prior live birth who do not perceive breastfeeding as inconvenient, feel able to breastfeed even though they likely have other demands for their attention, whereas, for the mother who has not had a prior live birth the perception of inconvenience may indicate to her that she is not "meant" to breastfeed. She may believe that the perceived barriers are not worth the effort.

At three months postpartum, mothers who reported a prior live birth, and those who reported "enough milk" were no more likely to be breastfeeding than mothers without a prior live birth who reported "enough milk."

One explanation for this finding may be that mothers who have had a prior live birth who perceive "not enough milk" terminate at equal rates as mothers without a prior live birth who perceive "not enough milk." Regardless of parity, mothers who feel that their bodies are not producing milk, will terminate and choose an alternative feeding method.

At three months postpartum, mothers who reported a prior live birth, and those who reported a "sleepy baby" were no more likely to be breastfeeding than mothers with no prior live birth who did not report that problem. There was no significant difference between the two parity groups.

One explanation for this finding may be that mothers who have had a prior live birth do not perceive their baby as "sleepy" or "not sleepy" any more than mothers who have not had a prior live birth. Perhaps this is not an issue of concern for mothers at three months postpartum as much as for new mothers in the very early phases of lactation after delivery. At three months postpartum, latch should be well-established and the concern of a "sleepy" or "not sleepy baby" affecting lactation outcome is not a worry. Perhaps mothers at this time interval are pleased that their newborns are sleeping rather than being concerned by it.

At three months postpartum, mothers who reported a prior live birth, and those who reported "too much time" were no less likely to be breastfeeding than mothers who did not report that problem.

One explanation for this finding may be that mothers who have had a prior live birth compared to mothers who have not had a prior live birth are no more likely to perceive breastfeeding as "taking too much time". Perhaps both groups of mothers at this time interval have grown accustomed to their child's particular nursing patterns and are no longer as much of a "clock watcher" as in the earlier days of breastfeeding a newborn infant.

Research Question 18: Delivery Site (Exosystem and Macrosystem)

Research Question 18 was as follows: Does a mother's delivery site (whether Baby-Friendly designated, or not), impact lactation status at three months postpartum? In this analysis, at three months postpartum, mothers who delivered at the BF designated hospital were no more likely to be breastfeeding than mothers who delivered at the community-based hospitals with a mature breastfeeding program. At three months postpartum, 209 mothers (81.32%) were still breastfeeding at Hospital A-BF, and 200 mothers (77.52%) were still breastfeeding at Hospital B.

This was surprising because the finding is not consistent with the current literature which indicates that BF hospital status has a positive impact on mothers' breastfeeding status. Reasons for this finding may be many. The first possible explanation may be that the sample between both study sites was not an adequate comparison. Perhaps the study should have been undertaken between a BF hospital and a hospital without a mature breastfeeding program that likely was meeting most if not all of *The Ten Steps to Successful Breastfeeding*, without the official designation.

Perhaps each hospital is providing excellent care according to evidence-based recommendations, and therefore no differences will be found regarding breastfeeding status between the two entities. Perhaps each institution is functioning at its maximum capacity and therefore, no difference would be noted between facilities. Though not a "stand out success," the BF hospital should not be viewed as "failing" as much as the community-based hospital should be seen as succeeding. It is indeed likely in this instance that the community-based hospital had achieved similar outcomes by incorporating comparable interventions with their patient population (even since its inception in the 1960s) minus the official BF designation.

The second plausible explanation for this finding may be that the lactation consultant at the BF hospital is overworked when compared to the community-based hospital that has a number of full and part-time consultants to see patients. Perhaps, though BF in name, the BF hospital does not have adequate staff to see and manage the numbers of new mothers who need assistance and counseling. Perhaps it is not the BF designation, as much as it is the amount of support that each hospital has on staff that makes the difference in outcome.

The third possible explanation for this finding may be that mothers in the community-based hospital receive better pre-natal education than the mothers in the BF hospital. This finding may be the key to this result. Perhaps, it is not the status of the hospital itself but of the entire organization (beginning at the first prenatal visit) that impacts lactation duration for new mothers at three months postpartum.

The next section of Chapter V will provide a discussion of the findings based on the Bronfenbrenner Theoretical Framework (Figure 1).

Microsystem Analysis: A Summary of Findings Related to Theoretical Framework

Microsystem Findings

Within the mother's microsystem, and consistent with the existing literature that finds lactating women to be older in age and more educated than non-breastfeeding mothers, the mean age of mothers still breastfeeding at three months postpartum in upper New York between 2004 and 2006 was greater than the mean age of mothers who had terminated lactation. The multiple correspondence analysis and multiple logistic regression analyses, as well as logistic regression analyses discussed at the conclusion of Chapter 4 showed similar results – microsystem-related variables had the greatest predictive effect on lactation status at three months postpartum in upstate New York.

Within the mother's microsystem, and contrary to existing literature, race and breastfeeding status were independent of one another at three months postpartum. No significant difference was found between race and lactation status at three months postpartum. Again, when minority status was individualized, results indicated similar findings between race and breastfeeding status at three months.

Within the mother's microsystem, mothers who reported experiencing the problems of not enough milk, lactation taking "too much time," and lactation being "inconvenient," were all less likely to be breastfeeding than mothers who did not report those problems. On the other hand, mothers who reported experiencing the problems of sleepy baby, sore and/or bleeding nipples, fussy baby, and engorgement, were no more or less likely to be breastfeeding than mothers who did not report having these problems.

Of interest, within the mother's microsystem, mothers who reported experiencing the problems of mastitis and/or breast infection were more likely to be breastfeeding than mothers who did not report those problems; however, one reason for this finding may be that mothers who have mastitis are more likely to use lactation as an intervention for breast pain than women not experiencing pain.

When parity was considered and the problems of lactation were controlled for, if a mother had a prior live birth and was not experiencing a "fussy baby," she was more likely to be breastfeeding than a mother with no prior live birth. Again, when parity was examined and the problems of lactation were controlled for, if a mother had a prior live birth and viewed breastfeeding as "not taking too much time," and "convenient," in both instances, they were more likely to be breastfeeding than mothers who had no prior live birth.

Mesosystem Findings

Within the mother's mesosystem, mothers who had completed more years of schooling were more likely to be breastfeeding than their less-educated counterparts. Similar to previous studies, marital status was also found to be significant, with married mothers more likely to be breastfeeding than unmarried respondents at three months postpartum. Finally, mothers who had other children (i.e., parity) within their environment were no more likely to be breastfeeding than mothers who had just delivered their first child.

Exosystem Findings

Within the mother's exosystem, mothers who had started working or going to school since their baby was born were less likely to be breastfeeding than mothers who had not at three months postpartum. At baseline, the mothers who expected a maternity leave of 0 to 1 month or 3 to 6 months were more likely to be breastfeeding at three months than those who expected a shorter maternity leave. Finally, the study found no significant difference between breastfeeding status at three months and a mother's expected amount of paid maternity leave at baseline.

Macrosystem Findings

There were no significant macrosystem findings in the current study. BF hospital designation was not a factor in this analysis. Public policy, culture, social norms, and the distribution of free or heavily discounted formula were not assessed in the FYI study.

Conclusion

At the time of the FYI, which was conducted between 2004 and 2006, mothers who delivered at the BF designated hospital were no more likely to be breastfeeding at three months postpartum than mothers who delivered at the comparison hospital that had a mature breastfeeding program. However, when considering other independent variables from a Social-Ecological Systems Framework, a mother's age, educational level, and employment or school status, were associated with lactation status at three months postpartum.

This study showed that 31 to 35 year old women, with 16 years or more of education, and who were married, were statistically more likely to be breastfeeding at three months postpartum than their younger (or slightly older), unmarried, and less educated counterparts. In this sample, race and parity were not significant.

Women who at baseline had expected a greater than 3 month maternity leave were significantly more likely to be breastfeeding at three months postpartum when compared to the women who expected a 1 to 3 month maternity leave. Mothers who had started working or going to school were significantly less likely to be breastfeeding than mothers who had not. The amount of paid maternity leave did not influence a mother's decision as much as the amount of actual time on leave.

Women who experienced problems with breastfeeding ("not enough milk," lactation taking "too much time," and lactation as "inconvenient") all showed a lessened likelihood to be breastfeeding at three months postpartum. In contrast, women who reported "mastitis or breast infection" were more likely to be breastfeeding than mothers who did not report those problems.

When controlling for the problems of nursing and analyzing parity's influence on lactation duration, women who had a prior live birth were more likely to be breastfeeding at three months postpartum if they reported breastfeeding as "convenient" and perceived their child as "not fussy" when compared to women who had not had a prior live birth.

Using a reduced model comparing the two primary problems from the microsystem and a mother's educational level, the study showed that a mother's level of education was a key factor in predicting lactation status at three months postpartum. In addition, the reduced model illustrated that the microsystem variables alone were the most useful in predicting lactation status at three months postpartum. The mesosystem variables appeared to be the least useful in predicting lactation status.

These findings have important implications for education, practice, policy, and future research. Implications and recommendations for future research follow.

Implications and Recommendations

The following topics were identified as important implications and opportunities for future research. The recommendations have been organized according to Bronfenbrenner's Social-Ecological Framework, beginning with the Microsystem, and concluding with the Macrosystem. Modifications to the original framework are mentioned to address additional research needs.

Microsystem Recommendations

- Biological: Race. It is undetermined why race was not shown to be a significant factor in the current study. It is plausible that both study sites were providing excellent evidence-based, culturally competent, and individualized care that overcame racial disparities. If this is the case, the methods that these two organizations employed, regardless of BF status, should be studied more thoroughly in order to replicate the findings elsewhere where race has proven to be significant. Whatever measures these two sites utilized to decrease racial disparities at three months postpartum (in light of the fact that U.S. Black women typically terminate breastfeeding earlier than U.S. White women) would be worth exploring further.

- Biological: Ethnicity. The current study did not differentiate "Black" and it has been described by researchers to be a barrier to providing culturally-appropriate care. Uniform ethnic descriptors should be included whenever lactation research is undertaken in order to better delineate research findings and devise appropriate interventions for all populations of women. Healthcare providers should educate themselves and stay abreast of their clients' belief systems, values, social norms, and role models, in order to better understand their clients' social-ecological frame of reference.
- Biological: Maternal Age. The current study showed that women 31 to 35 years of age were more likely to be breastfeeding at three months postpartum. Further studies should assess if advanced maternal age is associated with increased breastfeeding frequencies in other areas of the U.S. If this finding is consistent, as the literature review has revealed thus far, it is apparent that new strategies to reach younger women must be employed. The educational measures currently utilized (traditional face-to-face prenatal classes) may not be reaching the new generation of mothers who are more

adept at web-based technologies as a means of social networking, learning, and acquiring knowledge. Perhaps, healthcare providers and educators need to re-evaluate their use of traditional methodologies and begin to incorporate more multifaceted forms of technology into pre-natal classes, outreach, and educational programming in order to speak to new and diverse groups of mothers.

- Biological: Educational Status. The current study showed that women with 16 or more years of education were more likely to be breastfeeding at three months postpartum. Further studies should assess if mothers' educational status has an impact on breastfeeding duration. It would be essential to determine if women with less formal schooling need educational materials that are written at a different level. It would be interesting to ascertain if mothers with less schooling would be more attracted to certain types of educational materials or methodologies than mothers with more schooling. Are the pamphlets we incorporate into prenatal visits written at a level that is not conducive to learning for women with less education? Perhaps other means of education delivery systems (e.g., video clips, role model advertisements, YouTube clips, text message "tips", or the use of peer counselors) would better speak to younger mothers making the decision to continue to breastfeed.
- Biological: Parity Status. The current study showed that women with no prior live birth were no more likely to breastfeed when compared to women with a prior live birth. However, parity status was found to affect breastfeeding if it

was reported as "convenient." Future research needs to explore new ways to enable mothers with other children to make breastfeeding more convenient. Perhaps changing the environment of where breastfeeding is considered acceptable (e.g., parks, shopping centers and malls, churches, and restaurants) will help to increase the desirability of breastfeeding and change mothers' perceptions.

