

BREASTFEEDING KNOWLEDGE, AND ATTITUDES, BELIEFS, AND
INTENTIONS REGARDING BREASTFEEDING IN THE WORKPLACE
AMONG STUDENTS AND PROFESSIONALS IN HEALTH-RELATED
FIELDS

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Abstract

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BREASTFEEDING KNOWLEDGE, AND ATTITUDES, BELIEFS, AND INTENTIONS REGARDING BREASTFEEDING IN THE WORKPLACE AMONG STUDENTS AND PROFESSIONALS IN HEALTH-RELATED FIELDS

(Under the direction of SHARON M. NICKOLS-RICHARDSON)

Effective educational efforts require knowledgeable health professionals to promote breastfeeding and instigate changes in individual behavior. This research was conducted to assess breastfeeding knowledge, and attitudes, beliefs, and intentions among students and professionals in health-related fields. A 5-year prospective study was conducted to investigate breastfeeding knowledge, and attitudes, beliefs, and intentions regarding breastfeeding in the workplace among nutrition students ($n=69$) while in school and later while in the workplace. A 47-item questionnaire was mailed to participants to survey knowledge, and attitudes, beliefs, and intentions related to breastfeeding in the workplace along with demographic information. From baseline to follow-up, nutrition students had a significant increase in breastfeeding knowledge ($P \leq 0.001$), and change in attitudes ($P \leq 0.01$) and change in intentions ($P \leq 0.02$) regarding breastfeeding in the workplace. Sources of breastfeeding information were predictors of attitudes and intentions regarding breastfeeding in the workplace. In a separate study, a cross-sectional comparison of nutrition students ($n=270$) and non-nutrition students ($n=271$) at Virginia Tech demonstrated that nutrition students had significantly higher scores on breastfeeding knowledge, and attitudes, beliefs, and intentions regarding breastfeeding in the workplace scales (all $P \leq 0.001$) compared to non-nutrition students. The 47-item questionnaire was also used in this investigation with junior, senior, and graduate students enrolled at Virginia Tech in spring of 20004. In both nutrition and non-nutrition students, attitudes and beliefs were significant predictors (both $P \leq 0.001$) of intentions regarding breastfeeding in the workplace. In a final study, a cross-sectional evaluation of the Caribbean Association of Home Economics (CAHE) ($n=71$) revealed that respondents had mean (\pm SD) scores of 5.76 ± 1.34 for breastfeeding knowledge, 3.67 ± 0.50 for attitudes, and 4.23 ± 0.68 for beliefs related to breastfeeding in the workplace. Based on the 35-item survey, attitudes regarding breastfeeding in the workplace were positive predictors of beliefs ($P \leq 0.001$). Overall, nutrition students, nutrition graduates, and

CAHE members are knowledgeable about breastfeeding and possess positive attitudes and intentions regarding breastfeeding in the workplace. Attitudes regarding breastfeeding in the workplace are critical to intended behaviors. Nutrition program graduates may be effective educators of and advocates for breastfeeding and for breaking barriers to breastfeeding in the workplace.

DEDICATION

This dissertation is dedicated to my mother, who is watching over me from heaven and my dad, the guiding force in my life. Nothing would have been possible without your blessings. I love you.

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CHAPTER I

INTRODUCTION

The benefits of breastfeeding for mothers and infants have been widely recognized and researched. Studies have shown that breastfeeding is superior to infant formula feeding because of its protective properties against illness, in addition to its nutritional advantages (Goldman et al., 1998). Considering the extensive benefits of breastfeeding, the World Health Organization and the American Dietetic Association recommend exclusive breastfeeding of infants for the first six months and continued breastfeeding with complementary foods up to 12 months of age (ADA Reports, 2001). Despite widespread efforts to encourage breastfeeding, the rates in the United States (U.S.) have remained low (Pugh et al., 2002).

Studies of non-pregnant high school students suggest that attitudes toward infant feeding begin to form well before pregnancy (Weimann et al., 1998; Pascoe et al., 2002). Previous research has shown that maternal attitudes toward breastfeeding and perceptions of infant health benefits of breastfeeding influence the decision to breastfeed (Forste et al., 2001; Kieffer et al., 1997; Pascoe et al., 2002). Many demographic factors such as maternal age, marital status, education, race, socioeconomic status, cultural factors, parity, number of children at home, and social support have been shown to potentially influence a woman's decision to breastfeed (Bass & Groer, 1997; Goksen et al., 2002; Li et al., 2002; Scott and Binns, 1999). Along with a number of demographic factors, poor or negative attitudes toward breastfeeding have been shown to be barriers to initiating and sustaining breastfeeding (Bass & Groer, 1997; Dennis, 2002). Previous studies have shown that mothers who do not breastfeed or individuals who do not support breastfeeding have negative attitudes towards breastfeeding (Arora et al., 2000; Brown et al., 2001; Forste et al., 2001; Springer et al., 1999; Weimann et al., 1998; Duckett et al., 1998).

Research shows that mothers who intend to work post-partum are less likely to initiate and sustain breastfeeding. According to the Ross Mother's Survey, only 22% of women employed full-time breastfed their infants compared to 35.4% of mothers who were not

employed (Libbus and Bullock, 2002). Planning to be employed post-partum or being employed full-time decreased breastfeeding initiation and duration (Frank, 1998), while working part-time increased breastfeeding initiation and duration as compared to working full-time (Auerbach and Guss, 1984; Fein and Roe, 1998). Other studies have also shown a competition between breastfeeding and work. In general, if a mother decides to return to work within six weeks postpartum, she is less likely to initiate breastfeeding (Meek, 2001; Roe et al., 1999; Scott and Binns, 1999).

The decline in the practice of breastfeeding, which started in developed countries like the U.S., has been observed in developing countries as well (Galler et al., 2001). This decrease in breastfeeding rates around the world has led to serious implications for infant health in developing countries, including infants in the Caribbean (Amador et al., 1994). The decline in exclusive breastfeeding (EBF) has led to an increase in the prevalence of protein energy malnutrition (PEM) in Caribbean countries. Studies have shown that although high initiation rates of breastfeeding in the Caribbean exist, the prevalence and duration of EBF is very low (Scarlett et al., 1996). Qualitative assessments of Caribbean mother's perceptions, attitudes, and values attached to food items show that infant and child feeding practices vary considerably and that a mother's attitudes toward breastfeeding are strongly influenced by her female role models, including mother, mother-in-law, and grandmother (Chambers, 1997).

Because the decision to breastfeed is often made long before a woman becomes pregnant, breastfeeding promotion programs should focus on educating women during their preconceptual years. In order to facilitate positive attitudinal changes in individuals, health care professionals with adequate knowledge and positive attitudes about breastfeeding are critical. Although students majoring in health-related fields who receive nutrition education, including optimum infant feeding methods, are considered future role models or advocates of breastfeeding, there is a paucity of research that explores or assesses their breastfeeding knowledge, attitudes, and beliefs in these students. For example, students, majoring in nutrition and family and consumer sciences (a.k.a., home economics) in their roles as community nutritionists, dietitians, lactation consultants, peer counselors, teachers, and mothers can play very important roles as advocates for breastfeeding. Provided that they have adequate knowledge and positive attitudes about breastfeeding, they can

influence cultural beliefs and social norms to support breastfeeding. A number of studies have been conducted to assess breastfeeding practices throughout the world, but there is a lack of research that adequately assesses breastfeeding knowledge, attitudes, and intentions of health care professionals working in developed and developing countries. Gaining an international perspective on how health professionals in other countries view breastfeeding will provide insight into some of the factors influencing breastfeeding rates, in addition to breastfeeding education. This study will provide information regarding how nutrition majors, in the U.S., view breastfeeding while they are in school and later in their professional roles. Home economics graduates, in the Caribbean, can play an important role as breastfeeding educators and promoters; yet, it is unknown how these graduates view breastfeeding. This study will assess knowledge, attitudes, and intentions regarding breastfeeding among home economics (a.k.a., family and consumer sciences) graduates working in the Caribbean. It is very important to identify and address some of the assumptions and attitudes of these future health care professionals to ensure optimal infant nutrition.

Thus, the purpose of this study was to investigate breastfeeding knowledge, attitudes, and behaviors of students and graduates in the health sciences areas. The specific aims of the study were to: (a) assess knowledge, attitudes, and intentions regarding breastfeeding in nutrition students; (b) evaluate knowledge, attitudes, and intentions regarding breastfeeding in nutrition graduates; (c) investigate knowledge, attitudes, and intentions regarding breastfeeding in non-nutrition students; (d) compare knowledge, attitudes, and intentions regarding breastfeeding among nutrition students, nutrition graduates and non-nutrition students; (e) assess knowledge, attitudes, and intentions regarding breastfeeding in home economics graduates working in the Caribbean; and (f) compare knowledge, attitudes, and intentions regarding breastfeeding between nutrition graduates working in the U.S. and home economics graduates working in the Caribbean.

The first study found that nutrition students had a significant increase in breastfeeding knowledge and change in attitudes and intentions regarding breastfeeding in the workplace over time. Full-time employment did not negatively influence nutrition students' attitudes and intentions regarding breastfeeding in the workplace. Therefore, nutrition students retain their breastfeeding knowledge, positive attitudes and intentions regarding breastfeeding in the workplace even after they graduate. They are also likely to

breastfeed in the workplace (Chapter 3). Nutrition students had significantly higher scores on breastfeeding knowledge, positive attitudes, beliefs and intentions regarding breastfeeding in the workplace compared to non-nutrition students (Chapter 4). Mother's age, employment status, education, and number of children were not associated with any measure of breastfeeding in the workplace for member of the Caribbean Association of Home Economics (CAHE) (Chapter 5). In all study participants, (nutrition and non-nutrition students, nutrition graduates, and CAHE members) attitudes were positive predictors of beliefs and intentions regarding breastfeeding in the workplace. This research emphasizes the importance of nutrition education and knowledgeable professionals to facilitate positive attitudinal changes in individuals (Chapters 3, 4, and 5) with suggestions for future research (Chapter 6).

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CHAPTER II

REVIEW OF LITERATURE

The benefits of breastfeeding for mothers and infants have been widely recognized and researched. Studies have shown that breastfeeding is superior to infant formula feeding because of its protective properties against illness, in addition to its nutritional advantages (Goldman et al., 1998). Recognizing the extensive benefits of breastfeeding, the World Health Organization (WHO) and the American Dietetic Association (ADA) recommend exclusive breastfeeding (EBF) of infants for the first six months and continued breastfeeding with complementary foods up to 12 months of age (AAP Reports, 1997; ADA Reports, 2001).

Breastfeeding initiation and duration

According to the United States (U.S.) Department of Health and Human Services, in the year 2000, the breastfeeding initiation rate was 68.4% (ADA Reports, 2001). However, during the first 4-8 weeks postpartum, the rate of breastfeeding rapidly declines (Dennis, 2002b). Despite widespread efforts to encourage breastfeeding, the rate in the United States (U.S.) remains low (Pugh et al., 2002). Although research shows that breastfeeding has many benefits to the infant and the mother, only 31.4% of mothers in the U.S. continue to breastfeed at six months of age, and by 12 months, the rate drops to 17.6% (ADA Reports, 2001).

Results of the Third National Health and Nutrition Examination Survey (phase II, 1991-1994) revealed that of the 8,765 children younger than six years of age, approximately 47% were exclusively breastfed at seven days, and 32% at two months of age (Li et al., 2002b). Consistent with the findings from a number of studies, EBF was least common among minority mothers younger than 20 years of age, mothers with low education or income, overweight or obese, who smoked during pregnancy, and had low-birth-weight or premature babies (Li et al., 2002b). In addition, the survey found that although the breastfeeding initiation rate met the Healthy People 2010 goal, the breastfeeding rate was far below its goal of 50% at six months and 25% at 12 months (ADA Reports, 2001; Li et al., 2002b). The breastfeeding rate in African-American women was even less, at 19% at six months postpartum (Asch-Goodkin, 2001; Bonuck et al., 2002). Similar breastfeeding rates

were seen in the United Kingdom (U.K.), with only 69% of mothers initiating breastfeeding and 28% of mothers breastfeeding their infants at six months (Brooker, 2002)

Benefits of breastfeeding

Various studies have shown that breastfeeding has psychological, nutritional, and immunological benefits for the infant in addition to maternal and economic benefits (AAP Reports, 1997).

Health benefits for the infant

Physiological and cognitive development

Research shows that EBF for up to six months is associated with increased weight and length gains. In an effort to increase global breastfeeding rates, the WHO and the United Nations Children's Fund (UNICEF) launched the Baby-Friendly Hospital Initiative (BFHI) in 1991. This initiative is comprised of ten steps to successful breastfeeding with the aim of providing a health care environment for infants where breastfeeding is the norm (Martens et al., 2000). Maternity care facilities must implement each of the ten steps to earn the designation of "baby-friendly" hospital. Some of the steps of the BFHI include: "train all health care staff in skills necessary to implement the baby friendly policy; help mothers initiate breastfeeding within 30 minutes of delivery; give newborn infants no food or drink other than breastmilk, unless medically indicated; practice rooming-in by allowing mothers and infants to remain together 24-hours-a-day;" etc. (p.95, DiGirolamo, 2001). Studies report that, "as of October 2000, only 27 hospitals had actually completed the process of becoming designated as baby friendly" (p.95, DiGirolamo, 2001). In order to assess the effects of the BFHI on breastfeeding rates and infant growth, 17 infants were followed for 12 months, and their weights and heights were measured at 1, 2, 3, 6, 9, and 12 months. Infants in the experimental group weighed more than the control group at one and three months, and a similar trend was observed for gain in length. The authors concluded that EBF "accelerates weight and length gain in the first few months" (p.346, Kramer et al., 2002). However, this

acceleration was not seen at 12 months (Cahill and Wagner, 2002b; Kramer et al., 2002). A positive relationship was observed between infant growth rate and fat, lactose, protein, and energy content of breastmilk during the first six months of life in a separate study (Mitoulas et al., 2002). Breastfed infants have slower rates of gastric filling and faster rates of gastric emptying, which may contribute to growth rate (Heinig and Dewey, 1996).

Results of two randomized studies in Honduras showed that EBF for 4 versus 6 months resulted in earlier development of certain milestones by the infants (Dewey et al., 2001). Infants exclusively breastfed for six months crawled and walked sooner, compared to infants who were exclusively breastfed for only four months. Similar results were reported in another study conducted to explore the relationship between breastfeeding and growth. One hundred eighty-five Mexican children were followed from birth to 20 months. Exclusively or predominantly breastfed infants, for at least four months, had significantly ($P=0.04$) larger ponderal index increments compared to children who were not. Among infants in a lower socioeconomic status (SES) group, those who were fully breastfed for at least four months had larger length increments (0.59 cm) compared to children who were not. However, these differences in ponderal index and length were not significant in infants between six and 20 months of age. Investigators concluded that EBF may have more benefits to the infant, particularly during the early months of infancy (Eckhardt et al., 2001). In western Kenya, continued breastfeeding during the second year of life was positively associated with growth in a cohort of 264 children, but it was also seen that linear growth of these children was hindered by poor sanitation (Onyango et al., 1999). A study showed that prolonged breastfeeding (>24months) was positively associated with linear growth during the second and third year of life in 443 African toddlers (Simondon et al., 2001). Several observational studies have also found that breastmilk keeps the infant adequately hydrated, even in tropical settings, such that additional fluids, including water, tea, and other liquids are not required by the infant when breastfed (Black and Victora, 2002).

In addition to physiological benefits, a number of studies have shown that breastfeeding is associated with positive effects on neurodevelopment. These advantageous effects have been attributed to the presence of long chain polyunsaturated fatty acids in human milk. The fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), present in human milk may be responsible for advanced neurodevelopment (ADA Reports,

2001). Higher erythrocyte DHA concentration and better visual function was observed in full-term breastfed infants compared to formula-fed infants (Heinig and Dewey, 1996). A meta-analysis of 20 studies suggested that breastfeeding, compared to human milk substitute feeding, was associated with significantly higher cognitive development scores in infants (Anderson et al., 1999). In order to examine the association between breastfeeding and developmental milestones, 1,656 infants were followed for eight months. Milestones included fine motor skills, general motor skills, and language development. Results showed that increased duration of breastfeeding was associated with increased mastery of the milestones, and the authors concluded that breastfeeding benefited neurodevelopment (Vestergaard et al., 1999). In a separate study, infants who were exclusively breastfed for at least three weeks had fewer neurological abnormalities at nine years of age compared to infants who were not breastfed (Heinig and Dewey, 1996).

Nutritional benefits

The American Academy of Pediatrics (AAP) states that “the breastfed infant is the reference or normative model against which all alternative feeding methods must be measured with regard to growth, health, development and all other short and long term outcomes” (p.1035, AAP Reports, 1997). Human milk is ideal for infant growth and development. The composition of breastmilk changes throughout the lactation period according to each infant’s requirement and has an appropriate balance of nutrients that are easily digested and bioavailable (Dewey, 2000). Studies have shown that breastmilk has low concentrations of the amino acids, methionine, phenylalanine, and tyrosine, and high levels of cystine and taurine. This composition of breastmilk prevents central nervous system damage in infants and aids in neurodevelopment (Picciano, 2001). According to the ADA, breastmilk not only provides energy but also contains enzymes such as lipoprotein lipase, pancreatic lipase, and amylase, which aid in the digestion of nutrients. Breastmilk also provides fat and fat- and water-soluble vitamins, and minerals contained in breastmilk are more bioavailable compared to infant formula and are present in required quantities for the infant (ADA Reports, 1997; Cahill and Wagner, 2002b).

On average, breastmilk has been shown to “provide 375 and 500 kcal/d at 6 and 11 months” respectively (Dewey, 2000). Complementary feeding of breastfed infants is necessary to promote optimal growth and development during the first few years of life, but studies have shown that EBF for six months provides adequate nutrition for normal growth of the infant up to six months of age (Dewey, 2001b). The relatively low content of protein and sodium in human milk places less load on the immature kidney of the infant (ADA Reports, 2001). With respect to protein, human milk contains a high ratio of whey to casein, which is easily digestible. Nonlactose carbohydrate has been shown to play a role in an infant’s ability to resist infections, and fatty acids are essential for brain development. A number of studies have shown that breastfed infants gain weight rapidly during the first 2-3 months of life, followed by a relatively slower growth rate compared to formula-fed infants. Studies show that breastfed infants “self regulate their energy requirement” (p. 93, Dewey, 2001a) by maintaining a lower body temperature and metabolic rate than formula-fed infants (Dewey, 2001a; Eckhardt et al., 2001).

Immunological benefits and reduced infant morbidity

A dose-response relationship appears to exist between breastfeeding and infant immune function. For example, the more breastmilk that an infant receives during the first six months of infancy, the less likely the infant is to develop health problems including diarrhea and ear infections (Scariati et al., 1997). Breastfeeding is superior to infant formula feeding because breastmilk not only meets the nutritional requirements of the infant but also protects against infections through its defense factors such as secretory immunoglobulin A (IgA), lactoferrin, lysozyme, anti-inflammatory factors, cytokines, nucleotides, macrophages, and lymphocytes (Oddy, 2001). Hence, human milk enhances the infant’s immune system (Heinig and Dewey, 1996). Studies have shown that infants who are exclusively breastfed have fewer gastrointestinal infections due to the “bifidogenic activity” of the human milk protein (Liepke et al., 2002; Wright et al., 1998). When rates of respiratory and gastrointestinal illnesses were compared in 776 breastfed and bottle-fed infants, it was observed that infants who were fed human milk substitutes had “five-fold more gastrointestinal illnesses, three-fold more respiratory illnesses and double the episodes of otitis media” (p.194, Beaudry et al., 1995).

Similar findings have been reported by other investigators (Bocar, 1997; Cahill and Wagner, 2002a; Wright et al., 1998).

Infants who were breastfed for 13 weeks or more had significantly fewer gastrointestinal illnesses during the first year of life compared to bottle-fed infants. In addition, there was a decreased incidence, severity, and duration of diarrhea in breastfed infants (Bocar, 1997). A two-fold increase in illnesses including diarrhea was observed among formula-fed infants compared to infants who were breastfed for at least 12 months (Heinig and Dewey, 1996). In a study of 430 breastfed infants, there was only one hospital admission due to respiratory illness compared to 51 admissions in 346 bottle-fed infants; authors of this study concluded that breastfeeding prevented hospitalizations for respiratory illnesses (Beaudry et al., 1995). Research shows that infants who were breastfed and given pre-lacteal feedings (colostrum) had fewer episodes of diarrhea (Ziyane, 1999).

Studies confirming the relationship between breastfeeding and other childhood illnesses indicate that breastfeeding protects infants against infectious diseases including bacteraemia, meningitis, infant botulism, and urinary tract infections (Heinig and Dewey, 1996). Breastfeeding has also been shown to protect against chronic illnesses including insulin-dependent diabetes mellitus, Crohn's disease, ulcerative colitis, childhood cancers such as lymphoma (Heinig and Dewey, 1996), and sudden infant death syndrome (Dennis, 2002b). In a study conducted with 582 caregivers in the Dominican Republic, it was observed that 45.9% of the infants were breastfed for at least one year; further examination showed that a decrease in breastfeeding was associated with increased episodes of diarrhea (McLennan, 2000).

Health benefits for the mother

Apart from a number of health and nutritional benefits for the infant (Cahill and Wagner, 2002a), breastfeeding has several benefits for the mother. Breastfeeding minimizes postpartum bleeding and aids in rapid uterine involution (AAP Reports, 1997; Heinig and Dewey, 1997) as well as reduces the risk of breast cancer and non-insulin-dependent diabetes mellitus later in life (Newcomb et al., 1994; Simmons, 1997). Research shows that lactating women at six weeks postpartum had lower fasting glucose levels and improved glucose

metabolism compared to nonlactating women (Heinig and Dewey, 1997). Mothers who breastfed experienced an increased fractional absorption of calcium compared to nonlactating women and also a reduction in the incidence of osteoporosis (Kalkwarf, 1996), hip fractures (AAP Reports, 1997), and ovarian cancer (Rosenblatt and Thomas, 1993). Other health benefits of breastfeeding for the mother include lactational amenorrhea and maternal weight or fat loss (AAP Reports, 1997; ADA Reports, 2001; Heinig and Dewey, 1997). Mothers who continued to exclusively breastfeed their infants up to six months had significantly more weight loss (difference of 0.6 kg) compared to mothers who stopped exclusively breastfeeding their infants at four months (Dewey et al., 2001). A separate study revealed that women who formula-fed their infants retained more body weight compared to women who breastfed their infants (Janney et al., 1997).

Economic benefits

Economic reports suggest that a “minimum of \$3.6 billion would be saved if the prevalence of exclusive breastfeeding increased from 64% in hospitals and 29% at six months to the rates recommended by the Surgeon General (75 and 50%, respectively)” (p.9, Weimer, 2001). It has been estimated that if 50% of women in the U.S. would exclusively breastfeed their infants for six months, versus bottlefeed, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) would save \$6.5 million per month (Bonuck et al., 2002). According to some studies, breastfeeding is more convenient and less costly compared to formula feeding with lower formula and health care costs (Ball and Wright, 1999; Pugh et al., 2002). This is even more apparent in developing countries, where the major part of family income is spent on buying food for older children and adults (ADA Reports, 2001).

Factors influencing breastfeeding

Premature discontinuation of breastfeeding is complex and is influenced by a number of factors. Studies have been conducted to identify variables that influence infant feeding decisions. Many demographic factors such as maternal age, marital status, education, race, socioeconomic and cultural factors, parity, number of children at home, and social support

have been shown to influence women's decisions to breastfeed (Bass and Groer, 1997; Goksen, 2002; Scott and Binns, 1999). Maternal employment, inadequate support by health professionals in maternity hospitals and clinics, inadequate prenatal and postnatal breastfeeding education, and negative attitudes of mothers toward breastfeeding as well as lack of support from expectant fathers are barriers to initiating and sustaining breastfeeding (Corbett-Dick and Bezek, 1997; Cropley and Herwehe, 2002; Sharma and Petosa, 1997).

Maternal characteristics

A number of studies have shown that women who breastfeed are predominantly white, from higher socioeconomic classes, well-educated, married, older, and are not employed outside the home (Dennis, 2002b).

Maternal age

Women who are older (>25 years) are more likely to initiate and continue breastfeeding compared to younger women (Dennis, 2002b; Ertem et al., 2001; Scott and Binns, 1999; Wagner and Wagner, 1999). Research published between 1980 and 1999 indicated that only 9.1% of mothers younger than 20 years of age continued to breastfeed to six months, whereas women who were older were more likely (15-34%) to have breastfed for six months. A feeling of embarrassment and regard for breastfeeding as a private behavior have been associated with bottlefeeding (Wambach and Cole, 2000). Adolescent girls who had positive attitudes toward and more knowledge about breastfeeding were more likely to consider breastfeeding (Losch et al., 1995; Wambach and Cole, 2000). Mothers who were young, single, from low income and ethnic minority groups, and who had negative attitudes toward breastfeeding were reported as the least likely to breastfeed (Dennis, 2002b; Wagner and Wagner, 1999).

A study was conducted in 1995 with teenage mothers in the Michigan WIC program. Breastfeeding initiation rate and predictors of breastfeeding initiation in these teenage mothers were evaluated. Data from the 1995 Pregnancy Nutrition Surveillance System were used for this study, and a total of 3,534 teenagers between the ages of 12 and 19 years were included.

Only 35.1% of mothers initiated breastfeeding (Park et al., 2003). There was a significant difference ($P < 0.001$) in the prevalence of breastfeeding between white (40.4%) and black (19.5%) teenage mothers. Further analyses revealed that level of education, marital status, anemia status, and smoking during pregnancy influenced the initiation rate among white teenage mothers, whereas household size, parity, and level of education influenced the initiation rate among black teenage mothers. Black teenage mothers were 2.38 times less likely to initiate breastfeeding compared to white teenage mothers. The authors concluded that all teenagers, but specifically black, unwed, multiparous teenagers were less likely to initiate breastfeeding. Moreover, women with these characteristics should be targeted for breastfeeding support and education (Park et al., 2003).

Misinformation among adolescents and teenage mothers regarding breastfeeding is widespread (Springer et al., 1999). A survey of 100 teenage females in suburban Massachusetts showed that although 79% of them intended to have children, only 52% planned to breastfeed. Embarrassment and increased fatigue were perceived as barriers to breastfeeding among these teenage girls (Leffler, 2000). These teenagers were also not certain whether breastfeeding was beneficial to the nursing mother. The authors concluded that teenage girls should be targeted for breastfeeding education (Leffler, 2000). A similar but separate study was conducted to evaluate adolescents' attitudes and subjective norms toward breastfeeding. In this study, 203 males and 236 females from high schools in Montreal were surveyed. Although adolescents had positive attitudes regarding the advantages of breastfeeding, they had negative subjective norms about breastfeeding, especially among males. Fewer males versus females had seen a mother breastfeeding her infant ($P = 0.001$), and overall, males had more incorrect beliefs about breastfeeding compared to females. Compared to females, males more strongly believed that supply of breastmilk was related to breast size ($P = 0.004$), people compared the breastfeeding mother to a cow ($P = 0.0001$), breastfed infants were less "self-sufficient" later in life ($P = 0.0002$), and that when breastfeeding, a mother exposes her breasts to the public ($P = 0.0002$). The authors concluded that because subjective norms for fathers are important determinants of breastfeeding, education of adolescent males about breastfeeding is also necessary (Goulet et al., 2003).

A study conducted in Korea was designed to examine the effect of a breastfeeding campaign for adolescent females on scores of attitudes, norms, and intentions regarding

breastfeeding. The intervention group included 207 adolescent females exposed to the breastfeeding campaign compared to a control group (n=205). The mean score for intention to breastfeed was significantly higher ($P<0.05$) in the intervention group (4.07) compared to the control group (2.55). Females exposed to the campaign “had more positive attitudes, subjective norms and intentions toward breastfeeding than the control group” (p.236, Kim, 1998). These investigators concluded that educating adolescents about breastfeeding was effective and positively promoted breastfeeding (Kim, 1998).

