FACTORS ASSOCIATED WITH THE CESSATION OF EXCLUSIVE BREASTFEEDING AMONG A SELECT GROUP OF NEWFOUNDLAND MOTHERS

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by

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ABSTRACT

The purpose of this study was to identify factors associated with the cessation of exclusive breastfeeding among a select group of Newfoundland mothers. This was accomplished through a secondary analysis of a comprehensive study of infant feeding practices in Newfoundland and Labrador during the first six months of life.

A subset of the randomly selected sample from the primary investigation was chosen. It consisted of 265 Newfoundland mothers who were exclusively breastfeeding their infants at hospital discharge. In the primary investigation, data were collected prospectively during four structured interviews. Two questionnaires were used for data collection.

Descriptive statistics and the chi-square test were used to analyze the data. Results showed that at one month 36.2% of the mothers had discontinued exclusive breastfeeding. This percentage increased to 61.1% at four months, and to 72.4% at six months. The first week postpartum was the most common time reported for the cessation of exclusive breastfeeding, with 13.2% of mothers discontinuing at this time. At one month most mothers ceased exclusive breastfeeding because of difficulties with this method of feeding, because the baby was not satisfied with breastmilk, or to supplement and get a break. At four and six months the majority of mothers discontinued exclusive breastfeeding because they were returning to work, school, or university. Significant relationships between the duration of exclusive breastfeeding and selected factors were identified when four different subgroups of women were compared. These were women

who discontinued exclusive breastfeeding in the early, intermediate, and later postpartum period, and those who continued exclusive breastfeeding beyond six months. Significant factors included maternal age, education, living status, income, infant birth weight, introducing the infant to solid food at four and six months, previous experience with breastfeeding, and having had a prenatal discussion about infant feeding methods with one's mother, sister, or the public health nurse.

Findings revealed that most Newfoundland mothers discontinued exclusive breastfeeding long before the recommended time, and that the first month postpartum was especially difficult for mothers. Results can be used to target areas for future nursing intervention.

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Introduction

Within the past two decades an increased interest has been shown in infant feeding. With this interest has come the recognition of breastmilk as the superior food for infants (McNally, Hendricks, & Horowitz, 1985; Reiff & Essock-Vitale, 1985). Scientific evidence of the value of breastmilk led several official medical bodies, namely the World Health Organization (1974), the American Academy of Pediatrics, Committee on Nutrition (1978) and the Nutrition Committee, Canadian Paediatric Society (1979) to establish guidelines for infant nutrition and to promote breastmilk as the best food for babies. Specifically, these associations have recommended that in order to receive the full benefits of breastfeeding, it is the only milk infants should receive for the first four to six months of life.

According to several Canadian infant feeding surveys, breastfeeding initiation rates have increased dramatically since the 1960's, from 25% to approximately 80% in 1990 (Health and Welfare Canada, 1982; 1991; 1993; McNally et al., 1985; Myres, 1979; Tanaka, Yeung, & Anderson, 1987). Despite these advancements, researchers have noted a rapid decline in the duration of breastfeeding after hospital discharge with very few infants being exclusively breastfed after the first few months of life (Beaudry & Aucoin-Larade, 1989; Goodine & Fried, 1984; Health and Welfare Canada, 1982; 1991; McNally et al., 1985; Morse & Harrison, 1987; Myres, 1979; Yeung, Pennell, Leung, & Hall, 1981).

While there are provincial variations in the rates of initiation and duration of breastfeeding, the lowest rates have been found in the Atlantic provinces (Health and Welfare Canada, 1982; 1991; McNally et al., 1985; Myres, 1979; Tanaka et al., 1987). The purpose of this study is to identify factors associated with the cessation of exclusive breastfeeding before the recommended four to six months among a select group of Newfoundland mothers who, after birth and at hospital discharge, were giving their infants no milk other than breastmilk. This is accomplished through a secondary analysis of a comprehensive study of infant feeding practices in Newfoundland and Labrador covering the first six months of life. The primary investigation was conducted by researchers from the School of Nursing, Memorial University of Newfoundland, between January 1992 and June 1994.

Background to the Study

The background to this study is profiled under breastfeeding in Newfoundland and the importance of breastfeeding.

Breastfeeding in Newfoundland

Several surveys have indicated that low rates of breastfeeding prevail in Newfoundland. Despite the fact that the provincial breastfeeding initiation rate has increased from 17% in 1978 (Alton-Mackay & Orr, 1978), to 41.7% in 1994 (Matthews, Webber, McKim, Banoub-Baddour, & Laryea, 1995), it is the lowest initiation rate of the Canadian provinces (Banoub et al., 1985; Friel, Hudson, Banoub, & Ross, 1989). This statistic is not surprising given that Newfoundland has historically been economically

disadvantaged compared to the other Canadian provinces, and the lowest breastfeeding initiation rates have been found among women from lower socioeconomic groups (Goodine & Fried, 1984; McNally et al., 1985; Yeung et al., 1981).

Another factor that might explain the low incidence of breastfeeding in this province is that many Newfoundland mothers have negative attitudes toward breastfeeding. Banoub et al. (1985) conducted a provincial breastfeeding survey in 1984 and found that 37% of the women sampled did not breastfeed their infants because they had an aversion to it. Similarly, Matthews et al. (1995) noted that the major reason cited by 33.7% of the formula feeding mothers in their study for choosing not to breastfeed was that they considered the idea of breastfeeding distasteful and embarrassing. This negativity toward breastfeeding exists despite a number of educational programs and support services in the province which promote breastfeeding. Levine (1984) suggests that the reluctance to breastfeed is a reasonable response in a cultural context in which breasts are predominantly viewed as sexual objects rather than a means of nourishing the young. It is also a reasonable response in a society which equates breastfeeding with a lack of progress or not being modern.

In addition to the low provincial rates of breastfeeding initiation, large number of mothers are ceasing to breastfeed their infants prematurely. Banoub et al. (1985) found that by six weeks postpartum 11.6% of the women in their study had discontinued breastfeeding, as did 19.2% at four months. In addition, these same authors found that by four months postpartum, only 15.7% of the breastfeeding mothers (22.1%) were

exclusively breastfeeding their infants.

Matthews (1993) found that of the 59 mothers in her study who initiated breastfeeding in the hospital, 5% of them had discontinued breastfeeding before discharge, 20% were supplementing breastmilk with formula at six to eight weeks postpartum, and an additional 42% had discontinued breastfeeding by this time. Similarly, Matthews et al. (1995) found that from an initial rate of 41.7% at birth, the rate of exclusive breastfeeding among mothers in Newfoundland and Labrador declined to 25.4 % at one month, 14.9% at four months and 11.4% at six months. By one month 42.5% of the breastfeeding mothers were supplementing their babies with commercially prepared formula or other milks, and by four months 35.0% of the babies still receiving breastmilk were being supplemented with formula.

The question that Matthews et al. (1995) raise is does it matter that many Newfoundland mothers are not following infant feeding guidelines and that their infants are not receiving breastmilk for the first six months of life? Research suggests that it does matter since infant nutrition can have an impact on children's physical and intellectual growth and development (Chandra, 1990; Janke, 1993; Walker, 1993).

The Benefits of Breastfeeding

Breastmilk has been widely acknowledged as being advantageous for the infant. In terms of nutritional value, breastmilk, in addition to having the perfect balance of all the necessary nutrients needed to sustain babies for the first six months of life, contains these nutrients in a biospecific, bioavailable form allowing for their more effective

utilization (Howie, 1985; Janke, 1993; Lawrence, 1985; Riordan & Countryman, 1980a).

Breastmilk also has anti-infective properties. Studies have demonstrated that human milk protects the infant from illness by providing increased resistance to respiratory infections, gastrointestinal infections, ear infections and the early development of allergies (Chandra, 1990; Duffy, Byers, et al., 1986; Duffy, Riepenhoff-Talty, Byers, La Scolea, & Olga, 1986; Howie, 1985; Howie, Forsyth, Ogston, Clark, & Florey, 1990; Janke, 1993; Pullan et al., 1980; Riordan & Countryman, 1980a; Saarinen, 1982; Teele, Klein, & Rosner, 1989; Walker, 1993; Wang & Wu, 1996; Wright, Holberg, Martinez, Morgan, & Taussig, 1989).

Some researchers have suggested that prolonged breastfeeding protects against obesity in both childhood and adulthood (Hamosh, 1988; Kramer et al., 1986; Wolman, 1984), and is associated with reduced coronary artery pathology later in life due to the high level of cholesterol found in breastmilk (Janke, 1993; Nutrition Committee, Canadian Paediatric Society, 1979; Riordan & Countryman, 1980a). A moderate cholesterol intake in infancy is believed to be important in the development of metabolic pathways to deal with cholesterol in adulthood (Janke, 1993; Riordan & Countryman, 1980a).

Not breastfeeding has also been identified by Mitchell et al. (1991) as a risk factor for sudden infant death syndrome (SIDS). The development of the New Zealand cot death study by these researchers was prompted by a high mortality rate from SIDS in that country. Mitchel et al. highlighted three potentially amenable risk factors for SIDS,

namely the prone sleeping position of the baby, maternal smoking and a lack of breast-feeding. The researchers proposed that these risk factors, which appeared to be independent of each other in their association with SIDS, could explain 79% of deaths from this syndrome in New Zealand.

Researchers have reported a relationship between breastfeeding and child development. Children who have been breastfed have demonstrated higher intellectual performance than those who were formula fed (Lucas, Morley, Cole, Lister, & Leeson-Payne, 1992; Morrow-Tlucak, Haude, & Ernhart, 1988; Rogan & Gladen, 1993; Walker, 1993), and performance has been positively correlated with duration of breastfeeding (Lucas et al., 1992; Morrow-Tlucak et al., 1988). Taylor and Wadsworth (1984) also found a positive correlation between the duration of breastfeeding and performance in tests of vocabulary and visuomotor co-ordination and behaviour score. Bauer, Ewald, Hoffman, and Dubanoski (1991) showed that children who were breastfed the longest significantly scored higher on the McCarthy Scales of Children's Abilities, and Baumgartner (1984) found that at 12 months breastfed babies showed a significant social developmental and psychomotor advantage when compared to babies who were bottle fed. Similarly, Wang and Wu (1996) found that children who were not exclusively breastfed for the first four months of life showed significantly lower Gross Motor and Personal-Social development scores on the Denver Development Screening Test at one year of age than exclusively breastfed children.

Breastfeeding is psychologically advantageous for both the infant and mother.

The frequent holding, cuddling and skin-to-skin contact is believed to enhance the bond between the pair that began at birth (Janke, 1993; Jelliffe & Jellife, 1979; Newton, 1971; Riordan & Countryman, 1980b; Taylor, 1977).

In light of the evidence presented above, one can concur with Howie (1985) that breastfeeding is of central importance to children's growth and development.

Statement of the Problem

The recent report on the Health of Canadians prepared by the Federal, Provincial and Territorial Advisory Committee on Population Health (1994) has identified healthy child development as crucially important as a determinant of health. Given the early cessation of exclusive breastfeeding of infants in Newfoundland and the importance of this method of feeding to healthy child development, it is important to understand why mothers in this province stop breastfeeding before the recommended time.

Research Purpose and Questions

The purpose of this research is to study mothers who chose exclusive breastfeeding as the method of feeding for their new infants, to examine the duration of exclusive breastfeeding among these women, and to determine what are some of the factors that support or inhibit this method of feeding their infants during the first six months of life.

The following research questions are designed to address this purpose:

1. What are the sociodemographic and maternal-infant characteristics of mothers who chose exclusive breastfeeding?

2. What is the duration of exclusive breastfeeding among a select group of Newfoundland mothers who initiated this method of feeding in the hospital?

3. How many mothers who chose exclusive breastfeeding quit by one, four, and six months?

4. What are the reasons mothers give for discontinuing exclusive breastfeeding at these time periods?

5. What sociodemographic, maternal-infant, and preparation for breastfeeding characteristics distinguish between mothers who discontinue exclusive breastfeeding early, at intermediate, and later periods, and those who exclusively breastfeed for longer duration, i.e., beyond six months?

The Need for the Study

This study can be justified on the basis of several potential benefits. The identification of variables associated with premature cessation of exclusive breastfeeding for the mothers in this study may help nurses and other health professionals find a means of increasing the duration of exclusive breastfeeding in this province. Specifically, findings may highlight areas where further education and support are needed to improve infant nutrition. These areas could then be targeted when planning future breastfeeding promotion programs. Knowledge of these areas could also enhance care in the clinical setting. Further, the identification of potential obstacles which lead to premature weaning may allow mothers to recognize and overcome them more easily.

Conceptual Framework

A review of the literature did not result in the identification of a conceptual framework within which to study this particular problem. Consequently, a conceptual model was formulated. Physical, social, cultural and psychological influences were grouped under the headings of demographic, prenatal, postnatal factors and infant characteristics. While it is recognized that other factors may, and indeed do, have an influence on when exclusive breastfeeding ceases, the explanatory model devised for the current study reflects factors the primary investigators thought to be important determinants of infant feeding in the first six months of the infant's life. The conceptual model used in this study of the factors associated with the cessation of exclusive breastfeeding is presented in Figure 1.

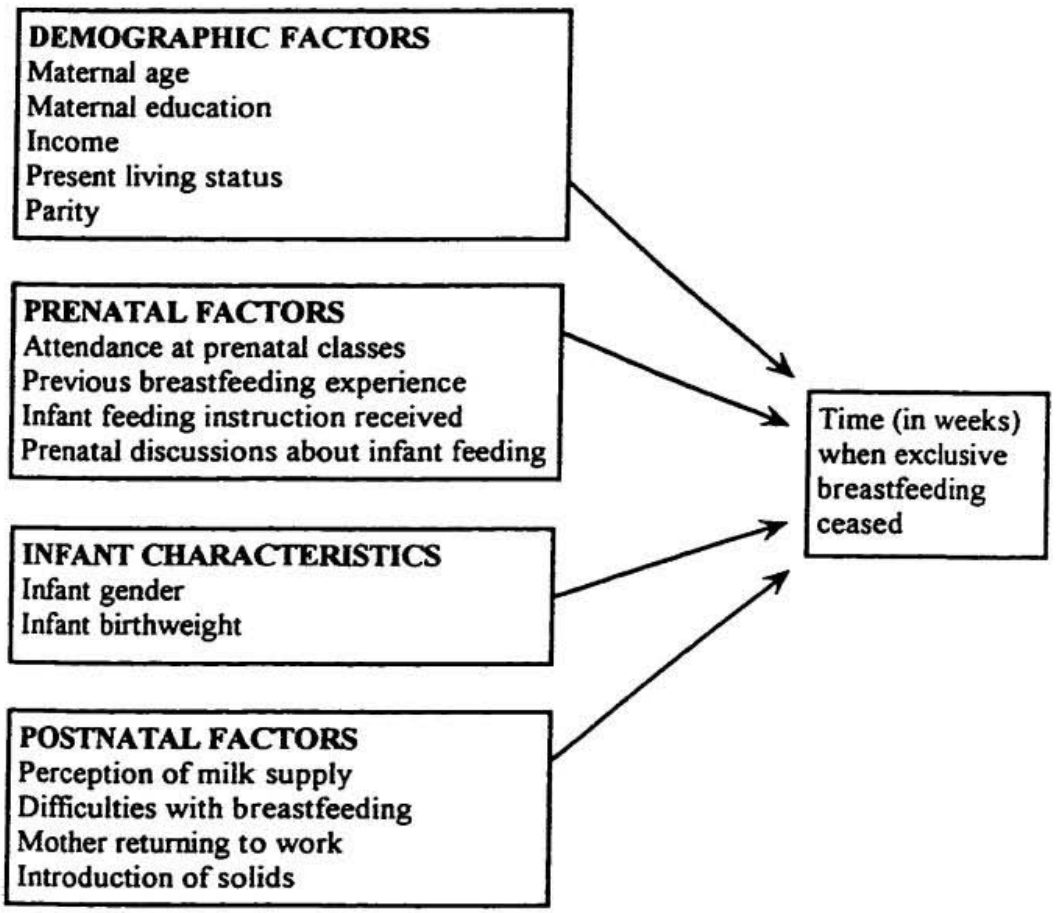

Figure 1. Conceptual Model of the Factors Associated with the Cessation of Breastfeeding.

CHAPTER 2

Literature Review

The main purpose of this chapter is to identify factors associated with cessation, or alternatively, duration of breastfeeding. The majority of researchers have studied the influence of factors on the duration of breastfeeding rather than examining early termination. While the main interest of this study is why mothers cease to breastfeed their infants exclusively in the first six months of their infant's life, it can be argued that knowledge of why some women continue to breastfeed, indirectly, leads to a better understanding of why other mothers stop breastfeeding prematurely. Emphasis will be placed on studies which were conducted for the primary purpose of examining factors in relation to the termination or continuation of breastfeeding, or to identify reasons for the discontinuation of breastfeeding. However, additional studies for which this was a secondary purpose are reviewed in the interest of completeness, but are not always described in detail. Following the discussion, a summary of the literature reviewed in this chapter will be presented, and the limitations of the research will be identified.

Factors Associated with the Cessation or Duration of Breastfeeding

Factors that have influenced the cessation or duration of breastfeeding can be divided into five categories: sociodemographic, prenatal, psychological, perinatal and postnatal factors.

Sociodemographic Factors

A number of researchers studied the influence of sociodemographic factors on the

duration or cessation of breastfeeding usually as part of a larger study. These studies are presented in chronological order in Table 1 identifying author, whether the study design was retrospective, prospective, or cross-sectional, number of "breastfeeding" subjects included, sampling procedure, and the factors associated with longer duration. Unless specified, researchers included both primiparous and multiparous women in their studies.

When the findings from the studies described in Table 1 were examined, several sociodemographic factors were found to be associated with the duration of breastfeeding including race, age, level of education, socio-economic status, marital status, parity and place of residence. Women who breastfed for the longest duration were Caucasian, older, well educated, of higher socioeconomic status, multiparous and lived in urban areas. Exceptions to the typical associations were identified by some researchers. Tamminen et al. (1983) identified that increasing age does not always correlate with increased duration of breastfeeding. These researchers found that fewer "exceptionally" old mothers (> 38 years), in addition to "exceptionally" young mothers (≤ 20 years) breastfed for six months or more than did mothers aged 21-38 years. Ekwo et al. (1984) found that women whose family income was greater than $25, 000 a year breastfed for a significantly shorter duration than mothers whose income was less than or equal to $25, 000 a year. Jakobsen et al. (1996) and Melville (1990) found less educated women to be the longest breastfeeders. Melville (1990) also found that significantly more rural women breastfed for at least 12 months than did those in urban areas, and Perez-Escamilla et al. (1993) also found an inverse relationship between urban background and the duration of

Table 1: Studies which examined the influence of sociodemographic factors on the duration or cessation of breastfeeding.

AUTHOR (COUNTRY)	YEAR	DESIGN	NUMBER OF SUBJECTS	SAMPLING METHOD	DEMOGRAPHIC FACTORS ASSOCIATED WITH LONGER DURATION
Sjölin et al. (Sweden)	1977	Retrospective	298	Random	Older age, higher education, higher socioeconomic status
Starling et al. (New Zealand)	1979	Prospective (12 months)	904	Convenience	Older age, higher education, two-parent family
West (Scotland)	1980	Prospective (6 months)	239	Convenience	Higher socioeconomic status
Yeung et al. (Canada)	1981	Prospective (18 months)	287	Convenience	Higher education
Bloom et al. (Canada)	1982	Prospective (6 months)	249	Convenience	Higher education, higher paternal occupational status, multiparous
Entwisle et al. (United States)	1982	Retrospective & Prospective (12 months)	*91 (1965-69) *78 (1973-76)	Convenience	Higher socioeconomic status
Rousseau et al. (Canada)	1982	Prospective (9 months)	89	Random	Higher education
Houston et al. (Scotland)	1983	Prospective (16 weeks)	47	Convenience	Higher social class
Tamminen et al. (Finland)	1983	Retrospective	1660	Convenience	Older age (but less than 38 years)

Table 1 (cont.): Studies which examined the influence of sociodemographic factors on the duration or cessation of breastfeeding.

AUTHOR (COUNTRY)	YEAR	DESIGN	NUMBER OF SUBJECTS	SAMPLING METHOD	DEMOGRAPHIC FACTORS ASSOCIATED WITH LONGER DURATION
Whichelow (England)	1983	Retrospective	130	Convenience	Multiparous
Wright & Walker (United Kingdom)	1983	Prospective (6 months)	*373	Random	Older age, higher education, higher socioeconomic status
Auerbach & Guss (United States)	1984	Retrospective	567	Convenience	Caucasian
Ekwo et al. (United States)	1984	Prospective (8 months)	*81	Convenience	Lower socioeconomic status
Ellis & Hewat (Canada)	1984b	Prospective (6 months)	131	Convenience	None
Goodine & Fried (Canada)	1984	Retrospective	248	Convenience	Higher education
Jones & West (United Kingdom)	1985	Prospective (12 months)	678	Convenience	Higher social class

Table 1 (cont.): Studies which examined the influence of sociodemographic factors on the duration or cessation of breastfeeding.

AUTHOR (COUNTRY)	YEAR	DESIGN	NUMBER OF SUBJECTS	SAMPLING METHOD	DEMOGRAPHIC FACTORS ASSOCIATED WITH LONGER DURATION
Loughlin et al. (United States)	1985	Prospective (2 months)	94	Convenience	None
Quandt (United States)	1985	Prospective (6 months)	*62	Convenience	Higher education
Samuels et al. (United States)	1985	Prospective (4 months)	417	Convenience	Caucasian, older age
Feinstein et al. (United States)	1986	Prospective (4 months)	166	Convenience	Older age, higher education
Jones et al. (United Kingdom)	1986	Prospective (12 months)	649	Convenience	Higher socioeconomic status
Lynch et al. (Canada)	1986	Prospective (9 months)	270	Convenience	Older age, higher educated, higher socio-economic status, married, multiparous
Hawkins et al. (United States)	1987	Retrospective	47	Convenience	Older age, higher education, married

Table 1 (cont.): Studies which examined the influence of sociodemographic factors on the duration or cessation of breastfeeding.

AUTHOR (COUNTRY)	YEAR	DESIGN	NUMBER OF SUBJECTS	SAMPLING METHOD	DEMOGRAPHIC FACTORS ASSOCIATED WITH LONGER DURATION
Coriel & Murphy (United States)	1988	Prospective (1 year)	44	Convenience	Older age
Janke (United States)	1988	Prospective (6 weeks)	215	Convenience	Higher education †, married †
Kurinij et al. (United States)	1988	Prospective (12 months)	*755	Convenience	Caucasian, older age ‡, higher education ‡, married ‡
Wright et al. (United States)	1988	Prospective (12 months)	778	Convenience	Anglo-American, higher education, married, multiparous
Beaudry & Aucoin-Larade (Canada)	1989	Retrospective	437	Modified cluster	English or mixed culture, older age, higher socioeconomic status
Kaufman & Hall (Canada)	1989	Prospective (9 months)	88	Convenience	Older age
Ryan & Martinez (United States)	1989	Retrospective	39,130	Probability	Caucasian, older age, higher education, higher socioeconomic status, multiparous

Table 1 (cont.): Studies which examined the influence of sociodemographic factors on the duration or cessation of breastfeeding.

AUTHOR (COUNTRY)	YEAR	DESIGN	NUMBER OF SUBJECTS	SAMPLING METHOD	DEMOGRAPHIC FACTORS ASSOCIATED WITH LONGER DURATION
Grossman, Fitzsimmons, et al. (United States)	1990	Prospective (2 months)	116	Convenience	Higher education
Grossman, Harter, et al. (United States)	1990	Prospective (6 months)	97	Convenience	Higher education, employment (source of income)
Melville (Jamaica)	1990	Not stated	315	Cluster (3 stage)	Older age, rural residence
Gielen et al. (United States)	1991	Prospective (12 weeks)	271	Stratified/ Disproportionate	Caucasian, older age, higher education
Hill (United States)	1991	Retrospective	400	Convenience	Caucasian, older age, higher education (maternal and paternal), higher socioeconomic status

Table 1 (cont.): Studies which examined the influence of sociodemographic factors on the duration or cessation of breastfeeding.

AUTHOR (COUNTRY)	YEAR	DESIGN	NUMBER OF SUBJECTS	SAMPLING METHOD	DEMOGRAPHIC FACTORS ASSOCIATED WITH LONGER DURATION
Mansbach et al. (Isreal)	1991	Retrospective & Prospective (2 years)	*170	Convenience	Higher education
Bagwell et al. (United States)	1992	Retrospective	1917	Convenience	Older age, multiparous
O'Campo et al. (United States)	1992	Prospective (8 months)	198	Stratified random	None
Rutishauser & Carlin (Australia)	1992	Prospective (6 months)	*739	Convenience	Older age, higher occupational score
Chen (Taiwan)	1993	Prospective (12 weeks)	180	Convenience	Multiparous
Lowe (Australia)	1993	Retrospective	66,434	Convenience	Higher socioeconomic status
Perez-Escamilla et al. (Mexico)	1993	Prospective (4 months)	165	Convenience	Rural background

Table 1 (cont.): Studies which examined the influence of sociodemographic factors on the duration or cessation of breastfeeding.