- Psychosocial: Mother's Perceptions. The current study showed that mothers who perceived lactation to take "too much time" were less likely to be breastfeeding at three months postpartum. Further research should be undertaken to appreciate what "too much time" means for new mothers. In a society where "faster" is equated with "better," researchers must determine the time expectations of mothers and their support systems. Do new mothers have unrealistic expectations of motherhood, and where have these idealistic expectations originated? Likewise, what are the characteristics of new mothers? Are today's mothers unable or unwilling to devote time to breastfeeding? Further research needs to be undertaken to discover if there are innovative ways to breastfeed while being efficient, in order to attract 21st-century mothers to breastfeeding.
- Spiritual: Mother's Belief System. Because no other studies have incorporated the spiritual aspect of the individual into the Social-Ecological Framework for breastfeeding mothers, it is apparent that further research should consider this feature of the holistic person. It would be appealing to nurse researchers and especially those interested in complementary and

alternative health, as well as parish and faith community-based nurses, to assess if a mother's belief in a higher power impacts her decision to continue to breastfeed and overcome obstacles without medical and allopathic intervention. A possible study exists in evaluating whether "spiritual" women react differently to painful or noxious stimuli, or whether levels of oxytocin are significantly different in women who meditate or pray during breastfeeding. Studies using biofeedback might produce interesting results.

Mesosystem Recommendations

- Healthcare Providers and Educators: Clients' Perceptions. From the Mesosystem, it is essential to study clients' perception of provider knowledge and attitudes toward lactation education. Patient access to providers who practice evidence-based care may vary depending on the site studied. Hospitals that have mature breastfeeding programs and excellent prenatal care for their clients, such as in this analysis, regardless of BF status, may prove more successful at encouraging women to exclusively breastfeed to six months duration regardless of employment status or the reported problems of lactation.
- Healthcare Providers, Educators, and Social Services: Lactation Consultant and Nurses' Baseline Knowledge. In order to make any recommendations, it is vital to examine the knowledge base of educators and healthcare providers working with women of childbearing age. Further research should study lactation consultant and nurses' educational backgrounds to determine the optimum number of clinical hours needed in preceptorships and hands-on

experience before working in the field. In addition, the personal characteristics of effective lactation consultants and nurses would be desirable to ascertain to determine the qualities of an exceptional, science-based consultant. While BF status is a central variable to examine, other variables to study may be the quantity of consultants and nurses on staff at any given time who work with women and child-bearing families at each site, and in the home, school, and/or work environment. These factors may also influence lactation duration in that the educational background, expertise, length of service at the institution, work history, number of lactation consultants or nurses on duty every day per number of inpatient admits, and the healthcare provider's ability to answer the number of calls received during any given shift from patients who have been discharged are also significant.

- Healthcare Providers and Educators: Necessity of IBCLC-prepared Consultants. It would seem helpful to study the outcomes of IBCLC preparation. Do lactation consultants need to be IBCLC to be effective at promoting lactation exclusivity and duration? Do IBCLCs who are also nurses have greater success rates with their patients in promoting lactation exclusivity and duration than IBCLCs who do not have a background in nursing?
- Family; Friends; Peers and Colleagues: Support or Sabotage of Breastfeeding Goals. Future research should study the impact of a mother's support system on her intentions for breastfeeding duration. Appealing studies become

apparent according to the Social-Ecological Systems Framework for breastfeeding mothers that were not analyzed in the current study, but are worthwhile, nonetheless. For instance, do parish or faith community nurses feel they have the necessary training to assist mothers who are having difficulties? Do women who have spouses who participated in prenatal breastfeeding education more likely to encourage longer breastfeeding durations? Do women who have colleagues who have breastfed feel more supported when they return to full-time employment? Do childcare entities regularly participate in ongoing continuing education courses from healthcare providers that focuses on lactation and the support of a breastfeeding mother?

- Friends and Web-based Social Networks: A Larger Arena of Support. Future research should study the impact of social supports including web-based social networks, which have not been studied previously. It is possible that new mothers, who have access to the Internet, would find solace and encouragement from discussing their breastfeeding issues with other mothers via chat rooms and other technological-inspired formats, such as Facebook. Perhaps today's mothers would find it easier to relate to another mother on-line than they would a professional healthcare provider. Research on the effectiveness of these types of informal social networks in alleviating maternal stress and promoting breastfeeding regardless of perceived barriers would be beneficial.

Exosystem Recommendations

- Neighborhood: Rural and Under-Served Populations. The findings of this study may provide a foundation for additional studies in other locales where researchers could examine the relationship among age, race, culture, public policy, BF designation, employment, the problems of nursing, parity, and date of lactation termination using similar methodologies. Studies in rural or underserved communities with no or few nurses who have acquired IBCLC certification and with no organizational systems in place to foster breastfeeding behaviors may show significant differences that have yet to be discovered, and that may be significant in the development of rural-based recommendations.
- Hospitals/Birthing Centers/Clinics: Pre-natal Education. The current study showed that the community-based hospital with a mature breastfeeding program had a significant difference in its ability to deliver pre-natal care. This finding may have impacted the study's conclusion that found no statistical difference between the two study sites on lactation duration at three months postpartum. Perhaps this prenatal finding "made up" for any step the community hospital did not achieve of The Ten Steps to Successful Breastfeeding within the hospital environment. Further research needs to determine the impact of not only hospital-based interventions on breastfeeding duration, but the impact of pre-hospital interventions on duration and exclusivity at three months postpartum and beyond.

- Web-based Social Communities: Study Web-Based Social Communities. Effort should be made to determine the characteristics of supportive and evidence-based web-based communities and their effect on lactation duration. Research should be undertaken to determine mothers' likelihood to access lactation support on-line.
- Work place/School: Study Employment Barriers. The current study found that women who returned to employment or school had lower breastfeeding rates at three months postpartum. Further research must continue to examine the barriers women face in their work and school settings. An examination of the personal characteristics of the women who continue to breastfeed despite returning to full-time employment or school, and an assessment of the business characteristics of accommodating environments that have successfully incorporated breastfeeding support for new mothers into their employee assistance programs would be beneficial and worthwhile to explore.
- Parish/Faith Communities: Study Parish and Faith Communities. The impact of parish or faith communities on lactation duration, though not considered in the present study, should be considered. The impact of parish or faith communities should be assessed to determine if faith-based environments might successfully promote and influence breastfeeding outcomes. Educational programming for women in this setting may prove especially attractive to certain ethnic groups that may trust these sources of information more than those housed in hospital-based medical-model settings. In

addition, breastfeeding support groups that meet in nonthreatening environments, like that of a community or wellness center, may be less intimidating to certain racial and cultural groups that identify with less patriarchal leadership styles and prefer informal gatherings versus formal "classes" where pre-registration is frequently requested.

Macrosystem Recommendations

- Public Policy: The Ten Steps to Successful Breastfeeding. Although the current study found no significance between the BF hospital and the community-based hospital in regard to lactation duration at three months postpartum, researchers should continue to study the impact of Baby-Friendly designation on lactation initiation, duration, and exclusivity. Perhaps a study comparing a hospital that continues to provide free formula, pacifiers, and discharge bags to its patients would have shown more striking results, and would have further underscored the need for the implementation of evidence-based standards of care for all newborns and postpartum mothers.

Indeed, the possibilities for further research within all of Bronfenbrenner's spheres of influence are endless and just waiting to be explored. As more facilities attempt to gain BF designation and JHACO establishes minimum requirements for hospital compliance, more research in this area will be warranted.

Limitations

The study had several limitations. These included:

- Limitation One: older dataset. The FYI dataset from the 2004 study was six years old at the time of analysis.
- Limitation Two: unfamiliar population. The sample came from a population within a community unfamiliar to the doctoral student. To combat this obstacle, travel to the research site occurred during data analysis to tour the study sites and develop a feel for the community. At the visit, introductions were made to key personnel, and study findings were reviewed with the panel of experts who developed the FYI survey. In addition, lactation consultants at both institutions were consulted; and practices, policies, and services provided between 2004 and 2006 were reviewed. Current practices were also assessed.
- Limitation Three: convenience sample. The sample was a convenience sample of breastfeeding mothers who presented to clinics associated with the two hospitals. Mothers who expressed interest in the study were recruited if they met inclusion criteria; therefore, no randomization of the sample occurred, and no generalizations could be inferred from the data to other locales.
- Limitation Four: unfamiliar dataset. The dataset was transferred to NDSU during the summer of 2009. The student and statisticians needed to familiarize themselves with the coding system and determine that all patterns of data were correct before analysis. Data omissions needed to be confirmed with the researchers in New York to ensure correct interpretation of the data. The statisticians and student needed to consult via email and conference calls

to review findings to determine accuracy. Agreement was made to determine variables that required collapsing, or combining, before meaningful analysis could be made.

- Limitation Five: discrete dataset. The survey relied on "Yes/No" responses from its participants limiting the analysis of the data. Recommendations for future use would be to include more Likert-type questions for greater depth of data analysis.
- Limitation Six: self-reported breastfeeding status. Another limitation of the study was that all mothers at the three month survey timeframe self reported their breastfeeding status. Maternal recall may have altered the reliability and validity of the dataset if mothers' reports of breastfeeding duration were inaccurate.
- Limitation Seven: no nurse or lactation consultant demographics obtained. The nurses and lactation consultants' educational backgrounds were not obtained for analysis. The researchers have no way of knowing if this may have impacted the breastfeeding knowledge of their clients.
- Limitation Eight: no manager or physician demographics obtained. The managers and physicians with whom the lactation consultants and nurses worked were not obtained for analysis. The researcher has no way of determining provider "buy-in," their degree of support for breastfeeding at each institution, nor their attitudes and perceptions of the need for the healthcare team to adhere to the recommendations of the WHO and UNICEF.

The purpose of this dissertation was to examine the impact of Baby-Friendly Hospital designation, employment, parity, and other social-ecological factors on lactation status at three months postpartum in upstate New York. Dozier's 2004 Feeding Your Infant dataset of 842 mothers was analyzed using an adapted version of the Bronfenbrenner Social-Ecological Systems Framework. The U.S. Surgeon General's 2011 release of the "Call to Action to Support Breastfeeding," implores all sectors of society to remove obstacles faced by women who want to breastfeed. In light of these nationwide efforts, and the international appeal of the WHO/UNICEF Baby-Friendly Hospital Initiative, these findings have important implications for education, practice, policy, and future research.

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Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that Jennifer DeJong successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 04/27/2009

Certification Number: 222763

Fax to kristy Shi

NDSU IRB

701-231-

NIH CERTIFICATE OF COMPLETION

Institutional Review Board

Office of the Vice President for Research, Creative Activities and Technology Transfer
NDSU Dept. 4000
1735 NDSU Research Park Drive
Research 1, P.O. Box 6050
Fargo, ND 58108-6050

Fax 701.231.8098

Federalwide Assurance #FWA0000[illegible]
Expires April 24, 2011

May 4, 2009

Dr. Kathy Enger
School of Education
FLC 216B

Re: IRB Certification of Human Research Project:

"Feeding Your Infant Study; and ex-post facto study using data through The University of Rochester Medical Center"
Protocol #:**HE09245**

Co-investigator(s) and research team: **Jennifer Lynne DeJong**

Study site(s): **NDSU** Funding: **n/a**

It has been determined that this human subjects research project qualifies for exempt status (category # 4) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*). This determination is based on the protocol form received 5/1/2009.

Please also note the following:

- This determination of exemption expires 3 years from this date. If you wish to continue the research after 5/3/2012, submit a new protocol several weeks prior to this date.
- The project must be conducted as described in the approved protocol. If you wish to make changes, pre-approval is to be obtained from the IRB, unless the changes are necessary to eliminate an apparent immediate hazard to subjects. A *Protocol Amendment Request Form* is available on the IRB website.
- Prompt, written notification must be made to the IRB of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
- Any significant new findings that may affect the risks and benefits to participation will be reported in writing to the participants and the IRB.
- Research records may be subject to a random or directed audit at any time to verify compliance with IRB policies.

Thank you for complying with NDSU IRB procedures; best wishes for success with your project.

Sincerely,

Kristy Shirley
Research Compliance Administrator

APPENDIX B. DATA USE AGREEMENT CONTRACT

Data Use Agreement

This Data Use Agreement ("the Agreement") is by and between *North Dakota State University, an educational institution* ("User"), on behalf of Jennifer L. DeJong, NDSU Graduate Student the principal investigator/data recipient and Univeristy of Rochester on behalf of *Ann Dozier, RN, PhD.*, the custodian of the data ("Source") and is effective as of *07/9/09* (the "Effective Date").

Background

The Office for Human Research Protection (OHRP) considers private information or specimens not to be individually identifiable when they cannot be linked to specific individuals by the investigator(s) either directly or indirectly through coding systems. For example, OHRP does not consider research involving only coded private information or specimens to involve human subjects as defined under 45 CFR 46.102(f) if the following conditions are both met:

(1) the private information or specimens were not collected specifically for the currently proposed research project through an interaction or intervention with living individuals; and

(2) the investigator(s) cannot readily ascertain the identity of the individual(s) to whom the coded private information or specimens pertain because, for example:

(a) the key to decipher the code is destroyed before the research begins;

(b) the investigators and the holder of the key enter into an agreement prohibiting the release of the key to the investigators under any circumstances, until the individuals are deceased (note that the HHS regulations do not require the IRB to review and approve this agreement)

Congress enacted the Health Insurance Portability and Accountability Act of 1996 (HIPAA), which provides protection for confidential health information; and, the United States Department of Health and Human Services (DHHS) has promulgated, pursuant to HIPAA, a "Privacy Rule" governing confidential health information. "Privacy Rule" means the regulations promulgated by DHHS to implement the portions of HIPAA that concern the confidentiality of health information, as may be amended or otherwise changed from time to time. At the date of this Agreement, these include 45 CFR §160 and §164, Subparts A and E.