Results of a study that assessed students’ attitudes toward breastfeeding revealed that although respondents had generally positive attitudes about breastfeeding, a significant number of college students considered “breastfeeding to be unattractive for a woman” (p.35, Forrester et al., 1997). Of 346 high school and 244 college students, only 135 individuals acknowledged having been breastfed. Embarrassment was perceived as a major barrier to breastfeeding, and breastfeeding in public was not considered acceptable by many of the students (Forrester et al., 1997). A study conducted to assess attitudes toward breastfeeding at a state-supported university in the north-central region of the U.S, involving students, faculty, and staff showed that although students perceived breastfeeding as healthy, they considered bottle-feeding more convenient and less embarrassing than breastfeeding. Although all participants (n=107) agreed that breastfeeding is better than bottle-feeding, they believed that breastfeeding is a private affair and should not be done in public (O’Keefe et al., 1998). Thus, age has an important impact on intent to breastfeed.

Socioeconomic status

It is well documented that, in the U.S., women who are of high-income status and are college-educated tend to have the highest breastfeeding rate, while young mothers from low socioeconomic backgrounds with low educational levels have the lowest breastfeeding rate. However, in developing countries, breastfeeding is inversely related to socioeconomic status (SES) (Beaudry et al., 1995; Dennis, 2002b). Data collected from 1,001 low-income pregnant women were used to study the relationship between breastfeeding intention and maternal demographics, previous breastfeeding experience, and social support. Respondents were predominantly African-American (80.2%) or Hispanic (14.2%), and of these women only

50.6% planned to breastfeed. More women with previous breastfeeding experience (n=205, 77.1%) intended to breastfeed compared to women who had no breastfeeding experience (n=652, 41.9%). Irrespective of previous breastfeeding experience, advice from health professionals was not associated with intention to breastfeed, implying that health care providers may not be effective in influencing infant feeding choices. Although 56.1% of the women received information about breastfeeding from the WIC program, this knowledge was not associated with the intention to breastfeed. Among women with no previous breastfeeding experience, it was observed that learning about the benefits of breastfeeding from different and multiple sources positively correlated ($r=0.13$, $P<0.01$) with intention to breastfeed. Male partners of pregnant women, older women from the community who were experienced in breastfeeding, family members, and peer educators were found to be influential factors for breastfeeding intentions (Humphreys et al., 1998).

A study was conducted in Brazil with school-aged girls (n=346) to assess the effect of socioeconomic class on perception and knowledge about breastfeeding. Girls, in fourth to eighth grades, representing a high social class school (HS, n=149) and a low social class school (LS, n=197) were asked to complete questionnaires regarding breastfeeding. More girls from LS witnessed breastfeeding at home ($P=0.001$) or in public ($P=0.02$) compared to girls from the HS. More girls from the HS (46%) reported that they would be embarrassed to breastfeed in public compared to girls from the LS (32%) ($P=0.01$) (Nakamura et al., 2003).

Ethnicity

Even after controlling for age and level of education, some studies have shown that African-American and Hispanic women breastfeed less frequently compared to white women or women from other ethnic backgrounds (AAP Reports, 1997; Wagner and Wagner, 1999; Wright and Schanler, 2001). However, no differences were found in breastfeeding rates between low-income ethnic groups, implying that SES is an important moderating factor that influences breastfeeding (Dennis, 2002b). At least two studies have shown that only 45% of African-American women ever breastfeed compared to 68% of white women (Bentley et al., 2003; Scott and Binns, 1999). In a study conducted to identify factors associated with the initiation of breastfeeding in a Puerto Rican population in Connecticut, it was observed that

breastfeeding initiation decreased with the increased length of maternal residence in the U.S. Breastfeeding initiation was negatively associated with prenatal bottlefeeding advice and low-birth-weight of the infant (Perez-Escamilla et al., 1998).

Data from the National Survey of Family growth were analyzed, and a sample of 1,088 women was evaluated to determine if racial factors affected breastfeeding. Approximately, 57% of the mothers breastfed their infants (65% white and 30% black), with a median duration of 5.25 months for white infants and 3.38 months for black infants. Results also showed that race had an independent effect on the decision to breastfeed, with black women 2.5 times less likely to breastfeed compared to white women (Forste et al., 2001). Similar to previous findings, a survey of Hispanic/Latino women at a hospital in Hartford, Connecticut, reported that the main barriers to breastfeeding were feelings of embarrassment, pain during breastfeeding, insufficient milk supply, and convenience of formula for the mother. The mothers identified mother, health care provider, and peer counselors as sources of support (Stopka et al., 2002).

Smoking status

Although smoking during pregnancy does not appear to be an issue in developing countries, it is a significant factor influencing breastfeeding initiation in developed countries. Mothers who smoke heavily are the least likely to establish EBF (Dennis, 2002b; Wagner and Wagner, 1999). Smoking had a significant negative association ($P < 0.001$) with breastfeeding (Noble, 2001). First time mothers who smoked during the last trimester of their pregnancies were less likely to initiate breastfeeding compared to mothers who did not smoke or who were in their second or subsequent pregnancies. A study designed to assess respiratory and gastrointestinal illnesses rate in 776 infants revealed that mothers who bottle-fed their infants smoked more cigarettes (Beaudry et al., 1995). A separate study was conducted to identify health-enhancing behaviors correlated with breastfeeding among a national sample of 578 mothers; smoking less than 100 cigarettes over the lifespan, consuming five or more servings of fruits and/or vegetables, and visiting the dentist annually were all significant ($P < 0.05$) predictors of breastfeeding. In this study, mothers who ever smoked less than 100 cigarettes

were 1.5 times more likely to breastfeed compared to mothers who smoked more than 100 cigarettes over the life span (Pesa and Shelton, 1999).

Maternal employment

Many studies have shown that one of the barriers to breastfeeding is work status. With increased urbanization and industrialization, more and more women have joined the work force. An estimated 50% of women employed in the workplace are of reproductive age and return to work within one year of their infants' births (Wyatt, 2002). The Bureau of Labor Statistics reported that in 2002, "51% of U.S. women with children under 1 year of age were employed outside the home" (p. 247, Libbus and Bullock, 2002), and according to the Ross Mother's Survey, only 22% of women employed full-time breastfed their infants compared to 35.4% of mothers who were not employed (Libbus and Bullock, 2002).

Researchers examined the 1988 National Maternal and Infant Health Survey (NMIHS) to explore the association between employment factors associated with breastfeeding initiation and duration. Of the 26,355 mothers sampled in the NMIHS, only 1,506 cases of employed breast-feeding women were used. Results showed that maternal employment was not responsible for low rates of breastfeeding initiation. However, it was observed that breastfeeding women who returned to work weaned their infants earlier compared to breastfeeding women who did not work. The negative association between employment and duration of breastfeeding was strongest in white women, and duration of maternity leave was significantly ($P<0.01$) associated with duration of breastfeeding (Visness and Kennedy, 1997).

Survey data from 10,530 women in Bristol, U.K., were analyzed to determine the association between breastfeeding and employment. Results showed that 79% ($n=8,316$) of the women initiated breastfeeding, and of the 4,837 mothers who planned to work postpartum, 83.5% of them initiated breastfeeding compared to 75.2% of the 5,693 mothers who did not plan to work postpartum ($P=0.001$). However, mothers who planned to return to work before six week postpartum were significantly ($P<0.05$) less likely to initiate breastfeeding compared to mothers who were not planning to return to work (Noble, 2001). Other studies have also shown a competition between breastfeeding and work. In general, if a mother decides to

return to work within six weeks postpartum, she is less likely to initiate breastfeeding (Meek, 2001; Roe et al., 1999; Scott and Binns, 1999). Similar findings were reported in studies conducted overseas. It was observed that women working outside the home in Thailand were less likely to breastfeed after they resumed their work. At six months postpartum, 80% of those women working at home were still breastfeeding, whereas less than 40% of those women employed outside of the home continued to breastfeed (Yimyam et al., 1999).

Some studies have shown that intention to return to paid employment is associated only with breastfeeding duration but not with breastfeeding initiation (Dennis, 2002b; Meek, 2001; Wright, 2001; Wright et al., 1998). To determine the effect of part-time employment on breastfeeding initiation and duration, researchers surveyed 2,615 mothers during the first month postpartum and then during months 2, 3, 4, 5, 6, 7, 9, and 12. Data from 1,488 surveys were analyzed and results showed that 76% of the mothers initiated breastfeeding. No differences in initiation rates were found between mothers who expected to work part-time and those who did not expect to return to work. However, mothers working full-time breastfed 8.6 weeks less than nonworking mothers ($P < 0.05$), and part-time work of more than four hours per day decreased the duration of breastfeeding (Fein and Roe, 1998). Evidence suggests that there is little support for breastfeeding mothers in the workplace (Bridges et al., 1997; Corbett-Dick and Bezek, 1997). Attitudes of 69 employers toward breastfeeding revealed that 41% believed that formula-fed infants are as healthy as breastfed infants. Employers who had been exposed to breastfeeding women or women who expressed breastmilk at work were more supportive of breastfeeding than those who were not exposed (Bridges et al., 1997).

A project that developed an information kit about breastfeeding to inform employers about the benefits of breastfeeding revealed that the response of employers toward breastfeeding was quite favorable. However, employers were not very willing to initiate policy changes in their companies to promote breastfeeding (McIntyre et al., 2002). As studies have shown, breastfed infants have fewer and less severe attacks of common illnesses. This has proven responsible for less maternal absenteeism (Cohen et al., 1995). Focus groups with large employers and small employers revealed that although employers were knowledgeable about the benefits of breastfeeding, they nonetheless believed that breastfeeding would not be profitable to their organizations and would not recommend

providing facilities and benefits to breastfeeding mothers in the workplace (Brown et al., 2001; Moore and Jansa, 1987). In order to assess the effects of employer attitudes and knowledge on the breastfeeding behavior of employed mothers, the researchers developed a survey and distributed it to 156 participants at a business meeting that included employers and personnel managers. Eighty-five participants completed and returned surveys. Sixty-nine percent (n=59) were women and 30% (n=26) men. A “gender preferential response” (p.247, Libbus and Bullock, 2002), to the questionnaire was observed, and only 53% of participants reported breastfeeding initiation in self or spouse compared to the national rate of 64%. These results were contrary to previous findings that showed that higher education was positively associated with breastfeeding initiation as these participants had at least secondary level or college level educations. Only a small percentage (18-25%) recognized the importance of promoting breastfeeding in the workplace and few (35%) believed that the workplace should be changed to allow women to breastfeed (Libbus and Bullock, 2002).

Type of work and hours of work have also been shown to influence breastfeeding (Visness and Kennedy, 1997). For example, African-American women and white women returning to professional jobs breastfed longer compared to breastfeeding mothers in clerical jobs (Kurinij et al., 1989; Meek, 2001). Findings from a separate study of 1,179 (668 black and 511 white) women showed that women who intended to return to work did so by the fourth month after delivery. Black women who intended to return to full-time employment (63%) had the lowest rate of breastfeeding, and those women who did not return to work until seven months postpartum breastfed their infants longer compared to those women who returned to work earlier. Moreover, among black women those who intended to return to part-time employment were twice as likely to initiate breastfeeding in the hospital compared to those women returning to full-time employment. However, this association was not noted among white women (Kurinij et al., 1989). Contrary to these findings, Visness and Kennedy (1997) found that white women in service occupations breastfed for a significantly longer duration compared to women in professional jobs, even after controlling for duration of maternity leave. Planning to be employed postpartum or being employed full-time decreased breastfeeding initiation and duration (Frank, 1998), while women working part-time increased breastfeeding initiation and duration as compared to women working full-time (Auerbach and Guss, 1984; Fein and Roe, 1998). An intervention study showed that working mothers who

received clinical support by the pediatrician and the nurse-midwife on a monthly basis for the first six months were more likely to practice EBF compared to women who did not receive any clinical follow-up. Results showed that 78 of 146 working mothers who received counseling and support from pediatricians and hospital staff were exclusively breastfeeding their infants at six months postpartum compared to 7 of 116 working mothers who did not receive any clinical support. The authors concluded that promotion and support of breastfeeding by knowledgeable health professionals enabled working mothers to exclusively breastfeed their infants (Auerbach, 1984; Corbett-Dick and Bezek, 1997; Valdes et al., 2000).

Maternal attitudes, confidence and intentions

The theory of planned behavior (TPB) has been used as a “theoretical framework” in breastfeeding research. According to the TPB, attitude, subjective norm, and perceived control very closely predict intention, which determines behavior (Duckett et al., 1998). The constructs of TPB are that intention is predicted by attitude toward the behavior and subjective norm. Subjective norm is a “person’s perception about what people in general think a person should do with respect to target behavior”(pg. 326., Duckett et al., 1998). Attitude in turn is predicted by beliefs about outcomes of the behavior and subjective norm is predicted by normative beliefs. Perceived behavioral control that is “general perceptions about having sufficient control to implement target behavior and perceptions about being able to manage specific factors necessary for performance of the target behavior(control beliefs) (pg. 326., Duckett et al., 1998) were included in TPB to predict intention. Studies have shown that intention is related to breastfeeding initiation or duration. Also, attitude toward breastfeeding, normative beliefs, and beliefs about outcomes have been shown to be associated with breastfeeding intentions (Duckett et al., 1998).

In order to evaluate the application of the TPB in cross-cultural settings, a study was conducted with 209 first-time breastfeeding mothers in Hong Kong. Data on beliefs, attitudes, subjective norm, perceived control and intended duration of breastfeeding were collected using a written self-report during the postpartum stay in the hospital. Telephone interviews were conducted at 1, 3, 6, 9, and 12 months to collect information on feeding patterns and difficulties with breastfeeding. The average duration of breastfeeding was 12.65 ± 14.87

weeks, and by four weeks, 43.6% of the mothers had completely weaned their babies. Perceived control was significantly associated with breastfeeding duration ($r=0.40$, $P<0.05$) and intended and actual duration of breastfeeding was also significantly correlated ($r=0.52$, $P<0.05$). The authors concluded that the variables of the TPB predicted duration of breastfeeding in these mothers (Dodgson et al., 2003). Similar results were reported in a separate study (Goksen, 2002).

Epidemiological studies have shown that a commitment to breastfeeding is made well before a woman becomes pregnant (Pascoe et al., 2002). Other studies have shown that a majority of expectant mothers make infant feeding decisions before or very early in pregnancy (Dennis, 2002b). Researchers followed a cohort of 490 women to determine the associations between women's thoughts, feelings, and experiences of breastfeeding and continuation of breastfeeding during the first four months postpartum. At 20 and 24 weeks of gestation, all women expressed their intentions to breastfeed their infants, and of these women 77% ($n=278$) were still breastfeeding at 6-10 weeks postpartum and 53% ($n=218$) at 16-20 weeks postpartum. Women who breastfed for a shorter duration than intended self-reported breastfeeding problems. Shorter duration of breastfeeding was also associated with symptoms of depression and anxiety, smoking, and return to work (McLeod et al., 2002). In order to understand the societal norms and attitudes toward breastfeeding, data from the Healthstyles survey were examined. Data from 2,351 people revealed that 45% of participants agreed that mothers who intend to breastfeed have to make too many lifestyle changes. While 27% considered breastfeeding in public inappropriate, 31% thought that babies should be weaned with baby food or cereal by three months of age (Li et al., 2002a; Zimmerman and Guttman, 2001).

A number of studies have shown that intention, knowledge, and confidence affect breastfeeding duration. A longitudinal study of 556 women who were interviewed at 2, 6, 10, 14, 18, and 24 weeks postpartum revealed that although 88.1% of them initiated breastfeeding while in-hospital only 49.9% were still breastfeeding at six months postpartum. Mothers who chose to bottlefeed ($n=66$) agreed that bottlefeeding is not better than breastfeeding but chose to bottlefeed because they "disliked breastfeeding" (p.14, Binns and Scott, 2002) (40.7%) and thought "bottlefeeding is easier" (p.14, Binns and Scott, 2002) (38.9%). The most common reasons given to change to infant formula were "breastfeeding too painful and/or that the baby

was refusing to breastfeed,” (p.14, Binns and Scott, 2002) and mothers who were anxious about their milk supplies at two weeks postpartum stopped breastfeeding by six weeks. The authors concluded that it is important to educate first-time mothers and health professionals about problems they might encounter with breastfeeding (Binns and Scott, 2002; Kloebler-Tarver et al., 2002). Positive attitude toward breastfeeding has been shown to be a better predictor of breastfeeding behavior than knowledge, and studies have shown that positive attitudes are associated with more positive breastfeeding outcomes (Losch et al., 1995; Wagner and Wagner, 1999).

Data derived from a 1995 convenience sample of low-income, primarily minority women receiving services in a public hospital were analyzed to determine the impact of attitudes, norms, parity, and experience on the intent to breastfeed. Data were collected using a 70-item breastfeeding questionnaire completed by 367 primiparous and 596 multiparous women. Among primiparous women, social norms and breastfeeding attitudes of the mother predicted breastfeeding intention. The woman’s mother, baby’s father, and the woman’s doctor strongly influenced the mother in making her infant-feeding decisions (Kloebler-Tarver et al., 2002). Similar findings were reported in a separate study (Wagner and Wagner, 1999). To explore reasons for early termination of breastfeeding in periurban Santo Domingo, 220 mothers were interviewed with a structured questionnaire. The main reason given for termination of breastfeeding was that the “child did not want it” (p.364, McLennan, 2001). Breastfeeding practices of close family members and subjective norms influenced mother’s breastfeeding practices. Perception of “insufficient milk” by others in the community was also one of the reasons for mothers to discontinue breastfeeding (McLennan, 2001).

A sample of 758 mothers drawn from the Food and Drug Administration’s Infant Feeding Practices Study (IFPS) were studied to determine the reasons behind cessation of breastfeeding during the first year postpartum. Analysis of these data showed that women who were older, with higher education and more children, breastfed for longer duration. During the first five months, the major reason given by mothers to discontinue breastfeeding was “insufficient milk supply” (p.280, Kirkland and Fein, 2003). The mothers thought that they were not producing enough milk or that the breastmilk did not satisfy the infant. Factors related to nutrition and lifestyle patterns were most predominantly chosen as reasons for cessation of breastfeeding during first two months and 3-5 months. However, these were not

important reasons for breastfeeding cessation as the infant aged. During the early postpartum months, the mother encountered a greater number of problems with breastfeeding, and many women chose to wean their infants before six months because they thought that “the infant was old enough” or stated that the “infant weaned itself” (p.281, Kirkland and Fein, 2003). The authors concluded that breastfeeding promotion programs should educate the mothers that the infant is not too old to be breastfed at six months (Kirkland and Fein, 2003).

In an effort to determine if psychological and biomedical factors, independent of demographic factors, influenced duration of breastfeeding during the first six postpartum months, researchers conducted an observational and longitudinal study with 539 mothers in Argentina. At hospital discharge, 97% of mothers were exclusively breastfeeding their infants, but this rate dropped to 83% at one month, 56% at four months, and 19% at six months. Mothers with secondary school or college education exclusively breastfed for longer duration than mothers with primary education ($P<0.01$). Mothers who breastfed their previous infants for more than six months were 14 times more likely to exclusively breastfeed their current infants for six months compared to women who breastfed their previous infants for less than one month (Cernadas et al., 2003). The duration of breastfeeding and percentage of EBF at six months was significantly ($P<0.001$) more in mothers with very good or more positive attitudes towards breastfeeding compared to mothers who did not have positive attitudes towards breastfeeding. Also, the duration and percentage of EBF at six months was significantly ($P<0.01$) higher in mothers who had good family support, especially the husband, compared to mothers who did not have good family support (Cernadas et al., 2003).

In their study, Piper and Parks (2001), analyzed data from 1,863 cases from the NMIHS to examine the relationship between breastfeeding intensity ratio and breastfeeding exclusivity. According to the Interagency Group for Action for Breastfeeding (IGAB), breastfeeding intensity is defined as “the continuum of partial breastfeeding, with an end point of exclusive breastfeeding” (p.227, Piper and Parks, 2001). The investigators calculated a breastfeeding intensity ratio (range=0-1), with full (exclusive) breastfeeding having an intensity ratio of 1.0 and partial breastfeeding with values less than 1.0. Results showed that 61% of mothers reported EBF during the first month, 31% during 2-3 months postpartum, and 13% during 4-6 months postpartum. Higher breastfeeding intensity during the first six months postpartum was significantly ($P<0.01$) associated with prolonged breastfeeding. Also,

breastfeeding intensity ratio was significantly and positively associated with higher maternal age ($P<0.01$), education ($P<0.01$), and birth weight of the infant ($P<0.01$). Furthermore, breastfeeding intensity ratio was associated positively with being married and being a nonsmoker postpartum (Piper and Parks, 2001).

A mother's lack of confidence in her ability to breastfeed and the mother's belief that infants prefer formula to breastmilk have been associated with a lack of breastfeeding. In a longitudinal observational study, information from 457 mothers was reviewed. Of these women, 125 (27.4%) initiated breastfeeding and 332 (72.6%) initiated bottlefeeding within 48 hours postpartum. To identify predictors of early termination of breastfeeding, 64 mothers who were breastfeeding were enrolled in the study. Results showed that although mothers were knowledgeable about the benefits of breastfeeding, 39.1% of them stated that babies enjoy formula more than breastmilk. Mothers who were not confident about breastfeeding at two months were 12 times more likely ($P<0.01$) to discontinue breastfeeding before two months compared to mothers who were confident that they would continue to breastfeed the baby up to two months (Ertem et al., 2001).

Intention to breastfeed before the birth of a child was found to be closely associated with mother's actual feeding practices. However, not many studies have been conducted to assess the influence of the mother's attitude on the duration of breastfeeding (Losch et al., 1995). A study that explored the relationship between breastfeeding knowledge, breastfeeding confidence and infant feeding plans revealed that the anticipated duration of breastfeeding was significantly correlated ($r= 0.273$, $P=0.024$) with length of lactation. The study also revealed that women who were planning to breastfeed exclusively ($n=57$) anticipated doing so for longer ($P=0.024$) than mothers who planned to combination feed ($n=17$) their infants. The authors concluded that a mother's prenatal decision to combination feed the infant is negatively associated with breastfeeding outcome (Chezem et al., 2003). According to one recent study, a major reason for early use of formula was mother's perceived difficulty with breastfeeding (Dennis, 2002b).

Along with a number of demographic factors, poor or negative attitudes toward breastfeeding have been shown to be barriers to initiating and sustaining breastfeeding (Bass and Groer, 1997; Dennis, 2002b). Data have shown that women who decide to breastfeed make their decisions even before they become pregnant (Arora et al., 2000; Losch et al.,

1995). Research shows that mothers who decide earlier to breastfeed are more likely to breastfeed for longer (Losch et al., 1995). Mothers who are not sure about their infant feeding choice during pregnancy are more likely to wean the baby during the early weeks after birth (Weimann et al., 1998). Women who believe that breastfeeding is healthier, easier, and more convenient are more likely to breastfeed compared to mothers who have negative attitudes towards breastfeeding (Libbus and Bullock, 2002). Feelings of embarrassment have been shown to be a major hindrance to breastfeeding, especially among low-income women (Perez-Escamilla et al., 1998).

A prospective cohort study of 1,059 women was conducted to identify factors associated with breastfeeding and duration of breastfeeding. Results showed that only 46.9% of the women were still breastfeeding at six months postpartum and intended duration of breastfeeding was strongly associated with prolonged breastfeeding. Also, lower maternal education, paternal occupational status, having more than one child, having a cesarean delivery, and having a low-birth-weight baby were negatively associated with breastfeeding at discharge (Scott et al., 2001a). Further data analyses showed that women who made the decision to breastfeed after they became pregnant were eight times (OR=7.93, 95% CI=3.33 to 20.00) more likely to discontinue breastfeeding in the hospital compared with women who decided on their infant feeding choice prior to becoming pregnant (Scott et al., 2001b). An in-depth unstructured interview of 19 white primigravidae women, aged 16 to 30 years, in England, revealed that although the majority of mothers (both formula and breastfeeding) agreed that “breast is best,” (p.212, Earle, 2002) they still considered breastfeeding “embarrassing, disgusting and inconvenient” (p.212, Earle, 2002). However, through promotional and educational strategies a woman’s intentions can be positively affected, thus increasing her duration of lactation (Kramer et al., 2002; Wright et al., 1998).

A recent study was conducted to assess the impact of postnatal depression on breastfeeding duration. Women (n=1,745) from two Australian obstetric hospitals completed questionnaires at recruitment, and at 2, 6, and 12 months postpartum. The Edinburgh Postnatal Depression scale was used to screen for symptoms. Results showed that only 30% of these women were exclusively or almost exclusively breastfeeding at the end of six months. A total of 314 (18%) women developed depression within the 12 months after delivery, with 63 showing the first symptoms by two months postpartum. The study revealed

that women who experienced postnatal depression were 1.25 times more likely to discontinue breastfeeding compared to women who were not depressed (Henderson et al., 2003).

Sources of support

Lack of support from a significant other and negative attitude of the significant other toward breastfeeding have been observed as major predictors of bottlefeeding. Fathers who support bottlefeeding are more likely to believe that “breastfeeding is bad for the breasts and interferes with sex” (p.509, Losch et al., 1995). Similar findings were reported in other studies (Scott et al., 2001b; Wambach and Cole, 2000). Research shows that fathers have less knowledge about and positive attitudes toward breastfeeding compared to mothers (Sharma and Petosa, 1997). A study that evaluated a corporate lactation program that provided breastfeeding education and services for male employees and their partners showed that fathers who participated in breastfeeding education programs were more supportive of their partners and their female colleagues who breastfed. The average duration of breastfeeding in infants whose fathers (n=128) participated in the study was eight months, and 69% of the infants were still breastfeeding at 6 months, even though 66% of the mothers were employed (full-time or part-time). This study shows that breastfeeding education of fathers can be effective in increasing breastfeeding duration, even in working mothers (Cohen et al., 2002).

A survey of 123 women regarding factors influencing infant feeding decisions revealed that 78% (n=96) of respondents made the decision regarding infant feeding method before they became pregnant or during the first trimester of pregnancy. The main reason given for choosing bottlefeeding over breastfeeding was the “mother’s perception of father’s preference” (p.e68, Arora et al., 2000) Family was a major source of breastfeeding information for the mother, followed by friends. However, the majority of mothers wanted more information on breastfeeding from different sources (Arora et al., 2000). In a clinical trial where intervention, including breastfeeding education, was provided to mothers (n=197) and fathers (n=196) after the birth of their children, parents with higher breastfeeding knowledge scores were more likely to breastfeed than parents who had lower knowledge scores. Father’s breastfeeding knowledge was significantly associated with EBF during the first month and the frequency of breastfeeding during the third and sixth months. Mothers

who had higher knowledge scores were 6.5 times more likely to practice EBF at the end of the third month and 1.97 times more likely to continue to breastfeed to the end of the sixth month. Infants whose fathers had higher knowledge scores were 1.76 times more likely to be exclusively breastfed at the end of the first month and 1.64 times more likely to be breastfeeding at the end of the sixth month (Susin et al., 1999). In a study involving women who participated in the WIC program, women in the intervention group (n=19) who received breastfeeding education by a trained counselor had a significant ($P<0.05$) increase in breastfeeding knowledge and change in breastfeeding intentions after the intervention. After the intervention, significantly ($P<0.001$) more participants in the intervention group exclusively breastfed and breastfed longer than the control group. The authors concluded that breastfeeding interventions focusing on breastfeeding education can increase positive attitudes and perceptions about breastfeeding (Finch and Daniel, 2002).

A randomized controlled trial was conducted to evaluate the effect of telephone-based peer support (mother-to-mother) on the duration of breastfeeding. For the breastfeeding peer support trial, 258 women were recruited from community hospitals near Toronto and Ontario, Canada. Results of the study showed that of the 130 mothers who received peer support intervention, 85% of them stated that they would seek help from a peer volunteer again and all of them agreed that every new breastfeeding mother should be provided with peer support. However, frequency and intensity of peer volunteer contacts did not seem to influence breastfeeding outcomes (Dennis, 2002a).

