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THE EFFECT OF EARLY ENGORGEMENT ON COMPLICATIONS OF LACTATION AND DURATION OF BREASTFEEDING

BY

PATRICIA LOUISE McCLELLAND (C)

A THESIS

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled The Effect of Early Engorgement on Complications of Lactation and Duration of Breastfeeding submitted by Patricia Louise McClelland in partial fulfillment of the requirements for the degree of Master of Nursing.

Peggy Anne Field
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Date 18 September 1989

ABSTRACT

The purpose of this study was to examine the effect of early engorgement on complications of lactation and the duration of breastfeeding. This quasi-experimental, longitudinal, comparison design utilized a mailed, self-administered questionnaire to collect information from two groups of post-Caesarian section mothers identified during an experimental study on engorgement (Robson, 1987). The first group was comprised of 40 mothers who had not experienced early engorgement (present by the third morning postpartum), while the second group was comprised of 30 mothers who had.

The questionnaire (designed by the researcher to gather data on engorgement, factors associated with extended breastfeeding, complications of lactation, duration of exclusive and mixed breastfeeding, and biographic information) was mailed to each mother at three months postpartum. Those mothers who were breastfeeding at this time received the questionnaire at six months postpartum. Return rate for the questionnaires was very high (82.3% at three months and 95.2% at six months).

A conceptual model was developed to illustrate the relationship between various factors in the early postpartum period which influence lactation, the development of engorgement, and the probable course of lactation.

It was expected that the mothers who had experienced early engorgement would have more occurrences and recurrences of complications of lactation following discharge from the hospital, and that they would have a shorter duration of both exclusive and mixed breastfeeding. Significant differences were found only on the occurrences of complications of lactation, where mothers in the engorged group had significantly more occurrences. There were, however, no differences found on recurrences of complications of lactation or the duration of either exclusive or mixed breastfeeding. On other factors there were no differences noted between the two groups at either the three month or the six month collection period. Finally, there was an emphasis on the importance of appropriate and adequate support throughout the breastfeeding period.

PREFACE

" P.S. I have met so many new mothers who quit breastfeeding in the first six weeks. I wish there were some ways to impress upon them that that's the hardest time and once you get past that its a wonderful time for you and baby! "

Written by one of the subjects participating in this research

ACKNOWLEDGEMENTS

A research effort such as this is not conducted by the author alone. I am, therefore, pleased to have the opportunity to thank the many people who provided valuable assistance along the way and in particular, those persons named below.

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And finally I wish to acknowledge my God, Author and Sustainer of life, my Source and my Strength.

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CHAPTER 1

INTRODUCTION

Background to the Problem

Breastfeeding is the process of nourishing a child with the milk secreted from a mother's breasts. Breast milk is a complex substance which adjusts in response to the environment, hunger, age, and nutritional requirements of the infant. It has been described as a "living" fluid (Minchin, 1985) because of this responsive ability and the immunologic protection it provides for the infant. In recent years an increased knowledge of the benefits of breast milk and an acknowledgement of the inability to synthesize an equivalent artificial product have resulted in the promotion, by both professional and lay groups, of exclusive and extended breastfeeding (Fisher, 1984; Gerrard, 1974; La Leche League International, 1981; Lawrence, 1985; Minchin, 1985; Nutrition Committee of the Canadian Paediatric Society, 1978; Riordan, 1983).

The importance of breast milk for the nourishment of infants has been recognized in the statement of the Nutrition Committee of the Canadian Paediatric Society (1978) "Ideally, breast milk should be practically the only source of nutrients for the first four to six months for most infants" (Nutrition Committee of the Canadian Paediatric Society and the Committee on Nutrition of the American Academy of Pediatrics, 1978, p. 591). This statement has since been revised to advocate breastfeeding until six to nine months of age (Nutrition Committee of the Canadian Paediatric Society, 1980). In addition, the Committee advocated education for both professionals and the public on achieving successful lactation, changes in hospital policies and procedures to accommodate early unlimited demand feeding of the infant by the mother, and avoidance of inhibitory procedures such as excessive sedation during the intrapartum and postpartum periods. The authors also recognized that many women are employed outside their home and called for

all countries to adopt legislation to allow three to four months of leave for a mother after the birth of her infant and also for studies to investigate the feasibility of combining the breastfeeding of infants with employment outside the home.

In 1981, the World Health Organization adopted the International Code of Marketing of Breastmilk Substitutes. The preamble states in part::

> Conscious that breast-feeding is an unequalled way of providing ideal food for the healthy growth and development of infants; that it forms a unique biological and emotional basis for the health of both mother and child; that the anti-infective properties of breast milk help to protect infants against disease; and that there is an important relationship between breast-feeding and child-spacing;
>
> Recognizing that the encouragement and protection of breast-feeding is an important part of the health, nutrition and other social measures required to promote healthy growth and development of infants and young children; and that breast-feeding is an important aspect of primary health care; ...(International Organization of Consumers Unions, 1987, p. 36).

By this the World Health Organization indicated its commitment to the breastfeeding of infants.

In 1984, the International Confederation of Midwives adopted a policy to actively encourage an increase in the number of infants being breastfed and the duration of breastfeeding. They affirmed:

> The right of all babies to be breast fed for at least the first 6 months of life, especially in parts of the world where malnutrition, morbidity and mortality are prevalent.
>
> The right of all mothers to proper advice, help, encouragement and counselling for successful breast feeding.
>
> The right of all families to accurate information about all aspects of breast feeding (International Confederation of Midwives, 1985, p. 47).