The User wishes to use certain information for research purposes permitted under 45 CFR 164.514(e) of the Privacy Rule and under the OHRP guidance cited above; and prior to releasing any confidential health information to User, the User and the Source agree to enter into an agreement under which User agrees to comply with the Privacy Rule and the OHRP guidance.

The parties, in consideration of the premises and the mutual promises and obligations set forth herein, the sufficiency of which is hereby acknowledged, and intending to be legally bound, agree as follows:

1. Access to Data. The Source shall provide User with access to the data described below in accordance with the terms and conditions of this Agreement. This data is in the form of a "Limited Data Set" as defined by HIPAA under 45 CFR 164.514(e) or a "coded data

Agm. 3332

ENTERED

8/12/09

set" as defined in OHRP guidance. Under no circumstances shall the Source be required under this Agreement to provide the User with any information that does not qualify as part of a limited data set or coded data set

2. Description of Data Set Following is a complete description for the data to be given by the Source to the User:

Feeding Your Infant Study Data Sets. For Dissertation Purposes only.

3. Authorized Parties. The following individuals or classes of individuals (the "Authorized Parties") are authorized to use the Data Set or any part of it on behalf of User and agree to abide by the terms of this Agreement:
Names: *Jennifer DeJong, NDSU Graduate Student, and her advisor, Dr. Kathy Enger, NDSU; ; Curt Doetkott, Research Analyst, NDSU; .*

4. Permitted Use. User, and any Authorized Party on User's behalf, may use the Data Set only for the following research purposes:

North Dakota State University Graduate Student, Jennifer L. DeJong, and her advisor, Dr. Kathy Enger, will use the "Feeding Your Infant" Data Set for Ms. DeJong's Dissertation, and for writing an article to be co-authored by Dr. Ann Dozier for publication purposes.

5. Conditions of Use. User and each Authorized Party agree as follows:

a. Not to use or further disclose the Data Set or any information contained therein other than as permitted by this Agreement or required by applicable law. User may not disclose the Data set in any manner that would violate the requirements of HIPAA. Additionally, User shall not, without the prior written consent of Source, disclose the Data Set on the basis that such disclosure is required by law without notifying the Source so that there shall be an opportunity to object to the disclosure and to seek appropriate relief.
b. To use appropriate safeguards to prevent use or disclosure of the Data Set or any information contained therein other than as provided for by this Agreement.
c. To report to Source any use or disclosure of the Data Set or any part of it not provided for by this Agreement of which User or any Authorized Party becomes aware.
d. To ensure that any agents, including subcontractors, to whom User or an Authorized Party provides the Data Set or any part of it to agree to the same restrictions and conditions that apply to the User and Authorized Parties under this Agreement.
e. Not to use the information contained in the Data Set to identify the individuals whose information is contained in the Data Set, nor to contact them under any circumstances.
f. Promptly following the end of the permitted use (as defined in Section 4 above) or upon termination of this agreement, to return all copies of the Data Set to Source or destroy them and certify to the destruction; or, if User represents and Source agrees that neither return nor destruction is feasible, to continue to extend the protections of this Agreement to the Data Set.

6. **Reliance.** User and each Authorized Party acknowledge and agree that Source has relied upon the promises and covenants made in this Agreement and in disclosing the Data Set hereunder.
7. **Relief.** User agrees that the breach or threatened breach of this Agreement may cause irreparable harm to Source and/or individuals, that Source may not have an adequate remedy at law, and that Source shall therefore be entitled to injunctive or other equitable relief to enforce this Agreement without obligation to post a bond. In the event Source becomes aware of any use of the Data Set or any part of it that is not authorized under this Agreement or required by applicable law, Source may (i) terminate this Agreement upon notice; (ii) disqualify (in whole or in part) the User and/or any Authorized Parties from receiving protected health information in the future; and/or (iii) report the inappropriate use or disclosure to the Secretary of the Department of Health and Human Services. Further sanctions may apply to the User and/or Authorized Parties under 45 CFR parts 160 and 164.
8. **Obligations Following Termination and Expiration.** Upon termination of this Agreement for cause, User and all Authorized Parties shall no longer be entitled to receive or use information contained in the Data Set. Neither expiration or termination without cause of this Agreement shall prevent User or Authorized Parties from completion of the research pursuant to Section 4 above, nor shall it prevent publication of research findings resulting from use of Data Set.
9. **Termination and Expiration of Agreement.** Except as otherwise provided in Section 5.f. above, this Agreement shall expire thirty days following satisfaction of the requirements of Section 5.f. above. **Additionally, either party may terminate this agreement upon 20 days written notice to the other party.**
10. **Construction and Jurisdiction.** RESERVED
11. **No Assignment.** This Agreement may not be assigned by User or any Authorized Party without the prior written consent of Source.
12. **Amendments.** This Agreement may not be amended except by a written amendment executed by both parties.
13. **Indemnification.** To the extent permitted by North Dakota law, User shall indemnify, hold harmless and defend Source from and against any and all claims, losses, liabilities, costs and other expense resulting from, or relating to, the acts or omissions of User in connection with the representations, duties and obligations of User under this agreement. The parties' respective rights and obligations under this section shall survive termination of the Agreement.

Publication. The Source reserves the right to read, edit for clarity and accuracy, and be listed as an author on any document submitted for presentation or publication. A minimum two-week notice shall be given to Source to provide adequate time for review and comment on any presentation or publication coming from these data.

WHEREFORE, the parties, through their authorized representatives, hereby accept and agree to the terms and conditions of this Agreement.

Authorized Representatives			
"Source"		"User"	
Institution Name	University of Rochester	Institution Name	North Dakota State University
First Name, MI, Last Name	Donna Beyea	By	Valrey Kettner
Title	Research Administrator	Title	Assoc VP Sponsored Programs Administration
Department Name	ORPA (Office of Research and Project Administration)	Department Name	
Institution Name	University of Rochester	Institution Name	North Dakota State University
Work Phone	585-275-8036	Work Phone	701/231-9608
Email Address	Donna.Beyea@rochester.edu OR dbeyea@UR.Rochester.edu	Email Address	Val.Kettner@ndsu.edu
Study Title/Name	Feeding Your Infant Study/Dozier	Study Title/Name	Feeding Your Infant Study/Dozier
Signature	North Dakota State University Libraries Addendum	Signature	North Dakota State University Libraries Addendum

Donna L. Beyea
Assistant Director
Office of Research and

Authorized Parties Signatures. The following individuals or classes of individuals (the "Authorized Parties") are authorized to use the Data Set or any part of it on behalf of User and agree to abide by the terms of this Agreement. Their project roles are clarified below their name.

NAME	SIGNATURE
Jennifer L. DeJong Graduate Student, NDSU	North Dakota State University Libraries Addendum To protect the privacy of individuals associated with the document, signatures have been removed from the digital version of this document.
Dr. Kathy Enger, NDSU Dissertation Advisor	
Curt Doetkott, Research Analyst, NDSU	
Ann Dozier, RN, PhD Principal Investigator, Custodian of Data	

APPENDIX C. FYI BASELINE SURVEY

Today's Date: ____/____/2005 **Baseline Survey C/B**
Hospital: ☐1 RGH ☐2 Highland

1. **Where you employed or in school during this pregnancy?**
   ☐0 No [redacted]
   ☐1 Yes

   a) **How much paid maternity leave do you expect to receive from your employer?**
   ____ Weeks paid ☐2 None
   ☐1 Don't know ☐3 Not applicable

   b) **Are you planning to return to work or school within the next 6 months?**
   ☐0 No
   ☐1 Yes

   1. **If yes, how old will your baby be when you return to work or school?**
   ____ # weeks
   ☐1 Not sure

   c) **When you return to work or school, how many hours per week will you work?** [redacted]
   ☐1 Less than 20 ☐3 30-39
   ☐2 20-29 ☐4 Full time

2. **Are you currently enrolled in WIC (supplemental food program for women, infants and children)?**
   ☐0 No **(If NO, SKIP to question #3)**
   ☐1 Yes

   a) **If yes, did anyone talk to you about infant feeding?**
   ☐0 No **(If NO, SKIP to question #3)**
   ☐1 Yes

   b) **What did they recommend? (please check only one)**
   ☐1 Exclusive breastfeeding
   ☐2 Formula only
   ☐3 Mix breast and formula feeding
   ☐4 Whatever I wanted
   ☐5 Other: ____________________

3. **Have you ever had breast surgery?**
   ☐0 No **(If NO, SKIP to question #4)**
   ☐1 Yes

   a) **If yes, what kind of breast surgery?**
   ☐1 Reduction ☐4 Mastectomy
   ☐2 Augmentation ☐5 Other: ____________________
   ☐3 Lumpectomy

4. **How many other babies have you had?**
   ______ babies

   a) **How old are they (in years)?**

   ______ First born ______ Fourth
   ______ Second ______ Fifth
   ______ Third ______ Sixth

   b) **How many of your other babies did you initially:**
   Breastfeed only ______
   Formula feed only ______
   Mix breastfeeding and formula feeding ______

[redacted]

   c) **If any of your children were breastfed, what was the longest period of time that you breastfed?**
   ______ # months (if less than 1 month, write <1)
   ☐888 None of my children breastfed

   d) **Did you ever have any problems with breastfeeding?**
   ☐0 No
   ☐1 Yes

   1. **If yes, what problems did you have?** [redacted]
      ☐1 Sore nipples ☐6 Inconvenient
      ☐2 Engorgement ☐7 Too much time
      ☐3 Fussy baby ☐8 Didn't enjoy breastfeeding
      ☐4 Sleepy baby ☐9 Not enough milk
      ☐5 Refusal to nurse ☐10 Other: ______________

   e) **In general, how would you rate your most recent breastfeeding experience (with one of your other children)**
   ☐1 Very good ☐4 Not so good
   ☐2 Fairly good ☐5 Bad
   ☐3 Neutral

5. **Before this baby was born, how did you plan to feed him/her IN THE HOSPITAL?**
   ☐1 Breastfeed only ☐3 Formula feed only
   ☐2 Breastfeed and formula feed ☐4 Undecided

6. **Did you *breastfeed* your baby at birth?**
   ☐0 No **(If No, SKIP to question #7)**
   ☐1 Yes

   a) **If YES, How would you rate your overall breastfeeding experience?**
   ☐1 Very good ☐4 Not so good
   ☐2 Fairly good ☐5 Bad
   ☐3 Neutral

7. **Did you *formula feed* your baby at birth?**
   ☐0 No **(If No, SKIP to question #8)**
   ☐1 Yes

a) **If YES, How would you rate your overall formula feeding experience?**

- ☐1 Very good
- ☐2 Fairly good
- ☐3 Neutral
- ☐4 Not so good
- ☐5 Bad

8. **How would you rate your breastfeeding experience while IN THE HOSPITAL?**

- ☐1 Very good
- ☐2 Fairly good
- ☐3 Neutral
- ☐4 Not so good
- ☐5 Bad

a) **Comments?**

____

____

____

9. **How confident do you feel about your ability to breastfeed this baby?**

- ☐1 Very confident
- ☐2 Fairly confident
- ☐3 Neutral
- ☐4 Somewhat confident
- ☐5 Not at all confident

a) **Comments?**

____

____

____

10. **How do you plan to feed this baby, AFTER LEAVING THE HOSPITAL?**

- ☐1 **Breast milk only**
- ☐2 Breast and formula feed
- ☐3 Breastfeed now, formula feed later
- ☐4 Breastfeed now, pumped breast milk later
- ☐5 Formula only
- ☐6 Haven't decided/Don't know

11. **How long do you plan to breastfeed this baby (ANY breastfeeding)?**

______ # weeks -or- Until what milestone: ____________________

☐88 Don't know

12. **What was the most important reason why you decided to breastfeed this baby? (Please choose only one)**

- ☐1 Medical advice
- ☐2 Better for Baby
- ☐3 Class/reading
- ☐4 Problems with mother's health
- ☐5 Family/Friends
- ☐6 Convenience
- ☐7 Better for mother
- ☐10 Other: ____________________