Hospital policies

Rooming-in with the infant after delivery was found to encourage breastfeeding, and mothers who practiced demand feeding were more likely to continue breastfeeding at 4-6 weeks compared to mothers who breastfed less frequently (Dennis, 2002b). Studies have shown that donation of infant formula vouchers, discount coupons, and provision of cases of infant formula through pediatric and obstetric offices are significantly associated with shorter duration of breastfeeding (Wright, 2001). Supplementary feeding with formula during the first few days after birth has been associated with increased risk of breastfeeding failure (Humenick et al., 1998). In an 8-week cohort study of 522 women, conducted to identify

factors that contributed to successful breastfeeding during their hospital stays, it was observed that only 44% of mothers spoke with a lactation consultant while in-hospital. More calls were made to family and friends to discuss breastfeeding problems compared to health professionals, including lactation consultant, obstetrician or physician (Kuan et al., 1999). Formal breastfeeding policies in hospitals, staff and physician training in breastfeeding management, and rooming-in have been shown to positively affect breastfeeding promotion efforts (Kovach, 2002). In an effort to describe hospital breastfeeding policies and practices in southeastern Pennsylvania Delaware Valley, researchers conducted a 5-year follow-up (1994 and 1999) study of 35 hospitals. Group interviews, with 1-6 participants at each hospital, were conducted to gather data. Results showed that formal breastfeeding policies were implemented in most of the maternity units in addition to rooming-in. Although breastfeeding initiation rates increased, mothers were still supplementing breastmilk with formula. Authors concluded that although the hospitals were more “breastfeeding friendly,” they were still lacking in professional education and implementation of rooming-in (Kovach, 2002).

Increased adherence to BFHI has been shown to increase the duration of breastfeeding beyond six weeks (DiGirolamo et al., 2001). A study was conducted in Sweden to examine if mandated early discharge from the maternity ward affected breastfeeding; results showed that of the 3,171 infants born in the central hospital of Karlstad, Sweden, in 1993, 89% (n=2,829) were healthy, with 97.7% of babies going home within seven days after birth. Significantly more infants who stayed in-hospital for 4-7 days (46%) were exclusively breastfed at 6 months compared to infants who stayed in-hospital for only 1-3 days (40%). Irrespective of length of postpartum hospital stay, 98% of mothers initiated breastfeeding. From 2-6 months postpartum, length of stay in the hospital after delivery was positively associated with frequency of breastfeeding at six months (Janson and Rydberg, 1998). In a population-based study, data were drawn from the 1999, 2000, and 2001, California MIHA survey to explore the association between postpartum length of stay in-hospital and breastfeeding. In this study, short hospital stay was defined as less than two nights for vaginal delivery and less than four nights for cesarean delivery, and standard hospital stay was defined as two nights for vaginal delivery and four nights for cesarean delivery. Of the 10,352 responses used in data analysis, it was observed that 44% of infants had short hospital stays and that at two months of age, only 36.6% of women exclusively breastfed while 15% fed “mostly breastmilk” to their

infants. Women who had short postpartum hospital stays were more likely (AR=1.11, 95% CI= 1.01-1.23) to discontinue breastfeeding earlier than women who had standard hospital stays (Heck et al., 2003).

Postpartum assistance from a lactation consultant has been shown to increase breastfeeding rates among educated mothers (Humenick et al., 1998; Lawrence and Howard, 2001). In an effort to assess the effects of the BFHI on breastfeeding rates and infant growth, 17 infants were followed for 12 months and their weights and heights were measured at 1, 2, 3, 6, 9, and 12 months. At three months postpartum, there was a seven-fold increase in EBF of infants in the BFHI compared to infants in the control group (43.3% vs. 6.4%; $P<0.001$) and more than 12-fold increase at six months (7.9 vs. 0.6%; $P<0.01$) (Kramer et al., 2002).

Health care professionals and breastfeeding

Studies have shown that health care professionals such as physicians have inadequate training in breastfeeding management (ADA Reports, 1997). Although health care professionals have been shown to positively influence breastfeeding women, research shows that they also provide women with inaccurate and/or inadequate breastfeeding information and recommendations. Among 340 mothers who were followed until they weaned their infants or to 20 weeks, 44.7% of the mothers reported talking to a health professional, mostly with a physician, followed by nurses and lactation consultants. Breastfeeding rates declined during the 20-week study period. Moreover, negative advice was given by physicians 11% of the time, 2% of the time from nurses and 0% of the time from lactation consultants (Humenick et al., 1998).

Strategies such as the BFHI, peer counseling, paternal support, and education of the mothers and health care professionals have been used to promote breastfeeding in the U.S. (Martens, 2000; Philipp et al., 2001). A study showed that a 1.5-hour mandated breastfeeding education intervention of nursing staff significantly increased the compliance of the BFHI and breastfeeding beliefs over a 7-month period at the intervention site compared to control site. The rates of EBF also increased by 23% (31% vs.54%), and fewer nurses offered supplementation (45% vs. 87%) after the intervention (Martens, 2000). Although

breastfeeding promotion or intervention programs have focused on educating the mothers, family members, and employers about the benefits of supporting breastfeeding, not much attention has been paid to the health professionals influencing these target groups. A study was conducted to assess Puerto Rican health teachers' attitudes towards breastfeeding who took part in a 6-hour breastfeeding workshop. A total of 125 teachers of health were included in the study; 89.6% (n=112) were females and 10.4% (n=13) were males. Only 46.9% of participants had positive attitudes towards breastfeeding, while 53.1% showed moderate to negative attitudes. A majority of the health teachers (60.3%) agreed that mothers must follow a specific diet in order to breastfeed, and 30.6% agreed that breastmilk should be offered as an alternative to artificial milk. Furthermore, 100% of the health teachers were against breastfeeding in public with 99.2% of them indicating that breastfeeding should be done only at home. Teachers who breastfed their children had more positive attitudes towards breastfeeding compared to teachers who bottlefed their children. The authors suggested that health teachers should be trained adequately so that they can influence students in developing positive attitudes toward breastfeeding (Parrilla-Rodriguez et al., 2001).

Surveys evaluating health care professionals' knowledge and attitudes about breastfeeding revealed that these professionals do strongly advocate to their clients that breastfeeding is the optimum method of infant feeding (Pascoe et al., 2002). Among primiparous mothers in Hawaii, negative opinions of physicians and infant's father were shown to increase the likelihood of formula feeding (Kieffer et al., 1997). Results of a survey of midwives and health visitors conducted to assess their attitudes toward breastfeeding showed that professionals were not very sure about the benefits of breastfeeding. Of the 150 midwives and 63 health visitors surveyed, 82 (42%) of them stated that breastfed babies received water frequently. Although the professionals said that rooming-in was very common, 225 of the 50 first-time mothers interviewed in the study stated that their babies were separated from them. Furthermore, 28% of the health professionals disagreed that breastfed babies are healthier, and 37% disagreed that type of feeding influences the health of the baby (Beeken and Waterston, 1992).

A study was conducted to assess pediatricians' practices and attitudes regarding breastfeeding promotion in the U.S. A total of 1,122 pediatricians completed surveys. Only 11% of them informed pregnant women about breastfeeding. Furthermore, the majority of

pediatricians were not familiar with the steps of the BFHI used to promote breastfeeding in hospitals. The researchers concluded that there was a “knowledge gap” in pediatricians, in general, and a less positive attitude toward breastfeeding (Schanler et al., 1999). Similar results were found in other studies (Philipp et al., 2001; Wright, 2001). A survey of 1,200 obstetricians to assess knowledge, attitudes, and training concerning breastfeeding revealed that of the 390 practicing obstetricians who responded, only 22.8% of them were not certain about their qualifications regarding the provision of prenatal education about breastfeeding. Results also showed that 23.3% (1 of 4) of obstetricians would give a woman a “gift pack with coupons for infant formula” (p.76, Power et al., 2003). The authors concluded that obstetricians need further training and education in breastfeeding management in order to positively influence a woman’s choice to breastfeed her infant (Power et al., 2003). In a study conducted to determine if perceived attitudes of physicians and hospital staff affected breastfeeding decisions, 41% of 1,620 women were not breastfeeding at six weeks postpartum. It was observed that mothers were less likely to breastfeed at six weeks if they reported that their physician or hospital staff had no preference or favored formula. Mothers were less likely to breastfeed at six weeks if they intended to breastfeed for two months or less and reported that the staff expressed no preference. The authors concluded that mothers who were not sure about their intention to breastfeed were more susceptible to their perceived attitudes of health professionals (DiGirolamo et al., 2003).

A study conducted with 50 maternal-newborn nurses to assess their attitudes, subjective norms, and behavioral intentions toward support of breastfeeding mothers revealed that the nurses did not have adequate knowledge of breastfeeding in certain areas including lactation physiology and efficacy of glucose feedings. However, their supportive behavior toward breastfeeding mothers was positively associated with their breastfeeding knowledge and attitudes (Bernaix, 2000).

Pediatric nurses referred patients with a breastfeeding problem more often to a lactation consultant (81%) and the least to a physician (5%). Of 134 nurses, only 35% agreed that supplementing breastfeeding with formula during the first two weeks causes breastfeeding failure. Furthermore, only 46% of the nurses reported receiving any breastfeeding education in their training programs (Register et al., 2000). Because studies suggest that nursing knowledge or attitudes can influence mothers’ breastfeeding decisions,

an intervention study was planned to determine whether breastfeeding education of nurses in a neonatal intensive care unit (NICU) changed in their knowledge and attitudes about breastfeeding. Nurses in the NICU completed questionnaires two weeks before and after they attended the 8 hours of educational sessions on breastfeeding. There was a significant increase ($P<0.001$) in the breastfeeding knowledge of NICU nurses. Authors concluded that breastfeeding education is very important for nurses in order to “support high-risk mother-infant dyads” (p.299, Siddell et al., 2003). In a similar study, assessment of pediatric resident physicians’ knowledge was conducted using a questionnaire after they attended a “four-part educational series on breastfeeding” (p.e60, Hillenbrand and Larsen, 2002). The educational intervention increased the residents’ knowledge from 69% preintervention to 80% postintervention ($P<0.001$). Fewer residents were familiar with the protective effects of breastfeeding against infant obesity or maternal cancer before the intervention. The authors concluded that pediatricians with adequate knowledge can provide appropriate counseling for breastfeeding mothers and efforts need to be made to educate these pediatricians (Hillenbrand and Larsen, 2002).

A survey of 1,000 nurses in Utah hospitals was conducted to collect baseline data on hospital policies using a 64-item multiple-choice questionnaire. Although nutritionists and dietitians have been shown to have more positive attitudes towards and knowledge about breastfeeding than nurses, of the 390 nurses who responded, only 2.1% identified dietitians as a professional expected to offer practical breastfeeding advice or techniques. The authors concluded that the participation of dietitians was minimal in assisting mothers in initiation and continuance of breastfeeding (Helm et al., 1997). A study conducted in the U.S. with 107 physicians-in-training to assess their knowledge of breastfeeding and infant growth revealed that only 5% of these medical residents knew that breastfed infants grow at a slower rate than formula-fed infants after four months of age (Guise and Freed, 2000). A survey conducted to assess breastfeeding attitudes and knowledge of health professionals in Gippsland, Australia, revealed that knowledge decreased as professionals aged (Lowe, 1990). In female professionals, positive experience with breastfeeding was associated with a higher knowledge score compared to female professionals who had never breastfed (Lowe, 1990).

Support from governmental programs, health professionals, and education in schools is very important for the promotion of breastfeeding and for bringing about changes in

individual behavior. Studies of non-pregnant high school students suggest that attitudes toward infant feeding begin to form well before pregnancy (Weimann et al., 1998). Because the decision to breastfeed is often made long before a woman becomes pregnant, breastfeeding promotion programs should focus on educating women during their prenatal years. Effective educational efforts need knowledgeable health professionals to drive these efforts; thus, students majoring in health sciences such as nutrition and home economics should be thoroughly educated and trained to support and advocate breastfeeding.

Breastfeeding practices in developing countries

The decline in the practice of breastfeeding, such as in developed countries like the U.S., has been observed in developing countries as well (Galler et al., 1998). Sub-optimal breastfeeding practices still prevail in many countries, especially in rural communities. A study that examined infant feeding practices in 12 rural communities in Gambia revealed that delayed initiation of breastfeeding, prelacteal feeding, and failure to practice EBF were widespread. Moreover, colostrum was considered “hot milk” causing diarrhea and stomach pain, and thus was not given to infants (Semega-Janneh et al., 2001). In a study conducted with 136 Guatemalan women, it was observed that stress during labor and delivery was associated with delayed onset of lactation (Grajeda and Perez-Escamilla, 2002).

A study conducted to assess breastfeeding knowledge and beliefs among adults in eastern Tobago revealed that in addition to having inadequate knowledge about the benefits of EBF, employment was one of the primary factors affecting breastfeeding (Bovell-Benjamin et al., 2001). A study conducted with 222 Honduran mothers to assess their attitudes about and barriers to breastfeeding showed that mothers perceived breastfeeding to be time consuming. They also thought that breastmilk was insufficient for the infant (Cohen et al., 1999). This decrease in breastfeeding rates around the world has led to serious implications for infant health in developing countries including infants in the Caribbean (Amador et al., 1994). This decline in EBF has led to an increase in the prevalence of protein energy malnutrition (PEM) in the Caribbean countries (Scarlett et al., 1996).

The Caribbean

Studies show that although there are high initiation rates of breastfeeding in the Caribbean, the prevalence and duration of EBF is very low. Despite the known benefits of breastfeeding, Caribbean studies have shown a high level of non-compliance with the recommended 4-6 months of EBF (Scarlett et al., 1996). A comparison of breastfeeding rates in Barbados, in 1969 and 1981, showed that the percentage of babies who were completely weaned by three months of age increased from 25% (1969) to 55% (1981). The 1981 survey revealed that, of the 126 mothers interviewed, 91% reported that they decided to breastfeed before delivery. However, only 17% of them were still breastfeeding at six months postpartum (Ramsey, 1983). The decline in the practice of breastfeeding, which started in developed countries, was rapidly followed by most developing countries. This trend has led to serious implications for infant health in areas like the Caribbean (Amador et al., 1994). Although the practice of exclusively breastfeeding the infant for the first six months was widespread until three decades ago, the recent introduction of infant-formula by multi-national companies has affected the length of lactation in the Caribbean (Marchione, 1978)

Although breastfeeding initiation is high in the English-speaking Caribbean, the initial prevalence of EBF is low and the drop thereafter is more rapid and pronounced. Protein energy malnutrition is predominant in 3- to 24-month-old infants in the Caribbean, and researchers suggest that the decline in breastfeeding, with the gastroenteritis and marasmus that accompany it, may be one of the causes of PEM. Early weaning was identified as one of the factors causing malnutrition and infant mortality in Jamaica (Cunnigham and Segree, 1990). Results of a study on breastfeeding promotion in an urban and rural Jamaican hospital showed that, of the 62 mothers interviewed at the urban hospital, only 56% initiated EBF. While only 13% of the mothers were allowed to initiate breastfeeding within the recommended first hour after delivery at the urban hospital, 75% of mothers were allowed to feed formula while in the hospital. Despite extensive education at the urban hospital, there was no difference in breastfeeding knowledge of mothers at urban and rural hospitals. The authors concluded that health professionals at the urban hospital were less supportive of breastfeeding than those at the rural hospital (Cunnigham and Segree, 1990).

Data on EBF from the Caribbean show that in 1990 only 48% of infants in Jamaica, and only 18% of infants from St. Lucia (in 1998) were exclusively breastfed. In 1991, only 25% of infants in Dominica, and 32% of infants from St. Kitts were exclusively breastfed at three months of age (Amador et al., 1994). An interview regarding breastfeeding of 85 mothers in Jamaica attending postnatal and well-baby clinics at six weeks postpartum found that although there was 99% breastfeeding prevalence at six weeks, only 38% were exclusively breastfed. Older women with children were more likely to practice EBF compared to their counterparts (Scarlett et al., 1996). Although Barbados is not characterized by extreme poverty or malnutrition, it has a low prevalence of breastfeeding. Results of a 6-month longitudinal study of 226 mothers with newborns in Barbados showed that all women in the sample initiated breastfeeding. However, only 69% of women were exclusively breastfeeding at seven weeks, 44% at three months and 17% at six months postpartum. Mother's perception of inadequate milk supply was one of the common reasons for termination of breastfeeding. This decline in breastfeeding may have long-term effects on child growth and development (Galler et al., 1998). Further analysis of the study population showed that mild postpartum depression was present in 16% of the women, and maternal mood predicted breastfeeding at seven weeks and six months. Results showed that mothers who were depressed at seven weeks were less likely ($P<0.01$) to breastfeed at that time. Also, correlation analysis between different mood scales revealed that the morale scale factor "enjoying children" (p.84, Galler et al., 1999) was a "measure of dysphoric mood at seven weeks" (p.84, Galler et al., 1999). Furthermore, mothers who said they "enjoyed children" (p.86, Galler et al., 1999) at seven weeks were less likely to ($P<0.001$) breastfeed at six months (Galler et al., 1999).

Qualitative assessments in the Caribbean of mother's perceptions, attitudes, and values attached to food items showed that infant and child feeding practices vary considerably and that a mother's attitudes toward breastfeeding are strongly influenced by her female role models including her mother, mother-in-law and grandmothers (Chambers, 1997). In another study conducted in the Caribbean, it was noted that there was a correlation between length of EBF, level of education and ethnicity (Afro-centricity). Mother's age, employment status, education, and number of children influenced breastfeeding duration in rural Jamaica (Almorth and Latham, 1982). A study conducted to examine the effect of breastfeeding and

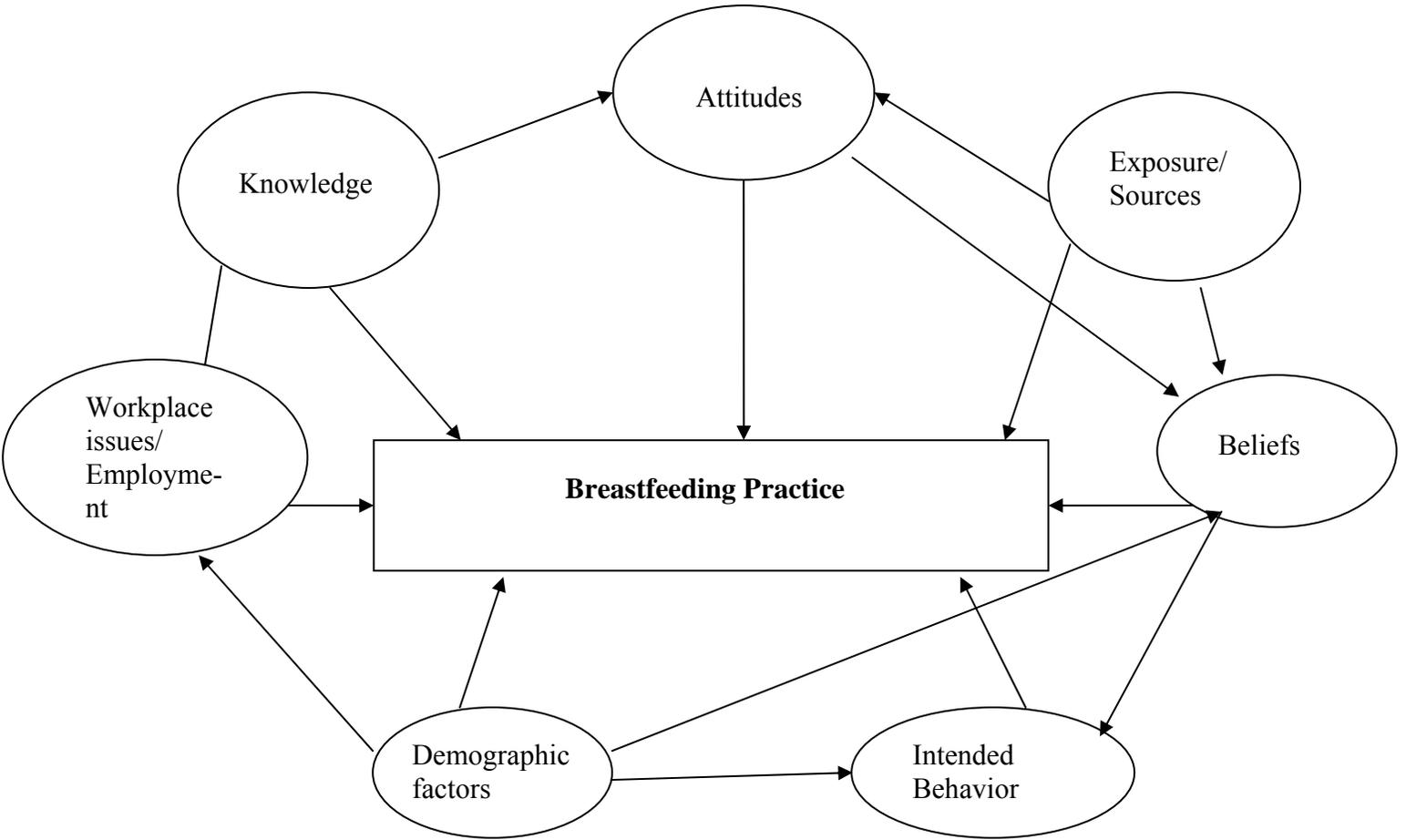
infant mortality in Latin America included 87% of the infant population in the Caribbean sub-region. Results showed that while only 10% of the infants in Trinidad, and Tobago, were exclusively breastfed during the first three months, 73% of the infants were partially breastfed. For the Caribbean sub-region as a whole, only 17% of the infants were exclusively breastfed during the first three months. These breastfeeding rates are extremely low and researchers suggest that interventions to promote breastfeeding should target younger infants and focus on EBF (Betran et al., 2001). Fieldwork conducted in a Dominican village where 60% of all women with children under the age of five were interviewed showed that there was little compliance with the “breast is best” program due to cultural notions of femininity, gender constructs and women’s social position (Krumeich et al., 2001).

One study, involving 70, 3- to 14-month-old infants in two poor communities near Kingston, Jamaica, showed that although 99% of the infants were reported to have been breastfed, 73% of the caregivers introduced porridges when the infants were 3- to 5 months-old. This is early compared with the current international recommendations of “about six months” of EBF (Gardner et al., 2002). Research shows that 98% of the mothers in Tobago initiate breastfeeding, but the rate declines rapidly during the first three months postpartum. Data collected at the health centers throughout Tobago revealed that of the 621 babies born in 1998, 54%, 43%, and 32% were exclusively breastfed for one, two, and three months, respectively. The national breastfeeding rate in Tobago was only 24% in 1999. The results showed that in addition to having inadequate knowledge about the benefits of EBF, employment was one of the principal factors affecting breastfeeding in eastern Tobago (Bovell-Benjamin et al., 2001). Sustained breastfeeding for the first six months postpartum is rarely practiced among women in Tobago and other English-speaking Caribbean nations. In a study conducted to examine the sociodemographic and health system factors associated with EBF, of 151 women attending Well Baby Clinics, 80% of mothers were knowledgeable about the recommended duration of EBF. However, only 48% reported EBF at two months and 21% at four months postpartum. Mother’s age was inversely associated with EBF at four months postpartum. These data show that there is a rapid decline in the rates of EBF among infants from birth to four months (Nichols et al., 2002).

Summary

Although research shows that breastfeeding has many benefits to the infant and the mother, only 31.4% of mothers in the U.S. continue to breastfeed at six months of age, and by 12 months, the rate drops to 17.6% (ADA Reports, 2001). Along with a number of demographic factors, poor or negative attitudes toward breastfeeding have been shown to be barriers to initiating and sustaining breastfeeding (Bass & Groer, 1997; Dennis, 2002). Studies have also shown a competition between breastfeeding and work. In general, if a mother decides to return to work within six weeks postpartum, she is less likely to initiate breastfeeding (Meek, 2001; Roe et al., 1999; Scott and Binns, 1999). A number of studies have been conducted to assess breastfeeding practices throughout the world, but there is a lack of research that adequately assesses breastfeeding knowledge, attitudes, and intentions of health care professionals working in developed and developing countries.

Model for breastfeeding practice based on Theory of planned behavior (TPB)



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A PROSPECTIVE STUDY OF KNOWLEDGE, ATTITUDES, AND INTENTIONS
REGARDING BREASTFEEDING IN THE WORKPLACE AMONG NUTRITION
STUDENTS WHILE IN SCHOOL AND IN THE WORKPLACE¹

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Abstract

Benefits of breastfeeding for mothers and infants have been widely recognized. Among many factors, work status and negative attitudes toward breastfeeding are barriers to initiating and sustaining breastfeeding. The purpose of this study was to investigate breastfeeding knowledge, attitudes, and intentions regarding breastfeeding in the workplace among nutrition students while they were in school and in the workplace. A 5-year longitudinal study was conducted in which 69 nutrition students who completed the “Breastfeeding in the Workplace” questionnaire at baseline and follow-up were included. Results indicated that nutrition students had a significant increase in breastfeeding knowledge ($P \leq 0.001$), and change in attitudes ($P \leq 0.007$) and intentions ($P \leq 0.017$) regarding breastfeeding in the workplace over time. Attitudes and beliefs were highly associated ($P \leq 0.01$) with intentions and were the primary predictors of intentions to breastfeed in the workplace. Sources of breastfeeding information, such as school, books and mother were also predictors of attitudes and intentions regarding breastfeeding in the workplace. Women compared to men (3.84 ± 0.56 vs. 3.41 ± 0.49 ; $P \leq 0.014$) and participants employed full-time compared to part-time (4.01 ± 0.50 vs. 3.66 ± 0.70 ; $P \leq 0.007$) had higher scores of intentions to breastfeed in the workplace. Over time, nutrition students retained their breastfeeding knowledge and positive attitudes and intentions toward breastfeeding in the workplace and were likely to practice breastfeeding. Full-time employment did not negatively influence nutrition students’ attitudes and intentions regarding breastfeeding in the workplace. School was a major source of breastfeeding information, and it influenced intentions regarding breastfeeding in the workplace.

Introduction

Although research shows that breastfeeding has many benefits to the infant and the mother, only 29% of mothers in the United States (U.S.) continue to breastfeed their infants beyond 6 months of age (ADA Reports, 2001). Many demographic factors such as maternal age, marital status, education, employment, race, socioeconomic and cultural factors, parity, number of children at home, and social support have been shown to influence a woman's decision to breastfeed (Bass and Groer, 1997; Goksen, 2002; Li, Ogden, Ballew, Gillespie, & Grummer-Strawn, 2002; Scott and Binns, 1999). Poor or negative attitudes toward breastfeeding have been identified as barriers to initiating and sustaining breastfeeding (Bass and Groer, 1997; Dennis, 2002). A number of studies have been conducted to explore breastfeeding knowledge and attitudes of teenage mothers, family members, working mothers, and employers. These investigations have shown that mothers who do not breastfeed or individuals who do not support breastfeeding have negative attitudes towards breastfeeding (Arora, McJunkin, Wehrer, & Kuhn, 2000; Brown, Poag, & Kasprzycki, 2001; Duckett, et al., 1998; Forste, Weiss, & Lippincott, 2001; Springer, Key, & Wagner, 1999; Weimann, DuBois, & Berenson, 1998).

One of the barriers to breastfeeding is work status. With increased urbanization and industrialization, more and more women have joined the work force. An estimated 50% of women employed in the workplace are of reproductive age and return to work within one year of their infants' births (Wyatt, 2002). According to the Ross Mother's Survey, only 22% of women employed full-time breastfed their infants compared to 35% of mothers who were not employed (Libbus and Bullock, 2002). Mothers who planned to return to work before 6 weeks postpartum were significantly ($P < 0.05$) less likely to initiate breastfeeding compared to mothers who were not planning to return to work (Noble, & ALSPAC Study Team, 2001). Research has also shown a negative association between breastfeeding duration and employment (Visness and Kennedy, 1997). Mothers working full-time breastfed for nearly 9 fewer weeks than nonworking mothers ($P < 0.05$), and part-time work of more than 4 hours per day decreased the duration of breastfeeding (Fein and Roe, 1998). Additional studies indicate that intention to return to paid employment is associated with breastfeeding duration but not with breastfeeding initiation (Dennis, 2002; Meek, 2001; Wright, 2001; Wright and Schanler, 2001). In general, if a mother decides to return to work within 6 weeks postpartum, she is

unlikely to initiate breastfeeding (Meek, 2001; Roe, Whittington, Fein, & Teisl, 1999; Scott and Binns, 1999).