The midwives urged that professionals promote breastfeeding by professionals, as well as education for professionals and public alike in the art and practice of breastfeeding. The provision, by national governments, of suitable facilities for breastfeeding for working mothers and in all public places as well as "...adequate financial benefit for the first six months postpartum for those mothers who choose not to undertake paid work while breastfeeding" (p. 470) were also urged. In many ways this policy parallels that of the paediatricians in declaring support and active promotion of breastfeeding.

Although the renewed interest of the developed nations in breastfeeding has resulted in an increase in the number of mothers initially breastfeeding their infants, many of these mothers resort within the first three months to feedings of either the mixed breast-artificial type or of totally artificial feedings. An explanation for the phenomenon of short duration of exclusive breastfeeding is not yet available; however, researchers are attempting to determine why mothers frequently terminate breastfeeding within the first three months in favour of either mixed-artificial or totally artificial feedings.

Duration of exclusive breastfeeding is difficult to assess because of the variety of definitions used in research studies to describe breastfeeding. Ekwo, Dusdieker, Booth, and Seals (1984) and Feinstein, Berkelhamer, Gruszka, Wong and Carey (1986) defined completely breastfed as one formula supplement per day or less. Ekwo, Dusdieker, Booth, and Seals (1984) reported that 23.4% of the infants in their study were completely breastfed for two or three months, while 12.4% were completely breastfed for eight months or longer. Feinstein, Berkelhamer, Gruszka, Wong and Carey (1986) noted that 57% of the infants were totally breastfed at one month and 44.5% at four months. Ellis and Hewat (1986) allowed no more than one bottle of formula per week in their definition of breastfeeding. Of the 90.8% of the mothers in their study who were breastfeeding on discharge from hospital, 45% were breastfeeding at three months and only 3.9% were breastfeeding at six months. Piu et al. (1984) and Sjolin, Hofvander and Hillervik (1977 & 1979) did not define breastfeeding but did use the terms exclusively breastfed, wholly breastfed, and completely breastfed, respectively. Piu et al. (1984) reported incidences of exclusive breastfeeding of 68%, 55.3%, 9.7% at one, three, and six months respectively. Sjolin, Hofvander, and Hillervik (1977) recounted the incidence of wholly breastfed infants at one, three, and six months as 39.5%, 12.5%, and 1.0% respectively. In 1979, Sjolin, Hofvander, and Hillervik related incidences of 85%, 63%, and 17% at one, three, and six months respectively. Both studies were conducted in the same city in Sweden.

The increased incidence at each time period may reflect an increased interest in breastfeeding.

In spite of the number of mothers who begin to breastfeed, the incidence of breastfeeding at six months is not compatible with the recommendation of the Canadian Paediatric Society that infants be exclusively breastfed for six to nine months (Nutrition Committee of the Canadian Paediatric Society, 1978). Neither the process of breastfeeding nor the long-term effects of engorgement, an early complication of lactation, are yet fully understood.

Statement of the Problem

Lactation begins following the birth of the infant. With early and frequent breastfeeding the mother's milk supply will begin to be established within two to three days. A sensation of fullness which might be somewhat uncomfortable prior to breastfeeding may be experienced. During the breastfeeding, however, the discomfort will have ceased. When something interferes with the emptying of the breast, particularly in the first week when production of breast milk is just beginning, engorgement may result. Engorgement typically occurs within the first week postpartum and is characterized by painful, overfull breasts which the infant has trouble grasping for breastfeeding. Sore nipples may occur as a result of the infant not fixing properly on the mother's breast.

Waller (1946) described histological evidence of damage to the glandular tissue of the breasts when engorgement was present. Newton and Newton (1951) attempted to answer the question of whether engorgement was caused by milk retention or vascular stasis. They concluded that postpartum engorgement is primarily due to retention of milk in the alveoli of the breast. The pressure in the engorged breast, caused by the milk retention, may be sufficient to inhibit the vascular flow and thereby result in vascular stasis. According to Riordan and Countryman (1980) "Severe engorgement may produce a plugged duct, mastitis, or even a breast abscess " (p.32). The proposed physiological

process of engorgement and resultant complications in the early postpartum period have been documented, but the long term effects of engorgement are largely unknown.

Purpose of the Study

The purpose of this study was to investigate the effect of early engorgement on the course of lactation in order to better understand the sequelae of early engorgement. Advances in the knowledge of breastfeeding are imperative in order to provide a basis for the evaluation of current nursing practices and the development of appropriate practices to assist and enable more mothers to exclusively breastfeed their infants throughout the first six months postpartum.

Research Questions

In order to investigate the relationship of early postpartum engorgement to the incidence of lactational complications and the duration of breastfeeding it was necessary to obtain information from mothers who had experienced engorgement in the early postpartum period and to compare the incidence of occurrence and recurrence of lactational complications and the duration of breastfeeding with a similar group of mothers who had not experienced engorgement. Accordingly, the following research questions were formulated.

1. Do mothers who have experienced early engorgement have more occurrences of complications of lactation than mothers who have not experienced early engorgement?

2. Do mothers who have experienced early engorgement have more recurrences of complications of lactation than mothers who have not experienced early engorgement?