13. **Name the top three people who influenced your decision the most:**

- ☐1 Your mother
- ☐2 Your partner's mother
- ☐3 Other family members
- ☐4 Baby's father
- ☐5 Friend
- ☐6 Prenatal care provider (OB/GYN, Midwife, FP)
- ☐7 Pediatric care provider (family physician, pediatrician)
- ☐10 Other: ____________________________

14. When did you decide how to feed THIS baby?

- ☐1 Before pregnancy
- ☐2 First trimester
- ☐3 Second trimester
- ☐4 Third trimester
- ☐5 After birth
- ☐6 Haven't decided

15. How difficult was the decision for you?

- ☐1 Not very difficult
- ☐2 Somewhat difficult
- ☐3 Very difficult

16. Did you change your mind during pregnancy about how to feed this baby?

- ☐0 No [redacted]
- ☐1 Yes

a) **What caused you to change your mind?** [redacted]

- ☐1 Medical advice
- ☐2 Class/reading
- ☐3 Family/friends
- ☐4 Work
- ☐5 Better for baby
- ☐6 Problems w/mother's health
- ☐7 Convenience
- ☐8 Better for mother
- ☐10 Other: ______________________

17. Did you seek out information to help you make up your mind about how to feed your baby?

- ☐0 No
- ☐1 Yes

18. Did you get information about infant feeding from any of the following sources?
[redacted]

- ☐1 Book/magazine
- ☐2 Family member
- ☐3 TV or radio ad
- ☐4 Video
- ☐5 Health care provider
- ☐6 WIC
- ☐7 Class
- ☐8 Friend
- ☐9 La Leche League

19. Have you seen or heard any advertising that promotes breastfeeding?

- ☐0 No [redacted]
- ☐1 Yes

a) **Have you seen or heard, "Babies were born to be breastfed?"**

- ☐0 No
- ☐1 Yes

20. **Did any health care professional discuss infant feeding methods with you during this pregnancy?**
   - ☐0 No (([redacted]
   - ☐1 Yes

   a) **If YES, who?** [redacted]

   - ☐1 Obstetrician
   - ☐2 OB Nurse
   - ☐3 WIC Nurse
   - ☐4 Family Practitioner
   - ☐5 Pediatrician
   - ☐6 Dietician
   - ☐7 Midwife
   - ☐8 Pediatric Nurse
   - ☐9 OB PA
   - ☐10 Don't remember
   - ☐11 Other: ____________________

   b) **What did they recommend?**
   - ☐1 Breastfeeding
   - ☐2 Formula feeding
   - ☐3 Both
   - ☐4 No recommendation

   c) **Did that person offer this information to you or did you ask for it?**
   - ☐1 They offered
   - ☐2 I asked

21. **How long was your *most helpful* discussion?**
   - ☐1 Brief (< 5 minutes)
   - ☐2 5 – 10 minutes
   - ☐3 > 10 minutes
   - ☐4 No discussion

22. **Did any of the following influence your decision?** [redacted]
   - ☐1 Advice from your doctor
   - ☐2 Advice from a relative or friend
   - ☐3 Conversations you had with your spouse or partner
   - ☐4 Information you were given by a health care professional
   - ☐6 Information you received at a class
   - ☐7 Information you found on your own
   - ☐8 TV, magazine or radio advertisements with the phrase, "Babies were born to be breastfed"
   - ☐9 Past experience with feeding other children
   - ☐10 What would best fit your lifestyle
   - ☐11 What would best fir your work schedule
   - ☐12 Cost
   - ☐13 Other: ____________________

23. **Which of the following had the *most* influence on your decision?**
[redacted]

- ☐1 Advice from your doctor
- ☐2 Advice from a relative or friend
- ☐3 Conversations you had with your spouse or partner
- ☐4 Information you were given by a health care professional
- ☐5 Information you received at a class
- ☐6 Information you found on your own
- ☐7 TV, magazine or radio advertisements with the phrase, "Babies were born to be breastfed"
- ☐8 Past experience with feeding other children
- ☐9 What would best fit your lifestyle
- ☐10 What would best fir your work schedule
- ☐11 Cost
- ☐12 Other: ______________________

24. **To what extent did you make decisions about infant feeding by yourself?**

- ☐1 I made the decisions all by myself
- ☐2 I made the decisions with help from my spouse/partner
- ☐3 I made the decisions with help from someone else (who: ______________________)
- ☐4 I feel that I was somewhat pressured into decisions (by: ______________________)
- ☐5 Someone else made the decisions for me (who: ______________________)
- ☐6 Other: ______________________

25. **How comfortable are you with the decisions you made?**

- ☐1 Very comfortable
- ☐2 Somewhat comfortable
- ☐3 Somewhat uncomfortable
- ☐4 Not at all comfortable

26. **Which of the following emotions or feelings do you have about your decisions on how you fed your baby?** [redacted]

- ☐1 Comfort
- ☐2 Embarrassment
- ☐3 Fear
- ☐4 Guilt
- ☐5 Happiness
- ☐6 Regret
- ☐7 Relief
- ☐8 Worry
- ☐9 Other: ______________________

27. **Which emotion or feeling is the strongest?** [redacted]

- ☐1 Comfort
- ☐2 Embarrassment
- ☐3 Fear
- ☐4 Guilt
- ☐5 Happiness
- ☐6 Regret
- ☐7 Relief
- ☐8 Worry
- ☐9 Other: ______________________

28. **Does the baby's father want you to breastfeed?**

- ☐0 No
- ☐1 Yes
- ☐2 Not applicable (n/a)

29. **Do other members of your family want you to breastfeed your baby?**
    - ☐0 No
    - ☐1 Yes
    - ☐2 Not applicable (n/a)

30. **How have your friends fed their babies?** [redacted]
    - ☐1 Most have breastfed
    - ☐2 Most have formula fed
    - ☐3 Most breastfed and formula fed
    - ☐4 Don't know
    - ☐5 Not applicable (n/a)

31. **Do you plan to give any formula to your baby while you are breastfeeding?**
    - ☐0 No [redacted]
    - ☐1 Yes

    a) **If YES, when do you plan to start formula feeding?**
    - ☐77 Immediately
    - ______ # weeks

    b) **Why do you plan to give formula while you are breastfeeding?**
    [redacted]
    - ☐1 So I can share feeding
    - ☐2 For night time feedings
    - ☐3 So I can return to work/school
    - ☐4 For when I have a babysitter
    - ☐5 To help baby accept bottle
    - ☐6 For convenience
    - ☐7 Other: ____________________

32. **How much formula do you have at home now?**
    - ☐1 none
    - ______ # cans
    - ______ # cases

33. **Did you receive any offers for free or discounted infant formula during your pregnancy?**
    - ☐0 No [redacted]
    - ☐1 Yes

    a) From whom?
    - ☐1 OB office
    - ☐2 Pediatrician Office
    - ☐3 Grocery store
    - ☐4 Magazine
    - ☐5 Baby Club
    - ☐6 Other: ____________________

34. **Do you know that you can pump and store your breast milk?**
    - ☐0 No
    - ☐1 Yes

35. **Are you planning to feed any pumped breast milk to your baby?**
    - ☐0 No [redacted]
    - ☐1 Yes

    a) **If YES, when do you plan to start?**
    - ☐77 Immediately
    - ______ # weeks

b) **Why do you plan to give pumped breast milk while you are breastfeeding?** [redacted]

- ☐1 So I can share feeding
- ☐2 For night time feedings
- ☐3 So I can return to work/school
- ☐4 For when I have a babysitter
- ☐5 To help baby accept bottle
- ☐6 For convenience
- ☐7 Other: ______________________

36. **What is the main reason you had your baby at this hospital?**
[redacted]

- ☐1 My doctor/midwife delivers here
- ☐2 It's the closest hospital to where I live
- ☐3 A friend or family member had her baby here
- ☐4 I had another baby here
- ☐5 I toured the maternity center and liked it
- ☐6 My insurance covers this hospital
- ☐7 This hospital has a good reputation
- ☐10 Other: ______________________

37. **Any additional information that you would like to add:**

____

____

____

____

____

____

Thank you for your time!

GUILT SURVEY

PART D: We are interested in your thoughts about how you have fed your baby over the past 6 months, including your experiences with breastfeeding or formula feeding and starting other foods in your baby's diet.

27. Did you look for or seek out information to help you make up your mind about how to feed your baby, including when to introduce solid foods?

☐0 No
☐1 Yes

28. Did any of the following influence your decision on how to feed your baby? [redacted]

☐1 Advice from your doctor
☐2 Advice from a relative or friend
☐3 Conversations you had with your spouse or partner
☐4 Information you were given by health care professionals
☐5 Information you received at a class
☐6 Information you found on your own
☐7 TV, magazine or radio advertisements with the phrase, "Babies were born to be breastfed"
☐8 Past experience with feeding other children
☐9 What would best fit your lifestyle
☐10 What would best fit your work schedule
☐11 Cost
☐12 Other: ____________________

29. Which of the following had the *most* influence on your decision? [redacted]

☐1 Advice from your doctor
☐2 Advice from a relative or friend
☐3 Conversations you had with your spouse or partner
☐4 Information you were given by health care professionals
☐5 Information you received at a class
☐6 Information you found on your own
☐7 TV, magazine or radio advertisements with the phrase, "Babies were born to be breastfed"
☐8 Past experience with feeding other children
☐9 What would best fit your lifestyle
☐10 What would best fit your work schedule
☐11 Cost
☐12 Other: ____________________

30. Who did you talk with about infant feeding? [redacted]

☐1 Obstetrician
☐2 Midwife/Family Practitioner
☐3 OB nurse
☐4 Dietician or WIC nurse
☐5 Pediatrician
☐6 Family member
☐7 Friend
☐8 Nobody
☐9 Other: ____________________

31. **Approximately how long was your *most helpful* discussion about infant feeding?**

☐1 Brief (<5 minutes) ☐3 >10 minutes
☐2 5-10 minutes ☐4 No discussions

32. **To what extent did you make decisions about infant feeding by yourself?**

☐1 I made the decisions all by myself
☐2 I made the decisions with help from my spouse/partner
☐3 I made the decisions with help from someone else
(who: ______________________________)
☐4 I feel that I was somewhat pressured into decisions
(by: ______________________________)
☐5 Someone else made the decisions for me
(who: ______________________________)
☐6 Other: ______________________________

33. **How comfortable are you with the decisions you made?**

☐1 Very comfortable ☐3 Somewhat uncomfortable
☐2 Somewhat comfortable ☐4 Not at all comfortable

34. **Which of the following emotions or feelings do you have about your decisions on how you fed your baby?**

☐1 Comfort ☐6 Regret
☐2 Embarrassment ☐7 Relief
☐3 Fear ☐8 Worry
☐4 Guilt ☐9 Other: ______________________
☐5 Happiness

35. **Which emotion or feeling is the strongest?** ([redacted]

☐1 Comfort ☐6 Regret
☐2 Embarrassment ☐7 Relief
☐3 Fear ☐8 Worry
☐4 Guilt ☐9 Other: ______________________
☐5 Happiness

36. **Did you *breastfeed* your baby at birth?**

☐0 No ([redacted]
☐1 Yes

a) **If YES, How would you rate your overall breastfeeding experience?**

☐1 Very good ☐4 Not so good
☐2 Fairly good ☐5 Bad
☐3 Neutral

37. **Did you *formula feed* your baby at birth?**

☐0 No ([redacted]
☐1 Yes

a) **If YES, How would you rate your overall formula-feeding experience?**

☐1 Very good ☐4 Not so good
☐2 Fairly good ☐5 Bad
☐3 Neutral

38. **Any additional information that you would like to add:**

____
____
____
____
____

Thank you for your time!!