AUTHOR (COUNTRY)	YEAR	DESIGN	NUMBER OF SUBJECTS	SAMPLING METHOD	DEMOGRAPHIC FACTORS ASSOCIATED WITH LONGER DURATION
Blomquist et al. (Sweden)	1994	Prospective (4 months)	521	Convenience	Older age
Lowe (Australia)	1994	Prospective	98	Convenience	Older age, higher education
Quarles et al. (United States)	1994	Prospective (4 months)	161	Convenience	Older age, higher education
Lawson & Tulloch (Australia)	1995	Prospective (3 months)	*78	Convenience	Higher education
Nolan & Goel (Canada)	1995	Cross-sectional	2110	Stratified cluster	Older age, higher education, not French speaking
Hill & Aldag (United States)	1996	Retrospective & Prospective (8 weeks)	400 (term infants) & 110 (low-birth-weight infants)	Convenience	Older age ■, higher education ■, higher socioeconomic status ■, married ■
Jakobsen et al. (West Africa)	1996	Prospective (2 years)	1678	Convenience	Ethnic group Balanta, older age, less education, multiparous

Table 1 (cont.): Studies which examined the influence of sociodemographic factors on the duration or cessation of breastfeeding.

AUTHOR (COUNTRY)	YEAR	DESIGN	NUMBER OF SUBJECTS	SAMPLING METHOD	DEMOGRAPHIC FACTORS ASSOCIATED WITH LONGER DURATION
Kiehl et al. (United States)	1996	Prospective (6 months)	138	Convenience	Married
Schy et al. (United States)	1996	Prospective (6 months)	150	Convenience	Higher education
Piper & Parks (United States)	1996	Retrospective	2372	Stratified systematic	Older age, multiparous

* primiparous subjects
† significant only for mothers who vaginally delivered
‡ significant for White mothers only
■ significant for term-infants only

breastfeeding. However, the studies by Jakobsen et al., Melville, and Perez-Escamilla et al. were conducted in developing countries where the longest breastfeeders have tended to be poor, to live in rural areas, and to have little education (Forman, 1984; Hofvander & Petros-Barvazian, 1978; Huffman, 1984).

Prenatal Factors

Knowledge of breastfeeding is one prenatal factor that has been associated with continued breastfeeding. Gulick (1982) conducted a descriptive, prospective study in the United States among primigravid mothers attending prenatal classes in their third trimester of pregnancy to determine the relationship between success in breastfeeding and mother's information on breastfeeding. An initial questionnaire was used to measure the women's breastfeeding knowledge and to obtain personal data. The second questionnaire was sent to participants after delivery to obtain additional prenatal and perinatal information, and to determine breastfeeding experience and duration. Mothers who continued to breastfeed their infant beyond one month of age (n = 44) were matched for age and education with mothers who stopped breastfeeding before their infant was one month old (n = 44). Gulick found that mothers who continued breastfeeding beyond one month (successful breastfeeders) were significantly more knowledgeable about breastfeeding than those who discontinued breastfeeding within the first month postpartum (unsuccessful breastfeeders). When specific items on the questionnaire were examined to determine if any particular items distinguished between the two groups, successful breastfeeders had significantly more knowledge of the benefits of

breastfeeding, nipple care during pregnancy, waking a sleepy baby for feeding, and bowel movement characteristics for breastfed babies. Gulick also found that the number of informational sources and breastfeeding informational scores were positively and significantly correlated; mothers who were more knowledgeable about breastfeeding utilized more feeding information sources.

Other researchers have examined prenatal education in relation to the duration of breastfeeding. Wright and Walker (1983) found that mothers who had prenatal knowledge of various aspects of breastfeeding including preparation of the breasts for feeding, care for their breasts, management of physical breastfeeding problems, the importance of extra fluids, and expression of excess milk were significantly more likely to be breastfeeding from six weeks onward than mothers who had not received this information. In addition, mothers who attended "mothercraft" classes during pregnancy, and took steps to prepare their breasts for breastfeeding prior to delivery were significantly more likely to be breastfeeding from the fourth and eighth week respectively than mothers who had not attended these classes or prepared their breasts for feeding.

Sciacca, Phipps, Dube, and Ratliff (1995) conducted a prospective study to evaluate the impact of a prenatal educational program on breastfeeding. The sample was self-selected and consisted of 68 low-income, primiparous, pregnant women who were enrolled in the Special Supplemental Food Program for Women, Infants, and Children (WIC) in Arizona. Subjects were randomly assigned to either a control group or an intervention group. Women in the control group received routine breastfeeding education

at the WIC clinics. Those in the intervention group participated with their partner in a special breastfeeding class for expectant couples, attended childbirth classes for couples, and were assigned to a peer counsellor after delivery for breastfeeding support. Mothers were followed until three months after delivery. The authors found that at two weeks, six weeks and three months postpartum, exclusive breastfeeding was significantly higher and exclusive formula feeding was significantly lower in the intervention group than the control group. However, the women in the intervention group were offered many prenatal and postnatal incentives to finish the components of the educational program, as were their partners. Consequently, the incentives may have been a greater motivator to continue breastfeeding than the education and support received.

Nonetheless, support for Sciacca et al.'s (1995) findings was found in studies by Bloom et al. (1982), Entwisle et al. (1982), Beaudry and Aucoin-Larade (1989), Grossman, Harter, Sachs and Kay (1990), and Matthews (1993). These authors identified a significant relationship between prenatal class attendance and a prolonged duration of breastfeeding. Bloom et al. also found that the average number of weeks of breastfeeding was significantly longer for mothers who attended a prenatal breastfeeding class. Piper and Parks (1996) found that prenatal class attendance was significantly related to exclusivity of breastfeeding at one month.

However, no association between prenatal education and the duration of breastfeeding has been reported in other studies (Ellis & Hewat, 1984b; Hill, 1987; Lynch et al., 1986; Starling et al., 1979). Hill conducted an experimental study to determine the

effect of a prenatal breastfeeding education program on breastfeeding success. The convenience sample consisted of 64 low-income pregnant women who were receiving care at an antenatal unit of a university hospital in the Midwestern United States. The women were separated according to parity, and randomly assigned to an experimental group or a control group. All subjects completed one form of the "Breastfeeding Knowledge Questionnaire", which served as a pretest. The experimental group took part in a prenatal breastfeeding education program which consisted of a 40 minute slide show with lecture and discussion, followed by a five to ten minute question and answer period. Participants in the experimental group then completed a parallel form of the Breastfeeding Knowledge Questionnaire, and were given a breastfeeding educational pamphlet which reinforced the material presented in the education program. Another questionnaire was used during an interview with the participants at six weeks postpartum, or was mailed to participants who could not be contacted by phone. Hill found that despite the fact that women in the experimental group were significantly more knowledgeable about breastfeeding after participating in the education program, there was no difference in the duration of breastfeeding between the experimental and control groups. However, the author noted that the lack of a statistically significant relationship between prenatal education and the length of breastfeeding may have been influenced by the fact that women in the control group were not prohibited from attending breastfeeding classes taught by the staff at the antenatal unit, and these women also received breastfeeding information from nurses.

O'Campo et al. (1992) also examined the influence of prenatally identified factors on the duration of breastfeeding. Using D.R. Cox proportional hazard analyses, three factors found to be significantly associated with prolonged duration of breastfeeding were: anticipated length of breastfeeding for six months or more; the woman's perception of having support for breastfeeding (high normative beliefs); and having breastfeeding role models (social learning). The findings from other studies have supported those of O'Campo et al.

One of the primary purposes in a prospective study by Coriel and Murphy (1988) was to examine the relationship between prenatal intent to breastfeed and the length of breastfeeding. The 44 subjects were Caucasian, married, well-informed, middle to upper class women who were attending prenatal education classes and planned to breastfeed. Data were collected using questionnaires; self-administered questionnaires were completed by subjects in the third trimester of pregnancy and at 12 months postpartum, and another questionnaire was administered during a home interview with subjects at six weeks. The authors found that the strongest predictor of actual duration of breastfeeding was intended duration.

Lawson and Tulloch (1995) conducted a prospective study in Australia to examine the influence of prenatal attitudinal factors and postnatal experiential factors on the duration of breastfeeding. The sample of 78 primiparous women was conveniently chosen and data were collected using a prenatal and postnatal questionnaire. The authors found an association between planned and actual duration of breastfeeding; mothers who

were giving their babies breastmilk only at three months had planned to breastfeed for four to six months. Other researchers have identified a relationship between intended duration of breastfeeding and actual duration (Entwistle, Doering, & Reilly 1982; Grossman, Fitzsimmons, Larsen-Alexander, Sachs, & Harter, 1990; Grossman, Harter, Sachs, & Kay, 1990; Hill, 1991; Kaufman & Hall, 1989; Loughlin et al., 1985; Lynch et al., 1986; Perez-Escamilla et al., 1993; Schy et al., 1996). In addition, Piper and Parks (1996) found that consistency of the pattern of breastfeeding at one month postpartum and the intent to exclusively or partially breastfeed during this time was significantly associated with persistence in breastfeeding for longer than six months, and Wright et al. (1996) also found a significant relationship between intended and actual breastfeeding patterns at four months postpartum.

Other researchers have noted that women were significantly more likely to have continued breastfeeding in the presence of one or more of the following factors: previous experience or success with breastfeeding; having observed friends or family members breastfeeding; having been breastfed; having a spouse who preferred that the baby be breastfed (Beaudry & Aucoin-Larade, 1989; Bergerman et al., 1979; Bloom et al., 1982; Entwisle et al., 1982; Feinstein et al., 1986; Hawkins et al., 1987; Jones et al., 1982; Kaufman & Hall, 1989; Lynch et al., 1986; Sjölin et al., 1977; West, 1980).

Another factor that has been associated with the duration of breastfeeding is the time when the decision to breastfeed was made (Goodine & Fried, 1984; Gulick, 1982; Jones et al., 1986; Lawson & Tulloch, 1995; Lynch et al., 1986). Gulick found that

mothers who made the decision early in pregnancy to breastfeed were more likely to be breastfeeding at one month than those who made the decision to breastfeed late in pregnancy. Jones et al. found that mothers who decided to breastfeed at the beginning of their pregnancy breastfed significantly longer than those who intended to bottle feed, but initiated breastfeeding. However, Goodine and Fried found that mothers who made this decision during pregnancy, breastfed for a significantly shorter period of time than mothers who made the decision to breastfeed prepregnancy, as did Lynch et al. Similarly, Lawson and Tulloch identified that mothers who fully breastfed for three months decided prior to conception that they would be breastfeeders.

Other studies have identified an association between additional prenatal factors and a longer duration of breastfeeding. These studies have indicated that mothers breastfed for a longer duration if they were breastfed in infancy (Lynch et al., 1986; Sloper et al., 1975), had more pregnancies (Hawkins et al., 1987), planned their pregnancy (Feinstein et al., 1986), began receiving prenatal care in the first trimester of pregnancy (Grossman, Harter, Sachs, & Kay, 1990), experienced few problems with pregnancy and enjoyed good prenatal health (Beaudry & Aucoin-Larade, 1989), and had contact with the La Leche League during pregnancy (Rousseau et al., 1982).

Psychological Factors

Researchers have identified relationships between several psychological factors and the duration or cessation of breastfeeding. One such factor is maternal confidence in breastfeeding (Beaudry & Aucoin-Larade, 1989; Gielen et al., 1991; Hill, 1991; Loughlin

et al., 1985; O'Campo et al., 1992). Loughlin et al. conducted a prospective, longitudinal study to determine the frequency of breastfeeding cessation in their private pediatric practice in North Carolina within the first two months postpartum, and to identify the characteristics of infants and mothers that put them at risk for early termination of breastfeeding. The sample consisted of 94 breastfeeding mothers for whom data collection was complete. Mothers completed a questionnaire in the hospital and at the routine two, four and eight week office visits. Nursery staff members also completed a hospital questionnaire describing infant behaviour and their perceptions of potential feeding difficulties for the "nursing dyad" in the future. Loughlin et al. found that maternal lack of confidence in breastfeeding, and ratings by the nursery staff of the infant's excessive crying, demanding personality, trouble with feeding, and anticipated future trouble with feeding were predictors of the discontinuation of breastfeeding within the first weeks postpartum. However, no association was found between the duration of breastfeeding and self-esteem.

Hill (1991) found that in addition to maternal confidence, two other psychosocial factors significantly correlated with continued breastfeeding; a mother's belief that breastfeeding is important and better for her infant and her perception that she had succeeded at breastfeeding. Other researchers have identified an association between continued breastfeeding and positive beliefs about breastfeeding (Bottorff, 1990; Jones et al., 1986; O'Campo et al., 1992). Similarly, Lawson and Tulloch (1995) found that women who were exclusively breastfeeding three months after delivery had a more

negative opinion of formula feeding.

Lothian (1995) conducted a qualitative study to determine the experience of breastfeeding and influences on continuation. Five married, white, suburban couples who were expecting their first baby were followed by an informal interview and participant observation. The author found that "satisfying the baby" was the main variable that arose to explain the duration of breastfeeding. In the presence of infant satisfaction, breastfeeding continuance was also influenced by baby characteristics, such as ability to suck, to self-regulate, and respond to soothing, maternal commitment and knowledge that breastfeeding was best for the baby, maternal satisfaction with breastfeeding, mother's skill in breastfeeding, and support. Maternal satisfaction with breastfeeding was associated with prolonged breastfeeding in another study (Schy et al., 1996).

Bottorff (1990) conducted a phenomenological study to explore the experiences of women who continued to breastfeed when alternatives were possible. Bottorff identified that the main reason for continuing was infant centered; mothers wanted to do what was best for the baby. The "gift" of breastfeeding could only be given by the mother... and "the contented child returns a gift that continues the exchange" (p. 205). The author suggested that this gift exchange bonds mother and child, and that evidence of the child's development and growth made it easier for the mother to continue in the face of difficulties. Bottorff added that personal commitment to breastfeeding, despite problems, uncertainty, discouragement and opposition, and the acceptance and support of others were important to persistence in breastfeeding. Additional researchers have identified

that women who had a positive attitude toward breastfeeding, were committed to breastfeeding, and motivated to continue this type of feeding, persisted with breastfeeding (Janke, 1988; Rousseau et al., 1982; Ryan & Martinez, 1989; Wright & Walker, 1983). However, Lawson and Tulloch (1995) found that for primiparous mothers, there was no association between the duration of breastfeeding and commitment to breastfeeding for the intended duration, or confidence in ability to overcome difficulties.

Hewet and Ellis (1986) identified that women who breastfeed for a longer duration also seem to adapt better to breastfeeding. The authors retrospectively explored women's perceptions of their breastfeeding experience using a qualitative, phenomenological methodology. The sample consisted of 40 mother-infant pairs who were chosen on the basis of their breastfeeding experience to form two comparable groups; 20 subjects breastfed for 6-13 months (long-term breastfeeders), and 20 discontinued between two days postpartum and eight weeks (short-term breastfeeders). Data were collected from in-depth interviews that were audio taped, transcribed, and systematically analysed. The authors found similarities and differences between the two groups. The similarities were a desire to breastfeed, ambivalence towards breastfeeding, prenatal preparation for breastfeeding, physical problems associated with breastfeeding, change in infant feeding patterns while breastfeeding, sensitivity to other people's feelings when nursing in public, and perceived pressure from others to breastfeed. Differences for mothers who breastfed for a longer period of time were feeding more often during establishment, decreased anxiety about infant weight loss, positive interpretation of their

baby's behaviour, an increased capacity to relax, greater flexibility in managing a daily routine, increased ability to incorporate siblings in the feeding experience, and greater psychological and emotional support from their partners. Similarly, Isabella and Isabella (1994) found that for the 32 primiparous women in their conveniently chosen sample, adjustment to pregnancy and motherhood, as well as emotional support from the subject's partner and mother, were associated with perceived success at breastfeeding and exclusive breastfeeding at four and nine months.

Perinatal Factors

Research has linked hospital-based factors with the cessation or duration of breastfeeding. Rajan (1994) conducted a secondary analysis of data from an investigation of pain relief in labour to examine the influence of obstetric procedures and anaesthesia/ analgesia on breastfeeding. The primary study, conducted in the United Kingdom in 1990, had a prospective design and the sample was conveniently chosen. Preliminary data were collected using questionnaires with a follow-up questionnaire completed by 1149 women at six weeks postpartum. The author found that at the time of follow-up, women were less likely to be breastfeeding if their labour was induced by artificial rupture of membranes, they received pethidine for pain relief in the second stage of labour, their second stage of labour was more than three hours or less than one hour, they had been given syntocinon to expedite labour, had not used relaxation and breathing techniques or TENS during labour, had an assisted delivery, experienced discomfort from stitches, and frequency of urination after delivery, and their baby was born at 35 weeks

gestation or less, was small, and experienced problems. Like Rajan, other researchers have found that smaller infant birth weight (Hawkins et al., 1987; Hill, 1991; Piper & Parks, 1996), an expedited labour (Blomquist et al., 1994), and use of anaesthetic during labour (Lynch et al., 1986) were associated with cessation or a shorter duration of breastfeeding.

Ellis and Hewat (1984b) supported some of Rajan's (1994) findings. The authors found that certain high risk factors in labour and delivery were associated with a shorter duration of breastfeeding at three and six months postpartum. They identified that mothers who experienced complications such as fetal heart deviations, meconium staining, infection, pre-eclampsia, and malpresentation, and whose baby was admitted to the intensive care unit breastfed for a shorter duration than mothers who did not experience complications, and whose infant was admitted to a regular nursery.

However, Tamminen et al.'s (1983) findings were contrary to those of Rajan (1994) and Ellis and Hewat (1984b). Tamminen et al.'s subjects were initially contacted six to eight months after delivery to assess their breastfeeding status. A diary kept in the obstetric ward by nurse-midwives attending the delivery served as the data base for the subjects' obstetric and perinatal information. When obstetric factors were examined in relation to the duration of breastfeeding, the authors found no association between a complicated labour and delivery and the duration of breastfeeding. The use of cardiotocography, episiotomy, oxytocin infusion, blood loss over 500 grams, maternal exhaustion, abnormal position, as well as uterine and placental complications were not

associated with duration. With regard to factors connected to the child, including birth weight, Apgar score, multiple birth, and transfer to a special care unit, there was also no correlation between the duration of breastfeeding and these factors once lactation was established. In addition, maternal illness, whether chronic or connected with pregnancy, had no effect on breastfeeding duration. However, Tamminen et al. did find that the presence of the father at delivery significantly increased the duration of breastfeeding.

The type of delivery has been associated with breastfeeding outcomes by other researchers. Samuels et al. (1985) found that women who had cesarean deliveries showed a sharper decline in the rate of breastfeeding within the first two weeks, than those who delivered vaginally. Similarly, Whichelow (1982) found that mothers who had a forceps or caesarean delivery were more likely to have discontinued breastfeeding within the first six months than mothers who delivered vaginally. Ellis and Hewat (1984b) identified that women who vaginally delivered were significantly more likely to engage in exclusive breastfeeding at three months. Additional researchers have identified that mothers who delivered vaginally breastfed for a longer duration than those who had an assisted or cesarean delivery (Blomquist et al., 1994; Goodine and Fried, 1984; Grossman, Fitzsimmons, Larsen-Alexander, Sachs, & Harter, 1990; Hill, 1991; Rutishauser & Carlin, 1992).

However, the findings from a study by Janke (1988) did not support an association between vaginal delivery and continuation of breastfeeding. Janke conducted a prospective study to determine whether birth type was associated with breastfeeding

success. The convenience sample consisted of 215 mothers who delivered a healthy infant at a northern metropolitan hospital in the United States and for whom data collection was complete. Data were collected through a hospital questionnaire and a telephone interview at six to seven weeks postpartum. The author found that while more subjects who had delivered by cesarean section were bottle feeding at six weeks than those who vaginally delivered, this difference did not reach statistical significance.

Waldenström and Nilsson (1994) conducted a randomised controlled trial to examine the duration of breastfeeding in relation to birth centre care. The sample of volunteered subjects were randomly assigned to an experimental group (n = 617) or a control group (n = 613). Mothers in the experimental group received birth centre care which focused on natural childbirth, continuity of caregivers, and the psychological aspects of care, as well as the father's involvement and support during labour. Mothers in the control group received standard obstetric care. Data were collected from hospital records and questionnaires, which were sent to subjects at two and 12 months postpartum. The authors found no difference in the duration of breastfeeding for mothers in the experimental or control group. However, the non-significant finding may have been influenced by the fact that regardless of group, all mothers were encouraged to breastfeed early in the postpartum period, to demand feed, and to not restrict the frequency or length of nursing.

Another perinatal factor that has been associated with continued breastfeeding is early mother-infant contact (Bernard-Bonnin, Stachtchenko, Giraard, & Rousseau, 1989;

Bloom et al., 1982). Bernard-Bonnin et al. used meta-analysis to combine nine controlled clinical trials which examined the influence of hospital practices on the duration of breastfeeding. They found that early mother-infant contact was significantly associated with breastfeeding duration of six to eight weeks, but they did not specify the number of hours from delivery. Bloom et al. also identified that mothers who continued breastfeeding were more likely to have held their baby in the delivery room. However, Starling et al. (1979) found no association between the time of initial contact and breastfeeding success, even though they identified that mothers who spent 12 or more hours with their baby were significantly more likely to be successful at breastfeeding. Similarly, Lawson and Tulloch (1995) noted that infants who continued to be breastfed at three months postpartum were more likely to have spent a greater proportion of time with their mothers in the first 72 hours of delivery than in the care of others.

Several researchers have examined the influence of early contact and early breastfeeding on the duration of breastfeeding (de Chateau & Windberg, 1978; Salariya, Easton, & Cater, 1978; Taylor, Maloni, & Brown, 1986; Taylor, Maloni, Taylor, & Campbell, 1985). All of these studies were prospective. de Chateau and Windberg's sample was conveniently chosen and comprised 42 primiparous mothers and their full term, healthy babies. The mother-infant pairs were randomly assigned to a study group (early contact group), or a control group. Mothers in the study group received 15 minutes of skin-to-skin contact and early suckling immediately after delivery. Those in the control group saw their baby in the immediate postpartum period, but they did not hold

the infant until approximately 30 minutes after delivery. Participants were interviewed at three months, and at one year after delivery to determine the duration of breastfeeding. de Chateau and Windberg found that twice as many mothers in the study group were completely breastfeeding at three months than in the control group. The authors also found that mothers in the study group breastfed their infants nearly 2.5 months longer than the mothers in the control group. However, they did not identify whether the difference in the incidence of breastfeeding at three months or the difference in the duration of breastfeeding was statistically significant.

In 1985, Taylor et al. conducted a study in Pittsburgh and hypothesized that continued breastfeeding would be associated with extra early contact between infant and mother. Their conveniently chosen sample consisted of 78 healthy, advantaged, primiparous women who vaginally delivered a healthy infant. Upon admission to the delivery room, mother-infant pairs were randomly assigned to receive regular contact or extra early contact (within 30 minutes after delivery). Regular contact babies stayed in a crib beside the mother's bed in the recovery room, while early contact infants stayed in the mother's bed, which was curtained-off for privacy. When data were analysed, Taylor et al. were unable to support their hypothesis. However, the authors found that persistence of breastfeeding at two through five months was significantly associated with breastfeeding during extra early contact.

In 1986, Taylor et al. conducted another study in the same place to identify whether continued breastfeeding would be associated with suckling during early mother-

infant contact, where the mother chose the time of first extended contact and initial suckling. The sample contained 362 breastfeeding mothers of middle-to upper-socioeconomic status. Based on a brief hospital interview, mothers were sorted into one of three groups: those who first breastfed their infant in the recovery room during early contact (ECS), those who had early contact with the infant in the recovery room, but chose to initially breastfeed after admission to the postpartum unit (EC), and those who had regular contact (RC) with their baby (had not held or suckled their infant until they were admitted to the postpartum floor). Six months postpartum, a questionnaire was mailed to the mothers to determine breastfeeding status and experiences, and additional questionnaires were sent to mothers at 12 and 18 months if they continued to breastfeed at six months. When data were analysed, Taylor et al. found that mothers who suckled their infants during early contact (ECS) showed a significantly slower rate of breastfeeding decline that those mothers who breastfed later (RC or EC).

The women in Salariya et al.'s (1982) sample were matched for social class and age, and were assigned to one of four groups. Two groups breastfed within ten minutes of delivery and the other two groups first put the baby to the breast four to six hours after delivery. One of each pair of groups fed every two hours and the other every four hours. Details of lactation were recorded in feeding charts for each baby. Results showed that early initiation groups had a higher proportion of mothers who were breastfeeding at six and 12 weeks, and at 18 months than later initiation groups. In addition, mothers who fed their infants every two hours, breastfed for a considerably longer time (median 182 days)

than those who breastfed every four hours.