Students majoring in health-related fields who receive nutrition education, including optimum infant feeding methods, may be future role models and advocates of breastfeeding. Yet, there is a paucity of research that explores or assesses the breastfeeding knowledge, attitudes, and beliefs of these students. Research shows that work status and negative attitudes toward breastfeeding are barriers to initiating and sustaining breastfeeding, but no studies have prospectively examined breastfeeding knowledge, attitudes, and intended behaviors of nutrition students regarding breastfeeding in the workplace. Women who intend to work postpartum are less likely to initiate and sustain breastfeeding (Dennis, 2002; Roe, et al., 1999). However, because of their educational background, nutrition students and graduates may have positive attitudes and intentions toward breastfeeding in the workplace. The purpose of this study was, therefore, to investigate breastfeeding knowledge, attitudes, and intentions regarding breastfeeding in the workplace among nutrition students while they were enrolled in college and later, while in the workplace. The hypothesis of this study was that nutrition students would have high knowledge of breastfeeding and positive attitudes and intentions toward breastfeeding in the workplace that would remain stable after graduation.

Methods

A longitudinal (5-year follow-up) study was conducted to examine nutrition students' knowledge, attitudes, and intentions regarding breastfeeding in the workplace, while they were in school and in the workplace. The study was conducted in two phases. Phase I, conducted in the spring of 1999, included an assessment of breastfeeding knowledge, attitudes and intentions of students majoring in nutrition at Virginia Tech (VT). The baseline cross-sectional survey was conducted using a 47-item questionnaire named "Breastfeeding in the Workplace" (Appendix A) developed for this study. The questionnaire was pre-tested for face validity by experts in the field of nutrition and breastfeeding. The questionnaire contained knowledge-based questions with "True," "False," or "Don't know" responses and closed-ended, attitude-based questions with ordered response categories. The questionnaire also contained closed-ended questions

with unordered response categories and questions to collect demographic information. After obtaining approval from the Institutional Review Board (IRB) at VT, the self-administered questionnaire was mailed to all juniors, seniors and graduate students enrolled in the Human Nutrition Foods and Exercise (HNFE) Department. The list of students used as the sample frame for Phase I was obtained from the HNFE department. A total of 200 students were included in the study, and questionnaires were mailed to students' local addresses. An implied consent form and a self-addressed, stamped envelope also accompanied each questionnaire for return of the completed questionnaire. Participation in the study was voluntary. Three follow-up contacts, by mail, telephone, and individual targeting, resulted in the return of 139 completed surveys (70% response rate).

Phase II of the study included a follow-up survey and was conducted in the spring of 2004 using the same "Breastfeeding in the Workplace" (Appendix B) questionnaire from 1999. However, to reflect the current status of the participants' employment, marriage, number of children and breastfeeding, specific questions were added to the demographic section of the questionnaire. The sample consisted of all participants who completed the survey in 1999. Current mailing addresses of participants were obtained from the VT alumni records office, and the questionnaire was mailed to all 139 HNFE graduates who completed the survey in 1999. Approval was obtained from the IRB at VT for this follow-up survey.

The questionnaire was accompanied by a cover letter reminding graduates of the purpose of the study and a stamped, self-addressed envelope to return their responses. The HNFE departmental envelopes were used to give authenticity and denote official sponsorship of the survey. Because the response rate was <70% after three weeks of the initial contact, a letter by mail, appealing for the return of the questionnaire, was sent to non-respondents. Seven weeks after the initial contact, a replacement questionnaire was sent only to non-respondents. Sample members were designated as "non-respondents" if they did not respond even after the second follow-up contact. In order to reduce non-response error in the study, demographic characteristics of non-respondents and respondents based on responses provided in 1999 were compared. No differences in demographic characteristics of respondents and non-respondents were found. Some of the

addresses were not accurate and hence some surveys were not deliverable. Also, some participants did not respond thus yielding a final sample size of 98.

The 47-item survey consisted of 10 knowledge, 5 exposure, 16 attitude, 7 intention, and 5 belief questions. The 10 knowledge-based questions required “True,” “False,” or “Don’t know” responses. Responses to the knowledge questions were scored from 0-10, depending on the number of correct answers. All questions were equally weighted (0 points if not correct; 1 point if correct). The exposure-based questions required “Yes” or “No” responses. The possible range for the exposure subscale was 1-5, with a higher score corresponding to more exposure (0 points if no; 1 point if yes). A 5-point Likert-type scale response format was used to score attitudes, intentions, and beliefs statements, with 1 being the most negative (Strongly Disagree/Definitely No/Very Unimportant) and 5 the most positive (Strongly Agree/Definitely Yes/Very Important). Separate scores were generated for knowledge, exposure, attitudes, intentions, and beliefs subscales. Responses to items associated with attitudes, intentions, and beliefs were summed, and the sum was divided by the number of items responded to create mean outcome scores.

The breastfeeding attitude variable had 16 attitudinal statements; however, due to possible ambiguity, 3 attitude items were not included in the final data analysis. Eight of the attitudinal statements were negatively worded to minimize social desirability in responses, and before calculation of the mean, these questions were reverse scored so that in all cases, the higher the score, the more positive the attitude. A higher total score (range: 1-5) denoted that participants had more positive breastfeeding attitudes, intentions, and beliefs. For some other items, students were asked to check as many options as applied. The “Check all that Apply” questions collected information on sources from which students obtained breastfeeding information, people who influence the mother’s decision to breastfeed, suitable places for breastfeeding, and employment benefits for breastfeeding mothers. Responses to items associated with the “Check all that Apply” questions were summed and the possible range for “sources from which students obtained breastfeeding information” was 0-22; the possible range for “people who influence the mother’s decision to breastfeed” was 0-9; the possible range for “suitable places for breastfeeding” was 0-17; the possible range for “employment benefits for

breastfeeding mothers” was 0-8. The remaining questions elicited demographic information, such as level and year in school, highest degree obtained, age, ethnicity, and gender.

Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS for Windows, version 12.0, 2001, SPSS, Chicago, IL). Descriptive statistics were used to analyze demographic data and presented as proportions of respondents or mean \pm SD. Paired student *t*-tests were used to compare participants at baseline and the follow-up interval. One-way analysis of variance (ANOVA) was used to examine between group differences at baseline and the 5-year interval based on ethnicity and educational level. Bivariate Pearson’s and Spearman’s correlation coefficients were calculated to examine simple relationships between baseline scores of knowledge, attitudes, and other measures of breastfeeding in the workplace as well as changes in these scores over a 5-year period with variables of interest. Stepwise linear regression analyses were conducted to further examine relationships between baseline scores of measures of breastfeeding in the workplace and variables of interest. Stepwise linear regression analyses were also conducted with change in measures of breastfeeding in the workplace over time as dependent variables with measures of breastfeeding in the workplace at baseline as independent variables. Variables were entered and removed from models at $\alpha = 0.10$ and 0.15 , respectively. Statistical significance was set at $P < 0.05$, using one and two-tailed comparisons.

Results

In 2004, the questionnaire designed for the baseline survey was mailed to all 139 VT nutrition graduates who completed the survey in 1999. Only 98 surveys were deliverable, of which 69 were returned and usable, yielding a response rate of 70%. Student *t*-tests conducted on the original survey of 1999 for non-response error did not show any significant differences in scores between respondent and non-respondents. Results of comparison of scores in breastfeeding knowledge, exposure, and attitudes and intentions, and other measures of breastfeeding in the workplace were based on data obtained from the 69 subjects who completed the questionnaire in 1999 as well as 2004. Characteristics of study participants in 2004 are shown in Table 1. Analyses of baseline data showed that, of the 69 participants included in the analysis, 57 were undergraduate and 12 were graduate students in 1999.

Table 1: Characteristics of study participants in 2004¹

Characteristic	N (%)
Gender	
Female	59 (85.5)
Male	10 (14.5)
Age (y)	26.8 ± 2.6 ²
Ethnicity	
Caucasian	62 (89.9)
African-American	2 (2.9)
Others	3 (4.3)
No response	2 (2.9)
Education	
College graduate	26 (37.7)
Some graduate school	13 (18.8)
Graduate school graduate	30 (43.5)
Institution of highest degree obtained	
Virginia Tech	49 (71.0)
Other	19 (27.5)
No response	1 (1.5)
Employment	
Full-time	46 (66.7)
Part-time	6 (8.7)
Student	12 (17.4)
Other	5 (7.2)
Profession	
Nutrition-related	30 (43.4)
Non-nutrition-related	37 (53.6)
No response	2 (3.0)
Children	
Yes	15 (21.7)
No	54 (78.3)

¹n=69

²Mean ± SD

Independent *t*-tests showed that there were no significant differences between undergraduate and graduate students in any of the measures of breastfeeding in the workplace.

Similarly, one-way ANOVA showed no significant differences in any scores with respect to duration of stay in school. Analyses of the follow-up data showed that the mean age of subjects at the 5-year interval was 26.8 ± 2.6 years. The majority (89.9%) of respondents were Caucasian and most were graduate school graduates (43.5%). Forty-nine (71.0%) participants received their highest degree from VT, and ~22% of participants had children.

Baseline and 5-year follow-up scores of breastfeeding knowledge, attitudes, and other measures of breastfeeding in the workplace are presented in Table 2. Scores on the knowledge subscale in subjects at baseline averaged 6.41 ± 1.55 with a median score of 6 (range of possible scores 0-10). From baseline to follow-up, there was a significant increase in scores of knowledge and other measures of breastfeeding in the workplace among nutrition students. When categorized by gender, women had significantly more positive intentions toward breastfeeding in the workplace (3.84 ± 0.56 vs. 3.41 ± 0.49 ; $P \leq 0.014$) and more sources of breastfeeding information (5.58 ± 3.57 vs. 3.50 ± 2.95 ; $P \leq 0.042$) compared to men. Of respondents who had children, 100% breastfed their children. Also at follow-up, no significant differences in any measures of breastfeeding in the workplace were found between educational level. No significant differences were found in any of the measures of breastfeeding in the workplace between participants who were employed in nutrition and non-nutrition related professions. Independent *t*-tests revealed that participants employed full-time had higher scores of intentions to breastfeed in the workplace (4.01 ± 0.50 vs. 3.66 ± 0.70 ; $P \leq 0.007$) and positive beliefs about breastfeeding in the workplace (4.56 ± 0.43 vs. 4.29 ± 0.52 ; $P \leq 0.013$) compared to those who were not employed full-time. One-way ANOVA showed that Caucasians had significantly ($P \leq 0.05$) more positive attitudes about breastfeeding in the workplace compared to African-Americans (3.94 ± 0.43 vs. 4.57 ± 0.01).

At baseline, participants listed school (75.4%), followed by mother (49.3%) and books (49.3%) as major sources of breastfeeding information. Paid maternity leave (72.5%), return to the same or similar position after maternity leave (81.2%), and flex-time jobs (59.4%) were selected as important policies that corporations should endorse in order to facilitate breastfeeding in the workplace. At follow-up, significantly more participants selected the workplace (82.6% vs. 62.35%, $P = 0.011$; $\chi^2 = 6.50$) and school (43.5% vs. 17.4%, $P = 0.005$;

$\chi^2 = 8.03$) as suitable places to breastfeed an infant. When data on sources of breastfeeding information at the 5-year interval were analyzed, it was found that school (60.9%), followed by books (46.4%), and mother (43.5%) were listed as major sources of breastfeeding information. At the 5-year follow-up, participants considered mother (76.8%), spouse (63.8%), and friends (52.2%) as people who would influence the mother's choice/decision to breastfeed. Also at the 5-year interval, the majority of participants (84.1%) thought that corporations should endorse paid maternity leave in order to facilitate breastfeeding or expressing breastmilk in the workplace. Return to the same or similar position after maternity leave (81.2%) and flex-time jobs (72.5%) were also listed as policies that corporations should endorse in order to facilitate breastfeeding in the workplace.

Except for knowledge score, female participants with children had significantly higher scores on all measures of breastfeeding in the workplace (Table 3) compared to those who did not have children. McNemar's test for proportions of paired data showed that there was a significant increase ($P \leq 0.017$), from baseline to 5-year follow-up, in the number of people who agreed that it was acceptable for a woman to breastfeed her infant or express her breastmilk during working hours (69.5% vs. 87.0% respectively). Change in proportion of responses over time for selected questions on various measures of breastfeeding in the workplace are presented in Table 4.

Table 5 displays correlation coefficients for the bivariate relationships between knowledge, attitudes, and other measures of breastfeeding in the workplace at baseline. Spearman's correlation analysis showed positive and significant association year in school ($r = 0.28, P \leq 0.05$) with knowledge. Pearson's correlation analysis revealed a positive and significant association between age ($r = 0.25, P \leq 0.05$) and level in school ($r = 0.25, P \leq 0.05$) with breastfeeding knowledge. Gender was positively and significantly ($r = 0.23, P \leq 0.05$) associated with exposure to breastfeeding in the workplace. No other demographic variables were significantly associated with measures of breastfeeding in the workplace. Although breastfeeding knowledge was found to be positively and significantly associated ($P \leq 0.05$) with sources of breastfeeding information, it was not found to be significantly related to attitudes, intentions, or beliefs regarding breastfeeding in the workplace. Exposure to people who breastfed or support breastfeeding in the workplace was found to be positively and significantly ($P \leq 0.05$) related to intentions to breastfeed in the workplace.

Table 2: Breastfeeding knowledge, attitudes, and other breastfeeding in the workplace measures of study participants at baseline and 5-year intervals¹

Variable	1999	2004	P value²
Knowledge	6.41 ± 1.55 ³	7.64 ± 1.39	<0.001
Exposure	1.62 ± 1.44	2.42 ± 1.43	<0.001
Attitudes	3.83 ± 0.41	3.99 ± 0.45	0.007
Intentions	3.57 ± 0.52	3.78 ± 0.57	0.007
Beliefs	4.20 ± 0.46	4.39 ± 0.50	0.017
Sources	4.42 ± 3.27	5.28 ± 3.54	0.035
Suitable places	5.51 ± 3.44	7.42 ± 3.92	<0.001
Employment benefits	4.45 ± 2.27	4.77 ± 2.23	NS ⁴

¹n=69

²Baseline vs. 5-year using paired *t*-tests (2-tailed)

³Mean ± SD

⁴NS = not significant

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Table 3: Comparison of mean scores of knowledge, attitudes, and other outcome measures associated with breastfeeding in female participants with children at the 5-year interval

Variable	Children¹	No children²	P value³
Knowledge	7.73 ± 1.83 ⁴	7.61 ± 1.26	NS ⁵
Exposure	3.27 ± 1.44	2.19 ± 1.35	0.008
Attitudes	4.18 ± 0.28	3.94 ± 0.49	0.0045
Intentions	4.11 ± 0.38	3.69 ± 0.58	0.001
Beliefs	4.69 ± 0.37	4.32 ± 0.51	0.0005
Sources	7.73 ± 4.03	4.59 ± 3.11	0.006
Suitable places	10.27 ± 4.46	6.63 ± 3.39	0.0045
Employment benefits	5.67 ± 2.59	4.52 ± 2.11	NS ⁵

¹n=15

²n=54

³One tailed *t*-test

⁴Mean ± SD

⁵NS = not significant

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Table 4. Responses for selected questions on breastfeeding knowledge and attitudes, beliefs, and intention regarding breastfeeding in the workplace at baseline and 5-year intervals¹

Variable	Question	Response	Baseline N (%)	Follow-up N (%)
Knowledge				
1.	According to the American Dietetic Association, the optimal duration of breastfeeding an infant is a minimum of twelve months	True	36 (52.9)	46 (66.7)
2.	Infant formula contains all ingredients found in human breastmilk	False	66 (95.7)	68 (98.6)
3.	Infants consuming breastmilk have fewer ear infections than infants consuming formula	True	57 (82.6)	64 (92.8)
4.	Immune systems of breast-fed infants are more developed than immune systems of formula-fed infants	True	65 (94.2)	67 (97.1)
Attitudes				
1.	Women who want to breastfeed their infants should not work outside the home	Disagree ²	62 (89.9)	65 (94.2)
2.	Female bosses are more supportive of breastfeeding or expressing breastmilk in the workplace than are male bosses	Disagree ²	25 (36.8)	14 (20.3)
3.	It is acceptable for women to breastfeed their infants or express their breastmilk during working hours	Agree ³	48 (69.5)	60 (87.0) ⁴
4.	Breastfeeding or expressing breastmilk in the workplace will interfere with work productivity	Disagree ²	43 (62.3)	56 (81.1) ⁵
5.	The public image of a corporation will be negative if women employees are allowed to breastfeed or express breastmilk at work	Disagree ²	61 (88.4)	61 (88.4)
6.	Women should not breastfeed or express breastmilk at work because it would be embarrassing to coworkers	Disagree ²	51 (73.9)	63 (91.3) ⁴
7.	Women should not breastfeed or express breastmilk at work because it is unattractive	Disagree ²	62 (89.8)	64 (92.8)
8.	A woman who breastfeeds or expresses breastmilk at work should not be paid for the time spent breastfeeding or expressing breastmilk	Disagree ²	22 (31.8)	44 (63.8) ⁶
9.	Absenteeism will decrease in women allowed to breastfeed or express breastmilk at work	Agree ³	46 (66.7)	43 (62.3)

Table 4 continued

Variable	Question	Response	Baseline N (%)	Follow-up N (%)
Intention				
1.	I or my significant other will breastfeed my/our child	Yes ⁷	62 (89.9)	67 (97.1)
2.	I or my significant other will breastfeed or express breastmilk while working outside the home	Yes ⁷	33 (47.8)	54 (78.3) ⁸
3.	I or my significant other will provide breastmilk for my/our child whenever it is hungry, even at work	Yes ⁷	46 (66.7)	54 (78.3)
Beliefs				
1.	How important is it that a woman breastfeed her infant?	Important ⁹	68 (98.5)	69 (100.0)
2.	How important is that employers support breastfeeding or expressing breastmilk in the workplace?	Important ⁹	62 (89.8)	62 (89.8)

¹n=69²Includes “strongly disagree” responses³Includes “strongly agree” responses⁴ $P \leq 0.017$, McNemar’s test; $\chi^2 < 1.0$ ⁵ $P \leq 0.011$, McNemar’s test; $\chi^2 = 3.88$ ⁶ $P \leq 0.001$, McNemar’s test; $\chi^2 = 12.250$ ⁷Includes “Definitely Yes” responses⁸ $P \leq 0.001$, McNemar’s test; $\chi^2 = 14.815$ ⁹Includes “Very important” responses**Knowledge**, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)**Attitudes**, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)**Beliefs**, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)**Intentions**, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Table 5. Pearson correlation coefficients for baseline breastfeeding in the workplace measures¹

Variable	Knowledge	Exposure	Attitudes	Intentions	Beliefs	Sources	Suitable places	Employment benefits
Knowledge	1							
Exposure	0.39**	1						
Attitudes	0.17	0.18	1					
Intentions	0.22	0.25*	0.69**	1				
Beliefs	0.20	0.11	0.57**	0.62**	1			
Sources	0.30*	0.55**	0.36**	0.48**	0.34**	1		
Suitable Places	0.17	0.19	0.39**	0.47**	0.18	0.45**	1	
Employment Benefits	0.19	0.01	0.32**	0.40**	0.33**	0.18	0.22	1

¹n=69

* $P \leq 0.05$; ** $P \leq 0.01$

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Pearson's correlational analyses revealed that there were positive and significant associations between attitudes toward breastfeeding in the workplace, beliefs regarding breastfeeding in the workplace, and intentions to breastfeed in the workplace (all $P \leq 0.01$). Sources of breastfeeding information were also found to be positively associated with positive attitudes toward breastfeeding in the workplace, intentions to breastfeed in the workplace, and beliefs about breastfeeding in the workplace (all $P \leq 0.01$). Positive attitude toward breastfeeding in the workplace, intentions to breastfeed in the workplace, and number of sources of breastfeeding information were observed to be positively and significantly associated (all $P \leq 0.01$) with scores on suitable places to breastfeed an infant. Positive attitudes, beliefs, and intentions regarding breastfeeding in the workplace were found to be positively and significantly associated (all $P \leq 0.01$) with employment benefits for breastfeeding mothers.

Educational level at the 5-year interval was not significantly associated with any of the scores of breastfeeding in the workplace measures. At follow-up, age was not significantly associated with knowledge but was positively and significantly ($r=0.27$; $P \leq 0.05$) associated with exposure to people who breastfed or supported breastfeeding in the workplace. Spearman's analysis of the relationship between ethnicity, and employment with different scores of breastfeeding measures showed that there was a positive and significant relationship between ethnicity ($r= 0.36$, $P \leq 0.01$) and scores of attitudes about breastfeeding in the workplace. Similarly, employment was positively and significantly ($r=0.27$, $P \leq 0.05$) associated with scores of intentions to breastfeed in the workplace. However, Pearson analyses show that full-time employment was negatively and significantly associated with beliefs ($r= -0.25$, $P \leq 0.05$) and intentions ($r= -0.29$, $P \leq 0.05$) to breastfeed in the workplace. Gender was also positively and significantly associated with scores of intention ($r=0.26$, $P \leq 0.05$) to breastfeed in the workplace. Table 6 displays correlation coefficients for relationships between knowledge, attitudes, and other breastfeeding in the workplace measures at the 5-year interval for all 69 participants.

At follow-up, exposure scores were positively and significantly associated with positive attitudes ($P \leq 0.01$) and intentions ($P \leq 0.05$) regarding breastfeeding in the workplace. Positive attitudes towards breastfeeding in the workplace were positively and significantly associated with intentions and beliefs regarding breastfeeding in the workplace and sources of

Table 6. Pearson correlation coefficients for breastfeeding in the workplace measures at the 5-year interval¹

Variable	Knowledge	Exposure	Attitudes	Intentions	Beliefs	Sources	Suitable places	Employment benefits
Knowledge	1							
Exposure	0.22	1						
Attitudes	-0.003	0.33**	1					
Intentions	0.05	0.25*	0.67**	1				
Beliefs	-0.01	0.14	0.59**	0.74**	1			
Sources	0.09	0.52**	0.40**	0.42**	0.22	1		
Suitable places	0.001	0.28*	0.29*	0.28*	0.29*	0.37**	1	
Employment benefits	0.04	0.47**	0.38**	0.26*	0.31**	0.28*	0.41**	1
Breastfed² child	0.03	0.31**	0.21	0.30*	0.32**	0.36**	0.38**	0.21

¹n=69

* $P \leq 0.05$; ** $P \leq 0.01$

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Breast fed; 1(yes)-0(no)

Table 7. Pearson correlation coefficients for breastfeeding in the workplace measures at baseline and 5-year intervals¹

Variable	Knowledge _04	Exposure _04	Attitudes _04	Intentions _04	Beliefs _04	Sources _04	Suitable places_04	Employment benefits_04
Knowledge _99	0.03	0.30*	0.20	0.04	0.11	0.26*	0.18	0.21
Exposure _99	0.28*	0.35**	0.04	0.05	0.03	0.43**	0.00	0.09
Attitudes _99	0.10	0.27*	0.38**	0.30*	0.24	0.32**	-0.01	0.17
Intentions _99	-0.07	0.20	0.29*	0.36**	0.16	0.37**	0.11	0.19
Beliefs _99	-0.04	0.00	0.26*	0.18	0.15	0.15	-0.18	0.17
Sources _99	0.28*	0.31**	0.16	0.27*	0.07	0.53**	-0.04	0.03
Suitable places_99	-0.004	0.17	0.25*	0.32**	0.11	0.39**	0.31**	-0.11
Employment benefits_99	-0.23	0.10	0.23	0.13	0.04	0.08	-0.17	0.13

¹n=69

* $P \leq 0.05$; ** $P \leq 0.01$

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Table 8. Stepwise linear regression models for knowledge, attitude, intentions, belief, suitable places, and employment benefits regarding breastfeeding in the workplace at baseline (n=69)

Dependent Variable	Predictor	R ²	Model Adjusted R ²	Unstandardized β (Standard Error)	Standardized β	P-value	Model p-value
Knowledge	0.18						0.001
	Constant			2.780(1.430)		0.056	
	Exposure	0.15		0.401(0.119)	0.372	0.001	
	Age (y)	0.05		0.135(0.065)	0.231	0.040	
Attitudes	0.12						0.002
	Constant			3.634(0.077)		<0.001	
	Sources	0.13		4.526(0.014)	0.364	0.002	
Intentions	0.53						<0.001
	Constant			0.425(0.426)		0.321	
	Attitudes	0.48		0.772(0.115)	0.600	<0.001	
	Sources	0.06		4.120(0.014)	0.258	0.005	
Beliefs	0.31						<0.001
	Constant			1.716(0.441)		<0.001	
	Attitudes	0.32		0.648(0.114)	0.569	<0.001	
Suitable places	0.24						<0.001
	Constant			-4.644(3.551)		0.194	
	Sources	0.20		0.373(0.120)	0.354	0.003	
	Attitudes	0.06		2.223(0.963)	0.262	0.024	
Employment benefits	0.10						0.006
	Constant			-.2.338(2.393)		0.332	
	Beliefs	0.11		1.616(0.566)	0.329	0.006	

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Variables were entered and removed from models at $\alpha = 0.10$ and 0.15 respectively

Independent variables- Age, Knowledge, Attitudes, Intentions, Beliefs, Sources, Suitable places, and Employment benefits

Table 9. Stepwise linear regression models for change in exposure, attitudes, intentions, beliefs, suitable place, and employment benefits related to breastfeeding over 5-years (n = 69)

Dependent Variable	Predictor	R ²	Model Adjusted R ²	Unstandardized β (Standard Error)	Standardized β	P-value	Model p-value
Exposure	0.06						0.023
	Constant			-1.538(1.714)		0.373	
	Age (y)	0.07		0.148(0.064)	0.273	0.023	
Attitudes	0.21						< 0.001
	Constant			2.595(0.473)		<0.001	
	Sources_04	0.16		4.012(0.015)	0.313	0.008	
	Attitudes_99	0.07		0.310(0.128)	0.277	0.018	
Intentions	0.68						<0.001
	Constant			-0.425(0.412)		0.307	
	Beliefs_04	0.54		0.603(0.099)	0.532	<0.001	
	Attitudes_04	0.08		0.439(0.112)	0.350	<0.001	
	Sources_99	0.03		3.98830.013)	0.228	0.003	
	Knowledge_99	0.02		-5.83(0.028)	-0.158	0.039	
Beliefs	0.33						<0.001
	Constant			1.788(0.441)		<0.001	
	Attitudes_04	0.34		0.650(0.110)	0.587	<0.001	
Suitable places	0.22						<0.001
	Constant			6.433(4.981)		0.201	
	Sources_04	0.14		0.392(0.122)	0.354	0.002	
	Beliefs_99	0.06		-2.324(0.928)	-0.274	0.015	
	Beliefs_04	0.06		1.980(0.861)	0.254	0.025	
Employment benefits	0.26						<0.001
	Constant			-1.722(2.078)		0.410	
	Exposure_04	0.22		0.609(0.172)	0.390	0.001	
	Attitudes_04	0.06		1.255(0.541)	0.256	0.024	

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Variables were entered and removed from models at $\alpha = 0.10$ and 0.15 respectively

Independent variables- Age, Knowledge, Attitudes, Intentions, Beliefs, Sources, Suitable places, and Employment benefits

breastfeeding information (all $P \leq 0.01$). In turn, intentions regarding breastfeeding in the workplace were positively and significantly associated with attitudes and beliefs regarding breastfeeding in the workplace (both $P \leq 0.01$). Correlation analyses also revealed that breastfeeding exposure, positive attitudes, intentions, and beliefs regarding breastfeeding in the workplace were positively and significantly associated (all $P \leq 0.05$) with number of suitable places to breastfeed an infant. Scores on exposure, positive attitudes, and beliefs toward breastfeeding in the workplace were positively and significantly associated ($P \leq 0.01$) with employment benefits for breastfeeding mothers. Pearson's correlation analyses also revealed that exposure to people who breastfed or supported breastfeeding in the workplace, number of sources of breastfeeding information, and beliefs regarding breastfeeding in the workplace were positively and significantly associated (all $P \leq 0.01$) with breastfeeding practice. Positive , intentions toward breastfeeding in the workplace were positively and significantly associated ($P \leq 0.05$) with breastfeeding practice.