Please return your survey in the postage-paid envelope provided to:
University of Rochester
601 Elmwood Avenue
Box 324 – FYI Program
P.O. Box 23029
Rochester NY 14692-9804

APPENDIX D. FYI TWO-WEEK SURVEY

Today's Date: ____/____/____ **Follow-up: 2-weeks**

1. **Please answer the following questions about your hospital stay when your baby was born.**

   a) **Did the hospital staff give you printed information or a video about breastfeeding?**
   - ☐0 No
   - ☐1 Yes

   b) **How long did your baby *usually* stay in your room with you?**
   - ☐1 Up to 8 hours per day
   - ☐2 8 hours or more, but less than 16 hours per day
   - ☐3 16 hours or more, but less than 23 hours per day
   - ☐4 23 hours or more per day

   c) **Would you have liked your baby to stay in your room with you less or more?**
   - ☐1 Less
   - ☐2 Just right
   - ☐3 More

   d) **Was your baby taken out of your room for exams, tests, baths, etc.?**
   - ☐0 No
   - ☐1 Yes

   e) **Did you breastfeed your baby in the hospital?**
   - ☐0 No
   - ☐1 Yes

   f) **Did you breastfeed your baby in the first hour after your baby was born?**
   - ☐0 No If No, why not? ______________________________
   - ☐1 Yes

   g) **Did hospital staff help you learn how to breastfeed?**
   - ☐0 No ☐2 I didn't need any help
   - ☐1 Yes

   h) **Was hospital staff helpful and encouraging with respect to breastfeeding?**
   - ☐0 No
   - ☐1 Yes

   i) **Did you feel pressured by the hospital staff to breastfeed your baby?**
   - ☐0 No
   - ☐1 Yes

   j) **Was your baby fed only breast milk during your hospital stay?**
   - ☐0 No
   - ☐1 Yes

k) **Did hospital staff tell you to breastfeed whenever your baby was hungry (or at least every 3 hours if your baby was sleepy)?**
☐0 No
☐1 Yes

l) **Did hospital staff give you a gift pack with formula?**
☐0 No
☐1 Yes

m) **Did hospital staff give you a telephone number to call for help with breastfeeding?**
☐0 No
☐1 Yes

n) **Did hospital staff give your baby a pacifier while in the hospital?**
☐0 No ☐2 Don't know
☐1 Yes

o) **Did you give your baby a pacifier in the hospital?**
☐0 No
☐1 Yes

p) **Did your baby stay with you during the day?**
☐0 No
☐1 Yes

q) **Did your baby stay with you at night?**
☐0 No ☐2 Yes, except the first night
☐1 Yes, every night

r) **Did you feel pressured to keep your baby in your room with you?**
☐0 No
☐1 Yes

s) **Did you go to a breastfeeding class while in the hospital?**
☐0 No
☐1 Yes

2. **Did you have any breastfeeding problems in the hospital?**
☐0 No [redacted]
☐1 Yes

a) **If YES, who helped you?** [redacted]
☐1 Nurse ☐5 Family Member/Friend
☐2 Pediatrician ☐6 Did not get help
☐3 Obstetrician ☐7 Other: ____________
☐4 Lactation Consultant

3. **Has the lactation consultant from the hospital called you since you left the hospital to see if you had any breastfeeding questions?**
   - ☐0 No
   - ☐1 Yes

4. **Are you still breastfeeding?**
   - ☐0 No [redacted]
   - ☐1 Yes

   a) **If YES, are you currently breastfeeding exclusively (your baby gets nothing but breast milk)?**
      - ☐0 No [redacted]
      - ☐1 Yes [redacted]

5. **If you are no longer feeding *any* breast milk to your baby, what were your reasons for stopping?** [redacted]
   - ☐1 My baby was having difficulty nursing
   - ☐2 Breast milk alone was not satisfying my baby
   - ☐3 My baby was not gaining enough weight
   - ☐4 My baby became sick and could not breastfeed
   - ☐5 My nipples were sore, cracked, or bleeding
   - ☐6 I was not producing enough milk
   - ☐7 I had too many other household duties
   - ☐8 I felt it was the right time to start weaning my baby
   - ☐9 I became sick and could not breastfeed
   - ☐10 I went back to work or school
   - ☐11 My husband or partner wanted me to stop breastfeeding
   - ☐12 I wanted or needed someone else to feed the baby
   - ☐13 Other: ______________________

6. **If you have stopped breastfeeding, how old was your baby when you stopped?**
   ________ # days

   a) What is the date that you last breastfed your baby?
      ____/____/2005

   b) What is the date that your baby last received any breast milk, if different from above date (6a)?
      ____/____/2005
      ☐ Not different from above date (6a)

7. **In general, how was your breastfeeding experience?**
   - ☐1 Very good
   - ☐2 Fairly good
   - ☐3 Not so good
   - ☐4 Bad
   - ☐5 Not sure

8. **How old was your baby the first time you gave him/her formula?**
   # days ☐777 Baby hasn't received any formula

9. **How old was your baby the first time you gave him/her solid foods?**
_______ # days ☐777 Baby hasn't received any solid foods

[redacted]

10. **If you are no longer using *only* breast milk to feed your baby, what were your reasons for adding other foods or liquids to your baby's diet?**
[redacted]
- ☐1 I am exclusively breastfeeding
- ☐2 My baby was having difficulty nursing
- ☐3 Breast milk alone was not satisfying my baby
- ☐4 My baby was not gaining enough weight
- ☐5 My baby became sick and could not breastfeed
- ☐6 My nipples were sore, cracked, or bleeding
- ☐7 I was not producing enough milk
- ☐8 I had too many other household duties
- ☐9 I felt it was the right time to start weaning my baby
- ☐10 I became sick and could not breastfeed
- ☐11 I went back to work or school
- ☐12 My husband or partner wanted me to stop breastfeeding
- ☐13 I wanted or needed someone else to feed the baby
- ☐14 Other: ______________________

11. **In general, how has your breastfeeding experience been so far?**
- ☐1 Very good
- ☐2 Fairly good
- ☐3 Not so good
- ☐4 Bad
- ☐5 Not sure

12. **If you are breastfeeding, are you feeding your baby any <u>pumped breast milk</u>?**
- ☐0 No [redacted]
- ☐1 Yes

a) **How many times per day does your baby receive <u>pumped breast milk</u>?**
_____ # times ☐1 Rare use (less than once per day)

b) **How does your baby get <u>pumped breast milk</u>?**
- ☐1 From a bottle
- ☐2 From an open cup
- ☐3 From a sippy cup
- ☐4 Other:

c) **Why do you give your baby <u>pumped breast milk</u>?** [redacted]
- ☐1 So someone else can feed him/her
- ☐2 So I can be sure baby will drink from a bottle
- ☐3 So I could go to work/school
- ☐4 For night time feedings
- ☐5 For when I have a baby sitter
- ☐6 For convenience
- ☐7 Other: ______________________________

13. **What are you currently feeding your baby?** [redacted]

- ☐1 Breast milk
- ☐2 Formula
- ☐3 Water
- ☐4 Juice
- ☐5 Tea
- ☐6 Cereal
- ☐7 Other solid food

14. **How many times do you usually feed your infant each day?**

_______ **# feedings**

a) **How many feedings does your baby usually get <u>breast milk</u>?**

_______ **# feedings**

b) **How many feedings does your baby usually get <u>formula</u>?**

_______ **# feedings**

c) **How many feedings does your baby usually get <u>other foods or liquids</u> (including water)?**

_______ **# feedings**

15. **Does your baby drink anything from a bottle?**

- ☐0 No [redacted]
- ☐1 Yes

a) **At what age (in days) did your baby first drink anything from a bottle (breast milk, formula, or other liquids)?**

_______ **# days**

b) **At what age (in days) did your baby first start getting a bottle on most days of the week?**

_______ **# days**

c) **When you give your baby a bottle, what is *usually* in it?** [redacted]

- ☐1 Breast milk only
- ☐2 Formula only
- ☐3 Breast milk and formula mixed
- ☐4 Sometimes breast milk and sometimes formula
- ☐5 Other (water, juice, tea, etc.)

16. **If you are breastfeeding and your baby gets any <u>formula</u>, why do you give your baby formula?** [redacted]

- ☐1 My baby does not get formula
- ☐2 So someone else can feed him/her
- ☐3 So I can be sure baby will drink from a bottle
- ☐4 So I could go to work/school
- ☐5 For night time feedings
- ☐6 For when I go out <u>with</u> baby
- ☐7 For when I go out <u>without</u> baby
- ☐8 For convenience
- ☐9 Other: ________________________________

17. **Have you had any problems with breastfeeding?**
   - ☐0 No [redacted]
   - ☐1 Yes

   a) **Have you had any of the following problems? (check all that apply)**

☐1 Not enough milk	☐5 Too much time
☐2 Refusal to nurse	☐6 Inconvenient
☐3 Fussy baby	☐7 Don't enjoy breastfeeding
☐4 Sleepy baby	☐8 Other: ____________

   b) **In the past two weeks have you had any of the following conditions? If YES, how many times? (If None, SKIP to question #18)**

	No	Yes	# Times
Sore/bleeding nipples	☐0	☐1	______
Engorged breasts	☐0	☐1	______
Mastitis/breast infection	☐0	☐1	______
Other: ____________	☐0	☐1	______

   1. **Did you receive any medical care for any of the above problems?**
      - ☐0 No
      - ☐1 Yes

   2. **Did you take any medications for any of the above problems?**
      - ☐0 No [redacted]
      - ☐1 Yes

      a) **If yes, please name the medications:**

      1- ____________ 4- ____________
      2- ____________ 5- ____________
      3- ____________ 6- ____________

18. **Have you called the hospital Lactation Consultant for help with breastfeeding since you left the hospital?**
   - ☐0 No [redacted]
   - ☐1 Yes

   a) **If YES, was she able to help you with your breastfeeding questions or problems?**
      - ☐0 No
      - ☐1 Yes

19. **Have you called anyone else for breastfeeding help or support (like La Leche League, your baby's doctor, WIC, etc.)?**
   - ☐0 No
   - ☐1 Yes

20. **Have you started working or going to school since your baby was born?**
   - ☐0 No [redacted]
   - ☐1 Yes

a) **If YES, how old was your baby when you returned to work or school?**
_______ # days

b) **On average, how many hours per week do you work or go to school?**
_______ # hours

c) **Who usually takes care of your baby while you work or go to school?**
[redacted]

- ☐1 Baby's father/My partner
- ☐2 Baby's Grandmother
- ☐3 Other relative
- ☐4 Babysitter/Nanny
- ☐5 In-home day care
- ☐6 Day care center
- ☐7 Work-site day care
- ☐8 Take baby to work
- ☐9 Other: ____________________

d) **Do you see your baby during your work/school day to breastfeed him/her?**

- ☐0 No
- ☐1 Yes

e) **What does your baby usually eat/drink while you are working or at school?** [redacted]

- ☐1 Breast milk in a bottle or cup
- ☐2 Formula
- ☐3 Solid food/cereal
- ☐4 Breastfeed

21. **Since you have been breastfeeding, have you taken any <u>vitamins</u> or <u>supplements</u>?**

- ☐0 No [redacted]
- ☐1 Yes

a) **If Yes, please list:**
1- ____________________
2- ____________________
3- ____________________
4- ____________________
5- ____________________

b) **What effect did they have on your baby?** [redacted]

- ☐1 None
- ☐2 Sleepy
- ☐3 Agitated/irritable/crying
- ☐7 Other:
- ☐4 Diarrhea
- ☐5 Rash
- ☐6 Not sure

22. **Since you have been breastfeeding, have you used any <u>herbal teas</u> or <u>preparations</u>?**

- ☐0 No [redacted]
- ☐1 Yes

a) **If Yes, please list:**
1- ____________________
2- ____________________
3- ____________________
4- ____________________
5- ____________________

b) **What effect did they have on your baby?** [redacted]

- ☐1 None
- ☐2 Sleepy
- ☐3 Agitated/irritable/crying
- ☐7 Other:
- ☐4 Diarrhea
- ☐5 Rash
- ☐6 Not sure

23. **Since you have been breastfeeding, have you <u>stopped eating</u> any foods or drinks?**

☐0 No [redacted]
☐1 Yes

a) **If Yes, please list:**
1- ____________
2- ____________
3- ____________
4- ____________
5- ____________

b) **What effect did these foods or drinks have on your baby, before you stopped eating them? (check all that apply)**

☐1 None
☐2 Sleepy
☐3 Agitated/irritable/crying
☐4 Diarrhea
☐5 Rash
☐6 Not sure
☐7 Other: ____________

24. **Since you have been breastfeeding, have you <u>added</u> any foods to your diet?**

☐0 No [redacted]
☐1 Yes

a) **If Yes, please list:**
1- ____________
2- ____________
3- ____________
4- ____________
5- ____________

b) **What effect did the added foods have on your baby?**
[redacted]

☐1 None
☐2 Sleepy
☐3 Agitated/irritable/crying
☐4 Diarrhea
☐5 Rash
☐6 Not sure
☐7 Other:

25 **Since you have been breastfeeding, have you taken anything to <u>increase</u> your milk supply?**

☐0 No
☐1 Yes

a) **If Yes, did you use any of the following and did they seem to help?**
[redacted]

	Used	Helped: No	Helped: Yes
Fenugreek	☐1	☐0	☐1
Blessed Thistle Leaf	☐1	☐0	☐1
Beer or Wine	☐1	☐0	☐1
Mother's Milk Tea	☐1	☐0	☐1
Reglan/Metoclopromide	☐1	☐0	☐1
Other:	☐1	☐0	☐1

THANK YOU FOR YOUR TIME!!!