The influence of the time of initial breastfeeding on the duration of breastfeeding was examined by other researchers. Whichelow (1982) retrospectively studied successful breastfeeders to identify factors associated with their success. Mothers were interviewed one year after delivery using a structured questionnaire to assess their breastfeeding experiences. The author found that weaning before six months was associated with a delay of more than two hours in the first feed. Additional researchers have found that mothers who initiated breastfeeding within one hour (Lawson & Tulloch, 1995; Lynch et al., 1986), four hours (Bloom et al., 1982; Hill, 1991), 12 hours (Beaudry & Aucoin-Larade, 1989; Wright & Walker, 1983), and 16 hours (Feinstein et al., 1986) of delivery were more likely to have continued breastfeeding. Rutishauser and Carlin (1992) also reported an association between early breastfeeding and continued breastfeeding, but they did not specify a critical time period.

The maternity ward system has also been examined in relation to the duration of breastfeeding. Cole (1977) conducted a prospective survey to explore the influence of factors in the hospital and home environment on breastfeeding outcome. A prenatal questionnaire was distributed to 338 pregnant women who attended prenatal classes in the United States. A second questionnaire was mailed at three months postpartum to the 153 women of the prenatal survey who had intended to breastfeed. The author found that mothers who were still breastfeeding at three months postpartum were significantly more likely to have chosen rooming-in arrangements as opposed to using a central nursery.

Clark and Beal (1982) conducted a prospective survey among mothers who delivered at one of four hospitals in southern Manitoba. Subjects completed a questionnaire in the hospital, and the 266 mothers who initiated breastfeeding were contacted by telephone at one, four and six months for follow-up interviews. The authors found the highest rate of weaning within the first month was among mothers who delivered at Hospitals A and C. At hospitals B and D, where the other mothers delivered, rooming-in was encouraged and mothers reported a higher degree of support from their obstetrician.

In a quasi-experimental study, Perez-Escamilla, Segura-Millan, Pollitt, and Dewey (1992) examined the influence of maternity ward system on the lactation performance of mothers who planned to partially or exclusively breastfeed. The sample contained 165 healthy, urban, Mexican women of low-socioeconomic status who vaginally delivered a healthy term infant at one of two hospitals. At hospital A infants stayed in a nursery (NUR) and were separated from their mothers and at hospital B babies roomed-in with the mother. Mothers who delivered in hospital B were randomly assigned to a group that was given individual breastfeeding guidance during the hospital stay (RIBFG), or to a control group (RI). Mothers were interviewed for follow-up at 8 ± 2, 70 ± 7, and 135 ± 8 days postpartum. The authors found that for primiparous mothers, the RIBFG and the RI groups had a significantly higher rate of full breastfeeding than the NUR group throughout the first four months after delivery. However, only the difference between the NUR group and the RIBFG group remained statistically significant in the long term. The

maternity ward system did not significantly influence the lactation success of multiparous women.

Lindenberg, Artola, and Jimenez (1990) examined the influence of varying amounts of mother-infant contact and breastfeeding promotion on the continuation of breastfeeding. Subjects delivered vaginally without complications in a large urban hospital. The sample consisted of 375 mother-infant pairs from poor urban areas. Subjects were assigned to one of three study groups: total separation during hospitalization with usual (routine) breastfeeding promotion, 45 minutes of mother-infant contact immediately after delivery with standardized promotion of breastfeeding, followed by total isolation until discharge, or to a rooming-in arrangement with constant contact until hospital discharge, and standardized breastfeeding promotion. Mothers who received standardized breastfeeding promotion were given a series of breastfeeding promotional messages. The authors found that while an early mother-infant period of 45 minutes was not significantly related to continued breastfeeding, extended contact (rooming-in) with standard breastfeeding promotion was significantly associated with prolonged breastfeeding to four months postpartum. In addition, breastfeeding guidance positively and significantly influenced the duration of breastfeeding among primiparous mothers who gave birth in hospital B. However, a limitation of this research study, as noted by the authors, was that breastfeeding promotion was combined with the major independent variable of varying amounts of contact between mother and infant, and the independent contribution of these interventions was not determined.

Elander and Lindberg (1984) retrospectively studied the impact of a short separation of mother and infant due to minor illness of the infant. Thirty infants who were full term, but separated from their mothers for one to six days during the first week postpartum were compared to 116 term infants who were born at the same hospital in Sweden as the separated infants, but were not separated from their mothers. Mothers were interviewed at three months postpartum to determine their breastfeeding status and experience, as well as delivery information. The authors found that the duration of "entire" breastfeeding in the separated group was significantly shorter than in the non-separated group at one, two and three months postpartum.

Schy et al. (1996) investigated the impact of a in-hospital breastfeeding education session on the duration of breastfeeding and satisfaction with this method of feeding. Subjects were randomly allocated to receive routine care (control group) or a standardized education session (experimental group) by a lactation consultant. Mothers were followed by telephone for six months, or until breastfeeding ceased. The authors found no difference in the duration of breastfeeding between the groups. In keeping with these findings, Bernard-Bonnin et al. (1989) found no association between hospital nursing support without postpartum telephone follow-up and the duration of breastfeeding. Sloper et al. (1975) were also unable to identify an association between nursing staff's attitude toward breastfeeding and the duration of breastfeeding.

However, Quarles, Williams, Hoyle, Brimeyer, and Williams (1996) identified that assistance by a lactation consultant during the postpartum hospital stay was linked

with a longer duration of breastfeeding. Forty-six mothers who delivered at hospital 1 (H1) were compared to 115 mothers who delivered at hospital 2 (H2). At H1, a lactation consultant provided staff and families with support for breastfeeding, as well as educational programming and clinical expertise. At H2 breastfeeding information and advice was offered at the discretion of staff nurses. At one and four months postpartum, mothers were interviewed by telephone to determine infant feeding status. The authors found that mothers who had access to a lactation consultant (H1) breastfed for a significantly longer duration than mothers who delivered at H2. Similarly, Cole (1977) found that mothers who were still breastfeeding at three months were significantly more likely to have reported that hospital nurses supplied them with helpful information. Wright and Walker (1983) also found that the duration of breastfeeding was extended among mothers who perceived that hospital medical staff were supportive of breastfeeding.

Researchers have also investigated the effect of formula gift packs on the duration of breastfeeding (Bergevin, Dougherty, & Kramer, 1983; Evans, Lyons & Killien,1986; Feinstein et al., 1986; Frank, Wirtz, Sorenson, & Heeren, 1987; Gray-Donald, Kramer, Munday, & Leduc, 1985; Neiffert, Gray, Gary, & Camp, 1988; Snell, Krantz, Keeton, Delgado, & Peckham, 1992). In these double-blind, controlled clinical trials, a formula gift pack was randomly distributed to subjects prior to hospital discharge. All of the samples were conveniently chosen. Data were collected from medical records, interviews, and/ or questionnaires. Bergevin et al.'s sample consisted of 448

breastfeeding mothers who delivered at a teaching hospital in Montreal, Quebec, and were followed for three months. The authors found that mothers who received the formula sample packet were less likely to be breastfeeding at one month, and more likely to have given their infants solid food by three months. These trends were even more significant in three vulnerable subgroups: primiparas, less educated women, and those who had been sick postpartum.

Snell et al. (1992) and Frank et al. (1989) also found an association between the receipt of a formula gift pack and a shortened duration of breastfeeding. Snell et al.'s sample consisted of 88 low-income Hispanic mothers who were breastfeeding at discharge from a university hospital in California. The authors found no relationship between exclusive breastfeeding and the receipt of a formula gift pack at one week postpartum, however, at three weeks the decline of exclusive breastfeeding was significantly related to the receipt of a formula gift pack. Snell et al. identified that at three weeks postpartum, all mothers who received a formula gift pack were giving supplemental bottles, which significantly contrasted with 75% of supplementation in the non-gift pack group.

The 343 multiethnic, urban women in Frank et al.'s (1987) study delivered at a hospital in Boston, and were of low socioeconomic status. The women received a formula discharge pack, or a research discharge pack which contained breastfeeding educational pamphlets and breast pads. At four months postpartum, the authors found that mothers who received the research discharge pack were significantly more likely to have

continued exclusive breastfeeding, to have been partially breastfeeding four months after delivery, and to have postponed giving their babies solid food than the mothers who received a formula discharge pack. Similarly, Wright et al. (1996) reported an association between the receipt of formula in hospital discharge packs and the cessation of breastfeeding at one month.

Other studies have found no association between the duration of breastfeeding and the receipt of formula gifts packs at hospital discharge (Evans et al., 1986; Feinstein et al., 1986; Gray-Donald et al., 1985; Neiffert et al., 1988). Evans et al. sampled 95 breastfeeding women from Seattle, Washington. Six to seven weeks after delivery, the authors found no significant difference in the duration of breastfeeding between the group who received formula samples and the group who had not received samples. As well, there was no statistically significant relationship between the receipt of formula samples and method of feeding for three subgroups hypothesized to be more vulnerable to the influence of formula samples: primiparous women, less educated women, and women who experienced postpartum illness.

Neifert et al.'s (1988) sample consisted of 60 low-income, primiparous, adolescent mothers, who had breastfed at least once postpartum. Mothers were followed for two months or until complete weaning occurred, whichever came first. The authors found that while mothers who received the study gift pack without formula significantly rated it to be more useful than those who received the gift pack containing formula, breastfeeding duration or age at which supplementation with formula was begun was not significantly

different for the mothers in the two gift pack groups. Feinstein et al.'s (1986) findings supported those of Evans and her associates (1986) and Neiffert et al. (1988).

The length of hospital stay has also been associated with the duration of breastfeeding. O'Leary Quinn, Koepsell, and Haller (1997) retrospectively examined the influence of the length of hospital stay on breastfeeding. Mothers who had a shortened length of stay (24-hours), with one home visit on the third postpartum day, were compared to those who had a usual length of stay (48-hours) and no home visit. The conveniently chosen sample consisted of 101 breastfeeding, primiparous women who had vaginally delivered a healthy infant. Data were collected during a telephone interview with the participants between six and eight weeks postpartum. Using chi-square, the authors were unable to identify a statistically significant difference between the incidence of breastfeeding at six to eight weeks postpartum for the women who had a two-day hospital stay and those who had a one-day stay with a home visit. Similarly, Sloper et al. (1975) found no association between the length of hospital stay and the duration of breastfeeding. However, Ellis and Hewat (1984b) found that mothers who, along with their baby, had a longer hospital stay had a shorter duration of breastfeeding at three and six months postpartum than mothers who had a short hospital stay, and whose infant was discharged after a short time in the hospital.

Supportive companionship during labour (Hofmeyr, Nikodem, Wolman, Chalmers, & Kramer, 1991), the delivery of a male infant (Rousseau et al., 1982), early milk arrival (Perez-Escamilla et al., 1993), breastfeeding on demand (Beaudry & Aucoin-

Larade, 1989; Wright et al., 1996), infant weight loss less than 10% of birth weight (Blomquist et al., 1994), as well as having a private room, and an unrestricted visiting policy (Beaudry & Aucoin-Larade, 1989) were additional factors found to influence the duration of breastfeeding.

Postnatal Factors

Several postnatal factors have been examined in relation to the continuation or cessation of breastfeeding. Early postpartum supplementation with formula during such periods as the hospital stay (Blomquist et al., 1994), the first week after delivery (Beaudry & Aucoin-Larade, 1989; Perez-Escamilla et al., 1993), and within two (Loughlin et al., 1985), four (Hawkins et al., 1987), and six weeks postpartum (Coriel & Murphy, 1988) have all been linked with the cessation of breastfeeding. Blomquist et al. also found that babies who were supplemented with donor's breastmilk in the hospital were at a greater risk of not being breastfed at three months than babies who had received no milk other than their mother's milk. Other researchers identified an association between formula supplementation and premature cessation of breastfeeding, but they did not report a specific point in time when formula supplements were first introduced (Grossman, Harter, Sachs, & Kay, 1990; Hill, 1991; Wright & Walker, 1983). Grossman et al. also found that the early introduction of other supplemental fluids such as water, glucose water and juice was a significant predictor of the cessation of breastfeeding within the first six weeks postpartum.

A change in hospital policy toward the discontinuation or restriction of formula

supplements has been associated with prolonged breastfeeding (Aliperti & MacAvoy, 1996; Nylander, Lindemann, Helsing, & Bendvold, 1991; Wright et al., 1996). Nylander et al. studied 407 consecutive mother-infant pairs who delivered at a large urban hospital in Norway pre- and post-discontinuation of formula supplementation and the promotion of earlier, more frequent breastfeeding. Nylander et al. found that mothers who delivered after the change in hospital policy breastfed significantly longer, and exclusively breastfed for a longer duration than mothers who delivered before the change in hospital policy was implemented.

Wright et al. (1996) also found that among the 392 women who were interviewed after a similar change in hospital policy, the duration of exclusive and partial breastfeeding at one and four months postpartum was significantly shorter among mothers who gave their infants formula in the hospital than among those who did not use supplements. Likewise, Aliperti and MacAvoy (1996) studied 32 breastfeeding primiparous women before such a change in hospital feeding routines, and 34 women after the change. The authors found that more mothers continued to breastfeed at two and six weeks in the group who were investigated after the change than before the change. However, unlike Nylander et al. (1991) and Aliperti and MacAvoy, they found no difference in the percentage of exclusive breastfeeding between the two groups at follow-up times.

The number of supplemental feedings may also be important to breastfeeding duration. Feinstein et al. (1986) found that less than one supplement of formula a day

(minimal supplementation) did not have a negative impact on the duration of breastfeeding. In fact, minimal supplementation, as opposed to more frequent supplementation, was significantly associated with continued breastfeeding at 4, 10 and 16 weeks postpartum.

In a controlled clinical trial of limited supplementation, Gray-Donald et al. (1985) found no association between supplementation practices and the duration of breastfeeding. The study was conducted at a university teaching hospital in Montreal. Following a pretrial investigation of 621 infants, which ensured there was no difference in supplements given to babies or the duration of breastfeeding in the two nurseries, subjects were allocated to one of the two nurseries; one nursery had restricted supplementation and the other had traditional supplementation. A total of 781 mothers comprised the final sample. When data from the subjects' hospital records and two postpartum telephone interviews were anaylzed, the authors found no significant difference in the percentage of breastfeeding at four and nine weeks between the groups who received restricted or traditional supplementation.

Breastfeeding style was also found to be a strong predictor of the duration of exclusive breastfeeding. Quandt (1985) found that mothers who exclusively breastfed for four months or more (long-term breastfeeders) were significantly more likely to have breastfed frequently during the day, to have had shorter feeding sessions, and a shorter interval of time between feedings than mothers who exclusively breastfed for four months or less (short-term breastfeeders). In keeping with these findings, Piper and Parks (1996)

also found that the pattern of breastfeeding was related to the duration of breastfeeding; mothers who breastfed for longer than six months were 3.5 times more likely to have exclusively breastfed for the first month postpartum. In addition, Feinstein et al. (1986) found that when mothers nursed their babies frequently (seven or more times a day), the risk of cessation of breastfeeding at one month was lowered, despite formula supplementation. Similarly, Hill (1991) found that the number of feedings a day was positively and significantly associated with the duration of breastfeeding.

Breastmilk intake was another factor that was examined in relation to the duration of breastfeeding. Houston et al. (1983) objectively measured babies breastmilk intake on the third and sixth day postpartum using a test-weigh procedure. The duration of breastfeeding was identified at 16 weeks after delivery when mothers were visited in their homes. The authors found that continuation of breastfeeding at six weeks was significantly lower in the group who gave a low amount of breastmilk than in the groups who gave a medium or a high amount of breastmilk. While the same trend was noted at 16 weeks postpartum, the differences did not reach statistical significance.

Infant sucking technique has also been examined in relation to breastfeeding success. Righard and Alade (1992) prospectively studied this relationship among a conveniently chosen sample of 82 mothers who delivered a healthy infant at one of two university hospitals in Sweden. Mothers were observed for assessment of breastfeeding technique at hospital discharge by the same observer and were divided into one of three groups: faulty (nipple-sucking) technique that was not corrected, faulty technique that

was corrected, and a control group with a correct sucking technique. Subjects were contacted by telephone for follow-up at two weeks, and at one, two and four months postpartum. The authors found a significantly higher number of mothers had changed from breastfeeding to bottle feeding in the first month in the group with the faulty sucking technique, than in the group whose sucking technique was correct or corrected at discharge. At four months the group with the faulty sucking technique were significantly more likely to have discontinued breastfeeding and experienced more problems than the groups with a correct sucking technique.

The use of pacifiers has also been associated with a shorter duration of breastfeeding (Righard & Alade, 1992; Victora, Tomasi, Teresa, Olinto, & Barros, 1993; Wright et al., 1996). Victora et al. retrospectively examined the relationship between pacifier use and the duration of breastfeeding among Brazilian children under the age of two. Mothers were interviewed to determine pacifier use at one month of age, duration of breastfeeding, and additional infant feeding information. The authors obtained complete information on infant feeding practices for 186 children who were six months of age and older. Results showed that breastfeeding cessation was significantly lower among infants who had not received pacifiers within the first month of life than among pacifier users, even after controlling for the child's sex, birth weight, age, socioeconomic status, and the time when bottle feeding was introduced. An additional finding among pacifier users was that full-time users were significantly more likely to have discontinued breastfeeding by six months than part-time users. Righard and Alade also found that pacifiers were used

by 90% of the mothers who discontinued breastfeeding by four months postpartum, but by only 40% of the mothers who continued to breastfeed at four months. In addition, mothers who regularly gave their infant a pacifier (greater than two hours a day) were significantly more likely to have experienced problems than those who never gave their infant a pacifier, or those who used it occasionally.

Excess weight in breastfeeding women is another factor that has been examined in relation to the duration of breastfeeding. Rutishauser and Carlin (1992) conducted a prospective study in Victoria, Australia among 739 primiparous mothers who attended an infant welfare centre after delivery and breastfed for at least 14 days. Data were collected from records kept by nurses at the centre. The authors found that maternal body mass index at one month that was above the normal range had a statistically significant and independent negative effect on the duration of breastfeeding; excess weight was associated with premature cessation of breastfeeding.

A postnatal factor that has been associated with prolonged breastfeeding is counselling and support for the mother after delivery. Bloom et al. (1982) conducted an experimental study (Study II) in Nova Scotia to determine the effect of post-hospitalization, informed support on the continuation of breastfeeding among 157 married, primiparous mothers. Breastfeeding subjects were randomly assigned to an experimental or a control group. Beginning 10 days postpartum, the experimental group were telephoned three times at one-week intervals to assess their breastfeeding experience. Mothers were offered advice about breastfeeding and infant behavior, and if

they voiced special concerns or asked for medical assistance, they were reassured and referred to a nurse who specialized in teaching breastfeeding mothers. Another female interviewer, blind to the participants' initial feeding method or changes in feeding practice, contacted the subjects at six weeks postpartum. Bloom et al. found that the average duration of breastfeeding was prolonged for one week for mothers in the experimental group, and this was statistically different from the control group.

Using a quasi-experimental design, Saunders and Carroll (1988) examined the impact of early postpartum support, with repeated contacts, on the duration of breastfeeding among a low-income, predominantly Hispanic group of women who lived in a rural community in New Mexico. Subjects were participants in the WIC program in the United States. The historical control group (n = 75) consisted of all breastfeeding WIC women who delivered at the local hospital during a 15 month period, and the experimental group (n = 80) consisted of all WIC mothers who initiated breastfeeding in the hospital during the following 16 month time frame. The early postpartum support and counselling offered to the experimental group consisted of a hospital visit, a telephone follow-up, and group education and support. Duration of breastfeeding was determined by contacting the subjects within two months and again at four months. Saunders and Carroll found that the subset of the experimental group who received all three support activities (n = 36), consistently and significantly breastfed longer than the control group; 95% were breastfeeding at four weeks and 67% at 16 weeks.

Additional support for Bloom et al.'s (1982) findings and those of Saunders and

Carroll (1988) was found in studies by Kelly (1983) and Frank and her associates (1987). Kelly randomly selected subjects from her general practice, and alternately assigned the 38 mothers who elected to breastfeed to receive routine health visiting (control group) of four visits from a health visitor within 12 weeks, or structured home support for six weeks (experimental group). Mothers in the experimental group received home visits every week for six weeks and then fortnightly visits until 12 weeks postpartum, and were encouraged to persist with breastfeeding. The author found more mothers in the study group continued to breastfeed at three weeks, six weeks, and three months that those in the control group.

Frank et al. (1987) randomly assigned subjects to receive routine or research breastfeeding counselling. Research counselling consisted of a personalized breastfeeding session in the hospital by a trained counsellor, who also made eight scheduled telephone calls to the mothers during the first three months after delivery. Additional follow-up was possible when problems were identified. The authors found that the research counselling intervention significantly influenced the duration of breastfeeding at two months postpartum. However, by four months postpartum, the intervention was no longer associated with duration. Additional researchers identified that support from health professionals by way of home visits (Houston, 1984), and telephone contact (Bernard-Bonnin et al., 1989) was associated with prolonged breastfeeding.

Jones and West (1985) and Auerbach (1985) examined whether assistance by a

lactational consultant which continued beyond delivery influenced the duration of breastfeeding. Auerbach's sample consisted of women who were enrolled in the WIC program in the United States; 50 women were randomly selected from those who registered in 1983 and 50 from 1984. Women who enrolled in 1984 had access to a lactational consultant. Auerbach found that the duration of breastfeeding in 1984 was much longer than it was in 1983. In addition, among the 1984 sample, women who consulted with a lactation consultant on one or more occasions breastfed for a significantly longer duration than those who had no contact with a consultant; 68% of them breastfed longer than four months.

In Jones and West's (1985) randomized controlled trial, women assigned to the intervention group received support and encouragement for breastfeeding and technical assistance from a lactation consultant during the hospital stay and in their homes during the first two weeks postpartum. At 12 months subjects were interviewed in their homes to determine the duration of breastfeeding and feeding practices. The authors found that significantly more mothers in the intervention group were breastfeeding at four months through to six months than mothers in the control group.

The influence of peer counselling from pregnancy to the early postpartum period on the duration of breastfeeding has also been investigated (Kistin et al., 1994; Long, Funk-Archuleta, Greiger, Mozar, & Heins, 1995). Kistin et al.'s conveniently chosen sample consisted of 59 women who received support from a peer counsellor in person or by telephone, and 43 women who did not have a counsellor. The counsellor had previous

breastfeeding experience and had taken part in a breastfeeding training program. When infant feeding practices were compared for the two groups, the authors found that women in the counsellor group had significantly higher rates of duration and exclusive breastfeeding at six and twelve weeks postpartum than the non-counsellor group.

Similarly, Long et al. (1995) examined this relationship among native American WIC mothers. They compared a group of 41 mothers who had contact with peer counsellors from pregnancy to six weeks after delivery, and for whom data collection was complete at three months, to an historical control group of 67 mothers . The authors found a significantly higher incidence of breastfeeding at three months among the counsellor group than the control group.

Kaufman and Hall (1989) prospectively examined the influence of social network support on the breastfeeding of low-birth-weight preterm infants. A hospital in Ontario was chosen as the study site. A review of hospital nursing records on the neonatal intensive care unit identified 88 mothers who had initiated breastfeeding or were expressing breastmilk. Mothers were interviewed in the hospital to confirm their breastfeeding status, and then completed a self-administered questionnaire to identify their perceptions of the wishes of their social network for infant feeding. Subjects were interviewed again by telephone every two to four weeks, starting at two weeks postpartum, to identify their sources of emotional and instrumental support for breastfeeding. Kaufman and Hall identified that the husband or partner was the most frequently cited source of support (75%) for the lactating mothers. The kinds of support

mothers appreciated were tangible assistance with difficulties, and encouragement to persist with expression of breastmilk or breastfeeding. The authors also found that as the number of supports increased, the potential for discontinuation of breastfeeding at 30 and 60 days significantly decreased. In fact, the number of supports the mother identified was the most important variable for prolonged breastfeeding.

Barron, Lane, Hannon, Struempler, and Williams (1988) examined the influence of family member and peer attitudes on breastfeeding outcomes among 40 low-income, breastfeeding, primiparous women. Mothers were personally interviewed shortly after delivery, and a questionnaire was used for telephone interviews with the subjects every two weeks for three months, or until breastfeeding was discontinued. At the time of weaning or at three months, mothers were interviewed again in person to obtain information on their support system, especially their attitudes toward breastfeeding. The authors found that the presence of a doula ("one or more individuals, often female, who give psychological encouragement and physical assistance to the newly delivered mother", Raphael, 1976, p. 172) significantly increased duration of breastfeeding, as did having more breastfeeding friends, and having sought help from friends.

Researchers also found that minimal support from family and friends, or a withdrawal of this support was associated with cessation of breastfeeding (Lynch et al., 1986; Morse, Harrison, & Prowse, 1986; Morse, Harrison, & Williams, 1988; O'Campo et al., 1992). Morse et al. (1986) conducted a longitudinal study to explore and describe the practice of minimal breastfeeding. The sample was conveniently chosen and

consisted of 30 mothers who were nursing once or twice a day without expressing their milk between feedings. Mothers were interviewed on a monthly basis by telephone until weaning occurred. Interviews were tape-recorded and followed a semi-structured format. Mothers were asked about their support for breastfeeding and their perceptions of the attitudes of others towards their breastfeeding. However, these particular findings were reported in greater detail by Morse et al. (1988).