Correlation analyses for scores of breastfeeding in the workplace measures at baseline with scores at the 5-year interval are presented in Table 7. Exposure to people who breastfed or supported breastfeeding in the workplace and number of sources of breastfeeding information at baseline were positively and significantly associated (both $P \leq 0.05$) with breastfeeding knowledge at the 5-year follow-up. Positive attitudes towards breastfeeding in the workplace at baseline were positively and significantly associated with attitudes ($P \leq 0.01$) and intentions ($P \leq 0.05$) scores at follow-up. Intentions regarding breastfeeding in the workplace at baseline were found to be positively and significantly associated with attitudes ($P \leq 0.05$) and intentions ($P \leq 0.01$) scores at 5-year follow-up. Beliefs about breastfeeding in the workplace at baseline were positively and significantly associated ($P \leq 0.05$) with attitudes regarding breastfeeding in the workplace at follow-up. Also, sources of breastfeeding information at baseline were positively and significantly ($P \leq 0.05$) associated with intentions scores at follow-up.

Stepwise linear regression analyses were conducted between baseline scores of breastfeeding in the workplace measures (Table 8) with select baseline variables. Final regression models for changes in scores of breastfeeding in the workplace measures over time are found in Table 9. No significant model was generated for breastfeeding knowledge at follow-up.

Discussion

The primary aim of this study was to prospectively examine nutrition students' breastfeeding knowledge, attitudes, and intentions regarding breastfeeding in the workplace. At baseline, Spearman's correlation analyses showed a positive and significant association between level in school (undergraduate or graduate) and breastfeeding knowledge. However, there was no significant gain in knowledge or increase in positive attitudes or intentions toward breastfeeding in the workplace, with increased duration in school. At the 5-year interval, no significant differences in measures of breastfeeding in the workplace were found between different educational levels or between participants employed in nutrition and non-nutrition related professions. At baseline, age was significantly associated with breastfeeding knowledge and was a positive predictor of breastfeeding knowledge (Table 8). However, no such association was found between age and breastfeeding knowledge at follow-up (Table 6). Although, sources of breastfeeding information at baseline were found to be positively and significantly associated with breastfeeding knowledge (Table 5), they did not enter into the regression model.

Over time, there were significant increases in all measures of breastfeeding in the workplace among nutrition graduates (Table 2). Previous research has suggested that breastfeeding promotion programs should target teenage girls, as they do not have adequate breastfeeding knowledge (Leffler, 2000). However, in the current study, nutrition students answered 75% of the breastfeeding knowledge questions correctly. Research shows that breastfeeding knowledge is not associated with intention to breastfeed (Humphreys, Thompson, & Miner, 1998). As well, in the present study breastfeeding knowledge at the baseline and 5-year intervals was not significantly associated with attitudes, intentions, or beliefs regarding breastfeeding in the workplace (Tables 5 and 6). Similarly, none of the demographic variables were significantly associated with breastfeeding knowledge.

On a scale of 0-5 for the attitudes, intentions, and beliefs subscales, nutrition students at baseline scored 3.83, 3.57, and 4.20 respectively. These scores imply that nutrition students have positive attitudes, intentions, and beliefs regarding breastfeeding in the workplace. Scores at follow-up showed that nutrition students not only maintained these positive attitudes, intentions, and beliefs but also increased them, over time. Since the majority of participants were women, it may be suggested that these results were consistent with previous

findings (Arora, et al., 2000; Dennis, 2002; Pascoe, Pletta, Beasley, & Schellpfeffer, 2002), demonstrating that the commitment to breastfeeding is made well before a woman becomes pregnant. Women who decided to breastfeed after they became pregnant were 8 times more likely to discontinue than women who decided to breastfeed prior to becoming pregnant (Scott, Landers, Hughes, & Binns, 2001). Mother's prenatal decision to combination feed the infant was negatively associated with breastfeeding outcome (Chezem, Friesen, & Boettcher, 2003). Research shows that intention to breastfeed before childbirth is closely associated with mother's actual breastfeeding practice (Losch, Dungy, Russell, & Dusdieker, 1995) and that positive attitudes are positively associated with increased duration of breastfeeding and percentage of exclusive breastfeeding (Cernadas, Noceda, Barrera, Martinez, & Garsd, 2003; Losch, et al., 1995). In view of these findings and given that nutrition students have positive attitudes, beliefs, and intentions toward breastfeeding in the workplace, it is reasonable to suggest that nutrition students will practice breastfeeding and will do so exclusively and for a long duration.

Research shows that fathers have less knowledge about and positive attitudes toward breastfeeding compared to mothers (Sharma and Petosa, 1997). In a study conducted to evaluate adolescents' attitudes and subjective norms toward breastfeeding, it was reported that teenage males had negative subjective norms about breastfeeding (Goulet, Lampron, Marcil, & Ross, 2003). Consistent with these findings, women in the current study had significantly more positive intentions toward breastfeeding in the workplace and more sources of breastfeeding information compared to males, although the number of male respondents was low. Gender was positively and significantly associated with intention to breastfeed in the workplace. Follow-up data revealed that there was a positive and significant relationship between ethnicity and positive attitudes about breastfeeding in the workplace. In the present study, the majority (92.5%) of respondents were Caucasian, consistent with previous findings (Bentely, Dee, & Jensen, 2003; Froste, et al., 2001; Scott and Binns, 1999) that Caucasians had significantly more positive attitudes about breastfeeding in the workplace than African-Americans.

Along with a number of demographic factors, poor or negative attitudes toward breastfeeding have been shown to be barriers to initiating and sustaining breastfeeding (Bass and Groer, 1997; Dennis, 2002). Furthermore, positive attitudes toward breastfeeding have

been shown to be better predictors of breastfeeding behavior than knowledge, and studies show that positive attitudes are associated with more positive breastfeeding outcomes (Losch, et al., 1995; Wagner and Wagner, 1999). Current study results were in accordance with these previous findings and showed that positive attitudes toward breastfeeding in the workplace were positively and significantly associated with breastfeeding practice. Also, attitudes and beliefs were positive predictors of intention to breastfeed in the workplace (Tables 8 and 9). Positive attitudes, intentions, and beliefs regarding breastfeeding in the workplace were positively and significantly correlated with each other (Tables 5 and 6). Studies show that breastfeeding education can positively affect attitudes, subjective norms and intentions to breastfeed (Kim, 1998; Kramer, et al., 2002). In the current study at baseline, attitudes toward breastfeeding in the workplace (Table 8) and at follow-up, beliefs toward breastfeeding (Table 9) were the primary positive predictors of intention to breastfeed in the workplace. At follow-up, significantly more participants, compared to baseline, agreed that either they or their significant others will breastfeed or express breastmilk while working outside the home. Consistent with previous findings (Losch, et al., 1995), Correlation analyses (Table 7) revealed that beliefs and intention regarding breastfeeding in the workplace were positively and significantly associated with breastfeeding practice. Participants' exposure to people who breastfed or supported breastfeeding in the workplace was found to be positively and significantly associated with breastfeeding knowledge and intention to breastfeed in the workplace at baseline (Table 5) and was also a positive predictor for breastfeeding knowledge at baseline (Table 8). Despite the positive association of exposure with attitudes and intentions regarding breastfeeding in the workplace at follow-up (Table 6), this variable did not enter into regression models to predict either attitudes or intentions.

Many studies have shown that one of the barriers to breastfeeding is work status. Research shows that there is competition between breastfeeding and employment (Meek, 2001) and that being employed full-time decreases breastfeeding initiation and duration (Frank, 1998). Participants who were employed full-time in the current study had significantly more positive intentions and beliefs about breastfeeding in the workplace compared to those who were not employed full-time. However, full-time employment was negatively and significantly associated with beliefs intentions to breastfeed in the workplace. Full-time employment was significantly associated with breastfeeding practice. These results are

consistent with previous findings where full-time employment was associated with breastfeeding duration and breastfeeding initiation (Auerbach and Guss, 1984; Dennis, 2002; Meek, 2001; Wright, 2001; Wright, Bauer, Naylor, Sutcliffe, & Clark, 1998)..

In nutrition students intention to breastfeed in the workplace did not only remain positive but also became stronger over time, suggesting that infant feeding decisions are made early in life. These findings are consistent with findings from earlier studies (Wambach and Cole, 2000; Weimann, DuBois, Berenson, 1998). A survey regarding factors influencing infant feeding decisions revealed that family was a major source of breastfeeding information for the mother, followed by friends (Arora, et al., 2000). In the current study, at the baseline and 5-year intervals, school, followed by mother and books were listed as major sources of breastfeeding information. Research shows that duration of maternity leave is significantly associated with duration of breastfeeding (Visness and Kennedy, 1997). Current study participants, at both intervals, selected paid maternity leave, return to the same or similar position after maternity leave, and flex-time jobs as important policies that corporations should endorse in order to facilitate breastfeeding in the workplace. Except for knowledge, participants with children had significantly higher scores on all the measures of breastfeeding in the workplace compared to those who did not have children (Table 3).

A study conducted to examine the relationship between breastfeeding intention and social support showed that male partners of pregnant women, older women from the community who were experienced in breastfeeding, family members, and peer educators played influential roles in breastfeeding intentions for the pregnant woman (Humphreys, et al., 1998). In another study, it was observed that the woman's mother, baby's father, and the woman's doctor strongly influenced the mother with her infant-feeding decisions (Kloebler-Tarver, Thompson, & Miner, 2002). In the present study at the 5-year interval, mother, spouse, and friends were identified as people who would influence the mother's choice/decision to breastfeed. Sources of breastfeeding information were found to be positively and significantly associated with breastfeeding knowledge, attitudes, beliefs, and intentions to breastfeed in the workplace (Tables 5 and 6). In regression models at baseline and follow-up, sources of breastfeeding information were included as positive predictors of

attitudes and intentions toward breastfeeding in the workplace, as well as number of places considered acceptable to breastfeed an infant (Tables 8 and 9).

Interestingly, sources of breastfeeding information at baseline were positively and significantly associated with intentions scores at follow-up (Table 7) and were positive predictors of intentions to breastfeed in the workplace (Table 9). Correlation analyses also revealed that exposure to people who breastfed or supported breastfeeding in the workplace and number of sources of breastfeeding information were positively and significantly associated with breastfeeding practice. These results suggest that breastfeeding information received early in life may be critical to infant feeding decisions made later in life.

Breastfeeding exposure, positive attitudes toward breastfeeding in the workplace, beliefs regarding breastfeeding in the workplace, intentions to breastfeed in the workplace, and sources of breastfeeding information were all positively and significantly associated with number of places considered acceptable to breastfeed an infant (Tables 5 and 6). However, only sources of breastfeeding information, attitudes regarding and beliefs regarding breastfeeding in the workplace (Tables 8 and 9) were positive predictors of number of places considered acceptable to breastfeed an infant. Studies have shown that students perceive breastfeeding as a private affair and do not consider breastfeeding in public acceptable (Forrester, Wheelock, & Warren, 1997; O'Keefe, Henly, & Anderson, 1998). Based on the present study, it is reasonable to suggest that nutrition students consider breastfeeding in public acceptable. However, it should be mentioned that the participants of this study recommended discretion when breastfeeding in public.

Similarly, breastfeeding exposure, positive attitudes, beliefs, and intentions regarding breastfeeding in the workplace and sources of breastfeeding information (Tables 5 and 6) were found to be positively and significantly associated with employment benefits, such as paid maternity leave for breastfeeding mothers. However, only beliefs, exposure and attitudes about breastfeeding in the workplace (Tables 8 and 9) were included as positive predictors of employment benefits for breastfeeding mothers. Previous research shows that duration of maternity leave was significantly associated with duration of breastfeeding (Visness and Kennedy, 1997), and the current study suggests that nutrition students recognize and prioritize this employment benefit for breastfeeding mothers.

Based on results of this five-year prospective study, it may be concluded that nutrition students not only retain their breastfeeding knowledge and positive attitudes and intentions regarding breastfeeding in the workplace but have increased them over time. Consistent with TPB, these results suggest that attitudes and beliefs are important predictors of intentions. However, attitudes, in this study, were predictors of beliefs but not vice versa. Also, as shown in other studies intentions, in our study, were related to breastfeeding initiation.

At the time of follow-up, only 22% of participants had children, but there was a significant association between intentions regarding breastfeeding in the workplace and breastfeeding practice. Literature shows that misinformation among teenagers about breastfeeding is rampant and that they are less likely to breastfeed. However, based on results of this study, it may be concluded that nutrition students are likely to breastfeed. One limitation to the present study is that information regarding confounding factors such as cultural and lifestyle factors, marital status, and socioeconomic status was not collected. Hence, it is difficult to decipher the independent effect of nutrition education on attitudes and intention to breastfeed in the workplace. Studies show that employment, especially full-time, is a barrier to breastfeeding. However, since nutrition students have adequate breastfeeding knowledge, positive attitudes, beliefs and intentions to breastfeed in the workplace, it is plausible to suggest that they are more likely to initiate and sustain breastfeeding in the workplace. Finally school remained a major source of breastfeeding information, while in school and in the workplace, suggesting that education can be used as a promotional strategy to positively influence breastfeeding intentions.

Almost all of the participants in this study were Caucasian (Table 1); thus, these results may not be generalizable to other ethnic groups. A study with a sample that is more representative of all ethnicities should be conducted. Also, most of the study participants were females; future studies should include greater numbers of male subjects to assess their breastfeeding knowledge and views about breastfeeding in the workplace. One of the major drawbacks of the study is that the questionnaire was pre-tested only for face validity but not for internal reliability or validity. Hence, it is difficult to assess the instrument's sensitivity and specificity. Since Phase II of this study was a follow-up survey, tracking participants was a problem. This study evaluated breastfeeding knowledge, attitudes, intentions and initiation of breastfeeding, but further research is needed to identify if breastfeeding knowledge, and

attitudes and intentions toward breastfeeding in the workplace are associated with duration of breastfeeding. However, our study findings indicate that nutrition education is very important to facilitate positive attitudinal changes regarding breastfeeding in the workplace. Nutrition graduates, not only as knowledgeable individuals, but also as health care professionals may be effective educators and promoters of breastfeeding.

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BREASTFEEDING KNOWLEDGE AND ATTITUDES, AND INTENTIONS
REGARDING BREASTFEEDING IN THE WORKPLACE AMONG UNIVERSITY
STUDENTS: A CROSS-SECTIONAL EVALUATION¹

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Abstract

Despite the health benefits of breastfeeding, only 31.4% of women in the United States are breastfeeding their infants at 6 months, far below the 50% goal of Healthy People 2010. Research shows that mothers who are unsure about their intentions to breastfeed are more susceptible to the attitudes of health professionals. Graduates of nutrition programs may serve as role models and advocates for breastfeeding; however, no study has been conducted to explore or assess breastfeeding knowledge, attitudes, and beliefs of students majoring in a nutrition program. The purpose of this study was to assess and compare breastfeeding knowledge and attitudes, and intentions regarding breastfeeding in the workplace among nutrition and non-nutrition students at Virginia Polytechnic Institute and State University. A cross-sectional study was conducted using a self-administered questionnaire distributed to 541 juniors, seniors and graduate students enrolled in nutrition ($n = 270$) and non-nutrition ($n = 271$) majors. Results showed that nutrition students had significantly higher scores on breastfeeding knowledge (6.72 ± 1.66 vs. 5.39 ± 1.98), positive attitudes (3.74 ± 0.50 vs. 3.56 ± 0.56), beliefs (4.12 ± 0.60 vs. 3.77 ± 0.77), and intentions (3.49 ± 0.55 vs. 3.18 ± 0.60) regarding breastfeeding in the workplace (all $P < 0.001$) compared to non-nutrition students, except for employment benefits for breastfeeding mothers. Overall, women in this study had significantly greater scores on breastfeeding knowledge (6.38 ± 1.71 vs. 5.27 ± 2.22), positive attitudes (3.72 ± 0.55 vs. 3.45 ± 0.48), beliefs (4.05 ± 0.67 vs. 3.66 ± 0.75), and intentions (3.44 ± 0.59 vs. 3.05 ± 0.54) regarding breastfeeding in the workplace (all $P < 0.001$) compared to men. In both nutrition and non-nutrition students, attitudes and beliefs were significant predictors (both $P < 0.001$) of intentions regarding breastfeeding in the workplace. In conclusion, nutrition students have adequate breastfeeding knowledge and positive attitudes, and intentions regarding breastfeeding in the workplace and may serve as effective role models to educate mothers, family members, and employers about the benefits of breastfeeding.

Introduction

Recognizing the extensive benefits of breastfeeding, the World Health Organization and the American Dietetic Association recommend exclusive breastfeeding of infants for the first six months and continued breastfeeding with complementary foods up to 12 months of age.^{1,2} According to the Department of Health and Human Services, in the year 2000, the breastfeeding initiation rate was 68.4%.² However, during the first 4-8 weeks postpartum, the rate of breastfeeding rapidly declined.³ Results of the Third National Health and Nutrition Examination Survey (phase II, 1991-1994) revealed that of the 8,765 children younger than six years of age, approximately 47% were exclusively breastfed at seven days, and 32% at two months of age.⁴

Support from governmental programs, health professionals, and education in schools are important for the promotion of breastfeeding and for bringing about changes in individual behavior. Yet, studies have shown that health care professionals have inadequate training in breastfeeding management.¹ In a study of 125 Puerto Rican health teachers, only 46.9% had positive attitudes towards breastfeeding, and 30.6% agreed that breastmilk should be offered as an alternative to artificial milk.⁵ Furthermore, 100% of these health teachers were against breastfeeding in public, with 99.2% of them indicating that breastfeeding should be done only at home.⁵ Among primiparous mothers in Hawaii, negative opinions of physicians and the infant's father were shown to increase the likelihood of formula feeding.⁶ Results of a survey of midwives and health visitors conducted to assess their attitudes toward breastfeeding showed that 28% of these health professionals disagreed that breastfed babies were healthier, and 37% disagreed that type of feeding influenced the health of the baby.⁷

A survey of 1,122 pediatricians conducted to assess pediatricians' practices and attitudes regarding breastfeeding promotion in the United States (U.S.) revealed that only 11% of them informed pregnant women about breastfeeding.⁸ In another survey of 1,200 obstetricians, 23.3% (1 of 4) of obstetricians responded that they would give infant formula, as a gift pack, to women.⁹ Research shows that mothers who are unsure about their intention to breastfeed are more susceptible to the attitudes of health professionals.¹⁰ Students majoring in health-related fields who receive nutrition education, including optimum infant feeding methods, may be future role models and advocates for breastfeeding. However, in a survey of 390 nurses in Utah hospitals, only 2.1% identified dietitians as a professional expected to

offer practical breastfeeding advice or techniques. The authors concluded that the participation of dietitians was minimal in assisting mothers in initiation and continuance of breastfeeding.¹¹

Effective educational efforts require knowledgeable health professionals to drive these efforts; thus, students majoring in health sciences such as nutrition should be thoroughly educated and trained to support and advocate breastfeeding. Students, majoring in nutrition in their roles as community nutritionists, dietitians, lactation consultants, peer counselors, teachers, and mothers may play important roles as advocates for breastfeeding. Provided that they have adequate knowledge and positive attitudes about breastfeeding, they may influence cultural beliefs and social norms to support breastfeeding. Although breastfeeding promotion or intervention programs have focused on educating mothers, family members, and employers about the benefits of supporting breastfeeding, not much attention has been drawn to health professionals influencing these target groups. The purpose of this study was to assess and compare breastfeeding knowledge and attitudes, and intentions regarding breastfeeding in the workplace among nutrition (HNFE) and non-nutrition (non-HNFE) students at Virginia Polytechnic Institute and State University (VT). It was hypothesized that students majoring in nutrition would have higher scores on breastfeeding knowledge and attitudes scales, and intentions regarding breastfeeding in the workplace compared to non-nutrition students.

Methods

A cross-sectional study was conducted to examine VT students' breastfeeding knowledge and attitudes, and intentions regarding breastfeeding in the workplace. This study was conducted in the spring of 2004. The study sample included juniors, seniors and graduate students enrolled in HNFE and non-HNFE majors at VT. Mixed-mode survey procedures were used to collect data. A Web-based version of the "Breastfeeding in the Workplace" (Appendix A) questionnaire, used in a previous study,¹² was used to assess breastfeeding knowledge, and attitudes and intentions regarding breastfeeding in the workplace among students at VT. All students at VT had electronic-mail (e-mail) accounts in the university system and opportunities to access the World Wide Web. Thus, an Internet survey was used to eliminate postage costs and to enhance response time. However, an insufficient response rate with the Web-based survey resulted in the use of a paper-based, self-administered survey to collect data.

After receiving approval from the Institutional Review Board for Research Involving Human Subjects at VT, the self-administered, Web-based questionnaire was distributed to all juniors, seniors, and graduate students enrolled in the Human Nutrition Foods and Exercise (HNFE) Department. The list of nutrition students was obtained from the HNFE departmental records. A total of 384 juniors, seniors, and graduate students enrolled in HNFE were included in the study. The sample of non-HNFE junior, senior, and graduate students was obtained by identifying large classes, such as theater and personal health, in which students from a variety of VT majors were enrolled. The instructor of each non-HNFE course was requested to announce the study in class. An e-mail message describing the study and including the Web address of the survey was distributed to all the potential participants by the program coordinator for HNFE students and each class instructor of non-HNFE students. After the initial contact, three follow-up e-mail messages with the Web address of the survey were sent after 1, 3, and 7 weeks. After week seven, a paper-based survey was distributed in nutrition classes to non-respondents in the HNFE group, until the response rate was $\geq 70\%$. In order to have equal number of participants in both study groups, non-respondents in the non-HNFE group completed an in-class, paper-based survey. Participants were asked to not complete the paper-based survey if they had already taken the Internet survey. In the HNFE group, 173 students completed the Web-based survey, and 102 students took the paper-based survey. In the non-HNFE group, 229 students took the Internet survey, and 46 students completed the paper-and-pencil survey. Five surveys in the HNFE group and four surveys in the non-HNFE group were not usable, reducing the number of study participants to 270 in the HNFE group and 271 in the non-HNFE group.

The Web-based survey responses and paper-and-pencil survey responses were compared to test for measurement differences. Measurement differences were not observed likely due to the homogeneity of the study sample. Since the questionnaire was anonymous, non-response error could not be estimated. An information sheet, which also served as an implied consent form, was provided to all study participants. Access to the study was password protected to limit access only to individuals in the subject pool. Questions on the Web-based survey were in a conventional format, similar to the format

used on the paper-based, self-administered questionnaire. Participation in the study was voluntary.

The “Breastfeeding in the Workplace” questionnaire was pre-tested for face validity by experts in the field of nutrition and breastfeeding. The questionnaire contained closed-ended, attitude-based questions with ordered response categories and closed-ended questions with unordered response categories and questions to collect demographic information. The 47-item survey was comprised of 10 knowledge, 5 exposure, 16 attitude, 7 intention, and 5 belief questions. The 10 knowledge-based questions required “True,” “False,” or “Don’t know” responses. Responses to the knowledge questions were scored from 0-10, depending on the number of correct answers. All questions were equally weighted (0 points if not correct; 1 point if correct). The exposure-based questions required “Yes” or “No” responses. The possible range for the exposure subscale was 1-5, with a higher score corresponding to more exposure (0 points if no; 1 point if yes). A 5-point Likert-type scale response format was used to score attitudes, intentions, and beliefs statements, with 1 being the most negative (Strongly Disagree/Definitely No/Very Unimportant) and 5 the most positive (Strongly Agree/Definitely Yes/Very Important). Separate scores were generated for knowledge, exposure, attitudes, intentions, and beliefs subscales. Responses to items associated with attitudes, intentions, and beliefs were summed, and the sum was divided by the number of items responded to create mean outcome scores.

The breastfeeding attitude variable had 16 attitudinal statements; however, due to possible ambiguity, two attitude items were not included in the final data analysis. Eight of the attitudinal statements were negatively worded to minimize social desirability in responses, and before calculation of the mean, these questions were reverse scored so that in all cases, the higher the score, the more positive the attitude. A higher total score (range: 1-5) denoted that participants had more positive breastfeeding attitudes, intentions, and beliefs. For some other items, students were asked to check as many options as applied. The “Check all that Apply” questions collected information on sources from which students obtained breastfeeding information, people who influence the mother’s decision to breastfeed, suitable places for breastfeeding, and employment benefits for breastfeeding mothers. Responses to items associated with the “Check all that

Apply” questions were summed and the possible range for “sources from which students obtained breastfeeding information” was 0-22; the possible range for “people who influence the mother’s decision to breastfeed” was 0-9; the possible range for “suitable places for breastfeeding” was 0-17; the possible range for “employment benefits for breastfeeding mothers” was 0-8. The remaining questions elicited demographic information, such as level and year in school, highest degree obtained, age, ethnicity, and gender.

Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS for Windows, version 12.0, 2001, SPSS, Chicago, IL). Descriptive statistics were used to analyze demographic data, and presented as proportions of respondents (mean \pm SD). Independent student *t*-tests were used to compare HNFE versus non-HNFE groups. One-way analysis of variance (ANOVA) was used to examine within group differences due to ethnicity and year in school. Bivariate Pearson’s and Spearman’s correlation coefficients were calculated for HNFE and non-HNFE groups to examine simple relationships between scores of knowledge, attitudes, and other measures of breastfeeding in the workplace as well as with demographic variables. Stepwise linear regression analyses were conducted in both groups, with measures of breastfeeding in the workplace as dependent as well as independent variables. Variables were entered and removed from models at $\alpha = 0.10$ and 0.15 , respectively. Statistical significance was set at $P < 0.05$, using one and two-tailed comparisons.

Results

Analyses of data showed that the proportion of women in the HNFE group was significantly higher ($\chi^2 = 10.92$, $P = 0.001$) compared to the non-HNFE group. Students in the non-HNFE group were significantly older ($P < 0.05$) compared to participants in the HNFE group. Characteristics of study participants are shown in Table 1. Respondents in both groups were predominantly Caucasian and undergraduate students. Scores of breastfeeding knowledge and attitudes, and other measures of breastfeeding in the workplace in HNFE and non-HNFE groups are presented in Table 2. Nutrition students had significantly higher scores on all measures of breastfeeding in the workplace compared to non-nutrition students, except employment benefits for breastfeeding mothers (Table 2). Within the HNFE group, independent *t*-tests showed that graduate students had more positive attitudes (4.02 ± 0.39 vs.

3.71 ± 0.51, $P=0.002$) and beliefs (4.41 ± 0.49 vs. 4.09 ± 0.61, $P=0.006$) regarding breastfeeding in the workplace compared to undergraduate students. In the non-HNFE group, graduate students had significantly higher scores on knowledge, exposure, attitudes, beliefs, intentions, and suitable places to breastfeed (Table 3) compared to undergraduate students. Overall, women in this study had significantly higher scores on most measures of breastfeeding in the workplace compared to men (Table 4). Even when categorized by groups, differences between genders remained significant for most of the scores (Table 4).

One-way ANOVA revealed that, for the entire study population, there were significant differences between ethnic groups in knowledge ($P<0.001$), exposure ($P=0.012$), and sources of breastfeeding information ($P=0.038$). When categorized by study group, no significant differences were found in any of the scores due to ethnicity in the HNFE group. However, in the non-HNFE group, sources of breastfeeding information was significantly higher ($P<0.05$) in African-Americans compared to Caucasians. Overall, graduate students (M.S. and Ph.D.) had significantly more positive attitudes and beliefs compared to juniors and seniors (both $P<0.05$). These differences in measures of breastfeeding in the workplace remained significant between undergraduate and graduate students, even when categorized by study group. In the HNFE group, a significant difference in attitudes ($P=0.034$) was found between level in school. In the non-HNFE group, graduate students had significantly more breastfeeding knowledge, positive attitudes, beliefs, and intentions (all $P<0.05$) regarding breastfeeding in the workplace, compared to juniors and seniors.