Please return your survey in the postage-paid envelope provided to:
University of Rochester
601 Elmwood Avenue
Box 324 – FYI Program
P.O. Box 23029
Rochester NY 14692-9804

APPENDIX E. FYI THREE-MONTH SURVEY

Today's Date: ____/____/2006 **Final follow-up: 3-6 months**

1. **Please answer the following questions about your hospital stay when your baby was born.**

   a) **Did the hospital staff give you printed information or a video about breastfeeding?**
   - ☐$_0$ No
   - ☐$_1$ Yes

   b) **How long did your baby *usually* stay in your room with you?**
   - ☐$_1$ Up to 8 hours per day
   - ☐$_2$ 8 hours or more, but less than 16 hours per day
   - ☐$_3$ 16 hours or more, but less than 23 hours per day
   - ☐$_4$ 23 hours or more per day

   c) **Would you have liked your baby to stay in your room with you less or more?**
   - ☐$_1$ Less
   - ☐$_2$ Just right
   - ☐$_3$ More

   d) **Was your baby taken out of your room for exams, tests, baths, etc.?**
   - ☐$_0$ No
   - ☐$_1$ Yes

   e) **Did you breastfeed your baby in the hospital?**
   - ☐$_0$ No
   - ☐$_1$ Yes

   f) **Did you breastfeed your baby in the first hour after your baby was born?**
   - ☐$_0$ No If No, why not? ______________________________
   - ☐$_1$ Yes

   g) **Did hospital staff help you learn how to breastfeed?**
   - ☐$_0$ No ☐$_2$ I didn't need any help
   - ☐$_1$ Yes

   h) **Was hospital staff helpful and encouraging with respect to breastfeeding?**
   - ☐$_0$ No
   - ☐$_1$ Yes

   i) **Did you feel pressured by the hospital staff to breastfeed your baby?**
   - ☐$_0$ No
   - ☐$_1$ Yes

   j) **Was your baby fed only breast milk during your hospital stay?**
   - ☐$_0$ No
   - ☐$_1$ Yes

k) **Did hospital staff tell you to breastfeed whenever your baby was hungry (or at least every 3 hours if your baby was sleepy)?**
- ☐ 0 No
- ☐ 1 Yes

l) **Did hospital staff give you a gift pack with formula?**
- ☐ 0 No
- ☐ 1 Yes

m) **Did hospital staff give you a telephone number to call for help with breastfeeding?**
- ☐ 0 No
- ☐ 1 Yes

n) **Did <u>hospital staff</u> give your baby a pacifier while in the hospital?**
- ☐ 0 No
- ☐ 1 Yes
- ☐ 2 Don't know

o) **Did <u>you</u> give your baby a pacifier in the hospital?**
- ☐ 0 No
- ☐ 1 Yes

p) **Did your baby stay with you during the day?**
- ☐ 0 No
- ☐ 1 Yes

q) **Did your baby stay with you at night?**
- ☐ 0 No
- ☐ 1 Yes, every night
- ☐ 2 Yes, except the first night

r) **Did you feel pressured to keep your baby in your room with you?**
- ☐ 0 No
- ☐ 1 Yes

s) **Did you go to a breastfeeding class while in the hospital?**
- ☐ 0 No
- ☐ 1 Yes

2. **Did you have any <u>breastfeeding problems in the hospital</u>?**
- ☐ 0 No [redacted]
- ☐ 1 Yes

a) **If YES, who helped you?** [redacted]
- ☐ 1 Nurse
- ☐ 2 Pediatrician
- ☐ 3 Obstetrician
- ☐ 4 Lactation Consultant
- ☐ 5 Family Member/Friend
- ☐ 6 Did not get help
- ☐ 7 Other: ____________________

3. **Has the lactation consultant from the hospital called you since you left the hospital to see if you had any breastfeeding questions?**
   - ☐0 No
   - ☐1 Yes

4. **Are you still breastfeeding?**
   - ☐0 No [redacted]
   - ☐1 Yes

   a) **If YES, are you currently breastfeeding exclusively (your baby gets nothing but breast milk)?**
      - ☐0 No [redacted]
      - ☐1 Yes [redacted]

5. **If you are no longer feeding *any* breast milk to your baby, what were your reasons for stopping? (**[redacted]
   - ☐1 My baby was having difficulty nursing
   - ☐2 Breast milk alone was not satisfying my baby
   - ☐3 My baby was not gaining enough weight
   - ☐4 My baby became sick and could not breastfeed
   - ☐5 My nipples were sore, cracked, or bleeding
   - ☐6 I was not producing enough milk
   - ☐7 I had too many other household duties
   - ☐8 I felt it was the right time to start weaning my baby
   - ☐9 I became sick and could not breastfeed
   - ☐10 I went back to work or school
   - ☐11 My husband or partner wanted me to stop breastfeeding
   - ☐12 I wanted or needed someone else to feed the baby
   - ☐13 Other: ________________________

6. **If you have stopped breastfeeding, how old was your baby when you stopped?**
   _______ # weeks

   a) What is the date that you last breastfed your baby?
      ______/______/2005

   b) What is the date that your baby last received any breast milk, if different from above date (6a)?
      ______/______/2005
      ☐ Not different from above date (6a)

7. **In general, how was your breastfeeding experience?**
   - ☐1 Very good
   - ☐2 Fairly good
   - ☐3 Not so good
   - ☐4 Bad
   - ☐5 Not sure

8. **How old was your baby the first time you gave him/her formula?**
   _______ # weeks ☐777 Baby hasn't received any formula

9. **How old was your baby the first time you gave him/her solid foods?**

_______ # weeks ☐777 Baby hasn't received any solid foods

If [redacted]

10. **If you are no longer using *only* breast milk to feed your baby, what were your reasons for adding other foods or liquids to your baby's diet?**

[redacted]

- ☐1 I am exclusively breastfeeding
- ☐2 My baby was having difficulty nursing
- ☐3 Breast milk alone was not satisfying my baby
- ☐4 My baby was not gaining enough weight
- ☐5 My baby became sick and could not breastfeed
- ☐6 My nipples were sore, cracked, or bleeding
- ☐7 I was not producing enough milk
- ☐8 I had too many other household duties
- ☐9 I felt it was the right time to start weaning my baby
- ☐10 I became sick and could not breastfeed
- ☐11 I went back to work or school
- ☐12 My husband or partner wanted me to stop breastfeeding
- ☐13 I wanted or needed someone else to feed the baby
- ☐14 Other: ______________________________

11. **In general, how has your breastfeeding experience been so far?**

- ☐1 Very good
- ☐2 Fairly good
- ☐3 Not so good
- ☐4 Bad
- ☐5 Not sure

12. **If you are breastfeeding, are you feeding your baby any <u>pumped breast milk</u>?**

- ☐0 No [redacted]
- ☐1 Yes

a) **How many times per day does your baby receive <u>pumped breast milk</u>?**

______ # times ☐1 Rare use (less than once per day)

b) **How does your baby get <u>pumped breast milk</u>?**

- ☐1 From a bottle
- ☐2 From an open cup
- ☐3 From a sippy cup
- ☐4 Other:

c) **Why do you give your baby <u>pumped breast milk</u>?** [redacted]

- ☐1 So someone else can feed him/her
- ☐2 So I can be sure baby will drink from a bottle
- ☐3 So I could go to work/school
- ☐4 For night time feedings
- ☐5 For when I have a baby sitter
- ☐6 For convenience
- ☐7 Other: ______________________________

13. **What are you currently feeding your baby?** ([redacted]

- ☐1 Breast milk
- ☐2 Formula
- ☐3 Water
- ☐4 Juice
- ☐5 Tea
- ☐6 Cereal
- ☐7 Other solid food

14. **How many times do you usually feed your infant each day?**

_______ # feedings

a) **How many feedings does your baby usually get breast milk?**

_______ # feedings

b) **How many feedings does your baby usually get formula?**

_______ # feedings

c) **How many feedings does your baby usually get other foods or liquids (including water)?**

_______ # feedings

15. **Does your baby drink anything from a bottle?**

- ☐0 No ([redacted]
- ☐1 Yes

a) **At what age (in weeks) did your baby first drink anything from a bottle (breast milk, formula, or other liquids)?**

_______ # weeks

b) **At what age (in weeks) did your baby first start getting a bottle on most days of the week?**

_______ # weeks

c) **When you give your baby a bottle, what is *usually* in it?** ([redacted]

- ☐1 Breast milk only
- ☐2 Formula only
- ☐3 Breast milk and formula mixed
- ☐4 Sometimes breast milk and sometimes formula
- ☐5 Other (water, juice, tea, etc.)

16. **If you are breastfeeding and your baby gets any formula, why do you give your baby formula?** ([redacted]

- ☐1 My baby does not get formula
- ☐2 So someone else can feed him/her
- ☐3 So I can be sure baby will drink from a bottle
- ☐4 So I could go to work/school
- ☐5 For night time feedings
- ☐6 For when I go out with baby
- ☐7 For when I go out without baby
- ☐8 For convenience
- ☐9 Other: ______________________________

17. **Have you had any problems with breastfeeding?**
    - ☐$_0$ No [redacted]
    - ☐$_1$ Yes

    a) **Have you had any of the following problems?** [redacted]

☐$_1$	Not enough milk	☐$_5$	Too much time
☐$_2$	Refusal to nurse	☐$_6$	Inconvenient
☐$_3$	Fussy baby	☐$_7$	Don't enjoy breastfeeding
☐$_4$	Sleepy baby	☐$_8$	Other: ____________________

    b) **Since your baby was born, have you had any of the following conditions? If YES, how many times?** [redacted]

	No	Yes	# Times
Sore/bleeding nipples	☐$_0$	☐$_1$	______
Engorged breasts	☐$_0$	☐$_1$	______
Mastitis/breast infection	☐$_0$	☐$_1$	______
Other: ______________	☐$_0$	☐$_1$	______

    1. **Did you receive any medical care for any of the above problems?**
       - ☐$_0$ No
       - ☐$_1$ Yes

    2. **Did you take any medications for any of the above problems?**
       - ☐$_0$ No [redacted]
       - ☐$_1$ Yes

       a) **If yes, please name the medications:**

       1- ______________ 4- ______________
       2- ______________ 5- ______________
       3- ______________ 6- ______________

18. **Have you called the hospital Lactation Consultant for help with breastfeeding since you left the hospital?**
    - ☐$_0$ No [redacted]
    - ☐$_1$ Yes

    a) **If YES, was she able to help you with your breastfeeding questions or problems?**
       - ☐$_0$ No
       - ☐$_1$ Yes

19. **Have you called anyone else for breastfeeding help or support (like La Leche League, your baby's doctor, WIC, etc.)?**
    - ☐$_0$ No
    - ☐$_1$ Yes

20. **Have you started working or going to school since your baby was born?**
    - ☐$_0$ No [redacted]
    - ☐$_1$ Yes

a) **If YES, how old was your baby when you returned to work or school?**
_______ **# weeks**

b) **On average, how many hours per week do you work or go to school?**
_______ **# hours**

c) **Who usually takes care of your baby while you work or go to school?**
([redacted]

☐1 Baby's father/My partner	☐6 Day care center
☐2 Baby's Grandmother	☐7 Work-site day care
☐3 Other relative	☐8 Take baby to work
☐4 Babysitter/Nanny	☐9 Other: ____________________
☐5 In-home day care	

d) **Do you see your baby during your work/school day to breastfeed him/her?**
☐0 No
☐1 Yes

e) **What does your baby usually eat/drink while you are working or at school?** ([redacted]

☐1 Breast milk in a bottle or cup	☐3 Solid food/cereal
☐2 Formula	☐4 Breastfeed

21. **Since you have been breastfeeding, have you taken any <u>vitamins</u> or <u>supplements</u>?**
☐0 No ([redacted]
☐1 Yes

a) **If Yes, please list:**
1- ____________________ 3- ____________________
2- ____________________ 4- ____________________
5- ____________________

b) **What effect did they have on your baby?** ([redacted]

☐1 None	☐4 Diarrhea
☐2 Sleepy	☐5 Rash
☐3 Agitated/irritable/crying	☐6 Not sure
☐7 Other:	

22. **Since you have been breastfeeding, have you used any <u>herbal teas</u> or <u>preparations</u>?**
☐0 No ([redacted]
☐1 Yes

a) **If Yes, please list:**
1- ____________________ 3- ____________________
2- ____________________ 4- ____________________
5- ____________________

b) **What effect did they have on your baby?** ([redacted]

☐1 None	☐4 Diarrhea
☐2 Sleepy	☐5 Rash
☐3 Agitated/irritable/crying	☐6 Not sure
☐7 Other:	

23. **Since you have been breastfeeding, have you stopped eating any foods or drinks?**

☐0 No (If NO, SKIP to question #24)
☐1 Yes

a) **If Yes, please list:**
1- ______
2- ______
3- ______
4- ______
5- ______

b) **What effect did these foods or drinks have on your baby, before you stopped eating them?** (check all that apply)

☐1 None
☐2 Sleepy
☐3 Agitated/irritable/crying
☐4 Diarrhea
☐5 Rash
☐6 Not sure
☐7 Other: ______

24. **Since you have been breastfeeding, have you added any foods to your diet?**

☐0 No (If NO, SKIP to question #25)
☐1 Yes

a) **If Yes, please list:**
1- ______
2- ______
3- ______
4- ______
5- ______

b) **What effect did the added foods have on your baby?** (check all that apply)

☐1 None
☐2 Sleepy
☐3 Agitated/irritable/crying
☐4 Diarrhea
☐5 Rash
☐6 Not sure
☐7 Other:

25 **Since you have been breastfeeding, have you taken anything to increase your milk supply?**

☐0 No
☐1 Yes

a) **If Yes, did you use any of the following and did they seem to help?** (check all that apply)

	Used	Helped No	Helped Yes
Fenugreek	☐1	☐0	☐1
Blessed Thistle Leaf	☐1	☐0	☐1
Beer or Wine	☐1	☐0	☐1
Mother's Milk Tea	☐1	☐0	☐1
Reglan/Metoclopromide	☐1	☐0	☐1
Other:	☐1	☐0	☐1

THANK YOU FOR YOUR TIME!!!