3. Do mothers who have experienced early engorgement have a shorter duration of exclusive breastfeeding than mothers who have not experienced early engorgement?

4. Do mothers who have experienced early engorgement have a shorter duration of mixed breastfeeding than mothers who have not experienced early engorgement?

Definition of Terms

Crucial terms used in this study have been defined in order to clarify and specify the manner in which each term was applied.

Breastfeeding

Breastfeeding refers to the process of nourishing and nurturing one's infant with the milk secreted from a mother's breasts during lactation and is a complex interaction of physiological, psychological, and sociocultural factors.

Exclusive Breastfeeding

Exclusive breastfeeding refers to breastfeeding alone, with no artificial formula feedings or other foods.

Mixed Breastfeeding

Mixed breastfeeding refers to the concurrent use of breast milk and artificial formulae and/or other foods in the infant's diet.

Lactogenesis

Lactogenesis is the initiation of lactation which occurs over approximately the first three months postpartum.

Lactation

Lactation refers to the physiologic process of producing and secreting breast milk.

Complications of Lactation

Complications of lactation refer to the physical complications of engorgement, infections such as mastitis, milk stasis, and sore nipples.

Occurrences of Complications of Lactation

Occurrences of complications of lactation refer to the initial episode of a complication of lactation which occurred following discharge from the hospital and was reported by the mother on the questionnaire (Appendix A, items #30 and 31).

Recurrences of Complications of Lactation

Recurrences of complications of lactation refer to all episodes of a complication of lactation subsequent to the initial occurrence (see Occurrences of Complications of Lactation) which were reported by the mother on the questionnaire (Appendix A, item # 31).

Duration of Breastfeeding

Duration of breastfeeding is the amount of time, in weeks, of exclusive or mixed breastfeeding.

Early Engorgement

Early engorgement refers to engorgement, characterized by enlargement and distention of breasts, and pain unrelieved by breastfeeding, which is present by the third morning postpartum.

Background of the Study

Subjects for this research study were recruited from a study on early engorgement (Robson, 1987) which was conducted in a large hospital in Edmonton. Following uncomplicated vaginal births, mothers are usually discharged from hospital prior to the onset or resolution of engorgement, while those having an operative (Caesarian section) delivery usually have a longer stay in hospital. Therefore, subjects in the engorgement study were mothers who had had a Caesarian section delivery and were breastfeeding their babies. The mothers who met the requirements for inclusion in the study were approached for consent and entered into the descriptive phase of the study on the second day

postpartum. Breast engorgement was assessed on the morning of the third day postpartum using breast circumference measurement, and palpation to determine pain, distention, or edema. Subjects with positive signs of engorgement were administered the McGill Pain Questionnaire, Clinical Signs of Let-Down Questionnaire, and Clinical Signs of Engorgement Questionnaire. In addition, test weighing of the infants before and after two consecutive feedings was carried out. Mothers who were not engorged continued in the descriptive phase of the study. Mothers who were engorged were randomly assigned to either a treatment or control group. Those in the control group received the usual care for engorged breasts, which was not uniform as there was no standardized procedure in place. As a result the routine care was directed at pain control and could include such measures as analgesia, breast expression, and the use of hot and/or cold applications. Subjects in the treatment group applied cold packs to their breasts for twenty minutes immediately following breastfeeding, for a minimum of two occasions on day three or on day four in addition to receiving the routine treatment. A research assistant, blind as to each subject's group, visited the mothers on the evenings of days three and four to collect data for the Descriptive Data Record, Record of Breast Circumference, McGill Pain Questionnaire, Clinical Signs of Let-Down Questionnaire, and Clinical Signs of Engorgement Questionnaire. In addition, the baby was test weighed after two feedings. Mothers who consented to participate in the Robson (1987) engorgement study received an explanation of this study on the effect of early engorgement on complications of lactation and duration of breastfeeding and a Permission for Contact form to sign if they were willing to be contacted for this study.

Assumptions Underlying the Study

An assumption of this study was that the long term effects of engorgement in the early postpartum period could be assessed by measuring the incidence of occurrence and recurrence of complications of lactation and the duration of exclusive and mixed

breastfeeding. This assumption was based on Waller's (1946) research in which he hypothesized that engorgement might result in physiological damage to the milk-secreting cells which would affect the ability of the breast to produce adequate milk and predispose the breast to complications. A second assumption was that the effect of history would operate equally across the two groups during the collection of the data.

Significance of the Study

Nurses are generally unaware of the course of lactation, the problems and the successes experienced by the mothers after discharge from hospital. Investigation of the course of lactation of mothers who have experienced early engorgement as well as those who have not experienced engorgement contributes to both the extension of the nursing perspective and the provision of further knowledge on the course of lactation. The results of this study may also be useful to nurses and others who are involved in the preparation of mothers who are planning to breastfeed their infants.

In addition, the documentation of the effect of early engorgement on complications of lactation and duration of breastfeeding is an important part of the nursing research process. As nurses we must systematically document and evaluate our practices and perceptions on the basis of carefully gathered evidence in order to provide a firm basis for our nursing practice.