Chi-square analyses showed that more HNFE students listed school (80.6% vs. 31.4%, $P<0.001$) and more non-HNFE students listed mother (69.1% vs. 53.6%, $P=0.001$) as major sources of breastfeeding information. Although there was no significant difference, more HNFE students selected books (35.0% vs. 27.4%), next to school and mother, as major sources of breastfeeding information compared to non-HNFE students. A higher proportion of HNFE students indicated the workplace as a suitable place to breastfeed an infant (64.8% vs. 41.8%, $P<0.001$) compared to non-HNFE students. Results also showed that a higher proportion of HNFE students selected paid, extended maternity leave (61.4% vs. 38.1%, $P<0.001$) as a necessary employment benefit for the breastfeeding mother compared to non-HNFE students. More non-HNFE students selected return to the same or similar position after maternity leave (68.8% vs. 41.3%, $P<0.001$) as an important policy for corporations to facilitate breastfeeding

Table 1: Characteristics of HNFE and non-HNFE students

Characteristic	HNFE n (%)	Non-HNFE n (%)
Gender		
**Women	212 (78.5)	175 (64.6)
Men	57 (21.1)	90 (33.2)
No response	1 (0.4)	6 (2.2)
*Age (y) ¹	21.67 ± 2.84 ²	22.29 ± 3.65 ³
Ethnicity		
Caucasian	214 (79.2)	172 (63.4)
African-American	17 (6.3)	17 (6.3)
Asian	8 (3.0)	40 (14.8)
Other	16 (5.9)	19 (7.0)
No response	15 (5.6)	23 (8.5)
Year in school		
Junior	120 (44.4)	101 (37.3)
Senior	125 (46.3)	134 (49.5)
M.S. student	14 (5.2)	15 (5.5)
Ph.D. student	11 (4.1)	21 (7.7)

¹Mean ± SD²n=264³n=268

*P≤0.05

**P≤0.001

Table 2: Breastfeeding knowledge, attitudes, and other outcome measures of HNFE and non-HNFE students

Variable	HNFE ¹	Non-HNFE ²	P value ³
Knowledge	6.72 ± 1.66 ⁴	5.39 ± 1.98	<0.001
Exposure	1.61 ± 1.30	0.69 ± 0.96	<0.001
Attitudes	3.74 ± 0.50	3.56 ± 0.56	<0.001
Beliefs	4.12 ± 0.60	3.77 ± 0.77	<0.001
Intentions	3.49 ± 0.55	3.18 ± 0.60	<0.001
Sources of breastfeeding information	3.41 ± 2.54	2.35 ± 2.08	<0.001
People who influence breastfeeding choice	3.84 ± 2.53	3.01 ± 2.20	<0.001
Suitable places to breastfeed	5.94 ± 3.94	4.93 ± 3.47	0.002
Employment benefits	3.12 ± 1.91	3.14 ± 2.04	NS ⁵

¹n=270

²n=271

³HNFE vs. non-HNFE using independent *t*-tests

⁴Mean ± SD

⁵NS = not significant

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

People, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Table 3. Breastfeeding knowledge, attitudes, and other measures of breastfeeding in the workplace among graduate and undergraduate students in the non-HNFE group¹

Variable	Graduate students ²	Undergraduate students ³	P value ⁴
Knowledge	6.11 ± 1.83 ⁵	5.27 ± 1.98	0.008
Exposure	1.03 ± 1.24	0.64 ± 0.90	0.011
Attitudes	3.86 ± 0.44	3.51 ± 0.56	<0.001
Beliefs	4.21 ± 0.49	3.67 ± 0.78	<0.001
Intentions	3.49 ± 0.53	3.13 ± 0.60	0.001
Suitable places	6.11 ± 4.48	4.74 ± 3.24	0.012

¹n=271

²n=36

³n=235

⁴Graduate vs. undergraduate students using independent *t*-tests

⁵Mean ± SD

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Table 4. Breastfeeding knowledge, attitudes, and other outcome measures of female and male students at Virginia Tech¹

Variable	Female ²	Male ³	P value ⁴	HNFE	Non-HFNE
Knowledge	6.38 ± 1.71 ⁵	5.27 ± 2.22	<0.001	0.001	<0.001
Exposure	1.31 ± 1.29	0.77 ± 0.98	<0.001	0.004	<0.01
Attitudes	3.72 ± 0.55	3.45 ± 0.48	<0.001	<0.001	0.003
Beliefs	4.05 ± 0.67	3.66 ± 0.75	<0.001	0.001	<0.001
Intentions	3.44 ± 0.59	3.05 ± 0.54	<0.001	<0.001	<0.001
Sources of breastfeeding information	3.13 ± 2.42	2.33 ± 2.16	<0.001	0.02	<0.05
People who influence breastfeeding choice	3.37 ± 2.38	3.61 ± 2.48	NS ⁶	0.013	NS
Suitable places to breastfeed	5.61 ± 3.94	5.11 ± 3.83	NS	NS	NS
Employment benefits	3.25 ± 1.97	2.85 ± 1.96	0.019	NS	NS
Age (y)	21.96 ± 3.57	22.03 ± 2.39	NS	NS	NS

¹n=534

²n=387

³n=147

⁴Females vs. males using independent *t*-tests

⁵Mean ± SD

⁶NS = not significant

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)
Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)
People, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)
Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)
Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

in the workplace. Change in response proportions for selected questions of various measures of breastfeeding in the workplace in HNFE and non-HNFE students are presented in Table 5. These differences in responses remained significant even when categorized by gender. More women (59.6%) and men (50.6%) in the HNFE group agreed that infants consuming breastmilk have fewer ear infections compared to women (40.4%) and men (49.4%) in the non-HNFE group ($P=0.001$ for both genders). Significantly more women (58.0%) and less men (43.6%) in the HNFE group agreed that immune systems are more developed in breast-fed infants compared to women (42.0%) and men (56.4%) in the non-HNFE group ($P<0.001$ for females and $P=0.018$ for males). Similarly, more women (59.7%) and less men (48.9%) in the HNFE group believed that it is important that a woman breastfeeds her infant compared to the non-HNFE group (40.3%, 51.1%, $P\leq 0.01$ for both genders). Significantly more women in the HNFE group indicated that they would breastfeed their children (57.2% vs. 42.8%, $P=0.037$) and would do so even while working outside the home (62.5% vs. 37.5%, $P=0.005$) compared to women in the non-HNFE group, respectively.

In the HNFE group, age was significantly and positively associated with attitudes ($r=0.13$), beliefs ($r=0.15$), sources of breastfeeding information ($r=0.13$), number of places considered appropriate to breastfeed ($r=0.15$) (all $P<0.05$), breastfeeding exposure ($r=0.16$, $P<0.01$), and employment benefits for breastfeeding mothers ($r=0.18$, $P<0.01$). Table 6 displays correlation coefficients for bivariate relationships between knowledge, attitudes, and other measures of breastfeeding in the workplace scores of HNFE students. There were significant and positive associations between attitudes, beliefs, and intentions (all $P<0.01$) regarding breastfeeding in the workplace. Sources of breastfeeding information was positively and significantly associated with knowledge, attitudes, beliefs, and intentions regarding breastfeeding in the workplace (all $P<0.01$). Breastfeeding knowledge, attitudes, beliefs, and intentions regarding breastfeeding in the workplace, and sources of breastfeeding information (all $P<0.01$), were found to have positive and significant relationships with employment benefits for breastfeeding mothers.

Pearson's correlation analyses showed that there were positive and significant relationships between gender and knowledge, attitudes, beliefs, and intentions regarding breastfeeding in the workplace (all $P<0.01$). However, level in school (graduate or

Table 5. Proportion of responses for selected questions on breastfeeding knowledge and attitudes, beliefs, and intentions regarding breastfeeding in the workplace in HNFE and non-HNFE groups

Variable	Question	Response	HNFE ¹ %	Non-HNFE ² %
Knowledge	1. According to the American Dietetic Association, the optimal duration of breastfeeding an infant is a minimum of twelve months	True	64.1	45.8 ³
	2. Infant formula contains all ingredients found in human breastmilk	False	96.3	88.9 ⁴
	3. Infants consuming breastmilk have fewer ear infections than infants consuming formula	True	79.6	59.8 ⁵
	4. Immune systems of breast-fed infants are more developed than immune systems of formula-fed infants	True	94.1	80.1 ⁶
Attitudes	1. Women who want to breastfeed their infants should not work outside the home	Agree ⁷	4.8	8.5
	2. Female bosses are more supportive of breastfeeding or expressing breastmilk in the workplace than are male bosses	Disagree ⁸	11.1	13.7
	3. It is acceptable for women to breastfeed their infants or express their breastmilk during working hours	Disagree ⁸	12.2	17.3
	4. Breastfeeding or expressing breastmilk in the workplace will interfere with work productivity	Agree ⁷	17.4	22.1
	5. The public image of a corporation will be negative if women employees are allowed to breastfeed or express breastmilk at work	Agree ⁷	8.9	12.9
	6. Women should not breastfeed or express breastmilk at work because it would be embarrassing to coworkers	Agree ⁷	8.5	12.5
	7. Women should not breastfeed or express breastmilk at work because it is unattractive	Agree ⁷	5.6	8.9
	8. A woman who breastfeeds or expresses breastmilk at work should not be paid for the time spent breastfeeding or expressing breastmilk	Agree ⁷	22.6	35.8 ⁹
	9. Absenteeism will decrease in women allowed to breastfeed or express breastmilk at work	Disagree ⁸	10.4	5.5 ¹⁰

Table 5 continued

Variable	Question	Response	HNFE ¹ %	Non-HNFE ² %
Intention	1. I or my significant other will breastfeed my/our child	Yes ¹¹	82.2	69.0 ¹²
	2. I or my significant other will breastfeed or express breastmilk while working outside the home	Yes ¹¹	44.4	32.5 ¹³
	3. I or my significant other will provide breastmilk for my/our child whenever it is hungry, even at work	Yes ¹¹	64.1	42.8 ¹⁴
Beliefs	1. How important is it that a woman breastfeed her infant?	Important ¹⁵	80.0	60.9 ¹⁶
	2. How important is that employers support breastfeeding or expressing breastmilk in the workplace?	Important ¹⁵	83.0	62.7 ¹⁷

¹n=270

²n=271

³ $P \leq 0.001$, $\chi^2 = 18.33$

⁴ $P = 0.001$, $\chi^2 = 10.72$

⁵ $P \leq 0.001$, $\chi^2 = 25.23$

⁶ $P \leq 0.001$, $\chi^2 = 23.53$

⁷Includes "Strongly Agree" responses

⁸Includes "Strongly Disagree" responses

⁹ $P = 0.001$, $\chi^2 = 11.40$

¹⁰ $P \leq 0.001$, $\chi^2 = 11.40$

¹¹Includes "Definitely Yes" responses

¹² $P \leq 0.001$, $\chi^2 = 12.81$

¹³ $P = 0.004$, $\chi^2 = 8.19$

¹⁴ $P \leq 0.001$, $\chi^2 = 24.60$

¹⁵Includes "Very Important" responses

¹⁶ $P \leq 0.001$, $\chi^2 = 23.73$

¹⁷ $P \leq 0.001$, $\chi^2 = 27.98$

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Table 6. Pearson correlation coefficients for breastfeeding in the workplace measures for HNFE students¹

Variable	Knowledge	Exposure	Attitudes	Beliefs	Intentions	Sources	Influence	Suitable places	Employment benefits
Knowledge	1								
Exposure	0.25**	1							
Attitudes	0.32**	0.21**	1						
Beliefs	0.22**	0.20**	0.72**	1					
Intentions	0.25**	0.25**	0.72**	0.71**	1				
Sources	0.23**	0.37**	0.16**	0.19**	0.25**	1			
Influence	0.14*	0.14*	0.19**	0.19**	0.12	0.22**	1		
Suitable places	0.26**	0.21**	0.40**	0.42**	0.47**	0.24**	0.19**	1	
Employment benefits	0.29**	0.13*	0.25**	0.17**	0.20**	0.18**	0.06	0.23**	1
Level	0.04	0.09	0.17**	0.15*	0.07	-0.01	0.09	0.05	0.12*
Gender²	0.19**	0.16**	0.24**	0.19**	0.26**	0.12**	-0.13*	0.08	0.11
Year³	0.12	0.14*	0.11	0.10	0.05	0.05	0.03	0.16*	0.05

¹n=270

²n=269

³Spearman's correlation

* $p \leq 0.05$; ** $p \leq 0.01$

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Influence, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Level- Undergraduate(1), Graduate(2)

Gender- Male (0), Female(1)

Year- Junior(4), Senior(5), Mater's(6), and PhD(7)

Table 7. Pearson correlation coefficients for breastfeeding in the workplace measures for non-HNFE students¹

Variable	Knowledge	Exposure	Attitudes	Beliefs	Intentions	Sources	Influence	Suitable places	Employment benefits
Knowledge	1								
Exposure	0.23**	1							
Attitudes	0.32**	0.21**	1						
Beliefs	0.32**	0.22**	0.77**	1					
Intentions	0.13*	0.19**	0.64**	0.69**	1				
Sources	0.28**	0.39**	0.14*	0.20**	0.14*	1			
Influence	0.16**	0.04	0.15*	0.16**	0.10	0.26**	1		
Suitable places	0.15*	0.12	0.42**	0.40**	0.34**	0.23**	0.22**	1	
Employment benefits	0.26**	0.18**	0.29**	0.30**	0.25**	0.19**	0.22**	0.24**	1
Level³	0.14*	0.14*	0.21**	0.22**	0.20**	0.09	-0.02	0.13*	0.05
Gender²	0.24**	0.15*	0.16**	0.23**	0.25**	0.12*	-0.01	-0.01	0.07
Year³	0.18**	0.03	0.21**	0.19**	0.10	0.10	-0.02	0.09	0.03

¹n=271

²n=265

³Spearman's correlation

* $p \leq 0.05$; ** $p \leq 0.01$

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Influence, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Level- Undergraduate(1), Graduate(2)

Gender- Male (0), Female(1)

Year- Junior(4), Senior(5), Mater's(6), and PhD(7)

Table 8. Stepwise linear regression models for knowledge, exposure, attitudes, beliefs, intentions, suitable places, and employment benefits related to breastfeeding in the workplace of HNFE students (n=270)

Dependent Variable	Predictor	R ²	Model Adjusted R ²	Unstandardized β (Standard Error)	Standardized β	t-Value	Model p-value
Knowledge		0.03	0.07	0.592(0.231)	0.156	0.011	<0.001
	Constant			6.024(0.179)		<0.001	
	Exposure	0.06		0.242(0.079)	0.193	0.003	
	Sources	0.02		9.556(0.041)	0.149	0.019	
Exposure		0.02	0.02				0.007
	Constant			0.109(0.557)		0.845	
	Age (y)	0.03		6.973(0.026)	0.165	0.007	
Attitudes		0.11	0.13				<0.001
	Constant			2.971(0.125)		<0.001	
	Knowledge	0.11		8.710(0.018)	0.282	<0.001	
	Influences	0.02		2.673(0.012)	0.134	0.021	
	Exposure	0.01		4.709(0.023)	0.121	0.041	
Beliefs		0.52	0.52				<0.001
	Constant			0.890(0.191)		<0.001	
	Attitudes	0.52		0.865(0.051)	0.723	<0.001	
Intention		0.07	0.61				<0.001
	Constant			0.475(0.209)		0.024	
	Attitudes	0.52		0.483(0.061)	0.439	<0.001	
	Beliefs	0.07		0.354(0.052)	0.385	<0.001	
	Sources	0.01		2.396(0.009)	0.110	0.006	
	Age (y)	<0.01		-1.540(0.007)	-0.086	0.029	
Suitable places		0.02	0.26				<0.001
	Constant			-10.599(1.979)		<0.001	
	Intention	0.22		2.952(0.388)	0.416	<0.001	
	Knowledge	0.02		0.302(0.133)	0.125	0.023	
	Age (y)	0.01		0.160(0.068)	0.125	0.018	
	Influences	0.01		0.195(0.083)	0.125	0.02	
Employment benefits		0.09	0.13				<0.001
	Constant			-2.891(1.068)		0.007	
	Knowledge	0.09		0.276(0.071)	0.236	<0.001	

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Influence, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Variables were entered and removed from models at $\alpha = 0.10$ and 0.15 respectively

Independent variables- Age, Knowledge, Attitudes, Intentions, Beliefs, Sources, influence, Suitable places, and Employment benefits

Table 9. Stepwise linear regression models for knowledge, exposure, attitudes, beliefs, intentions, suitable places, and employment benefits related to breastfeeding in the workplace of non- HNFE students (n=271)

Dependent Variable	Influences Predictor	R²	Model Adjusted R²	Unstandardized β (Standard Error)	Standardized β	P-value	Model p-value
Knowledge		0.02	0.09	0.129(0.054)	0.149	0.018	<0.001
	Constant			4.674(0.180)		<0.001	
	Sources	0.08		0.217(0.061)	0.226	<0.001	
	Exposure	0.02		0.295(0.131)	0.144	0.025	
Exposure			0.03				0.004
	Constant			-0.337(0.363)		0.354	
	Age (y)	0.03		4.637(0.176)	0.176	0.004	
Attitudes			0.13				<0.001
	Constant			2.646(0.214)		<0.001	
	Knowledge	0.11		8.132(0.017)	0.285	<0.001	
	Age (y)	0.02		1.887(0.009)	0.122	0.037	
	Exposure	0.01		7.081(0.035)	0.121	0.044	
Beliefs			0.61				<0.001
	Constant			-1.930(0.190)		0.919	
	Attitudes	0.60		1.038(0.053)	0.762	<0.001	
	Sources	0.01		3.758(0.015)	0.101	0.01	
Intention			0.51				<0.001
	Constant			0.739(0.168)		<0.001	
	Beliefs	0.47		0.379(0.054)	0.478	<0.001	
	Attitudes	0.04		0.347(0.074)	0.322	<0.001	
	Knowledge	0.02		-4.130(0.014)	-0.135	0.004	
Suitable places			0.22				<0.001
	Constant			-4.797(1.216)			
	Attitudes	0.20		2.585(0.337)	0.424	<0.001	
	Sources	0.02		0.260(0.092)	0.156	0.005	
Employment benefits			0.13				<0.001
	Constant			-1.092(0.754)		0.149	
	Attitudes	0.09		0.836(0.222)	0.231	<0.001	
	Knowledge	0.03		0.168(0.063)	0.164	0.008	

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Exposure, range = 0(low)-5(high); Yes (1 point), No (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Intentions, range = 1(no)-5(yes); Definitely No (1 point), Definitely Yes (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Influence, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Variables were entered and removed from models at $\alpha = 0.10$ and 0.15 respectively

Independent variables- Age, Knowledge, Attitudes, Intentions, Beliefs, Sources, Influence, Suitable places, and Employment benefits

undergraduate level) was positively and significantly associated only with attitudes ($P<0.01$) and intentions ($P<0.05$) regarding breastfeeding in the workplace.

Table 7 displays correlation coefficients for bivariate relationships between scores of knowledge, attitudes, and other measures of breastfeeding in the workplace of non-HNFE students. In the non-HNFE group, there were positive and significant relationships between age and exposure ($r=0.17$), attitudes ($r=0.17$), beliefs ($r=0.19$), and intentions ($r=0.16$) (all $P<0.01$) regarding breastfeeding in the workplace. Positive and significant associations were also found between attitudes and beliefs and intentions (both $P<0.01$) regarding breastfeeding in the workplace. Sources of breastfeeding information were positively and significantly associated with breastfeeding knowledge and beliefs (both $P<0.01$) and with attitudes and intentions (both $P<0.05$) regarding breastfeeding in the workplace. Unlike the HNFE group, level in school in the non-HNFE group was positively and significantly associated with most of the measures of breastfeeding in the workplace (Table 7). Pearson's correlation analyses showed that gender was positively and significantly associated with knowledge, attitudes, beliefs and intentions (all $P<0.01$) regarding breastfeeding in the workplace. Gender also had positive and significant relationships with exposure and sources of breastfeeding information (both $P<0.05$). Race was found to have a negative and significant ($r=-0.16$, $P<0.01$) relationship with breastfeeding knowledge and places considered suitable to breastfeed an infant ($r=-0.12$, $P<0.05$). Stepwise linear regression analyses were conducted between HNFE and non-HNFE students' scores of breastfeeding in the workplace (Tables 8 and 9) with age and select measures of breastfeeding in the workplace.

Discussion

The primary aim of this study was to examine HNFE and non-HNFE students' breastfeeding knowledge and attitudes, and intentions regarding breastfeeding in the workplace. The mean scores of breastfeeding knowledge, exposure, attitudes, beliefs, intentions, sources of breastfeeding information, and number of people who influence breastfeeding choice (Table 2) were significantly higher in the HNFE group compared to the non-HNFE group. These findings suggest that students at VT, in general, have adequate breastfeeding knowledge, and positive attitudes, beliefs and intentions regarding breastfeeding in the workplace, significantly more so in HNFE students. Spearman's correlation analyses showed that, in non-HNFE students, there was a positive and significant association between

level in school and breastfeeding knowledge. However, no such association was found in the HNFE group. This implies that there is no gain in breastfeeding knowledge in nutrition students, as they continue their nutrition-related education. Contrary to previous findings,^{7,13,14,15} students, especially nutrition students, in our study had adequate breastfeeding knowledge and positive attitudes toward breastfeeding in the workplace (Table 2). Approximately 95% of HNFE students agreed that breastfeeding is more beneficial to the infant than formula feeding (Table 5).

Our study results are consistent with previous findings in that males have more incorrect beliefs about breastfeeding compared to females.¹⁶ Women in our study had significantly higher scores on all the measures of breastfeeding in the workplace (Table 2). However, when categorized by study group, chi-square analyses showed that more men in the HNFE group had positive attitudes, beliefs and intentions regarding breastfeeding in the workplace compared to men in the non-HNFE group. These results emphasize the importance of nutrition/breastfeeding education, noted in previous studies,¹⁷ to positively influence attitudes and intentions regarding breastfeeding in the workplace among adolescents.

Data from the National Survey of Family Growth showed that race had an independent effect on the decision to breastfeed, with black women 2.5 times less likely to breastfeed compared to white women.¹⁸ Consistent with these findings, race in the non-HNFE group was found to have a negative and significant association with breastfeeding knowledge and with number of places considered suitable for breastfeeding an infant. Although not significant, we also found that in the non-HNFE group, ethnicity was negatively associated with attitudes toward breastfeeding in the workplace (Table 7). In both HNFE and non-HNFE groups, breastfeeding knowledge was positively and significantly associated with all the measures of breastfeeding in the workplace (Tables 6 and 7). Stepwise linear regression analyses showed that, in HNFE students, breastfeeding knowledge was a positive predictor of attitudes toward breastfeeding in the workplace and places considered suitable to breastfeed an infant (Table 8). Interestingly, breastfeeding knowledge in the non-HNFE group was a significant but negative predictor of intention to breastfeed in the workplace (Table 9). In the HNFE group, breastfeeding attitudes, beliefs, and sources of breastfeeding information were all positive predictors of intention to breastfeed in the workplace (Table 8). However, age in the HNFE

group was not associated with intentions and was a negative predictor of intention to breastfeed in the workplace (Tables 6 and 8). Based on these results and in view of previous findings,^{3,12,19,20} it may be suggested that nutrition students make their infant feeding decisions before or very early in pregnancy and hence, as research shows,²¹ are more likely to continue breastfeeding for a longer time.

In our study, significantly more HNFE students, compared to non-HNFE students, indicated that breastfeeding in the workplace was acceptable. Contrary to previous findings,^{5,22,23} our study results indicate that students at VT are more agreeable to breastfeeding in public places than other study populations. Overall, students in our study had a mean score of 5.43 ± 3.74 for number of places suitable to breastfeed an infant. Sources of breastfeeding information were also positively and significantly associated with all measures of breastfeeding in the workplace (Tables 6 and 7) and in HNFE students, sources of breastfeeding information were positive predictors of breastfeeding knowledge and intention to breastfeed (Table 8). In non-HNFE students, sources of breastfeeding information were positive predictors of breastfeeding knowledge, beliefs, and places considered suitable to breastfeed an infant (Table 9). Significantly more HNFE students identified school as their primary source of breastfeeding information compared to non-HNFE students, and significantly more non-HNFE students listed mother as their primary source of breastfeeding information compared to HNFE students. These results suggest that breastfeeding education, at an early age, is important to inculcate positive attitudes towards breastfeeding in the workplace in adolescents. Moreover, since “mother” seems to be the primary source of breastfeeding information for students in non-health related fields, breastfeeding promotion programs should target mothers.

In both HNFE and non-HNFE groups, there were positive and significant associations between attitudes, beliefs, and intentions regarding breastfeeding in the workplace (Tables 6 and 7). Linear regression models revealed that in both HNFE and non-HNFE students, attitudes and beliefs were positive and independent predictors of intentions to breastfeed in the workplace (Tables 8 and 9). We found that a significantly greater number of HNFE students, compared to non-HNFE students, indicated that they or their significant others will breastfeed their children and will do so even while working outside the home (Table 5). Thus,

it can be suggested that nutrition education is effective in positively influencing breastfeeding attitudes and intentions in these future health care professionals.

A survey completed by 367 primiparous and 596 multiparous, primarily minority, women receiving services in a public hospital showed that the woman's mother, baby's father, and the woman's doctor strongly influenced the mother in making her infant-feeding decisions.²⁴ In an 8-week cohort study of 522 women, it was reported that more calls were made to family and friends to discuss breastfeeding problems compared to health professionals, including lactation consultants, obstetricians or physicians.²⁵ Consistent with these findings, students in the present study indicated that mother, followed by spouse and friends, were primary people who influence a mother's breastfeeding choice.

Among primiparous mothers in Hawaii, negative opinions of physicians and infant's father were shown to increase the likelihood of formula feeding.⁶ Studies have shown that health care professionals such as physicians have inadequate training in breastfeeding management.¹ However, research shows that postpartum assistance from a lactation consultant increases breastfeeding rates among educated mothers.^{26,27} Since nutrition students in our study have positive attitudes and intentions regarding breastfeeding in the workplace (Table 2), it is possible that they will positively influence breastfeeding attitudes and intentions of target populations.

According to the TPB, attitude, subjective norm, and perceived control very closely predict intention, which determines behavior²⁸. The constructs of TPB are that intention is predicted by attitude toward the behavior and subjective norm. Attitude in turn is predicted by beliefs about outcomes of the behavior and subjective norm is predicted by normative beliefs²⁸. Our study results confirm that attitudes are strong predictors of beliefs and intentions regarding breastfeeding in the workplace. However in both HNFE and non-HNFE students, attitudes were positive predictors of beliefs but not vice versa (Tables 8 and 9). Studies have shown that intention is related to breastfeeding initiation or duration. Also, being consistent with other studies, attitudes toward breastfeeding and beliefs in our study were positive predictors of breastfeeding intentions²⁸.

In this study, breastfeeding knowledge in nutrition students was a positive predictor of attitudes toward breastfeeding in the workplace. In both the HNFE and non-HNFE groups, sources of breastfeeding information were positive predictors of breastfeeding knowledge. We

found that nutrition students have adequate breastfeeding knowledge and positive attitudes and intentions regarding breastfeeding in the workplace, and hence, may be effective in educating mothers, family members, and employers about the benefits of supporting breastfeeding. Research shows that nutrition majors not only retain their breastfeeding knowledge and positive attitudes and intentions toward breastfeeding in the workplace, over time, but are also more likely to practice breastfeeding.¹² In view of our study results and as suggested in previous research,¹¹ participation of dietitians in assisting mothers in initiation and continuance of breastfeeding should be emphasized. Breastfeeding promotion programs for non-nutrition students should focus on education strategies in order to increase their breastfeeding knowledge, exposure and sources of breastfeeding information. Breastfeeding intervention programs should focus on educating future health care professionals such as nutrition students to influence cultural beliefs and social norms to support breastfeeding. It is reasonable to suggest that nutrition students at VT in their roles as community nutritionists, dietitians, lactation consultants, peer counselors, teachers, and mothers will be positive role models and strong advocates of breastfeeding.