Morse et al. (1988) reported that women identified their husbands, mothers and mothers-in-law as the doula in the first few months. Mothers also reported that other family members, friends, and health professionals (doctor and nurse) supported their breastfeeding. However, this pattern of support changed as the mothers continued to breastfeed. From about eight months, friends began to suggest that it was time to wean the infant, and later became quiet about the mother's breastfeeding. Family members also began to withdraw support for breastfeeding between the tenth and thirteenth month; they refrained from commenting about breastfeeding, suggested that the baby should be weaned, and indicated that breastfeeding was no longer appropriate. In response to this withdraw of support and coercion for weaning, the authors reported that some mothers continued to breastfeed, but concealed this from people they thought would not understand, and others ceased to breastfeed in public. Nonetheless, cessation of breastfeeding occurred within one month of the withdrawal of all support, except in two cases, where cessation occurred within three months.

Similarly, O'Campo et al. (1992) found that by 10 weeks postpartum, 50% of the

women in their study with little or no support had stopped breastfeeding, whereas 50% of the women with a supportive network for breastfeeding continued to breastfeed at 25 weeks. Rousseau et al. (1982) identified that mothers who breastfed for longer than four months were supported by family members, especially the husband, and by the La Leche League. Likewise, Wright and Walker (1983) found that the incidence of breastfeeding from the first month onward was significantly higher among mothers who believed their friends with young infants were in favour of breastfeeding. Additional researchers have reported an association between a prolonged duration of breastfeeding and support for breastfeeding (Cronenwett & Reinhart, 1987; Perez-Escamilla et al., 1993; Starling et al., 1979), or a short duration of breastfeeding and a lack of postpartum support for breastfeeding (Bryant, 1982; Hall, 1978; Jones & West, 1985; Kelly, 1983; Perez-Escamilla et al., 1992).

However, other researchers have not found an association between the duration of breastfeeding and postpartum counselling or support (Beaudry & Aucoin-Larade, 1989; Chen, 1993; Grossman, Harter, Sachs, & Kay, 1990; Lynch et al., 1986). Chen conducted a quasi-experimental investigation in Taiwan to examine the influence of home visits and telephone contacts on the duration of breastfeeding. The conveniently chosen sample contained 180 mothers who were systematically assigned to a group that either received a home visit from a maternity nurse at one, two, four and eight weeks postpartum, telephone contact from a nurse at these same times, or to a control group. Data were collected from personal data sheets and questionnaires which were completed by all

participants at eight and 12 weeks. Using two-way ANOVA, the authors found no significant difference in the duration of breastfeeding between the three groups.

Lynch et al. (1986) conducted a randomized controlled trial in British Columbia among 270 breastfeeding women to determine the influence of a breastfeeding consultant on duration of breastfeeding. The experimental group received a visit from a public health nurse in the early postpartum period, a home visit and repeated telephone contacts from a lactation consultant, and access to a telephone answering service if difficulties arose. Mothers in the control group received only the visit from the public health nurse. Mothers were followed by telephone interviews for nine months. The authors were unable to identify a significant difference in the duration of breastfeeding between the two groups.

Grossman, Harter, Sachs, and Kay (1990) prospectively examined the effect of postpartum lactation counselling on the duration of breastfeeding among a sample of low-income, breastfeeding women who were eligible for WIC services in Ohio. Subjects were randomly assigned to either an intervention or control group. The control group received only the routine teaching regarding infant care and feeding usually given by the obstetrical nursing staff. The mothers in the intervention group received one-on-one education and support in the hospital from a nurse with extensive experience in lactation counselling, information on how to manage common problems with breastfeeding, a breastfeeding booklet and the telephone number of the breastfeeding hotline, and telephone follow-up within the first three weeks postpartum to assist for difficulties. The

authors were unable to demonstrate a significant difference in the median duration of breastfeeding between the control and intervention groups at six weeks, three months, and six months. In addition, no significant difference was found between early weaners and those who continued to breastfeed at six weeks with regard to the degree of support they received for breastfeeding from the baby's father, their family, or their friends. However, the authors suspected that some degree of contamination or Hawthorne effect occurred. They noted that the presence of the project nurses on the postpartum units seemed to have roused the regular staff's interest in the promotion of breastfeeding.

The early introduction of solid food has also been associated with premature cessation of breastfeeding (Cole, 1977; Grossman, Harter, Sachs, & Kay, 1990; Hawkins et al., 1987; Hill, 1991; Peters & Worthington-Roberts, 1982). Grossman et al. identified that mothers who supplemented their breastfed infant with cereal in the early postpartum period were significantly more likely to have weaned their infant before six weeks postpartum. Hill found that infants who were given solid foods within the first 14 weeks postpartum were breastfed for a shorter duration than mothers who did not introduce solids during this period. Cole noted that infants who were fed solids by four months were significantly more likely to have been weaned by three months than those who were not introduced to solid food until three months. Hawkins et al. found that mothers who breastfed for 25 weeks or more delayed the introduction of solid food the longest, and that the introduction of solids was a predictor of the duration of breastfeeding.

Researchers have also examined the relationship between the duration of

breastfeeding and another postnatal factor; maternal employment. Morse, Bottorff, and Boman (1989) reported findings from a longitudinal study which examined the experiences of breastfeeding mothers who returned to work. Their sample of volunteered participants consisted of 61 women. Data were collected prospectively during monthly telephone interviews. The authors found that women who breastfed for the longest duration were employed in variable patterns of work, and had access to their infants during the workday for breastfeeding.

Auerbach and Guss (1984) conducted a retrospective survey to examine mother's experiences with employment and breastfeeding among 567 women who volunteered to participate in the study. The women completed a self-administered questionnaire which addressed their working-breastfeeding experiences. Subjects were white, married, and well educated. The authors found that employment before 16 weeks postpartum, and full-time employment, were significantly associated with the cessation of breastfeeding before 12 months. However, returning to work within the first four months had a greater negative impact on the duration of breastfeeding than working 40 hours or more per week. An additional finding was that mothers who expressed their breasts between missed feedings, breastfed longer than those who did not express.

Gielen et al. (1991) also found that employment in the early postpartum period was associated with premature cessation of breastfeeding. Subjects for this prospective study were participants in an infant feeding study in Baltimore and were chosen from an urban heterogeneous population using stratified random sampling. Participants were

interviewed by telephone twice within the first three months after delivery to determine employment status and employment plans. A total of 271 mothers initiated breastfeeding and completed both interviews. The authors found that at the second interview, between six and 12 weeks postpartum, 48% of the employed mothers were breastfeeding compared with 68% of those who were unemployed, and this difference was statistically significant, even when controlling for demographic variables. When characteristics of the work environment were examined in relation to breastfeeding status, results revealed that mothers who worked for 20 hours a week or less were significantly more likely to have continued breastfeeding than mothers who worked 20 hours or more per week. However, no association was found between breastfeeding status and occupation, or work site accommodation for breastfeeding.

Kurinij, Shiono, Ezrine, and Rhoads (1989) conducted a prospective survey to determine the influence of maternal employment on breastfeeding among black and white primiparous mothers. Subjects delivered a healthy single infant at one of three metropolitan hospitals in Washington, DC. The 755 mothers who initiated breastfeeding were interviewed again at one, three, and seven months in their homes. If mothers continued to breastfeed at seven months, their infant feeding history was obtained through a telephone interview at 12 months. Kurinij and her associates found that maternal employment was associated with a shorter duration of breastfeeding among Black mothers only. However, unlike Gielen et al. (1991), they found that maternal occupation influenced breastfeeding duration. Women who breastfed for the longest duration

worked in professional occupations as opposed to technical, sales, or clerical positions.

Ryan and Martinez (1989) conducted a secondary analysis of data from a national infant feeding survey in the United States to compare the incidence and duration of breastfeeding among unemployed mothers and mothers who worked outside of the home on a full-time basis. The authors found that at six months postpartum, more than twice as many unemployed mothers continued to breastfeed than employed mothers. Additional researchers have found that mothers who sought employment or returned to work were significantly more likely to have breastfed for a short duration (Beaudry & Aucoin-Larade, 1989; Hill & Aldag, 1996; Martinez, Dodd, & Samartgedes, 1981; Nolan & Goel, 1996; Perez-Escamilla et al., 1993; Piper & Parks, 1996; Wright et al., 1988). In addition, Ekwo et al. (1984) found that mothers who believed they would have a problem scheduling breastfeeding when they returned to work were significantly more likely to have discontinued exclusive breastfeeding than mothers who perceived no such difficulty.

Katcher and Lanese (1985) showed that the duration of breastfeeding could be increased in a work environment that was supportive of breastfeeding. The authors conducted a retrospective study to compare the duration of breastfeeding among mothers who returned from maternity leave to a place of employment that had a support program for breastfeeding (n = 27), and those who returned before the support program was in place (n = 21). The support program consisted of breastfeeding advice and support, time off from work for breastmilk expression, access to a breast pump, a demonstration on how to express milk, information on breastmilk storage, and availability of a place to

store expressed breastmilk. Using a telephone questionnaire, the authors found that mothers were more likely to have continued breastfeeding after returning to work when the support program was in place.

Additional associations between postnatal factors and the duration of breastfeeding have been identified. Researchers have found that mothers who breastfed for a short duration had an inadequate milk supply (Barron et al., 1988; Hill, 1991), experienced lactational problems (Bergerman et al., 1979; Kaufman & Hall, 1989; Peters & Worthington-Roberts, 1982), worried about the demands of breastfeeding (Ekwo et al., 1984), disliked breastfeeding, found it inconvenient, or were embarrassed by it (Wright & Walker, 1983), and had poor health or well-being (Beaudry & Aucoin-Larade, 1989; Nolan & Goel, 1996).

Reasons for Discontinuing Breastfeeding

Six studies were identified for which the primary purpose was to identify reasons for the cessation of breastfeeding (Jakobsen et al., 1996; Bailey et al., 1993; Rogers, Morris, & Taper, 1987; Sjölin et al., 1977; Sjölin, Hofvander, & Hillervik, 1979; Verronen, 1982). Two of these studies have been described previously (Jakobsen et al., 1996; Sjölin et al., 1977). Verronen's (1982) study had a prospective design. The sample consisted of 150 mothers who were followed for six months in one of two well baby clinics in Tampere, Finland. A questionnaire was used in Verronen's study to assist the interviewer with data collection. Sjölin et al. (1979) retrospectively examined a randomly selected sample of 75 women who delivered at a University hospital in Uppsala, Sweden.

Subjects were interviewed and compared to a group of women who delivered at the same hospital during the same time period (control group).

In the remaining retrospective studies, subjects were conveniently chosen. Bailey et al.'s (1993) sample consisted of 45 low-income mothers who attended child health centres in metropolitan Perth, Australia, and had discontinued breastfeeding by three months postpartum. The method of data collection used in Bailey et al.'s study was a self-administered questionnaire. Rogers et al.'s (1987) sample of 80 white, married women of middle socio-economic status were participating in a longitudinal infant feeding study in Western Virginia. Data were collected during in-home interviews with subjects.

The majority of reasons mothers cited for discontinuing breastfeeding in the six studies described above can be categorized under five headings, as they were in a study by Lowe (1994): supply related, maternal problems, maternal decision, infant problems, and self-weaning. The most common reason for cessation in Lowe's (1994) study was supply related; anxiety about supply. An inadequate milk supply (or perception of same) was also the most frequently cited reason for discontinuing breastfeeding in the studies by Bailey et al. (1993), Rogers et al. (1987), and Sjölin et al. (1977). Despite the fact that in only three of these studies were mothers specifically asked why they felt they had an inadequate milk supply (Bailey et al., 1993; Sjölin et al., 1979; Verronen, 1982), mothers who discontinued breastfeeding for this reason frequently identified examples of infant behavior as "evidence" of their not having breastmilk. These examples included the

infant's frequent feeding, fussiness after breastfeeding, poor sucking technique or latch/ poor nursing, frequent crying, not sleeping enough or not sleeping through the night, night wakings, and slow or poor infant weight gain. Another determinant of an inadequate milk supply was the mothers' feeling that their breasts were empty.

Verronen (1982) and Sjölin et al. (1979) identified that lactation difficulties commonly occurred among mothers in their studies. Verronen defined these"transient lactational crises" as "subjective critical diminishing of the milk supply" (p. 71). Verronen found that 36% of the mothers experienced one or more of these crises, and 75% of them occurred within the first three months. Similarly, Sjölin et al. found that within the first six months postpartum, 46 of the 75 mothers in their study experienced at least one lactational crisis. Mothers attributed lactational crises to fatigue, emotional upsets, poor health, improper care of self, and milk drying up after formula or solids were introduced.

Hill and Aldag (1991) conducted a survey to determine which predictors distinguished between mothers who reported an adequate supply of milk (n = 284) and those who reported an inadequate supply of milk (n = 100) during the first eight weeks postpartum. The convenience sample was chosen from two private pediatrician offices and 17 WIC agencies in a Midwestern state. Data were collected using a breastfeeding questionnaire developed by the authors. Using factor analysis, the authors found that maternal confidence, paternal support, maternal health, mother-in-law disapproval, and infant birth weight accounted for 56% of the variance between those mothers who

reported an inadequate supply of milk and those who reported an adequate supply of milk. In addition, infant behavior at feeding times, as well as the introduction of solid foods and formula within the first eight weeks postpartum accounted for 70.4% of the variance between the two groups. The authors noted that when the infant was felt to be dissatisfied with breastfeeding, mothers often complemented with formula.

However, Bloom et al. (1982) identified that contrary to what many mothers seemed to believe, infant behavior is similar for formula-fed and breastfed babies. A secondary purpose in their study was to compare the sleeping and crying behaviours of babies who were breastfed and those who received formula. Despite the fact that breastfed babies were found to experience significantly more night wakings than formula fed infants, there were no significant differences between breastfed and formula fed babies in the total number of hours they slept, or the duration or daily number of crying bouts experienced.

In addition to supply related reasons, breastfeeding was discontinued because of maternal problems such as illness, or taking medications that were contraindicated when breastfeeding, fatigue, breast problems such as painful feedings/ sore, cracked or inverted nipples/ mastitis, engorged breasts/ too much milk/ milk congestion, stress, and separation from the baby because of travel, vacation, or being in the hospital.

Maternal decision reasons were also identified by mothers for the termination of breastfeeding. These reasons included dislike of breastfeeding/ embarrassment, or insecurity, it was the right time to wean/ age of baby, baby ready for solids, breastfeeding

was inconvenient/ too difficult, desire to give supplemental feedings, desire for increased freedom/ breastfeeding was time consuming, mother tired of breastfeeding/ lack of motivation, desire to lose weight/ dieting/ concern for figure or breast shape, scheduled activities, pregnancy - actual or planned, and to return to work or school.

Infant related reasons were also cited for the cessation of breastfeeding including infant illness, healthy infant (i.e., did not need breastmilk), colic, vomiting after feedings, and biting/ cutting teeth. Mothers have also reported the infant's self-weaning, refusal of the breast, lack of interest in breastfeeding, or preference for the bottle as a reason for discontinuing breastfeeding.

Additional reasons were identified through a review of the six primary studies described above, and several other studies for which the identification of reasons for discontinuing breastfeeding was either a secondary purpose in the study, or in which the researchers reported reasons for cessation (Banoub et al., 1984; Lynch et al., 1980; West, 1980). These reasons can be categorized as environmental or social reasons (Lynch et al., 1986; Sjölin et al., 1979; West, 1980) and included encouragement or advice of a health professional to wean, pressure to wean, or lack of support from family and friends for breastfeeding, inability to express breastmilk at work, demands of other children/ family obligations, sibling jealousy, and to allow the father to participate in feeding.

Summary

A review of the literature on breastfeeding identified numerous factors which were associated with cessation of breastfeeding. In terms of personal characteristics,

mothers who ceased breastfeeding prematurely tended to be 20 years old or less, to have no more than 12 years of schooling, to live without a spouse or partner, to be of low socio-economic status, and primiparous. With regard to prenatal factors, these mothers usually lacked self-confidence, lacked breastfeeding knowledge, had not attended prenatal classes, had not planned to breastfeed for more than a few months, and had few role models and little support for breastfeeding.

In terms of hospital-related factors, mothers who ceased breastfeeding prematurely tended to have assisted deliveries and a late initial breastfeed. In addition, they often did not have their baby rooming-in with them, and their infant was more likely to have been supplemented with formula. Postnatally, these women frequently felt that their milk supply was inadequate, so they partially breastfed their babies or switched to total formula feeding. They often experienced problems with breastfeeding, and found breastfeeding difficult and inconvenient. In addition, they usually had little social support and returned to work by the time their infant was six months old.

Nonetheless, exceptions to some of these typical associations were identified, and some researchers did not find these factors to be related to cessation of breastfeeding. However, as many researchers suggested, additional factors other than the ones investigated probably influenced the length of breastfeeding. In fact, it is likely that personal characteristics, in combination with prenatal, psychological, perinatal and postnatal factors influenced mothers' premature cessation of breastfeeding, rather than one single factor.

Limitations of Previous Research

There were several limitations associated with the breastfeeding research reviewed in this chapter. One limitation was that many researchers did not define breastfeeding in relation to their study. Additionally, even when breastfeeding was defined, analyses often included exclusive breastfeeding and partial or supplemented breastfeeding. Simopoulos and Grave (1984) suggested that a lack of uniformity in how breastfeeding is defined creates confusion and makes it difficult to draw conclusions about the study findings. In addition, when partial breastfeeding is combined with exclusive breastfeeding, the potential influence of formula supplementation on the cessation or duration of breastfeeding is ignored.

Another limitation of a number of studies was that generalizability of findings was not possible due to non-random sample selection techniques. Simopoulos and Grave (1984) identified the lack of generalizability of study findings as one of the major problems with infant feeding research.

Additionally, only a small number of researchers included open-ended questions on their questionnaires, or employed semi-structured interviewing techniques to collect data. The sole use of force-choice questionnaires may have influenced subjects' selection of socially acceptable answers and restricted responses, thereby leaving the real reasons for cessation or continuation of breastfeeding unexplored (Morse et al., 1988).

Another limitation is that many studies were retrospective in nature and therefore, plagued with recall bias. Winikoff, as cited in Simopoulos and Grave (1984), proposed

that collecting data on breastfeeding long after the behavior happened may influence subjects to report socially acceptable times for the cessation of breastfeeding, or to group events into convenient ages (months, half-years).

An additional limitation is that many researchers chose short postpartum follow-up periods (two months or less) to examine the influence of factors on the cessation or duration of breastfeeding, while others chose a short duration of intervention. Longer follow-up of mothers to include six months after delivery would further enhance our understanding of the factors that correlate with later cessation of breastfeeding or its prolonged duration.

Another limitation is that only a small number of researchers identified the validity and/ or reliability of their study instruments. Consequently, the adequacy of a number of study instruments and data collection techniques to produce accurate, unbiased and relevant results could not be determined (Polit & Hungler, 1987). In addition, very few researchers piloted or pretested the study instruments or interviews, and as such, their clarity and comprehensibility may not have been ensured (Polit & Hungler, 1987).

CHAPTER 3

Methodology

Research Design

The present study is a secondary analysis from a larger descriptive study which used a prospective, longitudinal, survey design. The purpose of the primary study was to conduct a comprehensive survey of infant feeding practices in Newfoundland and Labrador during the first six months of life. The primary infant feeding study was conducted between January 1992 and June 1993 and surveyed 909 mothers over a six month period.

Sample Selection

Primary Study

For the primary infant feeding study the sample was chosen in the following manner (Matthews et al., 1994). The year 1992 was divided into nine six-week periods to account for possible seasonal differences in the rate of breastfeeding. A sample was then randomly obtained by choosing one week out of each of these nine periods by the throw of a die. Mothers were asked to participate in the study if they gave birth to a healthy, full-term infant at any hospital in Newfoundland and Labrador with maternity services during the weeks chosen for data collection, spoke English, Innu, or Innuktituk, and did not have their babies placed on special non-allergenic formula as part of another study occurring at the same time. A total of 909 mothers were recruited from the various maternity units in Newfoundland and Labrador.

Present Study

A subset of the sample from the primary infant feeding study was chosen for this secondary investigation. Participants from Northern Newfoundland and Labrador were excluded (111 women) since many of the questionnaires returned to the research assistant for data entry from these areas were incomplete. In addition, subjects from coastal Labrador were not randomly selected due to the small number of births in the region during the study period. Instead, in that region all eligible mothers were asked to participate in the study. Women who initiated total formula feeding (bottle feeding) or breastfeeding and formula feeding in the primary study were excluded. In addition, women who reported themselves to be exclusively breastfeeding in the hospital, but whose infants were given formula prior to discharge were eliminated. Finally, subjects who were lost to follow-up and for whom the time when they stopped exclusive breastfeeding was not available were inadmissible. Figure 2 summarizes how the sample was selected for this investigation.

Questionnaires

A review of the literature did not yield an appropriate survey questionnaire that could be used for data collection in the primary investigation. For this reason, two questionnaires were developed. Both questionnaires contained closed- and open-ended questions. Questionnaire One (Appendix A), used for the initial face-to-face interview with the mothers in the hospital, focused on demographic data, prenatal classes, infant-related information, including gender, birth weight and height, the number of children

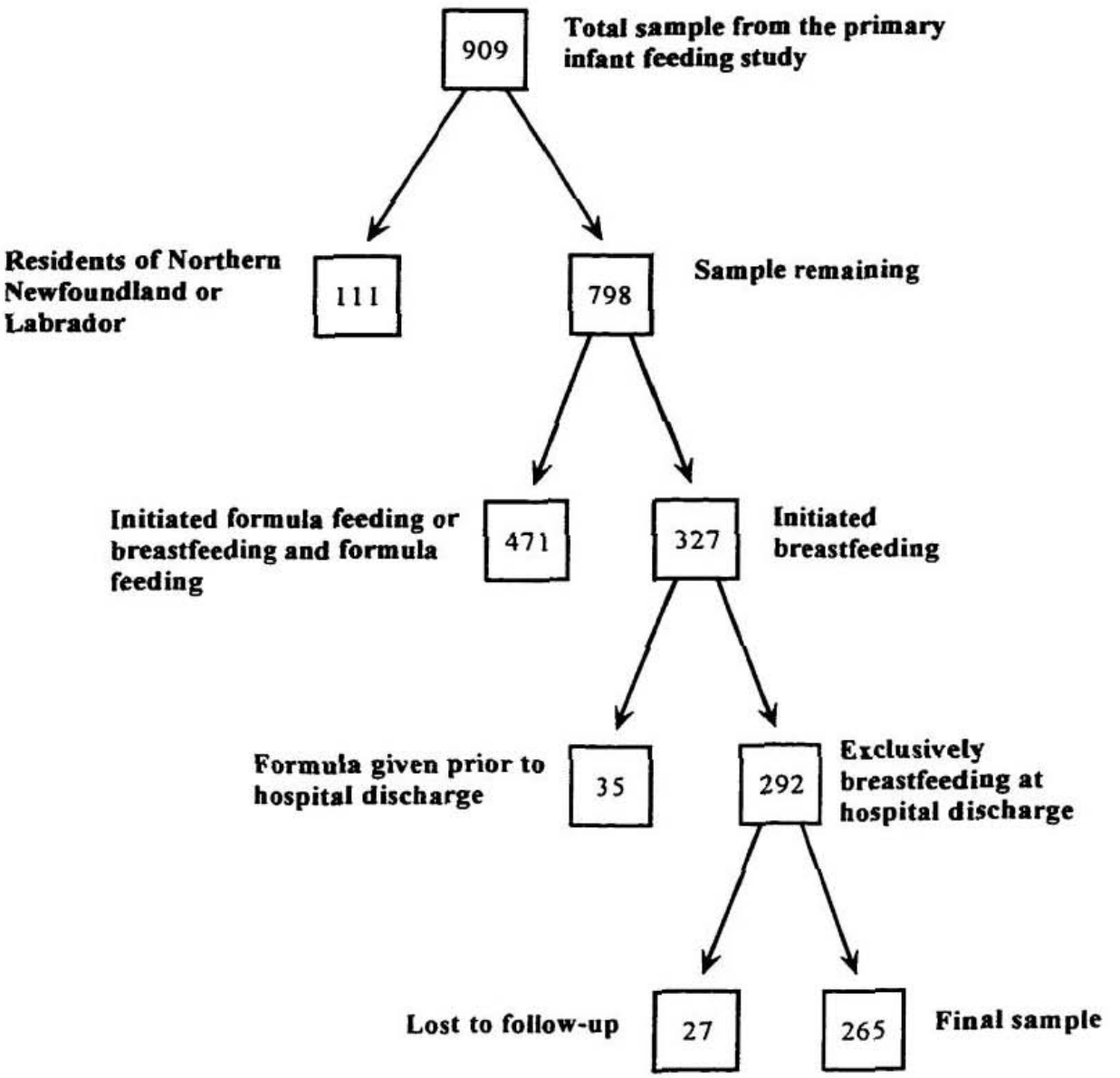

Figure 2. Description of Sampling.

a mother had (parity), previous breastfeeding experience, infant feeding instruction and discussions, as well as, initial infant feeding choices. Questionnaire Two (Appendix B) was used in the second, third and fourth telephone interviews at one, four and six months respectively, and addressed infant feeding practices at these times. Specifically, changes in infant feeding since the last interview were assessed, as were reasons for such changes, the details of the changes, and influences affecting the changes.