Summary

The problem and purpose of this study have been established. A model illustrating the conceptual framework and the interrelationships of the various elements of this study has been developed on the basis of the review of the literature in Chapter 2. Chapter 3 contains a review of the study design and methods. The results of the study are documented in Chapter 4 and the discussion, conclusions, and implications for nursing are presented in Chapter 5.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

A review of pertinent literature and research reports on reasons for breastfeeding, factors associated with duration of breastfeeding, reasons for terminating breastfeeding, discrepancy between actual and desired duration of breastfeeding, the process of breastfeeding, and engorgement, are presented as a framework for the research.

Reasons for Breastfeeding

Yeung, Pennell, Leung, and Hall (1981) studied the prevalence and influential factors of breastfeeding with an initial sample of 403 mothers (317 of the original sample were able to be followed for the 18 months of the study). The reason given most commonly (31.7%) by mothers who chose to breastfeed was the feeling that "breast milk was healthier than either cow's milk or formula". "Convenience" and the "immune properties of breast milk" were the reasons proffered by 12.9% and 12.5% of the mothers, respectively. Other mothers listed "closeness and warmth" as reasons to breastfeed (9.1%), followed by such reasons as "best way to feed" (5.7%), "mother enjoys it" (5.2%), "good for mother-baby" (4.3%), "easy to digest" (3.4%), "cheaper" (2.7%), "previous experience" (2.3%), and "uterus contracts" (0.9%) (p. 324). In a similar study, Tanaka, Yeung, and Anderson (1987) recorded that the two reasons given most commonly were that "breast milk was best for the baby" (60%) and breastfeeding was a "convenient" way to feed the baby (28%).

In McIntosh's (1985) study, where some subjects gave more than one reason for breastfeeding, the most frequent response "breastfeeding was better for the baby" was given by 90% of the mothers. Proportions for other reasons were "helps regain figure"

(21%), "convenient" (14%), "forms closer bond" (10%), "cheaper" (7%), and other reasons (2%) (p. 215).

Knauer (1981) conducted a study involving breastfeeding mothers using a "natural mothering" approach, which is defined as

> breastfeeding on demand, for nourishment as well as comfort, nursing through the night, no introduction of solid, supplementary foods until at least six months, and little or no use of bottles or pacifiers. In other words, it involves complete and constant access to the breast for all suckling needs, usually for the child's first year or longer (p.187-188).

Her sample was comprised of highly motivated mothers who were committed to breastfeeding their infants for an extended period of time (range of 5 months to more than 24 months), but the reasons given for breastfeeding were similar to those given by mothers in Yeung, Pennell, Leung, and Hall's study (1981). Reasons, in order of prevalence, were the health and nutritional benefits, emotional and psychological bonding, a natural part of childbearing, influenced by trend to breastfeeding, mother had been breastfed as an infant, and convenience and economy.

Reasons other mothers gave for not breastfeeding were recorded by Yeung, Pennell, Leung, and Hall (1981). The most common reason was "inconvenience" (37.6%), followed by "no desire" (23.9%). These two reasons were given by 61.5% of the mothers who decided not to breastfeed. McIntosh (1985) noted that 60% of the mothers who chose to bottle feed felt that breastfeeding was "inconvenient" and 35% reported breastfeeding to be "embarrassing".

There appears to be a difference in the focus of the mothers who chose to breastfeed compared to those who chose to bottle feed. The breastfeeding mothers predominantly gave infant-centred responses while the bottle feeding mothers gave mother-centred responses. Research relating the reasons mothers chose to breastfeed to the duration of breastfeeding is minimal.

Factors Associated with Duration of Breastfeeding

Lactogenesis, the establishment of lactation is a process that typically occurs over the first three or four months postpartum and it is during this phase that many mothers terminate breastfeeding. There are a number of factors identified which seem to be connected to duration of breastfeeding. Many of these factors are descriptive only and many are interrelated; therefore, assessment of the actual contribution of each factor to the duration of breastfeeding is difficult. Perhaps the best approach is to consider the factors which appear to promote breastfeeding.

A longer duration of breastfeeding appears to be associated with a number of social and biological factors such as older maternal age (Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Lynch, Koch, Hislop, & Coldman, 1986; McIntosh, 1985; Piu et al., 1984; Samuels, Margen, & Schoen, 1985; Sjolin, Hofvander, & Hillervik, 1977; Starling, Fergusson, Horwood, & Taylor, 1979; Wright & Walker, 1983; Yeung, Pennell, Leung, & Hall, 1981). No difference in the effect of age was noted by Ekwo, Dusdieker, Booth, and Seals (1984), Aberman and Kirchhoff (1985), and Hewat and Ellis (1986), although this might be accounted for by the small sample size in two studies and the inclusion of only primigravidas in the other.

Higher maternal education was also noted to be associated with greater duration of breastfeeding (Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Goodine & Fried, 1984; Lynch, Koch, Hislop, & Coldman, 1986; Sjolin, Hofvander, Hillervik, 1977; Starling, Fergusson, Horwood, & Taylor, 1979; Wright & Walker, 1983; Yeung, Pennell, Leung, & Hall, 1981). Only Piu, et al. (1984) noted that women with degrees breastfed the least. They postulated that this may be indicative of an earlier return to paid employment.