Our study evaluated breastfeeding intentions and initiation of university students, but further research is needed to identify if breastfeeding knowledge and attitudes, and intention toward breastfeeding in the workplace are associated with duration of breastfeeding in the workplace. Almost all of the participants in this study were Caucasian (Table 1), and so, these results may not be generalizable to other ethnic groups. Hence, a study with a sample that is more representative of all ethnicities should be conducted. Most of our study participants were women; future studies should include more men to assess their breastfeeding knowledge and views about breastfeeding in the workplace. One of the major drawbacks of the study is that the questionnaire was pre-tested only for face validity but not for internal reliability or validity. Therefore, the instrument's sensitivity and specificity are unknown. Also, since the self-administered questionnaire was anonymous, non-response error could not be estimated. Despite these limitations, our study results strongly suggest that nutrition students at VT are thoroughly educated to support and advocate breastfeeding.

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BREASTFEEDING KNOWLEDGE, AND ATTITUDES AND BELIEFS REGARDING
BREASTFEEDING IN THE WORKPLACE AMONG HOME ECONOMICS GRADUATES
WORKING IN THE CARIBBEAN¹

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Abstract

The decrease in breastfeeding rates around the world has led to serious implications for infant health in developing countries such as infants in the Caribbean. Caribbean studies have shown a high level of non-compliance with the recommended 6 months of exclusive breastfeeding. Home economics graduates, in the Caribbean, may play important roles as breastfeeding educators and promoters; yet, it is unknown how these graduates view breastfeeding. A cross-sectional survey, titled “Breastfeeding Knowledge and Attitudes in the Caribbean,” was used to assess knowledge, attitudes, and beliefs regarding breastfeeding in the workplace in members of the Caribbean Association of Home Economics (CAHE), working in the Caribbean. A total of 71 members completed the survey. Respondents had mean (\pm SD) scores of 5.76 ± 1.34 for breastfeeding knowledge, 3.67 ± 0.50 for attitudes, and 4.23 ± 0.68 for beliefs scales related to breastfeeding in the workplace. Mother’s age, employment status, education, and number of children were not associated with any measure of breastfeeding in the workplace. Attitudes regarding breastfeeding in the workplace were positive predictors of beliefs ($P < 0.001$), places considered suitable to breastfed an infant ($P = 0.007$), and number of employment benefits selected for breastfeeding mothers ($P = 0.043$). Knowledge was not significantly associated with any measure of breastfeeding in the workplace. In conclusion, these CAHE members had adequate breastfeeding knowledge, and positive attitudes and beliefs regarding breastfeeding in the workplace. Members of CAHE may provide accurate breastfeeding information and positive messages to target populations to promote exclusive breastfeeding in the Caribbean.

Introduction

Recognizing the extensive benefits of breastfeeding, the World Health Organization and the American Dietetic Association recommend exclusive breastfeeding (EBF) of infants for the first six months and continued breastfeeding with complementary foods up to 12 months of age.¹ The decline in breastfeeding in developed countries such as the United States (U.S.) has been observed in developing countries as well.² This decrease in breastfeeding rates around the world has led to serious implications for infant health including infants in the Caribbean.³ Caribbean studies have shown a high level of non-compliance with the recommended 6 months of EBF.⁴ Mother's age has been inversely associated with EBF at four months postpartum.⁵ In addition to inadequate knowledge about the benefits of EBF, employment was one of the principal factors affecting breastfeeding in eastern Tobago.⁶

This decline in EBF has led to an increase in the prevalence of protein energy malnutrition (PEM) in Caribbean countries.⁴ Gastroenteritis and marasmus often accompany poor rates of EBF and are linked to PEM. Early weaning has been identified as one of the factors causing malnutrition and infant mortality in Jamaica.⁷ Results of a study contrasting breastfeeding promotion in an urban versus rural Jamaican hospital demonstrated that health professionals at the urban hospital were less supportive of breastfeeding than those at the rural hospital.⁷ In order to facilitate positive attitudinal changes in individuals, health care professionals with adequate knowledge and positive attitudes about breastfeeding are critical.

There is a lack of research conducted internationally to assess knowledge, attitudes, and intentions of breastfeeding among health care professionals. Although Caribbean mothers are aware of the importance of breastfeeding, they are not fully knowledgeable about the benefits of EBF. Thus, in order to increase EBF rates, there is a need to educate and motivate specific target groups such as women and their families, health care providers, community leaders and national policy makers. Assimilating the disciplines of both social and natural sciences and the arts, home economic graduates can meet the changing needs of society and may play important roles in the promotion of EBF. Breastfeeding promotion programs emphasize the importance of education. In a pilot study, we found that 47 of 59 Caribbean Association of Home Economics (CAHE) members who completed a survey at a CAHE conference taught at the secondary, junior college, or university level. Hence, home

economics graduates may be used as conduits to promote EBF in formal school settings and in other non-formal social settings. Home economics graduates in the Caribbean may play important roles as breastfeeding educators and advocates; yet, it is unknown how these graduates view breastfeeding. An international perspective on how health professionals in other countries view breastfeeding may provide insight into factors influencing breastfeeding rates and education. The purpose of this study was, therefore, to assess knowledge, attitudes, and intentions regarding breastfeeding in a group of home economics graduates (a.k.a., family and consumer sciences) working in the Caribbean. It was hypothesized that members of CAHE would have adequate breastfeeding knowledge, and positive attitudes and beliefs regarding breastfeeding in the workplace.

Methods

A cross-sectional survey was conducted with CAHE members. Knowledge, attitudes, and beliefs regarding breastfeeding in the workplace of members were assessed using the “Breastfeeding Knowledge and Attitudes in the Caribbean” (Appendix C) questionnaire. This questionnaire was modified from the “Breastfeeding in the Workplace” (Appendix A) questionnaire,⁸ and was adapted to fit the English-speaking Caribbean population. The questionnaire was modified to reflect specific demographic information and breastfeeding practices in the Caribbean. The questionnaire was pre-tested for face validity by nurses and home economics graduates, and changes were made based on their suggestions. At the end of April 2003, a pilot study was conducted using the survey at the 15th Biennial CAHE Conference. A total of 59 members completed the survey; the pilot study sample included members of CAHE, working in the Caribbean. Based on pilot data, additional changes in demographic questions were made to the questionnaire.

To avoid postage and delivery costs and to enhance the survey response time, a Web-based version of the “Breastfeeding Knowledge and Attitudes in the Caribbean” questionnaire was used to collect data. After receiving approval from the Institutional Review Board for Research Involving Human Subjects at Virginia Tech, an electronic mail (e-mail) message with the link to the Web survey was sent to 74 CAHE members. These members were listed in the 2003-2005 CAHE directory and were the only

members who provided e-mail addresses. Of these 74 individuals, only 51 had active e-mail addresses.

After initial contact, members with active e-mail addresses were sent three reminder e-mails with the Web address of the survey at weeks 1, 3, and 7. Participants were asked not to complete the Web survey if they had already completed the paper-based survey at the 15th Biennial CAHE Conference. An information sheet, which also served as an implied consent form, was provided to each study participant. Multiple e-mail contacts resulted in 23 responses to the survey. Despite a discussion with two prominent CAHE members and arrangements to publicize the study on the CAHE World Wide Web page and in the CAHE Quarterly (organizational newsletter), the response rate was poor.

Due to the low response rate for the Web-based survey, Web responses and paper-and-pencil responses were tested for measurement differences and checked for duplicity and completeness. Data from paper-based and Web-based surveys were pooled and presented as preliminary study data. Because the questionnaire was anonymous, non-response error could not be estimated. The “Breastfeeding Knowledge and Attitudes in the Caribbean” questionnaire contained closed-ended, attitude-based questions with ordered response categories and closed-ended questions with unordered response categories as well as questions to collect demographic information. The survey consisted of 10 knowledge, 16 attitude, and 5 belief questions. The 10 knowledge-based questions required “True,” “False,” “Don’t know” responses. Responses to the knowledge questions were scored from 0-10, depending on the number of correct answers. All questions were equally weighted (0 points if not correct; 1 point if correct). A 5-point Likert-type scale response format was used to score attitude and belief statements, with 1 being the most negative (Strongly Disagree/Definitely No/Very Unimportant) and 5 the most positive (Strongly Agree/Definitely Yes/Very Important). Separate scores were generated for knowledge, attitudes, and belief subscales. Responses to items associated with attitudes and beliefs were summed and the sum was divided by the number of items completed to create mean outcome scores.

The breastfeeding attitude variable had 16 attitudinal statements; however, due to ambiguity, two attitude items were not included in final data analyses. Eight of the

attitudinal statements were negatively worded to minimize social desirability in responses, and before calculation of the mean, these questions were reverse scored so that in all cases the higher the score, the more positive the attitude. A higher total score (range: 1-5) denoted that participants had more positive breastfeeding attitudes and beliefs. For some other items, students were asked to check as many options as applied. The “Check all that Apply” questions collected information on sources from which CAHE members obtained breastfeeding information, people who influence the mother’s decision to breastfeed, suitable places for breastfeeding, and employment benefits for breastfeeding mothers. Responses to items associated with the “Check all that Apply” questions were summed and the possible range for “sources from which students obtained breastfeeding information” was 0-19; the possible range for “people who influence the mother’s decision to breastfeed” was 0-15; the possible range for “suitable places for breastfeeding” was 0-16; the possible range for “employment benefits for breastfeeding mothers” was 0-8. The remaining questions elicited demographic information, such as level and year in school, highest degree obtained, age, ethnicity, and gender.

Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS for Windows, version 12.0, 2001, SPSS, Chicago, IL). Descriptive statistics were used to characterize respondents and responses and presented as proportions or means \pm SD. Independent student *t*-tests were used to compare participants’ scores when categorized by age, ethnicity, children and employment status. One-way analysis of variance (ANOVA) was used to examine within group differences due to educational level. Bivariate Pearson’s correlation coefficients were calculated to examine simple relationships between scores of knowledge, attitudes, and other measures of breastfeeding in the workplace as well as with demographic variables. Stepwise linear regression analyses were also conducted with measures of breastfeeding in the workplace as dependent as well as independent variables. Variables were entered and removed from models at $\alpha = 0.10$ and 0.15 , respectively. Statistical significance was set at $P < 0.05$, using one and two-tailed comparisons.

Results

The paper- and Web-based surveys resulted in a total of 71 (54 paper and 17 Web) usable surveys (response rate = ~10%). For this study, it was assumed that members of

CAHE were home economics graduates; however, preliminary analyses revealed that 17.2% of the 700 members of CAHE were only high school/post high school graduates or had some college. Thus, the study population will henceforth be referred to as CAHE members and not home economics graduates. All study participants were women and the majority (54.9%) was aged 41-50 years. Participants were predominantly of African descent (85.9%) and graduate school graduates (44.3%). Characteristics of study participants are shown in Table 1. Most of the women were employed full-time (88.7%) working as secondary school teachers (64.1%) and had children (84.3%). Scores on breastfeeding knowledge, attitudes, and other measures of breastfeeding in the workplace are presented in Table 2. When categorized by age (≤ 30 versus ≥ 31 years), no significant differences were found between age groups in any scores (Table 3). No significant differences were found in any of the measures of breastfeeding in the workplace between women with and without children. Similarly, there were no significant differences in scores between women employed and not employed full-time.

Compared to members of African descent, CAHE members from mixed ethnicity had significantly more positive attitudes (3.99 ± 0.30 vs. 3.62 ± 0.50 , $P=0.033$) toward breastfeeding in the workplace, more sources of breastfeeding information (10.22 ± 3.73 vs. 6.48 ± 3.88 , $P=0.008$), and listed more employment benefits for breastfeeding mothers (5.11 ± 1.97 vs. 2.28 ± 1.99 , $P<0.001$). One-way ANOVA indicated significant differences between education level and beliefs ($P=0.035$) and number of employment benefits listed for breastfeeding mothers ($P=0.003$). Further *post-hoc* tests revealed that compared to college graduates and participants with some graduate school, graduate school graduates had significantly more ($P<0.05$) positive beliefs toward breastfeeding in the workplace. Graduate school graduates selected more employment benefits for breastfeeding mothers ($P<0.05$) compared to college graduates and participants with some graduate school.

Members of CAHE listed books (73.2%), followed by pamphlet/magazine (66.1%), nurse/midwife (63.3%), and local health campaigns (50.7%) as their major sources of breastfeeding information. Similarly nurse/midwife (41.8%), followed by mother (32.3%) local health announcements (30.9%), and nutritionist (23.9%) were listed as people who influence a mother's choice to breastfeed an infant. All participants

Table 1: Characteristics of study participants¹

Characteristic	N (%)
Age (y)	39 (54.9)
41-50	21 (29.6)
31-40	9 (12.7)
20-30	2 (2.8)
< 20	
Island	
Barbados	13 (18.3)
Guyana	12 (16.9)
Jamaica	12 (16.9)
Bahamas	9 (12.7)
Other	25 (35.2)
Ethnicity	
African-descent	61 (85.9)
Mixed	9 (12.7)
Other	1 (1.4)
Educational level²	
College graduate	22 (31.4)
Some graduate school	7 (7.1)
Graduate school graduate	31 (44.3)
Other	12 (17.2)
Employment	
Full-time	63 (88.7)
Other	8 (11.3)
Occupation³	
Secondary school teacher	41 (64.1)
College instructor	5 (7.8)
University lecturer	4 (6.3)
Other	14 (12.8)
Children²	
Yes	59 (84.3)
IFHE⁴ member	
Yes	14 (20.3)

¹n=71²n=70³n=64⁴IFHE, International Federation of Home Economists

Table 2: Breastfeeding knowledge, attitudes, and beliefs of CAHE members¹

Variable	Mean ± SD
Knowledge	5.76 ± 1.34
Attitudes	3.67 ± 0.50
Beliefs	4.23 ± 0.68
Sources of breastfeeding information	6.93 ± 4.02
People who influence breastfeeding choice	2.23 ± 2.16
Suitable places to breastfeed	5.90 ± 4.85
Employment benefits	2.65 ± 2.18

¹n=71

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

People, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Table 3. Breastfeeding knowledge, attitudes, and beliefs among CAHE members aged ≤ 30 versus ≥ 31 years

Variable	≤ 30 years ¹	≥ 31 years ²
Knowledge	5.55 \pm 1.70 ³	5.80 \pm 1.27
Attitudes	3.71 \pm 0.40	3.67 \pm 0.52
Beliefs	4.27 \pm 0.57	4.22 \pm 0.71
Sources of breastfeeding information	8.36 \pm 4.18	6.67 \pm 3.97
People who influence breastfeeding choice	3.00 \pm 2.45	2.08 \pm 2.09
Suitable places to breastfeed	7.09 \pm 5.65	5.68 \pm 4.71
Employment benefits	2.80 \pm 1.99	2.62 \pm 2.23

¹n=11

²n=60

³Mean \pm SD

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

People, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Table 4. Responses for selected questions on breastfeeding knowledge and attitudes, and beliefs regarding breastfeeding in the workplace among CAHE members

Variable	Question	Response	N (%)
Knowledge	1. According to the World Health Organization, the optimal duration of breastfeeding an infant is a minimum of twelve months ¹	True	33 (61.0)
	2. Infant formula contains all ingredients found in human breastmilk ²	False	56 (81.0)*
	3. Infants consuming breastmilk have fewer ear infections than infants consuming formula ²	True	42 (61.0)
	4. Immune systems of breast-fed infants are more developed than immune systems of formula-fed infants ³	True	63 (90.0)*
Attitudes	1. Women who want to breastfeed their infants should not work outside the home ⁴	Agree ⁵	5 (7.0)*
	2. It is acceptable for women to breastfeed their infants or express their breastmilk during working hours ⁴	Disagree ⁶	17 (24.0)*
	3. Breastfeeding or expressing breastmilk in the workplace will interfere with work productivity ⁴	Agree ⁵	12 (17.0)*
	4. The public image of a corporation will be negative if women employees are allowed to breastfeed or express breastmilk at work ⁴	Agree ⁵	5 (7.0)*
	5. Women should not breastfeed or express breastmilk at work because it would be embarrassing to coworkers ⁴	Agree ⁵	9 (13.0)*
	6. Women should not breastfeed or express breastmilk at work because it is unattractive ³	Agree ⁵	10 (14.0)*
	7. A woman who breastfeeds or expresses breastmilk at work should not be paid for the time spent breastfeeding or expressing breastmilk ⁴	Agree ⁵	10 (14.0)*
	8. Absenteeism will decrease in women allowed to breastfeed or express breastmilk at work ¹	Disagree ⁶	18 (26.0)*

Table 4 continued

Variable	Question	Response	N (%)
Beliefs			
1.	How important is it that a woman breastfeed her infant? ⁴	Important ⁷	71 (100.0)*
2.	How important is that employers support breastfeeding or expressing breastmilk in the workplace? ⁴	Important ⁷	55 (77.0)*

¹n=68

²n=69

³n=70

⁴n=71

⁵Includes “Strongly Agree” responses

⁶Includes “Strongly Disagree” responses

⁷Includes “Very Important” responses

* $P < 0.001$

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Table 5. Pearson correlation coefficients for breastfeeding in the workplace measures for CAHE members¹

Variable	Knowledge	Attitudes	Beliefs	Sources	Influence	Suitable places	Employment benefits
Knowledge	1						
Attitudes	0.01	1					
Beliefs	0.02	0.71**	1				
Sources	0.06	0.30*	0.35**	1			
Influence	-0.13	0.20	0.27*	0.42**	1		
Suitable places	-0.07	0.35**	0.32**	0.28*	0.32**	1	
Employment benefits	0.18	0.32**	0.22	0.32**	0.16	0.11	1
Ethnicity	0.05	0.26*	0.19	0.31**	0.21	0.07	0.44**

¹n=71

* $p \leq 0.05$; ** $p \leq 0.01$

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Influence, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Table 6. Stepwise linear regression models for attitudes, beliefs, suitable place, an employment benefits related to breastfeeding in the workplace of CAHE members

Dependent Variable	Predictor	R ²	Model Adjusted R ²	Unstandardized β (Standard Error)	Standardized β	P-value	Model p-value
Attitudes			0.09				0.008
	Constant			3.394(0.113)		<0.001	
	Sources	0.10		0.039(0.014)	0.316	0.008	
Beliefs			0.49				<0.001
	Constant			0.674(0.431)		0.123	
	Attitudes	0.50		0.967(0.116)	0.707	<0.001	
Suitable places			0.18				0.001
	Constant			-4.882(3.891)		0.214	
	Attitudes	0.14		0.721(0.261)	0.312	0.007	
	Influences	0.06		2.469(1.075)	0.259	0.025	
Employment benefits			0.20				<0.001
	Constant			-1.694(1.778)		0.344	
	Race	0.18		0.307(0.095)	0.362	0.002	
	Attitudes	0.05		1.014(0.491)	0.231	0.043	

Knowledge, range = 0(low)-10(high); Correct (1 point), Incorrect (0 points)

Attitudes, range = 1(negative)-5(positive); Strongly Disagree (1 point), Strongly Agree (5 points)

Beliefs, range = 1(weak)-5(strong); Very Unimportant (1 point), Very Important (5 points)

Sources, range = 0(none)-22(more); Not selected (0 points), Selected (1 point)

Influence, range = 0(none)-9(more); Not selected (0 points), Selected (1 point)

Suitable places, range = 0(less)-17(more); Not selected (0 points), Selected (1 point)

Employment benefits, range = 0(less)-8(more); Not selected (0 points), Selected (1 point)

Variables were entered and removed from models at $\alpha = 0.10$ and 0.15 respectively

Independent variables- Age, Knowledge, Attitudes, Beliefs, Sources, Suitable places, Influence, and Employment benefits

believed that it is important that a woman breastfeed her infant. Responses to some of the knowledge, attitudes and belief-based questions regarding breastfeeding in the workplace are presented in Table 4. Participants selected friend's home (71.8%), physician's waiting room (60.5%), and relative's home (45.1%) as public places acceptable to breastfeed an infant. Paid maternity leave (67.6%) and flex-time (42.2%) were selected as major employment benefits for breastfeeding mothers. Nutrition knowledge (67.2%), health concerns (55.2%) and daily routine activity (33.9%) were selected as top three factors that most influence the decision to breastfeed the infant. Majority (89.0%) of the employed participants received maternity leave as part of their employment benefits.

Correlation analyses (Table 5) revealed that knowledge was not significantly associated with any measures of breastfeeding in the workplace. Attitudes were positively and significantly related to beliefs regarding breastfeeding in the workplace ($P \leq 0.01$). Sources of breastfeeding information were positively and significantly associated with attitudes ($P \leq 0.05$) and beliefs ($P \leq 0.01$) regarding breastfeeding in the workplace. Sources of breastfeeding information, and attitudes and beliefs regarding breastfeeding in the workplace were all positively and significantly associated with number of places considered suitable to breastfeed an infant and number of employment benefits selected for breastfeeding mothers (Table 5). Race was found to be positively and significantly related to attitudes toward breastfeeding in the workplace ($P \leq 0.05$), sources of breastfeeding information ($P \leq 0.01$), and employment benefits selected for breastfeeding mothers ($P \leq 0.01$). Other demographic variables such as age, full-time employment, and children were not significantly associated with any measures of breastfeeding in the workplace.

Stepwise linear regression analyses were conducted between measures of breastfeeding in the workplace and demographic variables (Table 6). No significant models were generated for breastfeeding knowledge.

Discussion

The primary aim of this cross-sectional study was to assess knowledge, and attitudes and beliefs regarding breastfeeding in the workplace of members of CAHE, working in the Caribbean. Results suggest that, in general, this sample of CAHE members had adequate breastfeeding knowledge and positive attitudes and beliefs regarding breastfeeding in the

workplace. Mother's age, employment status, education, and number of children influenced breastfeeding duration in rural Jamaica.⁹ Results of our study show that when categorized by age (≤ 30 versus ≥ 31 years), employment (full-time versus other), and children (yes versus no), no significant differences were found between groups in any of the measures of breastfeeding in the workplace. In our study, mother's age, employment status, education, and number of children were not associated with any of the measures of breastfeeding in the workplace.

In developed countries such as the U.S., studies have shown that women who breastfeed are predominantly white, from higher socioeconomic classes, well-educated, married, older, and are not employed outside the home.¹⁰ In our study, graduate school graduates had significantly more positive beliefs regarding breastfeeding in the workplace than college graduates. Our study supports findings of previous studies¹⁰ showing that well-educated women are more likely to breastfeed. However, a negative association was found between employment and breastfeeding, although this association was not statistically significant. Qualitative assessments in the Caribbean of mother's perceptions, attitudes, and values attached to food items show that a mother's attitudes toward breastfeeding are strongly influenced by her female role models including her mother, mother-in-law and grandmothers.^{10,11} Along these lines, a woman's mother and nurse/midwife were selected as individuals who could influence the decision to breastfeed.

In our study, attitudes and beliefs regarding breastfeeding in the workplace were positively and significantly associated (Table 5); however, only attitudes toward breastfeeding were a positive predictor of beliefs, not *vice versa* (Table 6). Attitudes toward breastfeeding in the workplace were positive predictors of places considered acceptable to breastfeed an infant and employment benefits for breastfeeding mothers (Table 6). Results show that CAHE members, in general, have positive attitudes towards breastfeeding in the workplace. However, 24% of the women still disagreed that it is acceptable to breastfeed in the workplace, and 26% disagreed that absenteeism will decrease in women allowed to breastfeed at work (Table 4). Because stepwise linear regression analyses showed that sources of breastfeeding information was a positive predictor of attitudes regarding breastfeeding in the workplace, this suggests that breastfeeding promotion and intervention programs should use media (local health

campaigns and pamphlet/magazines), nutrition education (teachers), and health professionals (lactation consultants, nurse/midwife, and nutritionists) to provide breastfeeding information to target populations. Teachers and health professionals should be educated and trained in breastfeeding management in order to effectively promote breastfeeding in target populations.

Our findings showed that, compared to mixed ethnicity, respondents of African descent, had significantly less positive attitudes, sources of breastfeeding information, and selected fewer employment benefits for mothers breastfeeding in the workplace. In regression analyses it was noted that race and attitudes were positive predictors of number of employment benefits selected for breastfeeding mothers (Table 6). In view of these results, it may be suggested that breastfeeding intervention programs should target specifically individuals of African descent, to instill positive attitudes toward breastfeeding in the workplace. Nutrition knowledge and breastfeeding education should be the focus of breastfeeding promotion programs as they are important factors that influence the decision to breastfeed the infant.

In this sample of CAHE members, attitudes were strong predictors of beliefs regarding breastfeeding in the workplace, and sources of breastfeeding information were positive predictors of attitudes toward breastfeeding in the workplace. We found that our sample of CAHE members have adequate breastfeeding knowledge and positive attitudes and beliefs regarding breastfeeding in the workplace and may, therefore, be effective in educating new mothers, family members, and employers about the benefits of and the need to support breastfeeding. Our study indicates that in the Caribbean, health care professionals like lactation consultants, nurse/midwife, and nutritionists provide breastfeeding information and influence breastfeeding choice. Breastfeeding promotion and intervention programs should draw upon the breastfeeding knowledge, and attitudes and beliefs regarding breastfeeding in the workplace of CAHE members to provide breastfeeding information to target populations.

One limitation to this study was that the majority of women in our sample were 41-50 years of age. Younger women are less likely to breastfeed; therefore, further research should be conducted with a younger study population. Most of our participants breastfed their children; however, data on duration of breastfeeding and exclusiveness were not

collected. Further research is needed to examine the association and influence of breastfeeding knowledge and attitudes and intentions regarding breastfeeding in the workplace on breastfeeding duration and exclusiveness. Our study assessed breastfeeding knowledge and attitudes and intentions regarding breastfeeding in the workplace only in members of CAHE and so, the results are not generalizable to other study populations. Gender differences in measures of breastfeeding in the workplace could not be assessed as all of our study participants were women. Results of this study suggest that educating and motivating specific target groups such as women and their families, health care professionals, and employers can play an important role in promoting EBF in the Caribbean. According to “social marketing” that seeks to influence social behaviors ¹², the marketing mix strategy to influence breastfeeding behavior of future mothers and fathers should include CAHE members. Breastfeeding promotion programs emphasize the importance of education, and our pilot study revealed that 50 out of 64 members, who completed the survey, were teaching either at the secondary, junior college or university level.

Hence, if breastfeeding is the product, breastfeeding promotion and intervention programs should use media (local health campaigns and pamphlet/magazines), nutrition education (teachers), and health professionals (lactation consultants, nurse/midwife, and nutritionists) to promote breastfeeding. Promotion programs should emphasize the extensive benefits of breastfeeding and how it is cost effective to the family and society. Various physical emotional, psychological and economic benefits of breastfeeding should be marketed. CAHE members can be used as modes of communication to promote EBF in schools and through non-formal education and other social groups. Breastfeeding should be positioned as the normal feeding practice in comparison to bottle feeding and that bottle-fed infants are sick more often and more severely compared to breastfed infants.

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CHAPTER VI

SUMMARY AND FUTURE DIRECTIONS

A five-year prospective study (n=69) that compared nutrition students' breastfeeding knowledge, and attitudes and intention regarding breastfeeding in the workplace at baseline and 5-year intervals showed that nutrition students not only retained their breastfeeding knowledge and positive attitudes and intentions regarding breastfeeding in the workplace but increased them over time (Chapter 3). Sources of breastfeeding information, such as school, books and mother were also predictors of attitudes and intentions regarding breastfeeding in the workplace. At the time of follow-up, only 22% of participants had children, but there was a significant association between intentions regarding breastfeeding in the workplace and breastfeeding practice.

A cross-sectional comparison (Chapter 4) of nutrition students (n=270) and non-nutrition students (n=271) demonstrated that nutrition students had more breastfeeding knowledge, and positive attitudes, beliefs, and intentions regarding breastfeeding in the workplace compared to non-nutrition students. In nutrition students, breastfeeding knowledge was a positive predictor of attitudes toward breastfeeding in the workplace. Sources of breastfeeding information were positive predictors of breastfeeding knowledge (Chapter 4).

Members of the Caribbean Association of Home Economics (CAHE) (n=71), had adequate breastfeeding knowledge and positive attitudes and beliefs regarding breastfeeding in the workplace, and hence, may be effective educators of new mothers, family members, and employers about the benefits of and the need to support breastfeeding (Chapter 5). Sources of breastfeeding information were positive predictors of attitudes toward breastfeeding in the workplace (Chapter 5). In the Caribbean, health care professionals, including lactation consultants, nurses/midwives, and nutritionists, provide breastfeeding information and influence breastfeeding choice (Chapter 5).