Please return your survey in the postage-paid envelope provided to:
**University of Rochester
601 Elmwood Avenue
Box 324 – FYI Program
P.O. Box 23029
Rochester NY 14692-9804**

APPENDIX F. FYI SIX-MONTH SURVEY

Today's Date: ____/____/2006 **Follow-up survey: 6 months**

1. **Are you still breastfeeding?**
   - ☐0 No [redacted]
   - ☐1 Yes

   a) **If YES, are you currently breastfeeding exclusively (your baby gets nothing but breast milk)?**
   - ☐0 No [redacted]
   - ☐1 Yes [redacted]

2. **If you are no longer feeding *any* breast milk to your baby, what were your reasons for stopping?** [redacted]
   - ☐1 My baby was having difficulty nursing
   - ☐2 Breast milk alone was not satisfying my baby
   - ☐3 My baby was not gaining enough weight
   - ☐4 My baby became sick and could not breastfeed
   - ☐5 My nipples were sore, cracked, or bleeding
   - ☐6 I was not producing enough milk
   - ☐7 I had too many other household duties
   - ☐8 I felt it was the right time to start weaning my baby
   - ☐9 I became sick and could not breastfeed
   - ☐10 I went back to work or school
   - ☐11 My husband or partner wanted me to stop breastfeeding
   - ☐12 I wanted or needed someone else to feed the baby
   - ☐13 Other: ____________________

3. **If you have stopped breastfeeding, how old was your baby when you stopped?**
   ______ # weeks

   a) What is the date your baby was last breastfed?
   ____/____/____

   b) What is the date that your baby last received any breast milk?
   ____/____/____ If different from above date (3a)
   ☐ Not different from above date (3a)

4. **In general, how was your breastfeeding experience?**
   - ☐1 Very good
   - ☐2 Fairly good
   - ☐3 Not so good
   - ☐4 Bad
   - ☐5 Not sure

5. **How old was your baby the first time you gave him/her formula?**
   ______ # weeks ☐77 Baby hasn't received any formula

6. **How old was your baby the first time you gave him/her solid foods?**
   ______ # weeks ☐77 Baby hasn't received any solid foods

If [redacted]

7. **If you are no longer using *only* breast milk to feed your baby, what were your reasons for adding other foods or liquids to your baby's diet?** [redacted]
   - ☐1 I am exclusively breastfeeding
   - ☐2 My baby was having difficulty nursing
   - ☐3 Breast milk alone was not satisfying my baby
   - ☐4 My baby was not gaining enough weight
   - ☐5 My baby became sick and could not breastfeed
   - ☐6 My nipples were sore, cracked, or bleeding
   - ☐7 I was not producing enough milk
   - ☐8 I had too many other household duties
   - ☐9 I felt it was the right time to start weaning my baby
   - ☐10 I became sick and could not breastfeed
   - ☐11 I went back to work or school
   - ☐12 My husband or partner wanted me to stop breastfeeding
   - ☐13 I wanted or needed someone else to feed the baby
   - ☐14 Other: ____________________

8. **In general, how has your breastfeeding experience been so far?**
   - ☐1 Very good
   - ☐2 Fairly good
   - ☐3 Not so good
   - ☐4 Bad
   - ☐5 Not sure

9. **If you are breastfeeding, are you feeding your baby any pumped breast milk?**
   - ☐0 No [redacted]
   - ☐1 Yes

   a) **How many times per day does your baby receive pumped breast milk?**
      - ________ # times
      - ☐1 Rare use (less than once per day)

   b) **How does your baby get pumped breast milk?**
      - ☐1 From a bottle
      - ☐2 From an open cup
      - ☐3 From a sippy cup
      - ☐4 Other:

   c) **Why do you give your baby pumped breast milk?** [redacted]
      - ☐1 So someone else can feed him/her
      - ☐2 So I can be sure baby will drink from a bottle
      - ☐3 So I could go to work/school
      - ☐4 For night time feedings
      - ☐5 For when I have a baby sitter
      - ☐6 For convenience
      - ☐7 Other: ____________________

10. **What are you currently feeding your baby? ([redacted]**

- ☐$_1$ Breast milk
- ☐$_2$ Formula
- ☐$_3$ Water
- ☐$_4$ Juice
- ☐$_5$ Tea
- ☐$_6$ Cereal
- ☐$_7$ Other solid food

11. **How many times do you usually feed your infant each day?**

   ________ **# feedings**

   a) **How many feedings does your baby usually get <u>breast milk</u>?**

      ________ **# feedings**

   b) **How many feedings does your baby usually get <u>formula</u>?**

      ________ **# feedings**

   c) **How many feedings does your baby usually get <u>other foods or liquids, including water</u>?**

      ________ **# feedings**

12. **Does your baby drink anything from a bottle?**

- ☐$_0$ No ([redacted]
- ☐$_1$ Yes

   a) **At what age (in weeks) did your baby first drink anything from a bottle (breast milk, formula, or other liquids)?**

      ________ **# weeks**

   b) **At what age (in weeks) did your baby first start getting a bottle on most days of the week?**

      ________ **# weeks**

   c) **When you give your baby a bottle, what is *usually* in it? ([redacted]**

   - ☐$_1$ Breast milk only
   - ☐$_2$ Formula only
   - ☐$_3$ Breast milk and formula mixed
   - ☐$_4$ Sometimes breast milk and sometimes formula
   - ☐$_5$ Other (water, juice, tea, etc.)

13. **If you are breastfeeding and your baby gets any <u>formula</u>, why do you give your baby formula? ([redacted]**

- ☐$_1$ My baby does not get formula
- ☐$_2$ So someone else can feed him/her
- ☐$_3$ So I can be sure baby will drink from a bottle
- ☐$_4$ So I could go to work/school
- ☐$_5$ For night time feedings
- ☐$_6$ For when I have a baby sitter
- ☐$_7$ For convenience
- ☐$_8$ Other: ______________________________

14. **Have you had any problems with breastfeeding?**
☐0 No **(If No, SKIP to question #15)**
☐1 Yes

a) **Have you had any of the following problems?** **(check all that apply)**

☐1	Not enough milk	☐5	Too much time
☐2	Refusal to nurse	☐6	Inconvenient
☐3	Fussy baby	☐7	Don't enjoy breastfeeding
☐4	Sleepy baby	☐8	Other: ______________

b) **In the past three months have you had any of the following conditions? If YES, how many times? (If None, SKIP to question #15)**

	No	Yes	# Times
Sore/bleeding nipples	☐0	☐1	________
Engorged breasts	☐0	☐1	________
Mastitis/breast infection	☐0	☐1	________
Other: ______________	☐0	☐1	________

1. **Did you receive any medical care for any of the above problems?**
☐0 No
☐1 Yes

2. **Did you take any medications for any of the above problems?**
☐0 No
☐1 Yes

a) **If yes, please name the medications:**
1- ______________ 4- ______________
2- ______________ 5- ______________
3- ______________ 6- ______________

15. **Have you called the hospital Lactation Consultant for help with breastfeeding since you left the hospital?**
☐0 No **(If No, SKIP to question #16)**
☐1 Yes

a) **If YES, was she able to help you with your breastfeeding questions or problems?**
☐0 No
☐1 Yes

16. **Have you called anyone else for breastfeeding help or support (like La Leche League, your baby's doctor, WIC, etc.)?**
☐0 No
☐1 Yes

17. **Have you started working or going to school since your baby was born?**
- ☐0 No (**[redacted]**
- ☐1 Yes

a) **If YES, how old was your baby when you returned to work or school?**
_______ # weeks

b) **On average, how many hours per week do you work or go to school?**
_______ # hours

c) **Who usually takes care of your baby while you work or go to school?**
([redacted]
- ☐1 Baby's father/My partner
- ☐2 Baby's Grandmother
- ☐3 Other relative
- ☐4 Babysitter/Nanny
- ☐5 In-home day care
- ☐6 Day care center
- ☐7 Work-site day care
- ☐8 Take baby to work
- ☐9 Other: ____________________

d) **Do you see your baby during your work/school day to breastfeed him/her?**
- ☐0 No
- ☐1 Yes

e) **What does your baby usually eat/drink while you are working or at school?** ([redacted]
- ☐1 Breast milk in a bottle or cup
- ☐2 Formula
- ☐3 Solid food/cereal
- ☐4 Breastfeed

18. **Since you have been breastfeeding, have you taken any <u>vitamins</u> or <u>supplements</u>?**
- ☐0 No [redacted]
- ☐1 Yes

a) **If Yes, please list:**

1- ____________________ 4- ____________________
2- ____________________ 5- ____________________
3- ____________________ 6- ____________________

b) **What effect did they have on your baby?** ([redacted]
- ☐1 None
- ☐2 Sleepy
- ☐3 Agitated/irritable/crying
- ☐4 Diarrhea
- ☐5 Rash
- ☐6 Not sure
- ☐7 Other: ____________________

19. **Since you have been breastfeeding, have you used any <u>herbal teas</u> or <u>preparations</u>?**
- ☐0 No [redacted]
- ☐1 Yes

a) **If Yes, please list:**

1- ____________ 4- ____________
2- ____________ 5- ____________
3- ____________ 6- ____________

b) **What effect did they have on your baby?** [redacted]

- ☐1 None
- ☐2 Sleepy
- ☐3 Agitated/irritable/crying
- ☐4 Diarrhea
- ☐5 Rash
- ☐6 Not sure
- ☐7 Other: ____________

20. **Since you have been breastfeeding, have you <u>stopped eating</u> any foods or drinks?**
- ☐0 No [redacted]
- ☐1 Yes

a) **If Yes, please list:**

1- ____________ 4- ____________
2- ____________ 5- ____________
3- ____________ 6- ____________

b) **What effect did these foods or drinks have on your baby, before you stopped eating them? (check all that apply)**

- ☐1 None
- ☐2 Sleepy
- ☐3 Agitated/irritable/crying
- ☐4 Diarrhea
- ☐5 Rash
- ☐7 Not sure
- ☐6 Other: ____________

21. **Since you have been breastfeeding, have you <u>added</u> any foods to your diet?**
- ☐0 No [redacted]
- ☐1 Yes

a) **If Yes, please list:**

1- ____________ 4- ____________
2- ____________ 5- ____________
3- ____________ 6- ____________

b) **What effect did the added foods have on your baby?** [redacted]

- ☐1 None
- ☐2 Sleepy
- ☐3 Agitated/irritable/crying
- ☐4 Diarrhea
- ☐5 Rash
- ☐6 Not sure
- ☐7 Other: ____________

22. **Since you have been breastfeeding, have you taken anything to <u>increase</u> your milk supply?**

☐0 No
☐1 Yes

a) **If Yes, did you use any of the following and did they seem to help? (check all that apply)**

	<u>Used</u>	<u>Helped</u> No	Yes
Fenugreek	☐	☐0	☐1
Blessed Thistle Leaf	☐	☐0	☐1
Beer or Wine	☐	☐0	☐1
Mother's Milk Tea	☐	☐0	☐1
Reglan/Metoclopromide	☐	☐0	☐1
Other:	☐	☐0	☐1

THANK YOU FOR YOUR TIME!!!