The association of a higher socio-economic status with longer duration of breastfeeding has also been cited by some researchers (Jones, West, & Newcombe, 1986;

McIntosh, 1985; Sjolin, Hofvander, & Hillervik, 1977; Stahlberg, 1985; Wright & Walker, 1983; Yeung, Pennell, Leung, & Hall, 1981). In New Zealand, Gunn (1984) studied mothers from several socio-economic groups and discovered that the duration of breastfeeding was comparable for the European mothers in the two highest socio-economic groups and for the South Pacific Islanders in the two lowest socio-economic groups. The South Pacific Islanders have been recent immigrants and probably retain their traditional breastfeeding practices.

The interrelationships between these three factors (maternal age, education, and socio-economic status) might be somewhat self-explanatory. Women who have spent more time in school are more likely to have postponed having babies until their studies are completed or until they have worked for a time, and are more likely to be in a higher socio-economic group because of the advantage their education affords them for job opportunities.

Primiparity has been cited by some authors as a factor in longer duration of breastfeeding (Jones, West, & Newcombe, 1986; Samuels, Margen, & Schoen, 1985). Gunn (1984) noted that older primiparas were more likely to breastfeed than their younger counterparts.

Yeung, Pennell, Leung, and Hall (1981) noted that a previous positive experience with breastfeeding predisposed a mother to breastfeed longer. Gunn (1984) recorded that 47% of mothers who left the hospital bottle-feeding had failed in a previous attempt to breastfeed. Fisher (1984) discussed the possible role of "imprinting" breastfeeding behaviour through casual observance of breastfeeding mothers and suggested that this imprinting might predispose a woman to breastfeed when she had children. Certainly McIntosh's (1985) study might corroborate this view of the role of imprinting, as related to bottle feeding. He noted that the sight of a breastfeeding mother and infant was not familiar to some of the subjects in his study who were accustomed only to bottle feeding. Furthermore, some of these subjects were disgusted by a picture of a mother breastfeeding

her infant and decided that they would not breastfeed their infant. Jones, West, and Newcombe (1986) reported that mothers whose own mother had breastfed all her infants were likely to breastfeed for a longer duration than mothers who had been bottle fed. Perhaps the breastfed mothers had been imprinted at an early age with the sight of their own mother breastfeeding, in addition to seeing other mothers breastfeed. One cannot discount another possible explanation for the longer duration of breastfeeding by mothers who were themselves breastfed. The experience of their mothers might result in more effective advice and support.

A normal vaginal delivery of a normal term infant would present no obstacles to early and frequent suckling and therefore would be expected to be associated with early establishment of breastfeeding. Although a normal delivery appears to be associated with longer duration of breastfeeding (Ellis & Hewat, 1984a), Goodine and Fried (1984) noted no differences whether delivery was spontaneous, forceps, or Caesarian section. Humenick and Van Steenkiste (1983) noted no differences between vaginal or Caesarian section births; however, the Caesarian section group was small. On the other hand, Samuels, Margen, and Schoen (1985) reported that mothers were less likely to breastfeed after a Caesarian section and those who did were subject to a sharper decline in the first two weeks than mothers having a vaginal delivery. After the first two weeks, Caesarian section birth was associated with a slight negative effect on the duration of breastfeeding.

General anaesthesia during operative delivery has been noted to affect both the mother and the infant (La Leche League International, 1981; LaCerva, 1981; Varney, 1987). The infant may be sleepy and not feed well during the first days, while the mother would require a period of hours in order to recover from the anaesthesia and would not be able to breastfeed early in the postpartum period.

Smoking appears to be associated with both decreased incidence of breastfeeding and also decreased duration (Counsilman & MacKay, 1985; Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Goodine & Fried, 1984; Lyon, 1983; Whichelow, 1979;

Wright & Walker, 1983; Yeung, Pennell, Leung, & Hall, 1981), although reasons for this are not clear. Counsilman and MacKay (1985) suggest that the chemical effects of tobacco may have an inhibitory effect on serum prolactin. The consequence of this would be reflected in decreased milk supply. Whichelow (1979) noted that 70% of subjects weaning early were smokers. Whichelow (1979) also noted the inhibitory effect of oral contraceptives on duration of breastfeeding. This effect has been reported by others, including Helsing (1982), Jelliffe and Jelliffe (1978), and Minchin (1985).

A decision to breastfeed made pre-conceptually or early in pregnancy is related to a longer duration of breastfeeding than when the decision is made later during pregnancy (Aberman & Kirchhoff, 1985; Goodine & Fried, 1984; Gunn, 1984; Jones, West, & Newcombe, 1986; Lynch, Koch, Hislop, & Coldman, 1986; McIntosh, 1985; Solberg, 1981). This may reflect a higher level of commitment and planning for the pregnancy and also planning for breastfeeding.

A stable marital or co-habiting relationship appears to be associated with a longer duration of breastfeeding (Gunn, 1984; Samuels, Margen, & Schoen, 1985; Sjolin, Hofvander, & Hillervik, 1977; Starling, Fergusson, Horwood, & Taylor, 1979). This finding appears reasonable in view of the importance of support for the breastfeeding mother.