Face and content validity were established by sending both questionnaires to a nutritionist and a bio-statistician for external review. In addition, both questionnaires were pretested in the St. John's area. Twenty mothers were interviewed, using Questionnaire One, in the two maternity hospitals in the city. Mothers of infants aged one, four and six months were obtained from a review of public health records, contacted by telephone, and interviewed using Questionnaire Two. Following the pretest, minor changes in the wording of certain questions were made and the final draft was used to set up coding categories for computer processing.

Data Collection

Data were collected by registered nurses from the various provincial regions, except for coastal Labrador, where data collectors were community health representatives in each community. Interviewers were trained prior to data collection which began in January of 1992 and was completed in June 1993.

Subjects were administered Questionnaire One in the hospital at the initial

interview. The second, third, and fourth interviews were conducted in the participant's home by telephone, using Questionnaire Two. The second interview was conducted one month after the initial interview since previous studies identified this time as one when many changes in infant feeding occurred. The third interview, at four months, was selected to correspond with a typical time for public health nurse's postpartum check of infants, in addition to the fact that four months is the earliest time recommended for the initial introduction of solid food to infants' diets. The fourth interview, at six months, was chosen since this marks the recommended time frame for breastfeeding infants.

Operational Definitions

For this investigation, exclusive breastfeeding was defined as giving no milk other than human milk to the infant for the first six months of life. Cessation of exclusive breastfeeding was defined as the time when exclusive breastfeeding, as defined above, was no longer occurring. Early cessation group was defined as those women who discontinued exclusive breastfeeding at or before four weeks. Intermediate cessation group was defined as those women who ceased exclusive breastfeeding after four weeks but before 17 weeks. Later cessation group was defined as those women who ceased exclusive breastfeeding after 16 weeks but before 25 weeks. Longer duration group was defined as those women who ceased exclusive breastfeeding after 24 weeks.

Data Analysis

Completed questionnaires were coded by a research assistant into a data file and data were analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to describe maternal and infant demographic characteristics from Questionnaire One. Frequency counts, percentages, means and standard deviations were calculated.

For descriptive purposes maternal age was combined into five categories: less than 20 years, 20 to 24 years, 25 to 29 years, 30 to 34 years, and greater than 34 years. Infant birth weight was categorized into three groups based on a sex-specific birth weight table identified in the *Nelson Textbook of Pediatrics* (Behrman, Kliegman, Nelson, & Vaughan, 1992, p. 22). An infant was considered to be small, average, or large respectively if his or her birth weight was less than or equal to the 10th percentile, between the 10th and 90th percentiles, or greater than or equal to the 90th percentile.

Although described in more detail under characteristics of the sample in chapter four, several characteristics were recoded for chi-square analysis. Present living status was recoded to make two categories: living with husband or partner, and living without husband or partner. Household income was recoded as less than or equal to $2000 a month and greater than $2000 a month. Two categories were used to recode the highest level of education completed: no post-secondary education and post-secondary education. Parity was recoded as multiparous (more than one child) and primiparous (one child).

Frequencies and percentages were also calculated on the mothers' responses to

fixed answer questions from Questionnaires One and Two to determine maternal preparation for breastfeeding. Responses examined for this section included those which addressed attendance at prenatal classes, previous breastfeeding experience, instruction on infant feeding, discussions about feeding method choice, as well as, personal and professional influences on the feeding method chosen. Attendance at prenatal classes during this pregnancy was recoded into two categories: attendance at prenatal classes and no attendance at prenatal classes. Additionally, previous breastfeeding experience was recoded as having experience with breastfeeding and not having experience with breastfeeding, and the introduction of solid food to the infant was recoded as no introduction of solid food and introduction of solid food.

Frequency counts and percentages were also tabulated on the prevalence of exclusive breastfeeding at each of the four interviews, changes in feeding method which occurred at these times, and to identify the time (in weeks) when most mothers discontinued exclusive breastfeeding.

The cessation of exclusive breastfeeding was also combined into four categories: up to four weeks, 5 to 16 weeks, 17 to 24 weeks, and longer than 24 weeks. The first time period was chosen since previous studies indicated that changes in feeding method frequently occurred by the first month postpartum. The second time frame included mothers who exclusively breastfed for the minimal length of time recommended (four months), and the third category included mothers who discontinued at the upper range of time recommended for exclusive breastfeeding (six months). The final category

consisted of long-term exclusive breastfeeders who continued this method of feeding beyond six months.

Data from the open-ended question which examined mother's reasons for changing the method of feeding or type of milk given were also analyzed. Data from this question were originally sorted into categories and themes by the researchers from the primary infant feeding study. Mother's responses were ranked for their frequency and percentage at one, four and six months postpartum to determine the most common reasons for discontinuing exclusive breastfeeding at these times.

Finally, cross tabulations and the chi-square test were utilized to determine if certain factors distinguished between mothers who discontinued exclusive breastfeeding in the early, intermediate, and later postpartum period, i.e., up to four weeks, 5-16 weeks, and 17-24 weeks respectively, and those who continued beyond six months. Polit (1996) notes that this nonparametric statistical test is appropriate when inferences are being made about the existence of relationships between two categorical variables, and when there are hypotheses concerning the proportions of cases that fall into these categories. These variables are most often measured on a nominal scale. However, the chi-square test can also be used for ordinal-level data, as well as interval or ratio data with a small number of categories. The level of statistical significance for chi-square testing was set at 0.05.

Ethical Considerations

The research proposal for this secondary analysis was reviewed and approved by

the investigator's thesis committee prior to data analysis. The research proposal for the primary infant feeding study received ethical approval from the Human Investigation Committee of Memorial University of Newfoundland (Appendix C) and the participating hospitals.

In order to protect the rights of the subjects, certain procedures were followed. Data collected from the primary investigation remained under lock and key. This included the completed questionnaires, with subjects identified only by a code number, and computer disks containing the raw data. Data from the primary investigation were only accessible by the researchers of the primary infant feeding study, by this investigator, and her supervisor. However, any forms identifying the subjects, such as consent forms, were not available or required for the secondary analysis.

Additional attempts were made to protect the rights of subjects in the primary study. Participants were given a letter prior to data collection that explained the purpose of the study and the expected length and number of interviews, and informed them that they could withdraw from the study at any time. Subjects were asked to give verbal and written consent to participate. In addition, they were assured of the confidentiality of information given and that their names would not be used on the questionnaires. Instead they were identified by a code number. Finally, there were no anticipated physical or psychological risks for participants.

CHAPTER 4

Results

The findings from this investigation will be presented in six major sections. The first section contains a descriptive profile of the sample. The second section profiles maternal-infant characteristics, and the third describes mother's preparation for breastfeeding. Section four describes the duration of exclusive breastfeeding and highlights the time (in weeks) when most mothers ceased this method of feeding. Section five identifies reasons given by mothers at one, four and six months for why they ceased exclusive breastfeeding. In the final section, relationships between the duration of exclusive breastfeeding and selected variables are identified for four different subgroups of the population: 1) early cessation group, 2) intermediate cessation group, 3) later cessation group, and, 4) longer duration breastfeeding group.

Characteristics of the Sample

A total of 265 women met the major inclusion criteria of the study, i.e., they were exclusively breastfeeding their infant on discharge after birth. Table 2 contains a summary of the sample characteristics. The women were predominantly Caucasian, reflecting the population of the island. A high proportion lived with a spouse or partner. The women were fairly equally divided among the four regions of the province with a slightly higher percentage from the St. John's region, which has higher rates of initiation of breastfeeding (Banoub et al., 1985; Matthews et al., 1994). More variation was evident among the participants in maternal age, educational attainment, monthly household

Table 2: Characteristics of the sample ($N = 265$).

Characteristic	n	(%)
Region of Province:		
St. John's	93	35.1
Eastern	54	20.4
Central	60	22.6
Western	58	21.9
Present living status:		
Living alone	3	1.1
Husband/ partner	233	87.9
Family/ friends	29	10.9
Maternal age: [1]		
< 20	9	3.4
20-24	64	24.2
25-29	106	40.0
30-34	72	27.3
> 34	13	4.9
Education attained: [2]		
< Grade 9	6	2.3
Grade 9	9	3.4
Grade 11-12	56	21.2
Vocational training	101	38.3
Some university	42	15.9
University degree(s)	50	18.9
Monthly household income: [3]		
≤ $500	31	12.4
501 - $1000	29	11.6
1001 - $1500	44	17.7
1501 - $2000	48	19.3
> $2000	90	36.1

Table 2 (cont.): Characteristics of the sample ($N = 265$).

Characteristic	n	(%)
Maternal occupation: [4]		
Clerical	59	22.6
Sales & Service	39	14.9
Farming/etc.	10	3.8
Teaching	21	8.0
Scientific	57	21.8
Number of children:		
One	128	48.3
Two	93	35.1
Three or more	44	16.6

[1] 1 response missing
[2] 1 response missing
[3] 52 responses missing
[4] 79 responses missing

income and maternal occupation. The mean age of the women was 27.46 years (SD 4.41). While a high proportion had completed at least some post-secondary schooling, several women had less than a high school education. The majority of women reported their household income to be more than $2000 a month, yet for many others their income was half of this amount or less. Most women worked in clerical or scientific occupations. However, 28.7% of the women stated they were unemployed, but they did not identify their occupation. With regard to children, the majority of women had only one child.

Maternal-Infant Characteristics

For almost half of the mothers this was there first baby. The infants were nearly equally divided in terms of gender. While there was some variation in infant birth weight, the mean birth weight was 3554.77g (SD 447.33g). This finding is not surprising given that all of the infants were full-term at the time of delivery. The vast majority of infants were of average weight (between the 10th and 90th percentile). A high proportion of the mothers did not attend prenatal classes during their pregnancy. However, given that a number of subjects had more than one child, they may not have felt they needed to attend prenatal classes prior to the birth of this child, or prenatal classes may not have been easily accessible for all women. Most women did not have previous experience with breastfeeding.

For the most part, mothers followed infant feeding recommendations for the introduction of solid foods. The recommended time for infants to be introduced to solids

is when they are between four and six months of age, and cereal is the only food to be given in this time frame (Health & Welfare Canada & Canadian Paediatric Society, 1986). Furthermore, the same source recommends that vegetables and fruit should not be introduced until the infant is six to eight months old, and meat should not be given until the baby is eight months of age.

Only one mother introduced her infant to solid food by one month postpartum, and cereal was the only food she introduced. By four months more mothers had introduced their infant to solids, and greater than a third of the sample had done so by six months. The most common food given at four and six months was cereal, followed by vegetables and fruit. At six months a small percentage of mothers introduced their infant to meat, and other foods such as pudding, ice cream, yogurt, toast and teething biscuits. Table 3 provides a summary of maternal-infant characteristics.

Preparation for Breastfeeding

A large proportion of the mothers had received instruction on infant feeding. The most common medium for receiving this instruction was through infant feeding classes. Many women had not discussed methods of infant feeding with anyone prior to their baby's birth. Of those who had this discussion, more women talked to family members and friends than health professionals. Almost one-quarter of the mothers (23.6%) believed their personal convictions were more influential in their decision to breastfeed then their discussions with specific health professionals, family members, or friends. Table 4 summarizes maternal preparation for breastfeeding.

Table 3: Maternal-infant characteristics ($N = 265$).

Variable	n	%
Parity:		
Primiparous	128	48.3
Multiparous	137	51.7
Gender of infant:		
Female	130	49.1
Male	135	50.9
Birth weight of infant:		
≤10th percentile (small)	7	2.6
10th to 90th percentile (average)	170	64.2
≥90th percentile (large)	88	33.2
Attended prenatal classes during this pregnancy:		
Yes	120	45.3
No	145	54.7
Previous experience with breastfeeding:		
Yes	109	41.1
No	156	58.9
Introduction of solid food:		
One month[1]	1	0.4
Four months[2]	58	21.9
Six months[3]	97	36.6

[1] cereal only

[2] 22.7% cereal, 4.7% vegetables and 3.6% fruit

[3] 38.2% cereal, 31.9% vegetables, 22.7% fruit, 4.0% meat and 1.6% other

Table 4: Preparation for breastfeeding ($N = 265$).

Preparation	n	(%)
Instruction on infant feeding:[1]		
Yes	208	79.4
No	54	20.6
Where received instruction: [2]		
Class on feeding	110	43.1
Personal instruction	74	29.0
Class and personal instruction	14	5.5
Prenatal classes	3	1.2
Discussed infant feeding before birth:		
Yes	167	63.0
No	98	37.0
Discussed infant feeding with:		
Doctor	76	28.7
Public health nurse	62	23.4
Prenatal instructor	73	27.5
Hospital nurse	50	18.9
La Leche League	10	3.8
Other health professional [3]	10	3.8
Husband/ partner	133	50.2
Mother	89	33.6
Mother-in-law	45	17.0
Sister	70	26.4
Friends	117	44.2
Other family or friends [4]	15	5.7

Table 4 (cont.): Preparation for breastfeeding ($N = 265$).

Preparation	**n**	**(%)**
Influenced infant feeding decision most [5]:		
Friends	30	18.2
Husband/ partner	26	15.8
Sister(s)	15	9.1
Public health nurse	13	7.9
Prenatal instructor	12	7.3
Mother	11	6.7
Other	9	5.4
Doctor	4	2.4
Hospital nurse	3	1.8
La Leche League	3	0.6
Midwife	1	0.6

[1] 3 missing
[2] 64 missing
[3] midwife, student nurse, nurse in community setting
[4] aunt, sister-in-law, grandmother, co-workers
[5] 100 missing

Duration of Exclusive Breastfeeding

All 265 women were feeding their babies nothing but breastmilk at discharge from the hospital, however, by the completion of data collection at six months postpartum, substantial changes in feeding had occurred. At one month a quarter of the mothers had discontinued breastfeeding and a further 15% had introduced formula with breastfeeding. By six months postpartum, less than a third of the mothers continued to exclusively breastfeed their infant. While there were women who continued to partially breastfeed when they stopped exclusive breastfeeding, most women who discontinued exclusive breastfeeding began giving their infant formula or other milks alone. Table 5 identifies the change in method of infant feeding from the first interview in the hospital to the last interview at six months postpartum.

Mothers were asked how old their infants were (in weeks) when they changed the type of milk they were giving them. The responses to this question were analyzed to identify how many mothers ceased exclusive breastfeeding at one, four and six months. More than one third of the mothers had ceased exclusive breastfeeding by the end of four weeks. Furthermore, 13.2% of these women discontinued breastfeeding, only, by the first week postpartum. These women formed the early cessation group. Table 6 provides a summary of the time when exclusive breastfeeding ceased.

Table 5: Method of infant feeding at different data collection times showing change in feeding method over time ($N = 265$).

	Time Period			
Feeding Method:	**In hospital**	**One month**	**Four months[1]**	**Six months[2]**
	n (%)	**n (%)**	**n (%)**	**n (%)**
Breastmilk	265 (100)	162 (61.1)	94 (36.7)	71 (28.2)
Breastmilk with formula	—	39 (14.7)	51 (19.9)	36 (14.3)
Formula/ other milk	—	64 (24.2)	111 (43.4)	145 (57.5)

[1] 9 missing
[2] 13 missing

Table 6: Time (in weeks) grouped when exclusive breastfeeding ceased.

Week Ended [1]	**n**	**%**
1-4	96	36.2
5-16	66	24.9
17-24	30	11.3

[1] 73 women or 27.5% were still exclusively breastfeeding at the six month follow-up.

Reasons for Discontinuing Exclusive Breastfeeding at One, Four and Six Months

One of the areas explored was why mothers discontinued exclusive breastfeeding. Mothers were asked an open-ended question if they changed their method of infant feeding, "Why did you decide to change?". The reasons cited for cessation, recorded verbatim, provided a fuller understanding of why these mothers discontinued exclusive breastfeeding prematurely. The most common reason given by mothers for the cessation of exclusive breastfeeding in the first month was that they found breastfeeding too hard. Mothers who discontinued for this reason commented that they experienced problems with breastfeeding, such as "sore nipples" or difficulty "latching on"; they felt "worn out" and "exhausted"; were "not comfortable" with the method; and found it to be "too hectic" or "time consuming." For one mother in particular, the desire to breastfeed was not enough for her to continue in light of the difficulty she experienced. She responded, "My nipples were so sore that I couldn't continue. I had my heart set on breastfeeding, but it was just too painful."

The second most common reason for the cessation of exclusive breastfeeding at one month was the mother's perception of the baby not being satisfied with breastmilk. Respondents cited several infant behaviors as "evidence" of their not having sufficient breastmilk including the baby being "fussy", "irritable", "not sleeping", "not settling", "still hungry after breastfeeding", and "feeding a lot". The third most common reason for discontinuing exclusive breastfeeding was to supplement the infant and thus, get a break. Mothers reported that they "needed sleep", "needed a break because the baby was feeding

so often", that "formula could be given by somebody else", and they wanted the baby to get "used to a bottle."

At four months the highest ranking reasons for discontinuing breastfeeding were to return to "work", "school" or "university", the mother's perception that the baby was not being satisfied on breastmilk, and breastfeeding was too difficult. As was the case at four months, the most common reason for discontinuing exclusive breastfeeding at six months postpartum was the mother's having to return to work, school or university. The second highest ranked category for cessation at six months was no particular reason/ other. Some of the mothers in this category commented that they "decided they had breastfed long enough", "decided it was time to wean", and felt she (the baby) was ready for it". The third most common reasons were the baby's "not liking" or "wanting" breastmilk, and to get the baby "used to the bottle"/ weaning.

Additional reasons cited by mothers for discontinuing exclusive breastfeeding included mother's milk "dried up", side effects on the baby, the baby had physical problems such as "weight loss", "jaundice", and "crystals in the urine", physical problems with breastfeeding such as "mastitis" and "inverted nipples", medical reasons (mother), early postpartum problems related to cesarean section, breastfeeding was "inconvenient", and the advice or suggestion of a health professional. A summary of the reasons mothers gave for discontinuing exclusive breastfeeding at one, four and six months is provided in Table 7. The reasons were categorized as they were in the literature review.

Table 7: Reasons for discontinuing exclusive breastfeeding at one, four and six months.

Reason	One month[1]	Four months[2]	Six months[3]
	n (%)	n (%)	n (%)
Supply related:			
Baby not satisfied on breastmilk	23 (24.5)	12 (19.7)	0 (0)
Mother's milk dried up	0 (0)	1 (1.6)	1 (3.0)
Maternal problems:			
Physical problems with breastfeeding	7 (7.4)	2 (3.3)	0 (0)
Medical reasons	2 (2.1)	2 (3.3)	1 (3.0)
Early postpartum problems related to cesarean section	1 (1.1)	0 (0)	0 (0)
Maternal decision:			
Found breastfeeding too hard/ difficult	35 (37.2)	9 (14.8)	0 (0)
Breastfeeding was inconvenient	0 (0)	2 (3.35)	0 (0)
To supplement/ to get a break/ allow someone else to help	11 (11.7)	1 (1.6)	2 (6.1)
To get baby used to a bottle/ weaning	1 (1.1)	1 (1.6)	3 (9.1)

Table 7 (cont.): Reasons for discontinuing exclusive breastfeeding at one, four and six months.

Reason	One month[1]	Four months[2]	Six months[3]
	n (%)	n (%)	n (%)
Maternal decision (cont.)			
Mother going back to work/ school/ university	2 (2.1)	23 (37.7)	18 (54.5)
Infant related:			
Side effects on infant	1 (1.1)	0 (0)	0 (0)
Physical problems - losing weight/ gas spitting up	7 (7.4)	1 (1.6)	1 (3.0)
Self-weaning:			
Infant didn't like or want breastmilk	2 (2.1)	1 (1.6)	3 (9.1)
Environmental:			
Advice of health professional to wean	1 (1.1)	2 (3.3)	0 (0)
No reason/ other:	1 (1.1)	4 (6.6)	4 (12.1)
TOTAL	96 (100.0)	66 (100.0)	34 (100.0)

[1] 2 missing
[2] 5 missing
[3] 1 missing

Relationships Among the Variables

Women in the study were divided into four groups: early cessation, intermediate cessation, later cessation, and longer duration breastfeeders. Using the chi-square test, these groups were compared along a number of sociodemographic, maternal-infant, and preparation for breastfeeding factors to look for differences between the various groups. Only significant differences or important trends will be reported.

Early and Intermediate Cessation Groups

Sociodemographic variables

Several sociodemographic variables significantly distinguished these groups (Table 8). The first variable was maternal age. Younger women tended to discontinue exclusive breastfeeding within the first month, whereas older mothers more frequently gave no milk other than breastmilk for five weeks to four months. Living status was the second distinguishing characteristic. Women without a husband or partner were significantly more likely to have stopped exclusive breastfeeding early, as were women whose monthly household income was less than or equal to $2000.

Maternal-infant variables

Three maternal-infant variables significantly distinguished the early and intermediate cessation groups (Table 9). The first variable was previous experience with breastfeeding. Mothers who breastfed previous children were more likely to have discontinued exclusive breastfeeding in the intermediate postpartum period than those with no such experience. Similarly, mothers who gave their infant solid food by

Table 8: Sociodemographic influences on whether mothers discontinued exclusive breastfeeding in the early or intermediate postpartum period.

Sociodemographic Variable	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		5-16 weeks n = 66			
	n	(%)	n	(%)	X^2	p
Place of residence:					.976	.807
St. John's	29	(30.2)	23	(34.8)		
Eastern	18	(18.8)	12	(18.2)		
Central	28	(29.2)	15	(22.7)		
Western	21	(21.9)	16	(24.2)		
Living status:					6.76	.009
With partner	76	(79.2)	62	(93.9)		
Without partner	20	(20.8)	4	(6.1)		
Education:					2.29	.130
No post-secondary	34	(35.4)	16	(24.2)		
Post-secondary	62	(64.6)	50	(75.8)		
Maternal Age:[1]					14.38	.006
< 20	9	(9.4)	0	(0.0)		
20-24	34	(35.4)	12	(18.5)		
25-29	31	(32.3)	33	(50.8)		
30-34	19	(19.8)	18	(27.7)		
> 34	3	(3.1)	2	(3.1)		
Monthly income:[2]					10.81	.001
≤ $2000	51	(70.8)	22	(41.5)		
> $2000	21	(29.2)	31	(58.5)		

[1] 1 missing
[2] 37 missing

Table 9: The influence of maternal-infant variables on whether mothers discontinued exclusive breastfeeding in the early or intermediate postpartum period.

Maternal-Infant Variable	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		5-16 weeks n = 66			
	n	(%)	n	(%)	X^2	p
Parity:					1.98	.159
Primiparous	53	(55.2)	29	(43.9)		
Multiparous	43	(44.8)	37	(56.1)		
Gender of infant:					.177	.183
Male	48	(50.0)	40	(60.6)		
Female	48	(50.0)	26	(39.4)		
Infant birth weight:					7.11	.028
≤10th percentile	3	(3.1)	1	(1.5)		
10th to 90th percentile	71	(74.0)	37	(56.1)		
≥90th percentile	22	(22.9)	28	(42.4)		
Prenatal class attendance:					.004	.953
Yes	47	(49.0)	32	(48.5)		
No	49	(51.0)	34	(51.5)		
Previous breastfeeding experience:					4.71	.030
Yes	29	(30.2)	31	(47.0)		
No	67	(69.8)	35	(53.0)		
Introduction of solid food:						
Four months[1]					10.55	.005
Yes	8	(8.3)	18	(27.3)		
No	83	(86.5)	46	(69.7)		
Six months[2]					6.55	.038
Yes	9	(9.4)	13	(19.7)		
No	76	(79.2)	51	(77.3)		

[1] 7 missing
[2] 13 missing

four and six months more frequently continued exclusive breastfeeding for the intermediate length of time than mothers who did not introduce their infant to solid food at these times. Infant birth weight was the third significant distinguishing characteristic. Mothers who delivered a small full-term infant were more likely to have ceased exclusive breastfeeding in the early postpartum period than mothers who delivered an average or large sized full-term infant.

Preparation for breastfeeding variables

No variables which exemplified preparation for breastfeeding significantly distinguished the early and intermediate cessation groups. These results are presented in Table 10.

Early and Later Cessation Groups

Sociodemographic variables

The only sociodemographic variable which significantly distinguished the early and later cessation groups was maternal age (Table 11). Younger women more frequently discontinued exclusive breastfeeding within the first month than older mothers.

Maternal-infant variables

The only maternal-infant variable which distinguished these groups was the introduction of solid food to the infant at four and six months. Women who did not introduce solids at these times were more likely to have discontinued exclusive breastfeeding in the early postpartum period. These results are presented in Table 12.