Please return your survey in the postage-paid envelope provided to:
University of Rochester
601 Elmwood Avenue
Box 324 – FYI Program
P.O. Box 23029
Rochester NY 14692-9604

APPENDIX G. FLYERS

IRB-University of Rochester-Approved
RSRB No. 11612
Expires February 3, 2006

F Y I

Feeding Your Infant Program

Congratulations on your new baby!

Rochester General Hospital is participating in *FYI: Feeding Your Infant*, a project to learn more about mothers' experiences with feeding their babies in the hospital and at home.

Before you go home, an FYI staff member will stop in to talk with you about being part of this project.

If you do NOT want to talk with an FYI staff member to hear more about this project, please fill out this form and give it to your nurse or someone at the front desk. Thank you.

Your name: ______________________________________ (please print)

Room number: ______________ (if known)

Baby's birth date: _____/_____/ 2005 (if known)

[redacted]

Optional:

This information will only be used to determine the number of women breastfeeding and formula feeding; your name will not be used.

How do you plan to feed your baby?

- ☐1 Breast milk only
- ☐2 Breast and formula feed
- ☐3 Breastfeed now, formula feed later
- ☐4 Breastfeed now, pumped breast milk later
- ☐5 Formula only
- ☐6 Undecided

FYI is coordinated by the University of Rochester.

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Feeding Your Infant Program

Congratulations on your new baby!

Highland Hospital is participating in *FYI: Feeding Your Infant*, a project to learn more about mothers' experiences with feeding their babies in the hospital and at home.

Before you go home, an FYI staff member will stop in to talk with you about being part of this project.

If you do NOT want to talk with an FYI staff member to hear more about this project, please fill out this form and give it to your nurse or someone at the front desk. Thank you.

Your name: ______________________________________ **(please print)**

Room number:______________ **(if known)**

Baby's birth date: _____/_____/ 2005 **(if known)**

[redacted]

Optional:

This information will only be used to determine the number of women breastfeeding and formula feeding; your name will not be used.

How do you plan to feed your baby?

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FYI is coordinated by the University of Rochester.

APPENDIX H. SCRIPT FOR APPROACHING MOTHERS

Hello, my name is...

I am from the University of Rochester with the *FYI: Feeding Your Infant* study. We are interested in learning from women about their infant feeding experiences.

I need to ask if you are at least 18 years old?

If NO: Thank you for your time, however you must be at least eighteen years old in order to participate.

If YES: What feeding method have you decided on for your new baby?

If BREASTFEEDING:

– **Cost effectiveness:** We are interested in information about your experience with feeding your baby during the first six months including your costs, such as the time it takes to feed your baby and how often your baby goes to the doctor. To participate you would sign a consent form and then answer some questions today about your decision to breastfeed. This should take about 15-20 minutes. Over the next six months you will receive a brief survey each month in the mail to send back to us – each will taking about 10 minutes to complete. In addition, you will receive another brief survey in about two weeks to complete and then in three months and six months. Again, each survey takes about ten minutes to complete.

– **If quota has been met or woman feels like it's too much work:** We are interested in information about your experience with feeding your baby during the first six months. If you choose to participate you would sign a consent form and then answer some questions today about your decision to breastfeed. This should take about 10-15 minutes. Then in about two weeks you will receive a survey in the mail to complete and return to us. You will receive two similar surveys in three months and again in six months. Each survey takes about ten minutes to complete.

If FORMULA FEEDING:

– **Cost effectiveness:** We are interested in information about the costs of feeding. We are also interested in finding out the time it takes to feed your baby and how much your baby goes to the doctor during the first six months after you leave the hospital. If you choose to participate you would sign a consent form and then answer some questions today about your decision to formula feed. This should take about 10-15 minutes. Then every month for six months you will receive a survey in the mail to complete and return to us. Each survey takes about ten minutes to complete.

– **If quota has been met:** I really appreciate your willingness to participate in this study, however I already have as many women as I need who are formula feeding. Thank you for your time.

Each time you mail back a survey, you will be entered into a raffle for a gift certificate worth $25-50 (the value increases the longer you are in the study).

doctor's office will be told whether you are in the study or what your answers are.

Are you interested in participating in the study?...

APPENDIX I. WRITTEN CONSENT

Consent Form

Study Title: Baby-Friendly's impact on duration and exclusivity
Principal Investigators: Ann Dozier, RN, PhD
Cindy Howard, MD

Introduction:
This consent form describes a research study and program evaluation and what you may expect if you decide to participate. You are encouraged to read this consent form carefully and to ask the person who presents it any further questions you may have before making your decision whether or not to participate. This study is being conducted by Ann Dozier of the University of Rochester's Department of Community and Preventive Medicine and Cindy Howard from the Department of Pediatrics.

You are being asked to participate in this study because you have chosen to breastfeed your new baby.

Purpose of Study
We are interested in how long women continue breastfeeding after they leave the hospital and what may influence their interest and ability to continue breastfeeding.

Description of Study Procedures
If you agree to participate you will be asked to 1) answer questions *today* about your reasons for breastfeeding and your past experiences with infant feeding and 2) over the next six months, answer three mailed surveys about your experiences with breastfeeding your new baby including use of formula and why you did or did not continued. Today's interview will be about 15 minutes. Each survey will take about 15 minutes to complete.

We are also seeking your permission to obtain information from your hospital medical record for this delivery that of your new baby's. In addition we are seeking your permission to obtain the data on your infant's birth certificate. We are interested in access to the birth certificate since it has already been obtained from the above

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records and will reduce the amount of time we need to spend looking for certain pieces of information in these records.

Number of Subjects

We anticipate that between 350 and 400 women from this hospital will participate and another similar number from another area hospital.

Risks of Participation

The risks to participating are minimal. You are not being asked to do anything different than what you would normally do to feed or care for your infant. It is possible that some of the questions may make you uncomfortable or make you feel bad about something you did or did not do, but this is not likely. You may choose to not answer any of the questions. You may choose to drop out of the study at any time.

Benefits of Participation

There are no direct benefits to you or your infant from participating in this study. Through this study we hope to find out how to enhance women's breastfeeding experience and convince more women to breastfeed their newborn babies.

Payments

Each time you return a completed survey, you will be entered into a raffle for a gift certificate. For the first survey the gift certificate will be worth $25; the second one will be worth $35; and the third one will be worth $50. There is a 1 in 100 chance of being selected for each survey, or a 1/33 chance of winning a gift certificate if you complete all three surveys.

Sponsor Support

The University of Rochester is receiving payment from the Centers for Disease Control for conducting this study.

Confidentiality of Records and HIPAA Authorization

While we will make every effort to keep information we learn about you private, this cannot be guaranteed. Other people may need to see the information. While they normally protect the privacy of the information, they may not be required to do so by law. Results of the research may be presented at meetings or in publications, but your name will not be used. The federal Health Insurance Portability and Accountability Act (HIPAA) requires us to get your permission to use health information about you that we either create or use as part of the research. This permission is called an Authorization. We will use your answers to our interview and survey questions and information from your medical records. We will use your health information in combination with that of other subjects to evaluate the breastfeeding program at this hospital and compare it to another area hospital. Health information is used to report results of research to sponsors and federal regulators. It may be audited to make sure we are following regulations,

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policies and study plans. URMC/Strong Health policies let you see and copy health information after the study ends, but not until the study is completed. If you have never received a copy of the HIPAA Notice of Privacy Practices for this hospital, please ask the investigator for one. To meet regulations or for reasons related to this program evaluation, the study investigator may share a copy of this consent form and records that identify you with the following people: University of Rochester and the Centers for Disease Control

If you decide to take part, your Authorization for this study will not expire unless you cancel (revoke) it. The information collected during your participation will be kept indefinitely. You can always cancel this Authorization by writing to the study investigator. If you cancel your Authorization, you will also be removed from the study. However, standard medical care and any other benefits to which you are otherwise entitled will not be affected. Canceling your Authorization only affects uses and sharing of information after the study investigator gets your written request. Information gathered before then may need to be used and given to others.
As stated in the section on Voluntary Participation below, you can also refuse to sign this consent/Authorization and not be part of the study. You can also tell us you want to leave the study at any time without canceling the Authorization. By signing this consent form, you give us permission to use and/or share your health information as stated above.

Contact Persons
For more information concerning this study, please contact: Ann Dozier at 585-273-2592.

If you have any questions about your rights as a study subject, you may contact the Human Subjects Protection Specialist at the University of Rochester Research Subjects Review Board, Box 315, 601 Elmwood Avenue, Rochester, NY 14642-8315, Telephone (585) 276-0005, for long-distance you may call toll-free, (877) 449-4441.

Voluntary Participation
Participation in this study is voluntary. You are free not to participate or to withdraw at any time, for whatever reason, without risking loss of present or future care you would otherwise expect to receive. In the event that you do withdraw from this study, the information you have already provided will be kept in a confidential manner.

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Signature/Dates

I have read (or have had read to me) the contents of this consent form and have been encouraged to ask questions. I have received answers to my questions. I agree to participate in this study. I have received (or will receive) a signed copy of this form for my records and future reference.

Study Subject: ______________________________ Print Name

Study Subject: ______________________________ Signature

______________________________ Date

Person Obtaining Consent

I have read this form to the subject or the subject has read this form. I will provide the subject with a signed copy of this consent form. An explanation of the research was given and questions from the subject were solicited and answered to the subject's satisfaction. In my judgment, the subject has demonstrated comprehension of the information.

______________________________ Print Name and Title

______________________________ Signature

______________________________ Date

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APPENDIX J. DEMOGRAPHIC QUESTIONS FOR SURVEYS

Today's Date: ____/____/2005 **Contact Information**

1. **Maternal & Infant Identification:**

    a) **Your Name:**
    First: ______________________
    Last: ______________________
    Maiden: ______________________

    b) **Your Birth Date:**
    ____/____/____

    c) **Your Social Security Number: (last 4 digits)**
    ____

    d) **Your Medical Record Number:**
    ____

    e) **Baby's Name:**
    First: ______________________
    Last: ______________________

    f) **Baby's Birth Date:**
    ____/____/2005

    g) **Baby's Medical Record Number:**
    ____

2. **What is your race or ethnicity?**
    ____

3. **What is your marital status?**
    ☐1 Single ☐4 Divorced
    ☐2 Engaged ☐5 Separated
    ☐3 Married ☐6 Widowed

4. **Do you live with the baby's father?**
    ☐0 No
    ☐1 Yes

5. **Who else lives with you?**
    ____
    ____
    ____

6. **How old are you?**
    ______ years

7. **How old is the baby's father?**
    ______ years

8. **How many years of school have you finished?**
    ______ years

9. **How many years of school has the baby's father finished?**
_______ years

The following information is so we can contact you for the rest of the surveys. We will first mail them. If you do not return them within two weeks, we will try to call you. If you have moved, we will try to contact you through one of the other names you give us.

10. **Would you prefer that we call you for the follow-up surveys, instead of mailing them?**
☐0 No **(If No, SKIP to question #11)**
☐1 Yes

a) **If YES, what language are you more comfortable with?**
☐1 English
☐2 Spanish

11. **Your contact information:**

a) **Phone number (at home):**
( )- -

b) **Cell phone number:**
( )- -

c) **Other phone number:**
( )- - **Extension:** _______

d) **E-mail Address:**
____

e) **Address:**
House # & Street _______________ Apt # _______
City & Zip Code _______________

f) **Will you be moving in the next 6 months?**
☐0 No **(If NO, skip to question #12)**
☐1 Yes

g) **If Yes, when will you be moving?**
/ /2005

h) **What is your new address and phone number (if known)?**
House # & Street _______________ Apt # _______
City & Zip Code _______________
( )- -

12. **Relative's contact information:**

a) **Name of a Relative who will know how to reach you:**
First: _______________
Last: _______________
Relationship: _______________

b) **Phone number (at home):**
( ) - - ____________

c) **Cell phone number:**
( ) - - ____________

d) **Other phone number:**
( ) - - ____________ **Extension:** ____________

e) **Address:**
House # & Street ____________________ Apt. # ____
City & Zip Code ____________________

13. **Friend's contact information:**

a) **Name of a Friend who will know how to reach you:**
First: ____________
Last: ____________

b) **Phone Number (at home):**
( ) - - ____________

c) **Cell phone number:**
( ) - - ____________

d) **Other phone number:**
( ) - - ____________ **Extension:** ____________

e) **Address:**
House # & Street ____________________ Apt. # ____
City & Zip Code ____________________

14. **Can we contact your baby's pediatrician for a current address and phone number if we cannot locate you through any of the above contacts?**
☐0 No
☐1 Yes

a) **IF Yes, Name of Pediatrician**
First: ____________
Last: ____________

b) **Pediatrician's Practice Name**
____

c) **Phone Number:** (If known)
( ) - - ____________

d) **Address:**
(street) ____________________
(city & zip) ____________________