Support for breastfeeding mothers appears to be very important for the success of breastfeeding. Support can be divided into two time frames on the basis of the literature - support in the first few days (usually spent in the hospital) and ongoing support throughout the breastfeeding period. Early support of the father, friends, and the nurses was noted by many authors (Auerbach, 1985; Ekwo, Dusdieker, Booth & Seals, 1984; Ellis & Hewat, 1984a; Ellis & Hewat, 1984b; Gunn, 1984; Houston, 1984a; Humenick & Van Steenkiste, 1983; Jones & West, 1986; Jones, West, & Newcombe, 1986; McIntosh, 1985; Tanaka, Yeung, & Anderson, 1987; Waldenstrom, Sundelin, & Lindmark, 1987) as an important factor in the duration of breastfeeding. Ongoing support activities included the provision of

information, practical assistance, home help, and an available and sympathetic ear (Auerbach, 1985; Culpin, 1984; Ekwo, Dusdieker, Booth & Seals, 1984; Ellis & Hewat, 1984a; Ellis & Hewat, 1986; Fisher, 1984; Gunn, 1984; Hewat & Ellis, 1986; Houston, 1984a; Houston, 1984b; Houston, Howie, Cook, & McNeilly, 1981; Jones & West, 1986; Jones, West, & Newcombe, 1986; Knauer, 1981; McIntosh, 1985; Sjolin, Hofvander, & Hillervik, 1979; Starling, Fergusson, Horwood, & Taylor, 1979; Tanaka, Yeung, & Anderson, 1987; Verronen, 1982; Waldenstrom, Sundelin, & Lindmark, 1987) by family, social group, and professional workers. The importance of support from the family, specifically from the father of the infant, has been well documented and is particularly clear in McIntosh's (1985) report of primiparas - some of whom shared accommodation with parents and siblings as well as husband. In the crowded conditions experienced by many of the subjects, bottle feeding appeared to be the only method acceptable to most persons in the dwelling and consequently breastfeeding was not attempted by many subjects. Houston (1984a) used extra home support by a midwife in the form of biweekly home visits throughout the period of breastfeeding to assess the baby feeding pattern and discuss any problems. All women in the study group continued to breastfeed until twelve weeks postpartum, and one subgroup (n = 10) were all breastfeeding at 24 weeks. Although Houston did not define breastfeeding and did use a small number of subjects (28 in the study group), overall the entire 28 subjects continued to breastfeed longer than the control group. Such results are worthy of further inquiry and research. In addition, consistency in both advice and assistance given were closely related to support (Ellis & Hewat, 1984a; Ellis & Hewat, 1984b; Fisher, 1984; Houston, 1984a; McIntosh, 1985; Verronen, 1982).

Early contact of mother and infant with early initiation of breastfeeding was found by many authors (Elander & Lindberg, 1984; Ellis & Hewat, 1986; Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Hewat & Ellis, 1986; Isenalumhe & Oviawe, 1987; McIntosh, 1985; Waldenstrom, Sundelin, & Lindmark, 1987; World Health Organization, 1981; Wright & Walker, 1983) to be a predisposing factor to

increased duration of breastfeeding. Taylor, Maloni, Taylor, and Campbell (1985) recorded that extra early contact (infant in bed with mother instead of in crib beside mother's bed while in the recovery room) had no effect on the duration of breastfeeding. However, the 78 mothers in their study had either rooming-in or family-centred care where they had unlimited contact with their infants and all infants were breastfed within eight hours of birth. Mothers who initiated breastfeeding during the extra early contact were more likely to be breastfeeding their infants at two through five months postpartum than mothers who did not initiate breastfeeding during this period of extra early contact. Early contact and early initiation of breastfeeding are not of themselves prerequisites for extended, exclusive breastfeeding. There are some cultures where the infant is not breastfed until the third or fourth day, yet breastfeeding is established and maintained for prolonged periods (Abel, 1985; World Health Organization, 1981). The success of breastfeeding in these populations, where breastfeeding is universal, may result from the tradition of knowledge and practices built up over generations and the support and experience of relatives, neighbours, and professionals.

Other important factors related to successful breastfeeding include proper technique and assistance to get the infant positioned and feeding at the mother's breast (Fisher,1984; Jones & West, 1986; Solberg, 1981; Verronen, 1982); rooming-in and unrestricted breastfeeding to speed milk flow and reduce engorgement (DeCarvalho, Robertson, Friedman, & Klaus, 1983; Elander & Lindberg, 1984; Ellis & Hewat, 1986; Hewat & Ellis, 1986; Newton & Newton, 1951; Newton, 1952; Samuels, Margen, & Schoen, 1985; Starling, Fergusson, Horwood, & Taylor, 1979; Waldenstrom, Sundelin, & Lindmark, 1987; Walter, 1982); the avoidance of supplementary or complementary formulae which may interfere with the establishment of lactation (Ellis & Hewat, 1986; Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Goodine & Fried, 1984; Isenalumhe & Oviawe, 1987; Samuels, Margen, & Schoen, 1985; Starling, Fergusson, Horwood, & Taylor, 1979); and no discharge packs with formula or bottles (Bergevin, Dougherty, &

Kramer, 1983). Minchin (1985) argued that gift-packs may well decrease the duration of breastfeeding by the "temptation" they present when the infant is fussy or the mother isn't confident of her milk supply. The effect of these early factors are not confined to the first week postpartum, but affect the process of lactogenesis as noted by their association with longer duration of breastfeeding in the preceding studies.