Nutrition students, nutrition graduates, and CAHE members are knowledgeable about breastfeeding and have positive attitudes and intentions regarding breastfeeding in the workplace, and hence, may be effective educators and promoters of breastfeeding. Sources of breastfeeding information influence breastfeeding knowledge and attitudes; thus, target populations should be provided with breastfeeding information via multiple sources.

Consistent with the theory of planned behavior (TPB), these results suggest that attitudes are important and positive predictors of beliefs and intentions (Chapters 3, 4, and 5) regarding breastfeeding in the workplace.

The second study evaluated breastfeeding intentions and initiation of university students. Almost all of the participants in our studies with university students were Caucasian (Chapters 3 and 4) and most of our study participants (Chapters 3, 4, and 5) were women. In the Caribbean study, a selection bias may have occurred; therefore, results may not be generalizable. Moreover, only sub-samples of non-nutrition students were included in the second study, and due to this, the study may be prone to sampling and coverage error.

A common limitation to the present studies was that information regarding confounding factors such as cultural and lifestyle factors, marital status, and socioeconomic status was not collected. Hence, it is difficult to determine the independent effect of nutrition education on attitudes and intention to breastfeed in the workplace. One of the major drawbacks of these studies was that the questionnaire was pre-tested only for face validity but not for internal reliability or validity. Thus, it was difficult to assess the instrument's sensitivity and specificity.

Further research is needed to identify if breastfeeding knowledge and attitudes, and intention toward breastfeeding in the workplace are associated with duration of breastfeeding in the workplace. Since these results may not be generalizable to other ethnic groups a study with a more representative sample of all ethnicities should be conducted. Future studies should include more men to assess their breastfeeding knowledge and views about breastfeeding in the workplace. In order to avoid selection bias, a study with a greater representation of the Caribbean population should be conducted. For more accurate results, future studies should control for confounding factors such as cultural and lifestyle factors, marital status, and socioeconomic status. An instrument tested for internal validity and reliability should be used in future research to assess the instrument's sensitivity and specificity.

Appendix A
BREASTFEEDING IN THE WORKPLACE QUESTIONNAIRE

Circle “ True” if you think the statement is correct or “False” if you think the statement is incorrect. If you are not sure, circle “Don’t know”.

1. According to The American Dietetic Association, the optimal duration for breastfeeding an infant is a minimum of twelve months.

True False Don’t Know

2. Less than one-quarter of all major corporations **in the country** actively support breastfeeding or expression of breast milk in the workplace.

True False Don’t Know

3. Part-time employment by the mother does not affect breastfeeding choice or practice by the mother.

True False Don’t Know

4. Infant formula contains all ingredients found in human breast milk.

True False Don’t Know

5. A petite mother cannot produce an adequate quantity of breast milk for her infant.

True False Don’t Know

6. Infants consuming breast milk have fewer ear infections than infants consuming formula.

True False Don’t Know

7. Infants can consume either human breast milk or formula but not both concurrently.

True False Don’t Know

8. Immune systems of breast-fed infants are more developed than immune systems of formula-fed infants.

True False Don’t Know

9. Employees who have had female employees who breast-fed in the workplace are most supportive of breastfeeding at work.

True False Don’t Know

10. On-site child care is necessary at a mother’s place of employment if the mother desires to breastfeed while working.

True False Don’t Know

Please go to the next page

Circle “Yes” or “No”.

11. I know of at least one Registered Dietitian in my state who is knowledgeable about issues regarding breastfeeding in the workplace.

Yes No

12. I know of at least one Lactation Consultant in my state.

Yes No

13. I have read The American Dietetic Association position paper on Promotion of Breast-feeding.

Yes No

14. I know at least one woman who has breast-fed her infant or expressed breastmilk in the workplace.

Yes No

15. I have worked with at least one woman who has breast-fed her infant or expressed breastmilk in the workplace.

Yes No.

Circle the response that best describes your position on each statement.

16. Women who want to breastfeed their infants should not work outside the home.

Strongly agree Agree Neutral Disagree Strongly Disagree

17. Female bosses are more supportive of breastfeeding or expressing breast milk in the workplace than are male bosses.

Strongly agree Agree Neutral Disagree Strongly Disagree

18. Women who breastfeed their infant should be allowed longer maternity leaves than women who do not breastfeed their infants.

Strongly agree Agree Neutral Disagree Strongly Disagree

19. It is acceptable for women to breastfeed their infants or express their breast milk during working hours.

Strongly agree Agree Neutral Disagree Strongly Disagree

20. Breastfeeding or expressing breast milk in the workplace will interfere with work productivity.

Strongly agree Agree Neutral Disagree Strongly Disagree.

Please go to the next page

21. The public image of a corporation will be negative if women employees are allowed to breastfeed or express breast milk at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
22. Women who breastfeed or express breast milk at work should be provided with additional break to do so.
- Strongly agree Agree Neutral Disagree Strongly Disagree
23. Employers should provide private areas at work in which women can breastfeed their babies or express their breast milk.
- Strongly agree Agree Neutral Disagree Strongly Disagree
24. Women will return to work sooner after giving birth if they are allowed to breastfeed their babies or express breast milk at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
25. Women should not breastfeed or express breast milk at work because it would be embarrassing to coworkers.
- Strongly agree Agree Neutral Disagree Strongly Disagree
26. Women should not breastfeed or express breast milk at work because it is unattractive.
- Strongly agree Agree Neutral Disagree Strongly Disagree
27. A woman who breastfeeds or expresses breast milk at work should not be paid for the time spent breastfeeding or expressing breast milk.
- Strongly agree Agree Neutral Disagree Strongly Disagree
28. Employers should support women who want to breastfeed or express breast milk at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
29. Absenteeism will decrease in women allowed to breastfeed or express breast milk at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
30. Allowing women to breastfeed or express breast milk in the workplace will increase the incidence of other women doing so at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
31. Female employees will be more loyal to a company that allows breastfeeding or expressing breast milk in the workplace.
- Strongly agree Agree Neutral Disagree Strongly Disagree

Please go to the next page

Circle the statement that best describes what your actions will be.

32. I or my significant other will breastfeed my/our child

Definitely Yes Yes Maybe No Definitely No

33. I or my significant other will breastfeed or express breastmilk while working outside the home.

Definitely Yes Yes Maybe No Definitely No

34. When interviewing for a job, I will ask potential employer if breastfeeding or expressing breastmilk is allowed in the workplace

Definitely Yes Yes Maybe No Definitely No

35. I or my significant other will work for a company that allows breastfeeding or expressing breastmilk in the workplace.

Definitely Yes Yes Maybe No Definitely No

36. I or my significant other will interview for jobs only at companies that allow breastfeeding in the work place

Definitely Yes Yes Maybe No Definitely No

37. I will support women who breastfeed or express breastmilk in the workplace.

Definitely Yes Yes Maybe No Definitely No

38. I or my significant other will provide breastmilk for my/our child whenever it is hungry, even at work.

Definitely Yes Yes Maybe No Definitely No

Circle the response that most closely corresponds to your belief.

39. How important is that a woman breastfeed her infant?

Very Important Important Neutral Unimportant Very Unimportant

40. How important is it that a woman be allowed to breastfeed or express breast milk in the workplace?

Very Important Important Neutral Unimportant Very Unimportant

41. How important is it that employer support breastfeeding or expressing breast milk in the workplace?

Very Important Important Neutral Unimportant Very Unimportant

Please go to the next page

42. How important is it that coworkers support breastfeeding or expressing breast milk in the workplace?

Very Important Important Neutral Unimportant Very Unimportant

43. How important is it that corporations have a formal policy that allows breastfeeding or expressing breast milk in the work place?

Very Important Important Neutral Unimportant Very Unimportant

Circle all that apply.

44. I have received breastfeeding information from the following sources.

Mother	Grandmother	Radio	Nurse
Mother-in-law	Grandfather	Magazine	Physician
Father	Friend	Newspaper	Dietitian
Guardian	Brother	Books	Lactation consultant
Sister	School	Television	Other health professionals
Spouse	Internet	Professional journals	Other _____

45. Who influences the mother's choice to breastfeed the infant?

Mother	Father	Mother in-law	father in-law	Sister
Sister in-law	Spouse	Friends	Relatives	other _____

46. It would be acceptable for me or my significant other to breastfeed my/our children or express breast milk in the following areas

Home	Physician's waiting room	Business meeting
Relative's home	supermarket	Theater
Friend's home	Shopping mall	Stadium
Restaurant	Park	Church
Stranger's home	public transportation	school
Workplace	other _____	

47. Which of the following policies should a corporation endorse to facilitate breastfeeding or expressing breast milk in the workplace?

Flex-time jobs	Paid, extended maternity leave
Part-time jobs	Extended leave without pay
Job sharing	Leave with no loss of pay
Paid maternity leave	return to same or similar position after maternity leave
Other _____	

Please complete the following information

1. I would classify myself as a(n) _____

- Undergraduate Student
- Graduate Student, non Registered Dietitian
- Graduate Student and Registered Dietitian
- Dietetic intern
- Other _____

2. I am a _____

- Freshman
- Sophomore
- Junior
- Senior
- M.S. Student
- Ph. D. Student
- Other _____

3. My major is _____

4. My degree option is _____

5. My desired area of specialization in the workplace is _____

6. My desired place of employment is _____

7. My age _____

8. My gender _____

9. My ethnic background _____

If you would like to further explain any of your answers to any question (s), please do so here.

Thank you for your time and effort in completing this survey!

Appendix B
BREASTFEEDING IN THE WORKPLACE QUESTIONNAIRE-II

Circle “ True” if you think the statement is correct or “False” if you think the statement is incorrect. If you are not sure, circle “Don’t know”.

1. According to The American Dietetic Association, the optimal duration for breastfeeding an infant is a minimum of twelve months.
True False Don’t Know
2. Less than one-quarter of all major corporations **in the country** actively support breastfeeding or expression of breast milk in the workplace.
True False Don’t Know
3. Part-time employment by the mother does not affect breastfeeding choice or practice by the mother.
True False Don’t Know
4. Infant formula contains all ingredients found in human breast milk.
True False Don’t Know
5. A petite mother cannot produce an adequate quantity of breast milk for her infant.
True False Don’t Know
6. Infants consuming breast milk have fewer ear infections than infants consuming formula.
True False Don’t Know
7. Infants can consume either human breast milk or formula but not both concurrently.
True False Don’t Know
8. Immune systems of breast-fed infants are more developed than immune systems of formula-fed infants.
True False Don’t Know
9. Employees who have had female employees who breast-fed in the workplace are most supportive of breastfeeding at work.
True False Don’t Know
10. On-site child care is necessary at a mother’s place of employment if the mother desires to breastfeed while working.
True False Don’t Know

Circle “Yes” or “No”.

11. I know of at least one Registered Dietitian in my state who is knowledgeable about issues regarding breastfeeding in the workplace.
- Yes No
12. I know of at least one Lactation Consultant in my state.
- Yes No
13. I have read The American Dietetic Association position paper on Promotion of Breast-feeding.
- Yes No
14. I know at least one woman who has breast-fed her infant or expressed breastmilk in the workplace.
- Yes No
15. I have worked with at least one woman who has breast-fed her infant or expressed breastmilk in the workplace.
- Yes No.

Circle the response that best describes your position on each statement.

16. Women who want to breastfeed their infants should not work outside the home.
- Strongly agree Agree Neutral Disagree Strongly Disagree
17. Female bosses are more supportive of breastfeeding or expressing breast milk in the workplace than are male bosses.
- Strongly agree Agree Neutral Disagree Strongly Disagree
18. Women who breastfeed their infant should be allowed longer maternity leaves than women who do not breastfeed their infants.
- Strongly agree Agree Neutral Disagree Strongly Disagree
19. It is acceptable for women to breastfeed their infants or express their breast milk during working hours.
- Strongly agree Agree Neutral Disagree Strongly Disagree
20. Breastfeeding or expressing breast milk in the workplace will interfere with work productivity.
- Strongly agree Agree Neutral Disagree Strongly Disagree.

Please go to the next page

21. The public image of a corporation will be negative if women employees are allowed to breastfeed or express breast milk at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
22. Women who breastfeed or express breast milk at work should be provided with additional break to do so.
- Strongly agree Agree Neutral Disagree Strongly Disagree
23. Employers should provide private areas at work in which women can breastfeed their babies or express their breast milk.
- Strongly agree Agree Neutral Disagree Strongly Disagree
24. Women will return to work sooner after giving birth if they are allowed to breastfeed their babies or express breast milk at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
25. Women should not breastfeed or express breast milk at work because it would be embarrassing to coworkers.
- Strongly agree Agree Neutral Disagree Strongly Disagree
26. Women should not breastfeed or express breast milk at work because it is unattractive.
- Strongly agree Agree Neutral Disagree Strongly Disagree
27. A woman who breastfeeds or expresses breast milk at work should not be paid for the time spent breastfeeding or expressing breast milk.
- Strongly agree Agree Neutral Disagree Strongly Disagree
28. Employers should support women who want to breastfeed or express breast milk at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
29. Absenteeism will decrease in women allowed to breastfeed or express breast milk at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
30. Allowing women to breastfeed or express breast milk in the workplace will increase the incidence of other women doing so at work.
- Strongly agree Agree Neutral Disagree Strongly Disagree
31. Female employees will be more loyal to a company that allows breastfeeding or expressing breast milk in the workplace.
- Strongly agree Agree Neutral Disagree Strongly Disagree

Circle the statement that best describes what your actions will be.

32. I or my significant other will breastfeed my/our child
Definitely Yes Yes Maybe No Definitely No
33. I or my significant other will breastfeed or express breastmilk while working outside the home.
Definitely Yes Yes Maybe No Definitely No
34. When interviewing for a job, I will ask potential employer if breastfeeding or expressing breastmilk is allowed in the workplace
Definitely Yes Yes Maybe No Definitely No
35. I or my significant other will work for a company that allows breastfeeding or expressing breastmilk in the workplace.
Definitely Yes Yes Maybe No Definitely No
36. I or my significant other will interview for jobs only at companies that allow breastfeeding in the work place
Definitely Yes Yes Maybe No Definitely No
37. I will support women who breastfeed or express breastmilk in the workplace.
Definitely Yes Yes Maybe No Definitely No
38. I or my significant other will provide breastmilk for my/our child whenever it is hungry, even at work.
Definitely Yes Yes Maybe No Definitely No

Circle the response that most closely corresponds to your belief.

39. How important is that a woman breastfeed her infant?
Very Important Important Neutral Unimportant Very Unimportant
40. How important is it that a woman be allowed to breastfeed or express breast milk in the workplace?
Very Important Important Neutral Unimportant Very Unimportant
41. How important is it that employer support breastfeeding or expressing breast milk in the workplace?
Very Important Important Neutral Unimportant Very Unimportant

Please go to the next page

42. How important is it that coworkers support breastfeeding or expressing breast milk in the workplace?
- Very Important Important Neutral Unimportant Very Unimportant
43. How important is it that corporations have a formal policy that allows breastfeeding or expressing breast milk in the work place?
- Very Important Important Neutral Unimportant Very Unimportant

Circle all that apply.

44. I have received breastfeeding information from the following sources.

Mother	Grandmother	Radio	Nurse
Mother-in-law	Grandfather	Magazine	Physician
Father	Friend	Newspaper	Dietitian
Guardian	Brother	Books	Lactation consultant
Sister	School	Television	Other health professionals
Spouse	Internet	Professional journals	Other _____

45. Who influences the mother's choice to breastfeed the infant?

Mother	Father	Mother in-law	father in-law	Sister
Sister in-law	Spouse	Friends	Relatives	other _____

46. It would be acceptable for me or my significant other to breastfeed my/our children or express breast milk in the following areas

Home	Physician's waiting room	Business meeting
Relative's home	supermarket	Theater
Friend's home	Shopping mall	Stadium
Restaurant	Park	Church
Stranger's home	public transportation	school
Workplace	other _____	

47. Which of the following policies should a corporation endorse to facilitate breastfeeding or expressing breast milk in the workplace?

Flex-time jobs	Paid, extended maternity leave
Part-time jobs	Extended leave without pay
Job sharing	Leave with no loss of pay
Paid maternity leave	return to same or similar position after maternity leave
Other _____	

Please complete the following information

1. My age _____
2. My gender _____
3. My ethnic background _____
4. What is your highest educational level?
 - Less than High School or Secondary School*
 - High School /Secondary Graduate*
 - Post High School/Secondary training*
 - Some College* specify major _____
 - College Graduate* specify major _____
 - Some Graduate School* specify major _____
 - Graduate School Graduate* specify major _____
5. *I received my highest educational degree from* _____
6. *How many children do you have?*
 - None*
 - 1*
 - 2*
 - 3*
 - 4*
 - 5 or more*
7. *I have breastfed* _____ *of my children.*
8. *What is your current employment status?*
 - Employed Full-time*
 - Employed Part-time*
 - Homemaker*
 - Retired*
 - Disabled, unable to work*
 - Unemployed*
 - Student*
 - Other* _____
9. *What is your current job or occupation?* _____

If you would like to further explain any of your answers to any question (s), please do so here.

Thank you for your time and effort in completing this survey!

Appendix C
BREASTFEEDING KNOWLEDGE AND ATTITUDES IN THE CARIBBEAN

Circle “True” if you think the statement is correct or “False” if you think the statement is incorrect. If you are not sure, circle “Don’t know”.

1. According to World Health Organization, the optimal duration for breastfeeding an infant is a minimum of twelve months.

True False Don’t Know

2. Major businesses in the country actively support breastfeeding or expression of breast milk in the workplace.

True False Don’t Know

3. Mothers who return to work shorten the number weeks they breastfeed their infant.

True False Don’t Know

4. Infant formula contains all ingredients found in human breast milk.

True False Don’t Know

5. A petite (small and thin) mother cannot produce an adequate quantity of breast milk for her infant.

True False Don’t Know

6. Infants consuming breast milk have fewer ear infections than infants consuming formula.

True False Don’t Know

7. Infants should consume either human breast milk or formula but not both concurrently.

True False Don’t Know

8. Immune systems of breast-fed infants are more developed than immune systems of formula-fed infants.

True False Don’t Know

9. Employers who have had female employees who breast-fed in the workplace are most supportive of breastfeeding at work.

True False Don’t Know

10. On-site childcare is necessary at a mother’s place of employment if the mother desires to breastfeed while working.

True False Don’t Know

Please go to the next page

Circle one response that best describes your opinion on each statement.

11. Women who want to breastfeed their infants should not work outside the home.

Strongly agree Agree Neutral Disagree Strongly Disagree

12. Female bosses are more supportive of breastfeeding or expressing breast milk in the workplace than are male bosses.

Strongly agree Agree Neutral Disagree Strongly Disagree

13. Women who breastfeed their infant should be allowed longer maternity leaves than women who do not breastfeed their infants.

Strongly agree Agree Neutral Disagree Strongly Disagree

14. It is acceptable for women to breastfeed their infants or express their breast milk during working hours.

Strongly agree Agree Neutral Disagree Strongly Disagree

15. Breastfeeding or expressing breast milk in the workplace will interfere with work productivity.

Strongly agree Agree Neutral Disagree Strongly Disagree.

16. The public image of a business will be negative if women employees are allowed to breastfeed or express breast milk at work.

Strongly agree Agree Neutral Disagree Strongly Disagree

17. Women who breastfeed or express breast milk at work should be provided with additional break to do so.

Strongly agree Agree Neutral Disagree Strongly Disagree

18. Employers should provide private areas at work in which women can breastfeed their babies or express their breast milk.

Strongly agree Agree Neutral Disagree Strongly Disagree

19. Women will return to work sooner after giving birth if they are allowed to breastfeed their babies or express breast milk at work.

Strongly agree Agree Neutral Disagree Strongly Disagree

20. Women should not breastfeed or express breast milk at work because it would be embarrassing to coworkers.

Strongly agree Agree Neutral Disagree Strongly Disagree

Please go to the next page

21. Women should not breastfeed or express breast milk at work because it is unattractive.

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22. A woman who breastfeeds or expresses breast milk at work should not be paid for the time spent breastfeeding or expressing breast milk.

Strongly agree Agree Neutral Disagree Strongly Disagree

23. Employers should support women who want to breastfeed or express breast milk at work.

Strongly agree Agree Neutral Disagree Strongly Disagree

24. Absenteeism will decrease in women allowed to breastfeed or express breast milk at work.

Strongly agree Agree Neutral Disagree Strongly Disagree

25. Allowing women to breastfeed or express breast milk in the workplace will increase the incidence of other women doing so at work.

Strongly agree Agree Neutral Disagree Strongly Disagree

26. Female employees will be more loyal to a company that allows breastfeeding or expressing breast milk in the workplace.

Strongly agree Agree Neutral Disagree Strongly Disagree

Circle one response that most closely corresponds to your belief.

27. How important is that a woman breastfeed her infant?

Very Important Important Neutral Unimportant Very Unimportant

28. How important is it that a woman be allowed to breastfeed or express breast milk in the workplace?

Very Important Important Neutral Unimportant Very Unimportant

29. How important is it that employer support breastfeeding or expressing breast milk in the workplace?

Very Important Important Neutral Unimportant Very Unimportant

30. How important is it that coworkers support breastfeeding or expressing breast milk in the workplace?

Very Important Important Neutral Unimportant Very Unimportant

31. How important is it that businesses have a formal policy that allows breastfeeding or expressing breast milk in the work place?

Very Important Important Neutral Unimportant Very Unimportant

Circle all that apply.

32. I have received breastfeeding information from the following sources.

Mother	Mother in-law	Physician	Newspaper	Other _____
Father	Friend	Nutritionist	Billboards	
Spouse	Grandmother	School	Local radio	
Sister	Nurse/ Mid wife	Books	Local television	
Brother	Lactation consultant	Pamphlet/ Magazine	Local health campaigns	

33. Who influences your choice to breastfeed the infant?

Mother	Mother in-law	Guardian	Nutritionist
Father	Father in-law	Friends	Local health announcements
Spouse	Sister in-law	Nurse/mid wife	Cable television
Sister	Relatives	Physician	Other _____

34. I or my significant other have or would breastfeed my/our children or express breast milk in the following areas

Home	Physician's waiting room	Business meeting
Relative's	Home supermarket	Theater/ movie
Friend's home	Shopping mall	Stadium
Restaurant	Park	Church
Stranger's home	public transportation	school
Workplace	other _____	

35. Which of the following policies should a corporation endorse to facilitate breastfeeding or expressing breast milk in the workplace?

Paid maternity leave (How many weeks or months _____)

Paid, extended maternity leave (How many weeks or months _____)

Extended leave without pay (How many weeks or months _____)

Leave with no loss of pay (How many weeks or months _____)

Return to same or similar position after maternity leave

Part-time jobs

Job sharing

Flextime jobs

Other _____

36. From the list below (A-I), select the **top three factors** that most influence **your** decision to breastfeed the infant.

A. Daily routine and time	F. Nutrition knowledge
B. Family situation	G. Financial or money resources
C. Social situations	H. Childhood experiences
D. Health concerns	I. Availability of food
E. Accessibility to food markets and shops	

#1--Most influential factor _____

#2--Next most influential factor _____

#3--Last most influential factor _____

Demographic Information

Please check one answer for each question.

1. What is your age?

- Under 20
- 20- 30
- 31- 40
- 41-50

2. Where do you live?

- | | |
|--|---|
| <input type="checkbox"/> ABC Islands | <input type="checkbox"/> Jamaica |
| <input type="checkbox"/> Anguilla | <input type="checkbox"/> Martinique |
| <input type="checkbox"/> Antigua & Barbuda | <input type="checkbox"/> Puerto Rico |
| <input type="checkbox"/> Bahamas | <input type="checkbox"/> Saba & St. Eustatius |
| <input type="checkbox"/> Barbados | <input type="checkbox"/> St. Barth |
| <input type="checkbox"/> Cayman Islands | <input type="checkbox"/> St. Kitts & Nevis |
| <input type="checkbox"/> Cuba | <input type="checkbox"/> St. Lucia |
| <input type="checkbox"/> Dominica | <input type="checkbox"/> St. Maarten / St. Martin |
| <input type="checkbox"/> Dominican Rep. | <input type="checkbox"/> St. Vincent |
| <input type="checkbox"/> Grenada | <input type="checkbox"/> Trinidad & Tobago |
| <input type="checkbox"/> Grenadines | <input type="checkbox"/> Turks & Caicos |
| <input type="checkbox"/> Guadeloupe | <input type="checkbox"/> Virgin islands |
| <input type="checkbox"/> Guyana | <input type="checkbox"/> Other: |

3. What is your ethnicity?

- | | |
|--|--|
| <input type="checkbox"/> African | <input type="checkbox"/> Asian |
| <input type="checkbox"/> White/Caucasian | <input type="checkbox"/> Lebanese |
| <input type="checkbox"/> Indian | <input type="checkbox"/> Syrian |
| <input type="checkbox"/> French | <input type="checkbox"/> Mixed |
| <input type="checkbox"/> Latino/Hispanic | <input type="checkbox"/> Other. Please explain _____ |

4. What is your highest educational level?

- Less than High School or Secondary School
- High School /Secondary Graduate
- Post High School/Secondary training
- Some College specify major _____
- College Graduate specify major _____
- Some Graduate School specify major _____
- Graduate School Graduate specify major _____

5. I received my highest educational degree from _____

6. I received my highest educational degree from _____

7. How many children do you have?

- | | |
|-------------------------------|------------------------------------|
| <input type="checkbox"/> None | <input type="checkbox"/> 3 |
| <input type="checkbox"/> 1 | <input type="checkbox"/> 4 |
| <input type="checkbox"/> 2 | <input type="checkbox"/> 5 or more |

8. I have breastfed _____ of my children.

9. What is your current employment status?

- | | |
|---|---|
| <input type="checkbox"/> Employed Full-time | <input type="checkbox"/> Disabled, unable to work |
| <input type="checkbox"/> Employed Part-time | <input type="checkbox"/> Unemployed |
| <input type="checkbox"/> Homemaker | <input type="checkbox"/> Student |
| <input type="checkbox"/> Retired | <input type="checkbox"/> Other _____ |

10. What is your current job or occupation? (For example, secondary teacher, college professor, government worker.)
Job/Occupation _____

11. What types of benefits do you receive with your work? (Check all that apply.)

- | | |
|---|---|
| <input type="checkbox"/> Health Insurance | <input type="checkbox"/> Retirement |
| <input type="checkbox"/> Dental Insurance | <input type="checkbox"/> Maternity leave |
| <input type="checkbox"/> Family Leave | <input type="checkbox"/> None |
| <input type="checkbox"/> Sick Leave | <input type="checkbox"/> Other, specify _____ |
| <input type="checkbox"/> Vacation Leave | |

12. Are you a current International Federation of Home Economics (IFHE) Member?

Yes No

If you would like to further explain any of your answers to any question (s), please do so here.

Thank you for your time and effort in completing this survey!

Institutional Review Board

Dr. David M. Moore
IRB (Human Subjects) Chair
Assistant Vice Provost for Research Compliance
CVM Phase II - Duckpond Dr., Blacksburg, VA 24061-0442
Office: 540/231-4991; FAX: 540/231-6033
e-mail: moored@vt.edu

November 21, 2003

MEMORANDUM

TO: Sharon M. Nickols Human Nutrition, Foods, & Exercise 0430
Jayalakshmi Velpuri HNFE 430

FROM: David M. Moore 

SUBJECT: IRB EXEMPTION APPROVAL - "Breastfeeding in the workplace" -
IRB # 03-576

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of November 20, 2003.

Cc: File
Department Reviewer: William G. Herbert HNFE 0351

VITA

Jayalakshmi Velpuri, daughter of Venkateswarlu and Seetamahalakshmi Velpuri was born April 27, 1973 in Hyderabad, India. Jaya received her B. Sc in Home science and M. Sc. in Foods and Nutrition from Acharya N.G. Ranga agricultural University, India, in 1994 and 1997 respectively. She received her M.S. from University of Massachusetts (UMass) in Human Nutrition Foods and Exercise in 2000. While at UMass, Jaya was supported through Graduate Teaching Assistantships. After graduating from Virginia Polytechnic Institute and State University , Jaya will leave for Denver, CO to look for jobs. She plans to work with international organizations dealing with issues of maternal and child nutrition.