Table 10: The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the early or intermediate postpartum period.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		5-16 weeks n = 66			
	n	(%)	n	(%)	X^2	p
Received instruction on infant feeding:[1]					1.26	.261
Yes	78	(83.0)	50	(75.8)		
No	16	(17.0)	16	(24.2)		
Discussed infant feeding before infant's birth:					.766	.381
Yes	66	(68.8)	41	(62.1)		
No	30	(31.3)	25	(37.9)		
Discussed infant feeding with health care professional:						
Doctor:					.467	.494
Yes	31	(32.3)	18	(27.3)		
No	65	(67.7)	48	(72.7)		
Public health nurse:					.694	.405
Yes	29	(30.2)	16	(24.2)		
No	67	(69.8)	50	(75.8)		
Prenatal instructor:					.642	.423
Yes	25	(26.0)	21	(31.8)		
No	71	(74.0)	45	(68.2)		
Hospital nurse:					.354	.552
Yes	18	(18.8)	10	(15.2)		
No	78	(81.3)	56	(84.8)		

Table 10 (cont.): The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the early or intermediate postpartum period.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		5-16 weeks n = 66			
	n	(%)	n	(%)	X^2	p
Discussed infant feeding with family/ friends:						
Husband/ partner:					.068	.794
Yes	50	(52.1)	33	(50.0)		
No	46	(47.9)	33	(50.0)		
Mother:					1.30	.254
Yes	39	(40.6)	21	(31.8)		
No	57	(59.4)	45	(68.2)		
Mother-in-law:					.275	.600
Yes	16	(16.7)	9	(13.6)		
No	80	(83.3)	57	(86.4)		
Sister(s):					2.27	.634
Yes	28	(29.2)	17	(25.8)		
No	68	(70.8)	49	(74.2)		
Friends:					.776	.378
Yes	46	(47.9)	27	(40.9)		
No	50	(52.1)	39	(59.1)		

[1] 2 missing

Table 11: Sociodemographic influences on whether mothers discontinued exclusive breastfeeding in the early or later postpartum period.

Sociodemographic Variable	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		17-24 weeks n = 30			
	n	(%)	n	(%)	X^2	p
Place of residence:					3.94	.267
St. John's	29	(30.2)	11	(36.7)		
Eastern	18	(18.8)	9	(30.0)		
Central	28	(29.2)	4	(13.3)		
Western	21	(21.9)	6	(20.0)		
Living status:					3.18	.074
With partner	76	(79.2)	28	(93.3)		
Without partner	20	(20.8)	2	(6.7)		
Education:					2.51	.113
No post-secondary	34	(35.4)	6	(20.0)		
Post-secondary	62	(64.6)	24	(80.0)		
Maternal Age:					16.30	.003
< 20	9	(9.4)	0	(0.0)		
20-24	34	(35.4)	3	(10.0)		
25-29	31	(32.3)	10	(33.3)		
30-34	19	(19.8)	15	(50.0)		
> 34	3	(3.1)	2	(6.7)		
Monthly income:[1]					1.00	.317
≤ $2000	51	(70.8)	15	(60.0)		
> $2000	21	(29.2)	10	(40.0)		

[1] 29 missing

Table 12: The influence of maternal-infant variables on whether mothers discontinued exclusive breastfeeding in the early or later postpartum period.

Maternal-Infant Variable	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		17-24 weeks n = 30			
	n	(%)	n	(%)	X^2	p
Parity:					2.12	.146
Primiparous	53	(55.2)	12	(40.0)		
Multiparous	43	(44.8)	18	(60.0)		
Gender of infant:					.407	.524
Male	48	(50.0)	13	(43.3)		
Female	48	(50.0	17	(56.7)		
Infant birth weight:					5.33	.070
≤ 10th percentile	3	(3.1)	3	(10.0)		
10th to 90th percentile	71	(74.0)	16	(53.3)		
≥ 90th percentile	22	(22.9)	11	(36.7)		
Prenatal class attendance:					1.39	.238
Yes	47	(49.0)	11	(36.7)		
No	49	(51.0)	19	(63.3)		
Previous breastfeeding experience:					2.75	.097
Yes	29	(30.2)	14	(46.7)		
No	67	(69.8)	16	(53.3)		
Introduction of solid food:						
Four months[1]					6.14	.046
Yes	8	(8.3)	7	(23.3)		
No	83	(86.5)	23	(76.7)		
Six months[2]					25.93	.000
Yes	9	(9.4)	15	(50.0)		
No	76	(79.2)	15	(50.0)		

[1] 5 missing
[2] 11 missing

Preparation for breastfeeding variables

Having had a prenatal discussion about methods of infant feeding with a public health nurse was the only variable in this category which significantly distinguished the early and later cessation groups. Women who had this discussion prior to the infant's birth were less likely to have continued exclusive breastfeeding beyond the first month. These results are included in Table 13.

Early Cessation and Longer Duration Groups

Sociodemographic variables

A number of sociodemographic variables significantly distinguished these groups (Table 14). The first characteristic was maternal age. Younger women more frequently discontinued exclusive breastfeeding within the first month than older mothers. Level of education was the second distinguishing characteristic. Women with no post-secondary education were more likely to have discontinued exclusive breastfeeding early in the postpartum period. A much smaller percentage of these women exclusively breastfed for more than six months. The third distinguishing characteristic was living status. Women without a husband or partner were more likely to have stopped exclusive breastfeeding within the first month.

While there were no other sociodemographic characteristics which significantly distinguished these groups, a trend was observed when monthly household income was examined in relation to the length of exclusive breastfeeding. Women whose income was less than or equal to $2000 a month more frequently discontinued exclusive breastfeeding

Table 13: The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the early or later postpartum period.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		17-24 weeks n = 30			
	n	(%)	n	(%)	X^2	p
Received instruction on infant feeding:[1]					.864	.353
Yes	78	(83.0)	27	(90.0)		
No	16	(17.0)	3	(10.0)		
Discussed infant feeding before infant's birth:					.306	.580
Yes	66	(68.8)	19	(63.3)		
No	30	(31.3)	11	(36.7)		
Discussed infant feeding with health care professional:						
Doctor:					.055	.814
Yes	31	(32.3)	9	(30.0)		
No	65	(67.7)	21	(70.0)		
Public health nurse:					4.93	.026
Yes	29	(30.2)	3	(10.0)		
No	67	(69.8)	27	(90.0)		
Prenatal instructor:					1.11	.293
Yes	25	(26.0)	5	(16.7)		
No	71	(74.0)	25	(83.3)		
Hospital nurse:					.302	.583
Yes	18	(18.8)	7	(23.3)		
No	78	(81.3)	23	(76.7)		

Table 13 (cont.): The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the early or later postpartum period.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		17-24 weeks n = 30			
	n	(%)	n	(%)	X^2	p
Discussed infant feeding with family/ friends:						
Husband/ partner:					.014	.905
Yes	50	(52.1)	16	(53.3)		
No	46	(47.9)	14	(46.7)		
Mother:					.150	.699
Yes	39	(40.6)	11	(36.7)		
No	57	(59.4)	19	(63.3)		
Mother-in-law:					.681	.409
Yes	16	(16.7)	7	(23.3)		
No	80	(83.3)	23	(76.7)		
Sister(s):					1.23	.266
Yes	28	(29.2)	12	(40.0)		
No	68	(70.8)	18	(60.0)		
Friends:					.014	.905
Yes	46	(47.9)	14	(46.7)		
No	50	(52.1)	16	(53.3)		

[1] 2 missing

Table 14: Sociodemographic influences on whether mothers discontinued exclusive breastfeeding in the early postpartum period, or continued beyond six months.

Sociodemographic Variable	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Place of residence:					3.72	.294
St. John's	29	(30.2)	30	(41.1)		
Eastern	18	(18.8)	15	(20.5)		
Central	28	(29.2)	13	(17.8)		
Western	21	(21.9)	15	(20.5)		
Living status:					5.07	.024
With partner	76	(79.2)	67	(91.8)		
Without partner	20	(20.8)	6	(8.2)		
Education:					4.24	.040
No post-secondary	34	(35.4)	15	(20.8)		
Post-secondary	62	(64.6)	57	(79.2)		
Maternal Age:					14.55	.006
< 20	9	(9.4)	0	(0.0)		
20-24	34	(35.4)	15	(20.5)		
25-29	31	(32.3)	32	(43.8)		
30-34	19	(19.8)	20	(27.4)		
> 34	3	(3.1)	6	(8.2)		
Monthly income:[1]					3.39	.066
≤ $2000	51	(70.8)	35	(55.6)		
> $2000	21	(29.2)	28	(44.4)		

[1] 34 missing

in the first month than women whose monthly income was greater than $2000.

Maternal-infant variables

Two maternal-infant variables significantly distinguished the early cessation and longer duration groups (Table 15). The first variable was previous experience with breastfeeding. Mothers who breastfed previous children were more likely to have continued exclusive breastfeeding beyond six months than those with no such experience. Similarly, mothers who gave their infant solid food by four and six months more frequently continued exclusive breastfeeding beyond six months than mothers who had not introduced their infant to solid food at these times.

While infant birth weight was not a significant distinguishing characteristic, a trend was noted when this characteristic was examined in relation to the two groups. Mothers who delivered a smaller full-term infant tended to cease exclusive breastfeeding early in the postpartum period more often than mothers who delivered a larger full-term infant.

Preparation for breastfeeding variables

Only one variable significantly distinguished between the early cessation and longer duration breastfeeders (Table 16). Women who had a prenatal discussion about methods of infant feeding with their mother were more likely to have discontinued exclusive breastfeeding within the first month than those who had not had this discussion.

Table 15: The influence of maternal-infant variables on whether mothers discontinued exclusive breastfeeding in the early postpartum period, or continued beyond six months.

Maternal-Infant Variable	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Parity:					1.24	.266
Primiparous	53	(55.2)	34	(46.6)		
Multiparous	43	(44.8)	39	(53.4)		
Gender of infant:					.195	.659
Male	48	(50.0)	34	(46.6)		
Female	48	(50.0)	39	(53.4)		
Infant birth weight:					5.83	.054
≤10th percentile	3	(3.1)	0	(0.0)		
10th to 90th percentile	71	(74.0)	46	(63.0)		
≥90th percentile	22	(22.9)	27	(37.0)		
Prenatal class attendance:					1.03	.309
Yes	47	(49.0)	30	(41.1)		
No	49	(51.0)	43	(58.9)		
Previous breastfeeding experience:					5.54	.019
Yes	29	(30.2)	35	(47.9)		
No	67	(69.8)	38	(52.1)		
Introduction of solid food:						
Four months[1]					17.86	.000
Yes	8	(8.3)	25	(34.2)		
No	83	(86.5)	46	(63.0)		
Six months[2]					91.86	.000
Yes	9	(9.4)	60	(82.2)		
No	76	(79.2)	13	(17.8)		

[1] 7 missing
[2] 11 missing

Table 16: The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the early postpartum period, or continued beyond six months.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Received instruction on infant feeding:[1]					2.15	.143
Yes	78	(83.0)	53	(73.6)		
No	16	(17.0)	19	(26.4)		
Discussed infant feeding before infant's birth:					2.83	.093
Yes	66	(68.8)	41	(56.2)		
No	30	(31.3)	32	(43.8)		
Discussed infant feeding with health care professional:						
Doctor:					1.17	.279
Yes	31	(32.3)	18	(24.7)		
No	65	(67.7)	55	(75.3)		
Public health nurse:					2.66	.103
Yes	29	(30.2)	14	(19.2)		
No	67	(69.8)	59	(80.8)		
Prenatal instructor:					.346	.556
Yes	25	(26.0)	22	(30.1)		
No	71	(74.0)	51	(69.9)		
Hospital nurse:					.085	.770
Yes	18	(18.8)	15	(20.5)		
No	78	(81.3)	58	(79.5)		

Table 16 (cont.): The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the early postpartum period, or continued beyond six months.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	≤ 4 weeks n = 96		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Discussed infant feeding with family/ friends:						
Husband/ partner:					.503	.478
Yes	50	(52.1)	34	(46.6)		
No	46	(47.9)	39	(53.4)		
Mother:					4.73	.030
Yes	39	(40.6)	18	(24.7)		
No	57	(59.4)	55	(75.3)		
Mother-in-law:					.038	.845
Yes	16	(16.7)	13	(17.8)		
No	80	(83.3)	60	(82.2)		
Sister(s):					2.91	.088
Yes	28	(29.2)	13	(17.8)		
No	68	(70.8)	60	(82.2)		
Friends:					.780	.377
Yes	46	(47.9)	30	(41.1)		
No	50	(52.1)	43	(58.9)		

[1] 3 missing

Intermediate and Later Cessation Groups

Sociodemographic variables

No sociodemographic variables significantly distinguished these groups (Table 17).

Maternal-infant variables

The introduction of solid food to the infant by six months was the only variable in this category which distinguished the intermediate and later cessation groups. Mothers who introduced solid food by this time were more likely to have discontinued exclusive breastfeeding later in the postpartum period. These results are included in Table 18.

Preparation for breastfeeding variables

There were no variables in this category which significantly distinguished between the intermediate and later cessation groups. These results are presented in Table 19.

Intermediate Cessation and Longer Duration Groups

Sociodemographic variables

No sociodemographic variables significantly distinguished the intermediate cessation and and longer duration groups (Table 20).

Maternal-infant variables

The introduction of solid food to the infant by six months was the only variable in this category which distinguished these groups. Mothers who gave their infant solids by this time were more likely to have continued exclusive breastfeeding for a longer

Table 17: Sociodemographic influences on whether mothers discontinued exclusive breastfeeding in the intermediate or later postpartum period.

Sociodemographic Variable	Duration of Exclusive Breastfeeding					
	5-16 weeks n = 66		17-24 weeks n = 30			
	n	(%)	n	(%)	X^2	p
Place of residence:					2.42	.490
St. John's	23	(34.8)	11	(36.7)		
Eastern	12	(18.2)	9	(30.0)		
Central	15	(22.7)	4	(13.3)		
Western	16	(24.2)	6	(20.0)		
Living status:					.013	.909
With partner	62	(93.9)	28	(93.3)		
Without partner	4	(6.1)	2	(6.7)		
Education:					.210	.647
No post-secondary	16	(24.2)	6	(20.0)		
Post-secondary	50	(75.8)	24	(80.0)		
Maternal Age:[1]					5.88	.118
< 20	0	(0.0)	0	(0.0)		
20-24	12	(18.5)	3	(10.0)		
25-29	33	(50.8)	10	(33.3)		
30-34	18	(27.7)	15	(50.0)		
> 34	2	(3.1)	2	(6.7)		
Monthly income:[2]					2.33	.127
≤ $2000	22	(41.5)	15	(60.0)		
> $2000	31	(58.5)	10	(40.0)		

[1] 34 missing
[2] 18 missing

Table 18: The influence of maternal-infant variables on whether mothers discontinued exclusive breastfeeding in the intermediate or later postpartum period.

Maternal-Infant Variable	Duration of Exclusive Breastfeeding					
	5-16 weeks n = 66		17-24 weeks n = 30			
	n	(%)	n	(%)	X^2	p
Parity:					.131	.718
Primiparous	29	(43.9)	12	(40.0)		
Multiparous	37	(56.1)	18	(60.0)		
Gender of infant:					2.49	.115
Male	40	(60.6)	13	(43.3)		
Female	26	(39.4)	17	(56.7)		
Infant birth weight:					3.76	.153
≤10th percentile	1	(1.5)	3	(10.0)		
10th to 90th percentile	37	(56.1)	16	(53.3)		
≥90th percentile	28	(42.4)	11	(36.7)		
Prenatal class attendance:					1.16	.280
Yes	32	(48.5)	11	(36.7)		
No	34	(51.5)	19	(63.3)		
Previous breastfeeding experience:					.001	.978
Yes	31	(47.0)	14	(46.7)		
No	35	(53.0)	16	(53.3)		
Introduction of solid food:						
Four months[1]					1.17	.557
Yes	18	(27.3)	7	(23.3)		
No	46	(69.7)	23	(76.7)		
Six months[2]					9.63	.008
Yes	13	(19.7)	15	(50.0)		
No	51	(77.3)	15	(50.0)		

[1] 2 missing
[2] 9 missing

Table 19: The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the intermediate or later postpartum period.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	5-16 weeks n = 66		17-24 weeks n = 30			
	n	(%)	n	(%)	X^2	p
Received instruction on infant feeding:					2.63	.105
Yes	50	(75.8)	27	(90.0)		
No	16	(24.2)	3	(10.0)		
Discussed infant feeding before infant's birth:					.013	.909
Yes	41	(62.1)	19	(63.3)		
No	25	(37.9)	11	(36.7)		
Discussed infant feeding with health care professional:						
Doctor:					.076	.783
Yes	18	(27.3)	9	(30.0)		
No	48	(72.7)	21	(70.0)		
Public health nurse:					2.64	.105
Yes	16	(24.2)	3	(10.0)		
No	50	(75.8)	27	(90.0)		
Prenatal instructor:					2.40	.122
Yes	21	(31.8)	5	(16.7)		
No	45	(8.2)	25	(83.3)		
Hospital nurse:					.947	.330
Yes	10	(15.2)	7	(23.3)		
No	56	(84.8)	23	(76.7)		

Table 19 (cont.): The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the intermediate or later postpartum period.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	5-16 weeks n = 66		17-24 weeks n = 30			
	n	(%)	n	(%)	X^2	p
Discussed infant feeding with family/ friends:						
Husband/ partner:					.092	.762
Yes	33	(50.0)	34	(53.3)		
No	33	(50.0)	14	(46.7)		
Mother:					.218	.640
Yes	21	(31.8)	11	(36.7)		
No	45	(68.2)	19	(63.3)		
Mother-in-law:					1.40	.237
Yes	9	(13.6)	7	(23.3)		
No	57	(86.4)	23	(76.7)		
Sister(s):					2.91	.088
Yes	17	(25.8)	12	(40.0)		
No	49	(74.2)	18	(60.0)		
Friends:					.279	.597
Yes	27	(40.9)	14	(46.7)		
No	39	(59.1)	16	(53.3)		

Table 20: Sociodemographic influences on whether mothers discontinued exclusive breastfeeding in the intermediate postpartum period, or continued beyond six months.

Sociodemographic Variable	Duration of Exclusive Breastfeeding					
	5-16 weeks n = 66		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Place of residence:					1.08	.781
St. John's	23	(34.8)	30	(41.1)		
Eastern	12	(18.2)	15	(20.5)		
Central	15	(22.7)	13	(17.8)		
Western	16	(24.2)	15	(20.5)		
Living status:					.242	.623
With partner	62	(93.9)	67	(91.8)		
Without partner	4	(6.1)	6	(8.2)		
Education:[1]					.230	.632
No post-secondary	16	(24.2)	15	(20.8)		
Post-secondary	50	(75.8)	57	(79.2)		
Maternal Age:					2.00	.573
< 20	0	(0.0)	0	(0.0)		
20-24	12	(18.5)	15	(20.5)		
25-29	33	(50.8)	32	(43.8)		
30-34	18	(27.7)	20	(27.4)		
> 34	2	(3.1)	6	(8.2)		
Monthly income:[2]					2.27	.132
≤ $2000	22	(41.5)	35	(55.6)		
> $2000	31	(58.5)	28	(44.4)		

[1] 1 missing
[2] 23 missing

duration. These results are included in Table 21.

Preparation for breastfeeding variables

There were no variables in this category which significantly distinguished between the intermediate cessation and longer duration groups (Table 22).

Later Cessation and Longer Duration Groups

Sociodemographic variables

No sociodemographic variables significantly distinguished the later cessation and longer duration groups (Table 23).

Maternal-infant variables

Two maternal-infant variables significantly distinguished these groups (Table 24). The first variable was infant birth weight. Mothers who delivered small full-term infants more frequently discontinued exclusive breastfeeding later in the postpartum period, whereas mothers who delivered average or large sized full-term infants were more likely to have continued exclusive breastfeeding beyond six months. The introduction of solid food to the infant by six months was the second distinguishing variable. Mothers who gave solids by this time were more likely to have continued exclusive breastfeeding for a longer duration.

Preparation for breastfeeding variables

The only variable in this category which significantly distinguished between the later cessation and longer duration groups was having had a prenatal discussion about methods of infant feeding with one's sister (Table 25). Mothers who did not have this

Table 21: The influence of maternal-infant variables on whether mothers discontinued exclusive breastfeeding in the intermediate postpartum period, or continued beyond six months.

Maternal-Infant Variable	Duration of Exclusive Breastfeeding					
	5-16 weeks n = 66		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Parity:					.097	.755
Primiparous	29	(43.9)	34	(46.6)		
Multiparous	37	(56.1)	39	(53.4)		
Gender of infant:					2.74	.098
Male	40	(60.6)	34	(46.6)		
Female	26	(39.4)	39	(53.4)		
Infant birth weight:					1.65	.439
≤10th percentile	1	(1.5)	0	(0.0)		
10th to 90th percentile	37	(56.1)	46	(63.0)		
≥90th percentile	28	(42.4)	27	(37.0)		
Prenatal class attendance:					.766	.381
Yes	32	(48.5)	30	(41.1)		
No	34	(51.5)	43	(58.9)		
Previous breastfeeding experience:					.013	.908
Yes	31	(47.0)	35	(47.9)		
No	35	(53.0)	38	(52.1)		
Introduction of solid food:						
Four months[1]					.789	.674
Yes	18	(27.3)	25	(34.2)		
No	46	(69.7)	46	(63.0)		
Six months[2]					54.61	.000
Yes	13	(19.7)	60	(82.2)		
No	51	(77.3)	13	(17.8)		

[1] 4 missing
[2] 2 missing

Table 22: The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the intermediate postpartum period, or continued beyond six months.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	5-16 weeks n = 66		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Received instruction on infant feeding:[1]					.084	.772
Yes	50	(75.8)	53	(73.6)		
No	16	(24.2)	19	(26.4)		
Discussed infant feeding before infant's birth:					.508	.476
Yes	41	(62.1)	41	(56.2)		
No	25	(37.9)	32	(43.8)		
Discussed infant feeding with health care professional:						
Doctor:					.124	.725
Yes	18	(27.3)	18	(24.7)		
No	48	(72.7)	55	(75.3)		
Public health nurse:					.525	.469
Yes	16	(24.2)	14	(19.2)		
No	50	(75.8)	59	(80.8)		
Prenatal instructor:					.046	.830
Yes	21	(31.8)	22	(30.1)		
No	45	(68.2)	51	(69.9)		
Hospital nurse:					.684	.408
Yes	10	(15.2)	15	(20.5)		
No	56	(84.8)	58	(79.5)		

Table 22 (cont.): The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the intermediate postpartum period, or continued beyond six months.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	5-16 weeks n = 66		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Discussed infant feeding with family/ friends						
Husband/ partner:					.163	.687
Yes	33	(50.0)	34	(46.6)		
No	33	(50.0)	39	(53.4)		
Mother:					.880	.348
Yes	21	(31.8)	18	(24.7)		
No	45	(68.2)	55	(75.3)		
Mother-in-law:					.452	.501
Yes	9	(13.6)	13	(17.8)		
No	57	(86.4)	60	(82.2)		
Sister(s):					1.29	.255
Yes	17	(25.8)	13	(17.8)		
No	49	(74.2)	60	(82.2)		
Friends:					.001	.982
Yes	27	(40.9)	30	(41.1)		
No	39	(59.1)	43	(58.9)		

[1] 1 missing

Table 23: Sociodemographic influences on whether mothers discontinued exclusive breastfeeding in the later postpartum period, or continued beyond six months.

Sociodemographic Variable	Duration of Exclusive Breastfeeding					
	17-24 weeks n = 30		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Place of residence:					1.18	.758
St. John's	11	(36.7)	30	(41.1)		
Eastern	9	(30.0)	15	(20.5)		
Central	4	(13.3)	13	(17.8)		
Western	6	(20.0)	15	(20.5)		
Living status:					.072	.789
With partner	28	(93.3)	67	(91.8)		
Without partner	2	(6.7)	6	(8.2)		
Education:[1]					.009	.924
No post-secondary	6	(20.0)	15	(20.8)		
Post-secondary	24	(80.0)	57	(79.2)		
Maternal Age:					5.19	.158
< 20	0	(0.0)	0	(0.0)		
20-24	3	(10.0)	15	(20.5)		
25-29	10	(33.3)	32	(43.8)		
30-34	15	(50.0)	20	(27.4)		
> 34	2	(6.7)	6	(8.2)		
Monthly income:[2]					.144	.704
≤ $2000	15	(60.0)	35	(55.6)		
> $2000	10	(40.0)	28	(44.4)		

[1] 1 missing
[1] 15 missing

Table 24: The influence of maternal-infant variables on whether mothers discontinued exclusive breastfeeding in the later postpartum period, or continued beyond six months.