Ongoing factors such as flexibility in scheduling, adaptation to the needs of the infant, and maternal satisfaction with the breastfeeding process have also been noted as important (Ekwo, Dusdieker, Booth, & Seals, 1984: Hewat & Ellis, 1986; Humenick & Van Steenkiste, 1983). Maternal nutrition is another factor that influences breastfeeding over the longer duration. Even with extra food eaten while breastfeeding, a mother who exclusively breastfeeds her infant for at least three months will begin losing the extra weight accumulated during pregnancy. The role of nutrition in maintaining lactation is important as both the quantity and quality of breastmilk is dependent on the mother's nutritional status (Lawrence, 1985; Riordan, 1983). Cutting and Ludlam (1984), referring to the interaction of breastfeeding and nutrition, stated that "It is ironic that the lowest rates of breast feeding are in general found in countries which have the best nourished mothers" (p. 74). It is possible that the nutritional status of mothers in developed countries is not as adequate as it is assumed to be. Whichelow (1979) advised an experimental group of breastfeeding mothers to "eat for two" and noted that at three months postpartum this group was more likely to be still breastfeeding and to continue to breastfeed. Further research on the interaction of nutrition level of mothers and duration of breastfeeding needs to be conducted.

Reasons for Terminating Breastfeeding

Having reviewed mothers' reasons for breastfeeding and the factors associated with increased duration of breastfeeding, it is appropriate to investigate the reasons mothers give for terminating breastfeeding or initiating mixed feedings prior to the recommended six

months. Most studies which indicate the reasons women terminate breastfeeding entirely or initiate mixed feedings report that insufficient milk is the reason given by most mothers, especially within the first three months (Goodine & Fried, 1984; Gunn, 1984; McIntosh, 1985; Salariya, Easton, & Cater, 1979; Sjolin, Hofvander, & Hillervik, 1977; Starling, Fergusson, Horwood, & Taylor, 1979; Tanaka, Yeung, & Anderson, 1987; Verronen, 1982; Whichelow, 1979; World Health Organization, 1981; Yeung, Pennell, Leung, & Hall, 1981). Feinstein, Berkelhamer, Gruszka, Wong, and Carey (1986) reported that 12 of 39 mothers who were partially breastfeeding terminated breastfeeding because of insufficient milk, while only 2 of 69 mothers totally breastfeeding discontinued breastfeeding due to insufficient milk. Houston (1984a) used bi-weekly home visits by midwives who advised and supported mothers in the experimental group during the first 24 weeks postpartum. None of the mothers in the experimental group terminated breastfeeding because of their perception that they had insufficient milk whereas 15% of the mothers in the control group did. The proportion of mothers terminating due to insufficient milk was much lower than expected on the basis of the studies cited earlier. However, results of this modest study need to be confirmed by replication with a larger sample.

Transient lactation crisis, a term used by Sjolin, Hofvander, and Hillervik (1979) and Verronen (1982), describes imminent involuntary discontinuation of breastfeeding. Most of the crises of this type occurred during the first three months and through "general support and simple advice it was often possible to postpone weaning for a considerable time" (Sjolin, Hofvander, & Hillervik, 1979, p. 523). Verronen (1982) recorded transient lactational crises, a temporary period of "too little milk" (p. 447), in a group of 150 mothers. Of these, 36% experienced transient lactation crises at least once and continued to breastfeed after receiving information on proper breastfeeding techniques (e.g. feed more often, offer both breasts at each feed, increase maternal rest, food and fluids, and do not use supplementary feedings). Of these crises, 75% occurred within the first 12 weeks postpartum. The duration of breastfeeding in the group was high, with 81% of the mothers

breastfeeding at three months and 65% breastfeeding for six months or more. Only 18% of the mothers terminated breastfeeding because of insufficient milk. Verronen (1982) notes that, "If the mother is not prepared for days of insufficient milk, she is apt to interpret them as a sign of losing her milk. In this study most mothers knew what to do and succeeded in overcoming the crisis" (p. 449).

Other reasons commonly given for terminating breastfeeding include physical problems (sore nipples, sore breasts, breast infections, or abscesses, baby refusing to suckle, maternal fatigue, illness of mother or infant), inconvenience, and return to paid employment outside the home. Physical problems as a reason for terminating breastfeeding are more common in the first three months than later in the course of lactation (McIntosh, 1985; Rogers, Morris, & Taper, 1987; Sjolin, Hofvander, & Hillervik, 1977; Starling, Fergusson, Horwood, & Taylor, 1979; Tanaka, Yeung & Anderson, 1987; Verronen, 1982; Whichelow, 1979; Yeung, Pennell, Leung, & Hall, 1981). Ekwo, Dusdieker, Booth, and Seals (1984) found that maternal complications such as maternal illness, sore nipples, maternal fatigue, infected breast, or inverted nipples did not affect the duration of breastfeeding. However, the sample of breastfeeding mothers was not recruited until six to eight weeks postpartum, by which time mothers with these problems might already have terminated breastfeeding. Inasmuch as Ekwo, Dusdieker, Booth, and Seals (1984) were investigating psychosocial factors, these factors may have been subsumed under categories such as "maternal concern about her health" (p. 243) for the mothers included in the study. Hewat and Ellis (1986) reported that maternal illness, tiredness, sore or infected breasts or nipples did not relate to duration of breastfeeding. Hewat and Ellis (1986), however, used a retrospective qualitative exploratory design to establish similarities and differences for long and short duration breastfeeding mothers. The women who had a breastfeeding duration from two to eight weeks were between nine and thirteen months postpartum at the beginning of the study and may possibly have forgotten some factors influencing their decisions to terminate breastfeeding or, in that early stage of lactogenesis, sore nipples or

breasts may have been secondary to other factors which resulted in their termination of breastfeeding.