Maternal-Infant Variable	Duration of Exclusive Breastfeeding					
	17-24 weeks n = 30		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Parity:					.372	.542
Primiparous	12	(40.0)	34	(46.6)		
Multiparous	18	(60.0)	39	(53.4)		
Gender of infant:					.091	.764
Male	13	(43.3)	34	(46.6)		
Female	17	(56.7)	39	(53.4)		
Infant birth weight:					7.63	.054
≤10th percentile	3	(3.1)	0	(0.0)		
10th to 90th percentile	71	(74.0)	46	(63.0)		
≥90th percentile	22	(22.9)	27	(37.0)		
Prenatal class attendance:					.174	.677
Yes	11	(36.7)	30	(41.1)		
No	19	(63.3)	43	(58.9)		
Previous breastfeeding experience:					.014	.906
Yes	14	(46.7)	35	(47.9)		
No	16	(53.3)	38	(52.1)		
Introduction of solid food:						
Four months[1]					2.22	.328
Yes	7	(23.3)	25	(34.2)		
No	23	(76.7)	46	(63.0)		
Six months					11.13	.001
Yes	15	(50.0)	60	(82.2)		
No	15	(50.0)	13	(17.8)		

[1] 2 missing

Table 25: The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the later postpartum period, or continued beyond six months.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	17-24 weeks n = 30		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Received instruction on infant feeding:[1]					3.36	.067
Yes	27	(90.0)	53	(73.6)		
No	3	(10.0)	19	(26.4)		
Discussed infant feeding before infant's birth:					.449	.503
Yes	19	(63.3)	41	(56.2)		
No	11	(36.7)	32	(43.8)		
Discussed infant feeding with health care professional:						
Doctor:					.314	.575
Yes	9	(30.0)	18	(24.7)		
No	21	(70.0)	55	(75.3)		
Public health nurse:					1.30	.254
Yes	3	(10.0)	14	(19.2)		
No	27	(90.0)	59	(80.8)		
Prenatal instructor:					.1.99	.158
Yes	5	(16.7)	22	(30.1)		
No	25	(83.3)	51	(69.9)		

Table 25 (cont.): The influence of maternal preparation for breastfeeding on whether mothers discontinued exclusive breastfeeding in the later postpartum period, or continued beyond six months.

Maternal Preparation	Duration of Exclusive Breastfeeding					
	17-24 weeks n = 30		>24 weeks n = 73			
	n	(%)	n	(%)	X^2	p
Hospital nurse:					.098	.754
Yes	7	(23.3)	15	(20.5)		
No	23	(76.7)	58	(79.5)		
Discussed infant feeding with family/ friends:						
Husband/ partner:					.389	.533
Yes	16	(53.3)	34	(46.6)		
No	14	(46.7)	39	(53.4)		
Mother:					1.52	.218
Yes	11	(36.7)	18	(24.7)		
No	19	(63.3)	55	(75.3)		
Mother-in-law:					.415	.520
Yes	7	(23.3)	13	(17.8)		
No	23	(76.7)	60	(82.2)		
Sister(s):					5.70	.017
Yes	12	(40.0)	13	(17.8)		
No	18	(60.0)	60	(82.2)		
Friends:					.270	.604
Yes	14	(46.7)	30	(41.1)		
No	16	(53.3)	43	(58.9)		

[1] 1 missing

discussion were more likely to have continued exclusive breastfeeding beyond six months. However, 32 of the 60 women who did not have this discussion actually responded "not applicable" to this question, implying that they did not have a sister. Consequently, interpretation of these results is difficult.

CHAPTER 5

Discussion

The purpose of this study was to examine exclusive breastfeeding, especially cessation, among a select group of Newfoundland mothers who initiated this method of feeding in the hospital. A secondary analysis of data from a primary infant feeding study was conducted to identify the duration of exclusive breastfeeding and the number of mothers who discontinued this method of feeding by one, four and six months, and mother's reasons for cessation of exclusive breastfeeding. An additional purpose was to determine whether certain sociodemographic, maternal-infant, and preparation for breastfeeding factors distinguished between mothers who discontinued exclusive breastfeeding in the early, intermediate, and later postpartum period, and long-term exclusive breastfeeders who continued this method of feeding beyond the recommended time of six months. The findings from this investigation will be discussed in relation to the study purposes identified above, and will be compared to results from previous breastfeeding research. In addition, possible explanations for the findings of the present study will be identified.

Duration of Exclusive Breastfeeding and Reasons for Cessation

At hospital discharge all mothers were exclusively breastfeeding their infants. However, at one month more than one-third of the mothers had changed to breastfeeding with formula supplementation or total formula feeding. Furthermore, the most common time reported for the cessation of exclusive breastfeeding was the first week postpartum.

By four months the proportion of mothers who were no longer exclusively breastfeeding continued to increase, and by six months less than one-third of the women were exclusively breastfeeding. The dramatic decline in the rate of exclusive breastfeeding showed that the majority of Newfoundland mothers were not following the infant feeding recommendation that the infant should receive no milk other than breastmilk for the first four to six months of life (American Academy of Pediatrics, Committee on Nutrition, 1978; Health & Welfare Canada & the Canadian Paediatric Society, 1986; Nutrition Committee, Canadian Paediatric Society, 1979). A rapid decline in the rate of exclusive breastfeeding has also been identified in other studies, with very few infants being exclusively breastfed after the first few months of life (Bailey et al., 1993; Banoub et al., 1985; Beaudry & Aucoin-Larade, 1989; Clark & Beal, 1982; Evans et al., 1986; Loughlin et al., 1985; Perez-Escamilla et al., 1993; Rousseau et al., 1982; Samuels et al., 1985; Sjölin et al., 1977; Snell et al., 1992; Starling et al., 1979; Wright & Walker, 1983; Yeung et al., 1981).

Findings from the present investigation suggest that the first month postpartum is a difficult time frame for breastfeeding mothers. In fact, the reason most frequently cited by mothers for discontinuing exclusive breastfeeding within the first month was that they found breastfeeding too hard. In keeping with this finding, a high proportion of mothers discontinued exclusive breastfeeding at one month to get a break, and to allow someone else to help. These results support previous research that many women discontinue breastfeeding because they find the process too difficult. Clark and Beal (1982) and

Yeung et al. (1981) proposed that similar findings in their studies suggested that mothers who discontinued for these reasons had not expected to feel tired, or they thought that breastfeeding was going to be easier than it actually was. These explanations also seem appropriate in light of the reasons identified above for why so many mothers in the present study ceased exclusive breastfeeding prematurely.

Another reason proposed by Clark and Beal (1982) and Matthews (1993) for premature cessation of breastfeeding was a lack of support for breastfeeding. Inadequate support for breastfeeding is also a probable explanation for why so many mothers in the present study ceased exclusive breastfeeding within the first month postpartum. This is supported by the finding that mothers who had a prenatal discussion about infant feeding with their mother were more likely to have discontinued exclusive breastfeeding by the end of the first month. Exclusive breastfeeding is demanding, yet mothers need to be encouraged to continue this method of feeding in order for the infant to achieve the full benefits of breastfeeding. Encouragement is especially important when a mother is experiencing problems, or feelings of fatigue and inadequacy. Without physical and psychological support for breastfeeding, some mothers may have become easily discouraged, and felt that discontinuation of exclusive breastfeeding was the only option.

Other explanations proposed by Clark and Beal (1982) and Matthews (1993) for premature cessation of breastfeeding included inadequate preparation for breastfeeding, and inappropriate expectations about breastfeeding. Given that the majority of mothers in the present study had not had a discussion about infant feeding methods with health care

professionals or their family and friends before their infant's birth, they may not have been prepared for the time-consuming nature of exclusive breastfeeding, or for problems with breastfeeding which many women experience. With unrealistic expectations of breastfeeding, and a lack of knowledge of breast care, some mothers may have become easily discouraged. Other mothers may not have been informed of the benefits of breastfeeding, and as such, may have had little motivation to continue breastfeeding.

Another possible explanation for why such a high proportion of mothers discontinued exclusive breastfeeding in the early postpartum period is that they may have initiated breastfeeding in the hospital because they felt that breastfeeding was the most socially acceptable method of infant feeding, yet they were uncomfortable with breastfeeding or embarrassed by it. Consequently, they may have discontinued exclusive breastfeeding, but noted a reason other than embarrassment for why they quit.

Previous studies have identified that many Newfoundland mothers still find breastfeeding embarrassing and distasteful (Banoub et al., 1985; Matthews et al., 1995). An aversion to breastfeeding was the main reason cited by mothers in the primary infant feeding study (Matthews et al.) for choosing not to breastfeed, and the second most common reason for not initiating breastfeeding in Banoub et al.'s study. In the present study some mothers who discontinued exclusive breastfeeding in the early postpartum period may have been more comfortable with bottle feeding in certain situations, especially when breastfeeding in public, or in front of individuals they knew were uncomfortable with breastfeeding. They may have also initiated formula feeding because

they had difficulty expressing breastmilk, or were uncomfortable with breastmilk expression.

The second most common reason for the discontinuation of exclusive breastfeeding at one month was the mother's perception that her milk supply was inadequate. Unfortunately, many mothers discontinued exclusive breastfeeding before lactation was likely to have been established. An inadequate milk supply has often been the most common reason reported in other breastfeeding studies for the discontinuation of breastfeeding, especially in the first few months postpartum. Previous researchers (Clark & Beal, 1982; Feinstein et al., 1986; Hill, 1991; Hill & Aldag, 1991) have identified possible explanations for why the perception of an inadequate supply of breastmilk results in premature cessation of breastfeeding. These researchers suggested that some mothers interpret normal infant behavior as infant hunger, or they do not understand the supply-and-demand mechanism of milk production. An inadequate milk supply is manifested by the mother's perception that the quantity or quality of her milk is unable to satisfy the infant and/ or is inadequate for weight gain (Hill & Aldag, 1991). Mothers who perceive that they are incapable of satisfying their infant with breastmilk alone, introduce breastmilk substitutes "and a cycle is begun: the use of substitute results in less demand for breastmilk; subsequently, breastmilk is diminished" (Hill, 1991, p. 313). This is unfortunate given that the majority of mothers are capable of achieving sufficient lactation with or without assistance (Hill, 1992). These explanations are equally plausible for why the perception of an inadequate supply of

breastfeeding resulted in premature cessation of exclusive breastfeeding in the present investigation.

Bentovim (1976) constructed a conceptual model to explain the sociocultural and psychological factors influencing breastfeeding initiation and continuation. He proposed that a woman's decision to discontinue breastfeeding and to select alternative feeding methods occurs because conditions and processes for reinforcing breastfeeding are not present. Bentovim identified several endogenous and exogenous conditions and processes which produced failure of breastfeeding reinforcement. Endogenous factors included shame and embarrassment when breastfeeding, physical difficulties with breastfeeding, such as sore or absessed breasts, and failure of the milk let-down response. By contrast, exogenous factors included a lack of professional or family support for breastfeeding, domestic pressures, frequent feeding, tiredness, poor infant suckling, and infant hunger. The conditions and processes proposed by Bentovim as influencing factors in the discontinuation of breastfeeding lend support to the afore mentioned explanations proposed for the premature discontinuation of exclusive breastfeeding in the present study.

At four and six months, the main reason why mothers discontinued exclusive breastfeeding was because they had to return to work, school, or university. Previous researchers have found that the need to return to work was the most common reason for discontinuing breastfeeding between three and six months postpartum (Bloom et al., 1982; Feinstein et al., 1986; Lynch et al., 1986; Tanaka et al., 1987; Yeung et al., 1981).

One possible explanation for why returning to work could have necessitated premature cessation of exclusive breastfeeding in the present study is that these mothers may have been returning to a place of employment that was not supportive of breastfeeding. For example, there may not have been a suitable place for mothers to express and store breastmilk, or their hours of work may not have been flexible enough to allow them the time to express their breasts. Other possible explanations are that these mothers may have intended to wean or to start weaning once they returned to work, or they did not desire to combine breastfeeding and employment. Gulick (1982) and Grossman, Fitzsimmons, Larsen-Alexander, Sachs, and Harter (1990) noted that while some reasons cited by mothers for discontinuing breastfeeding are difficult to modify, many mothers who quit breastfeeding prematurely experience difficulties with breastfeeding that are preventable, or could be managed by careful lactation teaching and management. Unfortunately, this was the case for many mothers who prematurely discontinued exclusive breastfeeding in the present study.

Factors Associated With the Duration of Exclusive Breastfeeding

Young mothers, with no post-secondary education, and living without a spouse or partner were particularly vulnerable to early cessation of exclusive breastfeeding. These findings support previous research which identified the same associations between maternal age, level of education, and living status and the duration of breastfeeding. Sjölin et al. (1977) proposed several explanations for similar associations in their study. They suggested that older, more mature and experienced mothers, who are also well

educated and live under stable conditions, may be better able to continue breastfeeding even when they experience difficulties. Sjölin et al. also suggested that mothers who are better educated may be more knowledgeable of where to obtain information and support for breastfeeding, and of how to use this information to prepare themselves for breastfeeding. They also proposed that these mothers are likely to become less confused by biased advice and contradictory information from health professionals, family members, friends, and the media. These proposed explanations are equally plausible explanations for why women in the present study who were older, better educated, and living with their partner were more likely to have continued exclusive breastfeeding beyond the first month postpartum.

There was also an association between another sociodemographic factor and the duration of exclusive breastfeeding. Mothers with a lower monthly household income more frequently discontinued exclusive breastfeeding in the early postpartum period. Previous research has also identified an association between income and the duration of breastfeeding. The typical association between low income and a lower duration of breastfeeding is unfortunate given that breastfeeding does not incur the same expenses associated with formula feeding. In fact, breastfeeding would actually be cost-effective for these mothers. However, financial stressors, coupled with the demands of breastfeeding, may have made it difficult for some mothers to continue exclusive breastfeeding. In addition, the belief that "only poor women breastfeed" still prevails in Newfoundland culture, especially in the outport communities. Consequently, some

women with lower household incomes may have discontinued breastfeeding because of the stigma they felt was attached to it.

With regard to maternal-infant factors, infant birth weight was significantly associated with the duration of exclusive breastfeeding. Despite the fact that all babies in the sample were healthy, full-term infants, smaller infants were more likely to have been exclusively breastfed for a shorter period of time than larger infants. Mothers with smaller babies may have been more concerned about the adequacy or quantity of their milk to satisfy their infant or to result in sufficient weight gain. Consequently, their anxiety may have influenced them to supplement breastfeeding or to change to formula feeding. Previous research has supported an association between smaller infant birth weight and a shorter duration of breastfeeding (Hawkins et al., 1987; Hill, 1991; Piper & Parks, 1996).

When the introduction of solid food was evaluated for a relationship with the duration of exclusive breastfeeding, results indicated that introducing the infant to solids at four and six months was associated with prolonged exclusive breastfeeding. This finding is contrary to previous research which linked the introduction of solid food to premature cessation of breastfeeding (Cole, 1977; Grossman, Harter, Sachs, & Kay, 1990; Hawkins et al., 1987; Hill, 1991; Peters & Worthington-Roberts, 1982). One possible explanation for the unexpected finding is that mothers who continued exclusive breastfeeders may have nonetheless been anxious about their milk supply. They may have been less concerned about the satiety of their infants when solids were introduced,

since the infant was no longer being fed by breastmilk alone. Another possible explanation is that these breastfeeding mothers were aware that solids could be introduced between four and six months and they introduced them at these times. An alternative explanation is that mothers were encouraged by family members, friends, or health professionals to introduce solid food.

In terms of maternal preparation for breastfeeding, mothers with no previous breastfeeding experience were more likely to have discontinued exclusive breastfeeding in the early postpartum period. Mothers with breastfeeding experience may have been more comfortable with breastfeeding and better able to rely on their experience to assist them when difficulties arose. In addition, even if mothers discontinued breastfeeding prematurely in the past, they may have wanted to prolong the duration of breastfeeding in this instance. As well, previous success with breastfeeding may have motivated some mothers to become long-term exclusive breastfeeders. Other research has supported an association between previous experience or success with breastfeeding and a prolonged duration of breastfeeding (Feinstein et al., 1986; Sjölin et al., 1977; West, 1980).

Having had a prenatal discussion about infant feeding methods with one's mother was another factor that influenced the duration of exclusive breastfeeding. Women who had this discussion were more likely to have discontinued exclusive breastfeeding early. It is likely that the mothers of these women were unsupportive of breastfeeding, and that they were from a generation of non-breastfeeders. They may have encouraged their daughters to discontinue breastfeeding for formula feeding, a more "socially acceptable"

method of infant feeding. Negative attitudes toward breastfeeding are still prevalent in our society despite continued education and the promotion of breastfeeding, and attest to the strong influence of culture on breastfeeding practices.

Likewise, women who discussed methods of infant feeding with the public health nurse prior to the infant's birth more frequently discontinued exclusive breastfeeding early in the postpartum period rather than later. However, the quality of these discussions could not be ascertained from the survey data, therefore, the discussion may not have been pro-breastfeeding or even supportive of breastfeeding. In addition, some women may have forgotten beneficial information they may have been given which could have prepared them physically and psychologically for breastfeeding. This is especially true if there was a long interim between the time of the discussion and the point when breastfeeding difficulties arose. Nonetheless, previous researchers have suggested that health professionals have not adequately promoted breastfeeding (Rousseau et al., 1982; Winikoff, Laukaran, Myers, & Stone, 1986).

Similar discussions with other health professionals were not significantly associated with the duration of exclusive breastfeeding. One possible explanation for this finding is that many mothers had not discussed methods of infant feeding with a health professional prenatally. In the present study it is unfortunate that many physicians, health professionals with whom women would likely have had the most contact, did not take advantage of the excellent opportunity they had during antenatal and postnatal visits to offer assistance and support for breastfeeding. Physicians can also refer women to other

health professionals, such as lactation consultants, who could give them additional breastfeeding information and support.

In addition, Matthews et al. (1994) identified that merely having discussed infant feeding methods prior to the baby's birth does not necessarily mean that the discussion would have influenced mother's infant feeding practices. This is another possible explanation for why prenatal discussions about infant feeding did not prolong the duration of exclusive breastfeeding in this study. In fact, the majority of mothers reported that they themselves exerted more influence on their decision to breastfeed than health professionals, family members, or friends. This finding is consistent with previous research (Cox & Turnball, 1994; Fetherston, 1996; Yeung et al., 1981).

Attendance at prenatal classes was also not associated with the duration of exclusive breastfeeding in the present study. One possible explanation for this finding is that the content and timing of the classes may have been inadequate and inappropriate (Olsson, 1988). Olsson suggested that prenatal instructors often focus on the physical aspects of breastfeeding, and fail to explore the psychosocial influences on the decision to initiate and continue breastfeeding. She added that "most women decide very early in pregnancy, if not prior to pregnancy, how they will feed their infant" (p. 32). Since the majority of mothers attend prenatal classes in their third trimester of pregnancy, they may have made their decisions about infant feeding prior to attending these classes.

Similarly, having received infant feeding instruction did not influence the duration of exclusive breastfeeding. This brings into question the quality of the instruction given

to mothers. Tanaka, Yeung, and Anderson (1989) suggested that instruction required and desired is not necessarily provided, and that instruction and information given to mothers is not always given in a comprehensive or appropriate manner. In addition, the authors proposed that the timing of the instruction is not always appropriate. These inadequacies are also possible explanations for the lack of association between infant feeding instruction and the duration of exclusive breastfeeding in the present study.

Conceptual Model

The conceptual model formulated for this study proposed that certain demographic, prenatal and postnatal factors, as well as infant characteristics would be associated with the cessation of exclusive breastfeeding. Maternal age, level of education, income, and living status were the four demographic variables associated with early cessation of breastfeeding in the present study. Young mothers, with no post-secondary education, whose monthly household income was $2000 or less, and who lived without a husband or partner were significantly more likely to have discontinued exclusive breastfeeding in the first month postpartum rather than discontinued in the intermediate or later postpartum period, or to have prolonged the duration of breastfeeding beyond six months. Parity of the mother was not significantly related to the duration of exclusive breastfeeding.

With regard to infant characteristics, gender was not significantly associated with the duration of exclusive breastfeeding. However, mothers who delivered a small full-term infant were more likely to have discontinued exclusive breastfeeding in the early

postpartum period, as opposed to intermediate period, and to have discontinued exclusive breastfeeding in the later postpartum period, rather than continued exclusive breastfeeding beyond six months.

In terms of prenatal factors, the only factors that influenced the duration of exclusive breastfeeding was having had a prenatal discussion about methods of infant feeding with one's mother, sister, or the public health nurse. Women who had this discussion with their mother or the public health nurse were more likely to have discontinued exclusive breastfeeding early in the postpartum period. Likewise, women who had not discussed methods of infant with their sister prenatally were more likely to have continued exclusive breastfeeding beyond six months, rather than discontinued between 17 and 24 weeks postpartum. Similar prenatal discussions with other family members, friends, or health professionals were not associated with the duration of exclusive breastfeeding, and neither was attendance at prenatal classes, or infant feeding instruction received. However, previous experience with breastfeeding was significantly associated with continued exclusive breastfeeding; mothers continued exclusive breastfeeding to the intermediate postpartum period or prolonged exclusive breastfeeding beyond six months.

In terms of the postnatal factors examined for a relationship with the discontinuation of exclusive breastfeeding, problems with breastfeeding, both psychological and physical, the perception of an inadequate milk supply, and the need to return to work were the most common reasons reported by mothers in this study for the

cessation of exclusive breastfeeding within the first six months postpartum. Difficulties with breastfeeding was cited as the main reason for cessation of exclusive breastfeeding within the first four weeks after delivery. The perception of an inadequate milk supply was the second most frequently cited reason for discontinuing exclusive breastfeeding within the first month postpartum and by four months, and the main reason reported by mothers for ceasing exclusive breastfeeding at four months and six months was the need to return to work, school, or university. The introduction of solid food to the infant by four and six months, a factor found in other studies to correlate with early cessation of breastfeeding, was not found to have this influence in the present study. In fact, this factor was significantly associated with prolonged exclusive breastfeeding.

It may be that the important factors associated with early, intermediate, and later cessation of exclusive breastfeeding were contained in the conceptual model. However, further testing of an expanded model will be necessary to determine if additional factors are related to the discontinuation of exclusive breastfeeding, including the other factors hypothesized to be related to this variable in the literature, such as, perinatal factors, which were not addressed in the primary infant feeding study. With further evaluation, it will be possible to determine if the model truly conceptualizes the relationship between various factors and the cessation of exclusive breastfeeding.

CHAPTER 6

Limitations, Conclusion and Implications

The final chapter contains the limitations of the study, the conclusions from the research, and the implications for nursing practice, education and research which emerge from the results.

Limitations

Doing a secondary analysis allows the researcher to avoid costly and time-consuming steps in the research process (Polit & Hungler, 1987), and in this case, the existence of a large data base, relevant to the researcher's area of interest, and obtained from a randomly selected sample was invaluable. Nonetheless, when doing this type of analysis the researcher is limited to the existing data. In this case the secondary data did not contain all of the variables the researcher would have liked to have examined since the original study had a larger focus, and did not deal exclusively with cessation of breastfeeding and what influenced this decision. Consideration should, therefore, be given to the following limitations when examining the study results:

1) A number of problem areas were highlighted with the survey questions designed for the primary infant feeding study:

a) Results sets were not always mutually exclusive. For example, women could respond yes, no, or not applicable to discussion of infant feeding with different people;

b) employment status and occupation were confused; and (c) some questions were meant for multiparous women only but were asked of and answered by primiparous women, i.e.,

having received infant feeding instruction.

2) The questionnaires, while pretested, did not have established validity other than face and content validity. No measures of reliability were made.

3) The survey included questions on whether or not preparation for infant feeding occurred, but did not address specific preparation for breastfeeding, nor the quality of information received.

Conclusion

A high number of Newfoundland mothers discontinued exclusive breastfeeding long before the recommended time for doing so. Almost two-fifths of the mothers had stopped by one month. A number of the reasons mothers gave for the cessation of exclusive breastfeeding are ones that may have been identified and corrected or managed, while others may be more complex. These complexities stem from some of the factors that were associated with cessation of exclusive breastfeeding at the different time periods studied. For example, younger women were overrepresented among those who discontinued exclusive breastfeeding within the first month. Age can be a proxy for a number of factors, such as cohort effect, life experience and other factors which need more careful study. Likewise, living status, or being without a partner, was a significant variable and this may indicate a lack of support that comes from not having a partner to help with continuation of breastfeeding.

Maternal-infant characteristics also were related to early cessation in that women with larger infants tended to exclusively breastfeed longer suggesting they may have been

more satisfied with the knowledge that they did not have to be as concerned with whether their infants were receiving sufficient food. In a society where we sometimes like to quantify amount over quality of nutrition, infant weight could be important.

The findings are strongly suggestive of the early period when breastfeeding is being established as an important period. In this early period there are some high risk groups who may be particularly vulnerable to premature cessation of exclusive breastfeeding. The following section contains a number of implications for nursing with an emphasis on education, practice, and research which may help these vulnerable groups.

Implications

This study has implications for nursing education, practice and future research.

Nursing Education

Regardless of whether nurses work on maternity units or in the community setting, they need to be knowledgeable about breastfeeding and of the many factors which lead to its cessation. This knowledge is necessary if nurses working with breastfeeding mothers or future mothers are to provide information that is current and relevant, and if nursing interventions are to encourage exclusive breastfeeding beyond the early postpartum period. Continuing education and inservice programs are a means of presenting breastfeeding information to nurses already in practice and of disseminating the latest results from breastfeeding research. Through these programs nurses could discuss the results of this study in relation to current nursing practice. They could acknowledge educational and supportive nursing interventions already used in practice

which promote the continuation of breastfeeding, as well as identify those requiring modification. Nurses could discuss and identify ways to assist breastfeeding mothers in the first month postpartum to better deal with the physical and psychological difficulties so often faced by breastfeeding mothers. This would be especially important when working with young mothers, with no post-secondary education and living without a spouse or partner, characteristics which in this investigation were found to be associated with cessation of exclusive breastfeeding within the first month postpartum. In addition, continuing education and inservice programs could be a means of identifying new nursing interventions to assist the breastfeeding mother to continue exclusive breastfeeding beyond the first month, and especially the first week of the infant's life. This would ensure that optimal physical and emotional support is offered to breastfeeding mothers for the continuation of exclusive breastfeeding.

However, a sound knowledge of the many factors associated with the duration and cessation of breastfeeding should also come from nursing education programs. Results of the latest breastfeeding research should be included in basic nursing education programs so that in addition to acquiring general knowledge about breastfeeding, nursing students would be aware of the difficulties breastfeeding poses for many new mothers, especially in the early postpartum period. The importance of implementing nursing interventions which promote the continuation of exclusive breastfeeding during this difficult time frame would need to be emphasized. Nursing students could be encouraged to identify both educational and supportive strategies that they could implement while working with

breastfeeding mothers and their families in the community or hospital setting which might enable mothers to exclusively breastfeed for the recommended time.

Graduate nursing students could also be encouraged to develop a program to promote the continuation of exclusive breastfeeding as a special project for program development. The program could be targeted to the sub-group of women identified previously as being particularly vulnerable to early discontinuation of exclusive breastfeeding. This program could then be used by nurses working in practice settings.

Nursing Practice

Based on the results of this study, nurses working in postpartum hospital units and the community setting can do more to promote the continuation of exclusive breastfeeding. Nursing care should be planned and provided "on the basis of the needs of each woman, rather than as directed by routines and protocol" (Ellis & Hewat, 1984a, p. 46). Nonetheless, emphasis needs to be placed on intervening more aggressively with breastfeeding mothers in the first month postpartum. This is especially important when caring for young, less educated, and single mothers.

Nurses in hospitals working on postpartum units should provide "hands on" teaching of latching techniques. They should also supervise initial breastfeeding attempts and frequently assess mother's experiences with breastfeeding so that problems can be solved or prevented and support can be given. In so doing, problems could be identified and dealt with before they become the reason for cessation. Nurses could inform breastfeeding mothers of how to manage problems such as nipple soreness and

engorgement, especially when they are caring for new mothers who are being discharged from the hospital before their milk has come in.

It is imperative that nurses also encourage mothers to express their feelings and concerns about breastfeeding. Nurses should inform breastfeeding mothers that feelings of fatigue and inadequacy are common in the first few weeks after delivery. This information may help mothers to recognize that if they are finding exclusive breastfeeding to be a challenge and are worried about their milk supply, they are not alone. In light of this, nurses should offer practical advice and information to breastfeeding mothers, such as how to promote an adequate milk supply. This advice could include drinking extra fluids throughout the day, especially during feeding times, to ensure an adequate fluid intake, eating a nutritious diet as opposed to dieting, capitalizing on opportunities for rest by sleeping when the baby sleeps, or asking friends or family to occasionally care for the baby or other children, and breastfeeding "on demand", as opposed to scheduled feeding.

Nurses should also offer breastfeeding mothers additional concrete information about breastfeeding such as how they can evaluate the adequacy of their milk supply. Mothers need to know that they can feel confident that their baby is getting sufficient milk when the baby has six or eight wet diapers a day and is gaining weight, regardless of the amount per week. Nurses also need to highlight common infant behaviors, such as restlessness, sleeplessness, crying and irritability which are frequently interpreted as evidence of infant hunger and an inadequate supply of breastmilk. This is especially

important when the mother has no previous experience with breastfeeding.

In addition to offering anticipatory guidance and education, nurses working in hospitals should inform breastfeeding mothers of existing support services in the community such as breastfeeding support groups, and of community resource personnel, including lactation consultants and midwives, who can offer advice and support.

Nurses working in the community setting can also foster a mother's confidence in her ability to breastfeed. Postpartum home visits, which usually begin within the first week of hospital discharge, provide an excellent opportunity to offer information about the practical aspects and physiology of breastfeeding, can allow for the early identification of problems, provide an opportunity to offer encouragement and reinforcement to the mother, and to assess her support system for breastfeeding (Ellis, 1981). This is especially important if the woman is part of the particularly vulnerable sub-group previously identified.

However, one home visit in the first week postpartum is unlikely to be enough for all breastfeeding mothers. Community health nurses with knowledge of the factors associated with the cessation of exclusive breastfeeding, and an awareness of the individual mother's breastfeeding situation, will need to determine if additional home-visits are necessary. Keeping in mind that more than one-third of the mothers in this investigation discontinued exclusive breastfeeding by the end of the first month, this time frame would be appropriate for extra home visits. In addition to home visits, telephone calls from the community health nurse could help to rectify problems at their onset, and

would be a means of providing additional encouragement to breastfeeding mothers.

An additional postpartum visit, ideally timed, could also provide an opportunity for the community health nurse to offer practical advice and education to the breastfeeding mother. For example, given the fact that the third most commonly cited reason by mothers for discontinuing breastfeeding in the first month postpartum was to supplement and get a break, mothers might benefit from a discussion on breastmilk expression. By expressing milk, mothers could get a break from breastfeeding and another person, such as the partner or family member, could participate in the baby's feeding. Mothers could be taught various ways to express milk (hand-expression versus pumping), be supervised during an expression, and educated about how to store the milk and prepare it for feeding. In addition, if a mother was able to see milk being expressed from her breasts, it might relieve some of her anxiety about having a sufficient milk supply.

This teaching session could also have long-term benefits for breastfeeding mothers who are planning to return to work, school, or university. This was the most common reason cited by mothers in this study for discontinuing exclusive breastfeeding at four and six months. If mothers are taught how to properly express breastmilk, and are given the opportunity to ask questions and discuss their concerns long before they return to work, they might be encouraged to continue exclusive breastfeeding for a longer period of time. Mothers could then offer breastmilk in a bottle, rather than supplement their infants with formula prematurely.

Nurses working in the community can also offer support to breastfeeding mothers during well baby clinics. Ellis (1981) proposes that "mothers of infants and young children can learn from each other as they come together and discuss their activities and concerns at the health centre" (p. 72). She suggests that actual breastfeeding during these clinics can encourage and reinforce breastfeeding among other mothers, and foster the "socialization of young children into this aspect of mothering" (p.73).

Given that many women who discussed infant feeding with the public health nurse prior to their infant's birth discontinued exclusive breastfeeding early in the postpartum period, community nurses should also ensure that they encourage the continuation of exclusive breastfeeding prenatally. Prenatal instructors, who are usually nurses, need to inform breastfeeding mothers and their support person(s) of why exclusive breastfeeding until the infant is four to six months old is so important. Nurses working in this setting must offer current and consistent information on the benefits of breastfeeding and breastfeeding techniques. In addition, given that the majority of mothers received instruction on infant feeding through personal teaching, prenatal instructors could recommend breastfeeding literature which addresses breastfeeding techniques and allows for a review of topics covered in prenatal classes.

However, perhaps more importantly, prenatal instructors should also address typical breastfeeding problems, as well as common feelings and concerns of breastfeeding mothers, especially exclusive breastfeeders. Mothers who planned to breastfeed would be prepared for the possibility of problems before the initiation of breastfeeding, and would

be aware of the fact that many women find exclusive breastfeeding psychologically challenging. In this way, prenatal instructors would be offering more than practical breastfeeding information; they would be addressing the psychological aspects of breastfeeding. Women's beliefs and attitudes toward breastfeeding should also be assessed so that concerns, questions and misconceptions could be dealt with before breastfeeding is initiated. Of particular importance here, given that many women who discontinued exclusive breastfeeding in the early postpartum period talked with their mothers about infant feeding, would be to identify and discuss any negative attitudes women received from this, or any other source.

Realistic expectations about others' behaviour toward breastfeeding also need to be addressed. Equally important is to discuss realistic expectations and behaviour of breastfed infants relating to growth and development, growth spurts, and satiety. This information may help to alleviate the concerns of some mothers of the adequacy of their milk to nourish their infant.

Prenatal classes are also an ideal time to impress upon partners and coaches the importance of supporting the mother as she breastfeeds. For example, partners could be encouraged to praise and encourage the breastfeeding mother, and to relieve her of infant responsibilities when she is frustrated and tired (Hewat & Ellis, 1986). In addition, partners should be given the opportunity to raise any questions or concerns they might have about breastfeeding.

Educational programs, separate from traditional prenatal classes, could also be

offered by community nurses early in the pregnancy and targeted to women at risk of premature cessation of exclusive breastfeeding. A local example of a prenatal program which provides education and support to socially disadvantaged women separate from traditional prenatal classes is the *Daybreak Healthy Baby Club Program*. This program was established in 1990 by the Daybreak Parent Child Centre in St. John's, Newfoundland and was designed for the purpose of improving prenatal care among low-income mothers whose children attend programs at the centre (McKim & Rabinowitz, 1996). Mothers receive individualized education and counselling, social support, food supplements, and general assistance throughout their pregnancy and after delivery. Breastfeeding is encouraged, and incentives such as food and monetary supplements of $25 a month are offered for the continuation of breastfeeding. If Healthy Baby Clubs which promote breastfeeding were also established outside of the St. John's region, they could be a means of increasing the duration of exclusive breastfeeding in the province.

Individuals from the women's immediate support network, especially mothers, could also be encouraged to attend special educational programs for high risk mothers (Matthews et al., 1995). Another possibility is to offer special breastfeeding educational programs for a family member, such as the "grandmother-to-be". However, while information on the benefits and physical aspects of breastfeeding would have to be addressed in these programs, nurses working in this capacity would need to identify and discuss family member's attitudes toward breastfeeding. They would also need to emphasize the psychological aspects of breastfeeding, and the importance of supporting

the breastfeeding mother.

Given that young mothers with no post-secondary education are also particularly vulnerable to premature cessation of exclusive breastfeeding, community health nurses could also encourage the continuation of exclusive breastfeeding by introducing breastfeeding education and promotion programs in the school curriculum as early as possible, and directing them to both male and female students. This was another recommendation proposed by Matthews et al. (1995) in the primary infant feeding study, and is equally relevant for this investigation. Ellis (1981) suggests that if public health professionals are to foster more positive attitudes toward breastfeeding, they must begin with young children. She proposes that children may begin to view breastmilk as the norm for infant nutrition if breastfeeding mothers are encouraged to assist community health nurses with nutrition teaching sessions. In addition, Ellis supports the involvement of community health nurses in the teaching of breastfeeding content in health, nutrition, home economics, and/ or family life courses in high school. Gulick (1982) and Rousseau et al. (1982) also support this recommendation that breastfeeding information should be an integral component in health and/ or science programs in the school.

Nursing Research

An additional recommendation from the primary infant feeding investigation was that their study of infant feeding practices be replicated every ten years in order to assess the effectiveness of provincial infant feeding programs. For the same reason, secondary analyses which focus on the exclusive breastfeeding sub-group from these replicated

studies should be repeated. However, if the questionnaires designed for the primary infant feeding study are to be used for follow-up studies, certain modifications will be necessary. With these modifications, the potential for confusion would be lessened. In addition, it would be possible to utilize more advanced statistical procedures to determine if certain factors alone, or in combination, are predictive of infant feeding practices among Newfoundland mothers, including exclusive breastfeeders. The recommended changes include:

1) Changing the response options for the questions pertaining to mother's discussions about infant feeding with members of the health care team, and with family and friends, to "yes" or "no", as opposed to "yes", "no" and "not applicable".

2) Assessing maternal education as the number of years of schooling completed instead of the highest level of education completed. This will change the variable from its categorized form to a continuous form.

3) Assessing maternal employment status as working in paid employment or not working in paid employment, rather than maternal occupation.

4) Clarifying to mothers what is intended by "bottle feeding" so that women who give their infants expressed breastmilk in a bottle on occasion will not be inadvertantly excluded as exclusive breastfeeders.

5) Making questions about infant feeding instruction applicable to all women so that primiparous and multiparous women would be asked these questions. In addition, specific questions which address both the quality of instruction and breastfeeding content

covered in infant feeding classes should be added to the questionnaires.

Additional recommendations for future research are made based on findings from the present study:

1) Given that young mothers, with no post-secondary education, and living without a spouse or partner are particularly vulnerable to cessation of exclusive breastfeeding in the early postpartum period, an intervention study could be aimed at increasing the duration of exclusive breastfeeding among these women. A specially trained nurse could offer extensive pre- and postnatal education, counselling and support to a group of mothers from these target groups who planned to exclusively breastfeed their infant. The effectiveness of this intervention could be evaluated by comparing the intervention group to breastfeeding mothers from these same subgroups who received routine education from nurses working in the community and hospital setting.

2) The main reason mothers cited for discontinuing exclusive breastfeeding at four and six months postpartum was to return to work. Even though we know that the need to return to work was the most frequently cited reason for cessation at these times, we do not know how maternal employment influences the duration of exclusive breastfeeding among Newfoundland mothers. Auerbach and Guss (1984) highlighted the fact that maternal employment outside the home is becoming increasingly common and that in reality, "women who have entered professions requiring major educational commitments, as well as women whose paychecks are necessary for family survival, are unlikely to terminate employment following the birth of a child" (p. 958). Through the process of

program development, a nurse could target several large employers of women, such as hospitals, or government offices and with their cooperation, identify and implement changes to make these workplaces more "breastfeeding-friendly". These strategies could include those identified in a study by Katcher and Lanese (1985) such as more flexible hours of employment to allow for breastmilk expression, access to a breast pump and a comfortable place for the expression of breastmilk, availability of a place to store expressed breastmilk, breastfeeding advice, and access to information and support from a lactation consultant who either worked at the at the place of employment, or with whom breastfeeding mothers had contact. The duration of breastfeeding, and in particular exclusive breastfeeding, could be compared for mothers who returned to their place of employment before and after a support program for breastfeeding was implemented. This was the type of study conducted by Katcher and Lanese. By conducting this intervention study, it may be possible to prolong the duration of exclusive breastfeeding among Newfoundland mothers who return to work after the birth of a baby.

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Appendix A
Questionnaire ONE

Subject ID #
Interviewer ID #
Date of Interview YYMMDD
Date of baby's birth
Interview #

Get information for 1 thru 3 from the baby's chart:

1. Baby's gender
   1. Male
   2. Female

2. Baby's weight (in grams)

3. Baby's height (in centimeters)

Get information for Question 3-8 from the mother's chart.
If this information is not available, ask the mother.

4. Mother's age

5 Ethnic origin
   1. Micmac
   2. Inuit
   3. Innu
   4. Caucasian
   5. Asian
   6. Other. Specify _____

6. Present living status
   1. Living alone
   2. Living with husband/partner
   3. Living with family/relatives
   4. Living with friends

7. What is the highest level of education you have **completed**?
   1. Grade 9
   2. High School (Grade 11 or 12)
   3. Vocational training
   4. Some University education
   5. University degree(s)

8. Maternal occupation _____

9. Paternal occupation _____

---

10. Number of children, including your present baby, is.....
If the answer is 01, go to #12. All others proceed to #11.

11. Did you attend pre-natal classes during a previous pregnancy?
   1. No classes
   2. Some classes
   3. All classes

12. Did you attend pre-natal classes during this pregnancy?
   1. No classes
   2. Some classes
   3. All classes

13. How are you presently feeding your baby?
   1. Breastfeeding
   2. Bottle feeding
   3. Both

14. Did anyone discuss infant feeding with you **before** you had your baby?
   1. Yes, go to question #15
   2. No, go to question #18

15. Did you discuss methods of infant feeding with any of the following members of the health care team:
   1. Doctor?
   2. Public Health Nurse?
   3. Prenatal Instructor?
   4. Midwife?
   5. Hospital Nurse?
   6. La Leche League?
   7. Other? Specify _____

16. Did you discuss methods of infant feeding with any of the following family members:
    8. Husband/partner?
    9. Mother?
    10. Mother-in-law?
    11. Sister(s)?
    12. Friends?
    13. Other? Specify _____

17. Of the people who discussed infant feeding with you, who influenced you the **most**? Respondent makes only **ONE** selection from the list of 1-13 from the two questions above (#15 and #16).

18. If breastfeeding, is the baby being given anything else?
    1. Nothing else
    2. Glucose water
    3. Sterile water
    4. Formula
    5. Other. Specify _____

If the mother has had other children, ask....

19. Did you breastfeed any of your previous babies?

20. Did you receive any instruction on infant feeding?
    1. Yes, go to question #21
    2. No, go to question #22

21. How did you receive this instruction?
    1. Breastfeeding class
    2. Formula class
    3. Breastfeeding & formula class
    4. Personal instruction
    5. NA

22. If you are bottlefeeding, can you tell us why you decided not to breastfeed? **(Record exactly what the mother says)**

Appendix B

Questionnaire TWO

Previous Method of Feeding

At Hospital _____
Interview 2 _____
Interview 3 _____
Interview 4 _____

Subject ID #
Interviewer ID #
Date of Interview YYMMDD
Interview #

At each interview note: Baby's age **(In weeks)**
Baby's weight **(In kilograms)**
Baby's height **(In centimeters)**

Questions 1-5 to be answered by all mothers.

PROMPT:
Check the method of feeding at the last interview, and then ask the mother:

The last time we spoke to you, you were_____

1. What are you feeding your baby now?
   1. Breastmilk
   2. Breastmilk with formula
   3. Formula or other milks

2. **So, has this method or type of formula changed since your last interview?**
   1. Yes, Go to question #3
   2. No. If breastfeeding, go to #8.
      If bottlefeeding, go to #24.

3. How many <u>weeks</u> old was the baby when you changed?

4. Why you decided to change? **(Record exactly what the mother tells you)**

5. Did you discuss this change with anyone before you changed?
   If YES, proceed with #6. All others continue with either the section for <u>Breastfeeding</u> (#8 - #23) or <u>Bottlefeeding</u> (#24 - #40) mothers.

6. Before you changed, did you discuss this change with any of the following members of the health care team:
   1. Doctor?
   2. Public Health Nurse?
   3. Prenatal Instructor?
   4. Midwife?
   5. Hospital Nurse?
   6. La Leche League?
   7. Other? Specify _____

7. Before you changed, did you discuss this change with any of the following family members:
   8. Husband/partner?
   9. Mother?
   10. Mother-in-law?
   11. Sister(s)?
   12. Friends?
   13. Other? Specify _____

Those who are BOTTLEFEEDING, proceed to question #24.
Those who are BREASTFEEDING, or BREAST- and BOTTLEFEEDING proceed to question #8

This section is for BREASTFEEDING mothers only.

8. Are you breastfeeding with supplement or food of any kind?

   If YES, go to question #9. If NO, go to question #19.

9. What liquids are you giving your baby?
   1. Plain boiled water
   2. Boiled water with sugar added
   3. Commercial infant formula with iron
   4. Commercial infant formula without iron
   5. Regular evaporated milk formula
   6. Two percent evaporated milk formula
   7. Whole cow's milk
   8. One percent cow's milk
   9. Two percent cow's milk
   10. Skimmed milk
   11. Goat's milk
   12. Soymilk (Isomil, Prosobee, Progestimil)
   13. Other (Specify)_____

10. Why have you chosen to give the baby these other liquids?
(Record exactly what the mother says)

11. How often do you give some liquid other than breastmilk?
    1. After every feed
    2. At least once a day
    3. Less than once a day

12. Are you giving the baby any solid foods?
If YES, go to question #13. If NO, go to question #19.

13. What types of food are you feeding the baby?
    1. Cereal
    2. Fruit
    3. Vegetables
    4. Meat
    5. Other (Specify) _____

14. At what age did you start your baby on solid food? **(Number of weeks)**

15. Why did you start your baby on solid food?
(Record exactly what the mother tells you)

16. Before you started your baby on solid food, did you discuss this with anyone?
If YES, go to question #17. If NO, go to question #19.

17. Before you started your baby on solid food, did you discuss this with any of the following members of the health care team:
    1. Doctor?
    2. Public Health Nurse?
    3. Prenatal Instructor?
    4. Midwife?
    5. Hospital Nurse?
    6. La Leche League?
    7. Other? Specify_____

18. Before you started your baby on solid food, did you discuss this with any of the following family members:
    8. Husband/partner?
    9. Mother?
    10. Mother-in-law?
    11. Sister(s)?
    12. Friends?

13. Other? Specify _____

19. Are you giving your baby any vitamins?
If YES, go to question #20. If NO, go to question #21.

20. Which vitamins are you giving the baby?
1. Vitamin A & D
2. Vitamin C
3. Vitamin A, C, & D

21. Are you giving your baby any fluoride?

22. Are you giving your baby any iron? **If YES, go to question #23.**

23. How are you giving the baby iron?
1. Iron in drops
2. Iron in formula

End of interview if breastfeeding only.

ASK:
Do you expect to be at this telephone number when I call you for the next interview?
If not, is there another number that I can contact you at?

At the **final interview** please complete question #41.

This section is for BOTTLEFEEDING mothers only.

24. What milk do you usually feed your baby?
1. Commercial infant formula with iron
2. Commercial infant formula without iron
3. Regular evaporated milk formula
4. Two percent evaporated milk formula
5. Whole cow's milk
6. One percent cow's milk
7. Two percent cow's milk
8. Skimmed milk
9. Goat's milk
10. Soymilk (Isomil, Prosobee, Progestimil)
11. Other (Specify) _____

25. If you are feeding your baby evaporated milk (carnation), do you add anything to the milk? **If YES, go to question #26. If NO, go to question #28.**

26. What do you add to the evaporated milk?

1 Sugar
2. Honey
3. Corn syrup
4. Molasses
5. Water
6. Other (Specify) _____

27. How do you mix your baby's formula?
(Have the mother describe the proportions in the mother's own words.)

28. Do you give your baby any liquids other than milk?
If YES, go to question #29. If NO, go to question #30.

29. What other liquids are you giving your baby?

1. Boiled water
2. Sweetened water
3. Fruit juice
4. Other (Specify) _____

30. Have you started to give your baby any solid food?
If YES, go to question #31. If NO, go to question #36.

31. What food are you giving to the baby?

1. Cereal
2. Fruit
3. Vegetables
4. Meat
5. Other (specify) _____

32. At what age, **in weeks**, did you start to give your baby solid food?

33. Before you started your baby on solid food did you discuss this with anyone?
If YES, go to question #34. If NO, go to question #36.

34. Before you started your baby on solid food, did you discuss this with any of the following members of the health care team: 1. Doctor?
2. Public Health Nurse
3. Prenatal Instructor?
4. Midwife?
5. Hospital Nurse?
6. La Leche League?
7. Other? Specify_____

35. Before you started your baby on solid food, did you discuss this with any of the following family members:
8. Husband/partner?
9. Mother?
10. Mother-in-law?
11. Sister(s)?
12. Friends?
13. Other? Specify _____

36. Are you giving your baby any vitamins?
If YES, go to question #37. If NO, go to question #38.

37. Which vitamins are you giving the baby?
1. Vitamin A & D
2. Vitamin C
3. Vitamin A, C. & D

38. Are you giving your baby any fluoride?

39. Are you giving your baby any iron? **If YES, go to question # 40.**

40. How are you giving the baby iron?
1. Iron in drops
2. Iron in formula

End of section for BOTTLEFEEDING mothers.

ASK: Do you expect to be at this telephone number when I call you for the next interview?If not, is there another number that I can contact you at? _____

ASK THE FOLLOWING QUESTION AT THE FINAL INTERVIEW ONLY !!!

I am now going to ask you about your monthly, household income. Although it would assist us in our project, you are not obligated to answer this question.

Within what range does your monthly household income fall?

1. $ 0 to $500 per month
2. $501 to $1000 per month
3. $1001 to $1500 per month
4. $1501 to $2000 per month
5. more than $2000 per month
6. prefer not to respond

Memorial
University of Newfoundland

Office of the Dean of Medicine
The Health Sciences Centre

Appendix C

November 23, 1989

TO: Ms. K. Matthews, School of Nursing

FROM: Dean of Medicine

RE: Application to Human Investigation Committee (Ref # 790)

The Human Investigation Committee of the Faculty of Medicine has reviewed your proposal entitled "Infant Feeding Practices in Newfoundland and Labrador: A Survey of the First Six Months of Life."

Approval, subject to the provisions in the attached letter from the Committee, has been granted from point of view of ethics as defined in the terms of reference of this Faculty Committee.

It will be your responsibility to seek necessary approval from the Hospital(s) wherein the investigation will be conducted.

Notwithstanding the approval of the Human Investigation Committee, the primary responsibility for the ethical conduct of the investigation remains with you.

David Hawkins

David Hawkins, M.D.

cc: Secretary, HIC
Dr. N. Gogan
Medical Director - Hospitals Involved
Ethics Committee Chairman - Hospitals Involved
Chairmen of the Disciplines Involved

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