Inconvenience of breastfeeding is cited both as a reason to not breastfeed (McIntosh, 1985; Yeung, Pennell, Leung, & Hall, 1981) and as a reason for the termination of breastfeeding (Goodine & Fried, 1984; Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; McIntosh, 1985; Starling, Fergusson, Horwood, & Taylor, 1979; Tanaka, Yeung, & Anderson, 1987; Yeung, Pennell, Leung, & Hall, 1981). Tanaka, Yeung, and Anderson (1987) and Goodine and Fried (1984) noted that inconvenience of breastfeeding was a dominant factor in terminating breastfeeding by six months postpartum.

The return to work (paid employment) of breastfeeding mothers has been cited as a reason for the termination of breastfeeding (Auerbach & Guss, 1984; Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Gunn, 1984; Rogers, Morris, & Taper, 1987; Sjolin, Hofvander, & Hillervik, 1977; Stahlberg, 1985; Verronen, 1982). Auerbach and Guss (1984) further elaborated on the timing of the return to work and the number of hours worked. Termination of breastfeeding was more likely when the mother returned to full-time employment prior to sixteen weeks postpartum.

Sjolin, Hofvander, and Hillervik (1979) noted that the mothers who were interviewed throughout the study period reported emotional reasons as a cause of lactation crisis more commonly than mothers who were interviewed for the first time at six months postpartum. Regarding the latter, they stated that "The mothers themselves seem to have difficulties in recognising or accepting in retrospect the emotional strains that may be involved in breast feeding" (p. 526). The unacknowledged cumulative effect of minor emotional crises may be both a factor in the duration of breastfeeding as well as a reason that mothers terminate breastfeeding.

Discrepancy Between Actual and Desired Duration of Breastfeeding

A discrepancy between the desired duration of breastfeeding and the actual duration has been described by some researchers (Disbrow, 1963; Sjolin, Hofvander, & Hillervik, 1977; Starling, Fergusson, Horwood, & Taylor, 1979). Disbrow (1963) discussed the reactions of mothers to lack of "success" in breastfeeding and suggested that the effect on the mother was detrimental to her self-esteem. Humenick and Van Steenkiste (1983) stated that "...it is important that mothers who wish to breast feed feel they have succeeded since a perception of failure at breast feeding can be a destructive blow to a mother's self-esteem" (p. 213). Gunn (1984) reported that 47% of the mothers who were bottle feeding their infants when they left hospital had failed in a previous attempt to breastfeed. Such a discrepancy might have repercussions not only on the incidence of breastfeeding of subsequent infants but also on the maternal response to the present infant.

The Process of Breastfeeding

Anatomy and Physiology

The human breast is composed of various amounts of fatty and fibrous tissue, but the tissues which are important for lactation are the glandular tissues called alveoli, which are themselves composed of secretory cells surrounding the terminus of ductules. Around this unit of ductule and secretory cells is a contractile unit of myoepithelial cells which ejects the milk into the ductules when stimulated by oxytocin. The ductules merge into larger collecting lactiferous ducts which then widen into the ampullae or lactiferous sinuses located behind the areola. The fifteen to twenty lobes in each breast are composed of similar arrangements of glandular tissues and ducts. The areola contains the tubercles of Montgomery which are small sebaceous glands providing lubrication and antisepsis for the nipple, which has fifteen to twenty openings.

During pregnancy, oestrogen secretion results in the proliferation and differentiation of the ducts and progesterone secretion causes an increase in the size of the lobes and alveoli. Throughout pregnancy, colostrum is present and is the early nourishment for the infant during the first day or two of breastfeeding. The physiologic preparation of the breasts during pregnancy is known as mammogenesis. The pregnant woman will notice an increase in size, increased erectness of the nipples, and possibly some secretion of colostrum in later pregnancy (Frederick, 1984; Riordan, 1983). Recently there has been some investigation of women who were not able to lactate and the researchers noted that women who do not experience any breast changes during pregnancy may have inadequate glandular development and, therefore, may not be able to produce enough milk to nourish an infant (Neifert, Seacat, & Jobe, 1985). This condition, although uncommon, is the only known cause of primary lactation failure.

Prolactin levels rise throughout pregnancy and peak at about three hours postpartum when the inhibitory effect of placental oestrogens and progesterones has been removed. The establishment of milk production, lactogenesis, commences during this time and continues over the first three or four months postpartum (Jelliffe & Jelliffe, 1978). The peak levels of prolactin fall rapidly to baseline values by about two weeks postpartum. The suckling action of the infant on the mother's breasts at each feeding stimulates the anterior pituitary to release prolactin which in turn stimulates milk production. Suckling also stimulates the posterior pituitary to release oxytocin which results in contraction of the myoepithelial cells and secretion of the milk into the ductules. This latter sequence is termed the let-down or milk-ejection reflex and, particularly in the early postpartum period, it may be accompanied by a tingling sensation in the breasts, milk dripping from the breast not being nursed, uterine cramps, or even milk dripping from the breasts before the infant starts to breastfeed as the mother thinks about breastfeeding or hears her infant cry (Newton & Newton, 1970). During the establishment of lactation, problems such as

inadequate milk, sore nipples, or mastitis are not uncommon (Helsing, 1982; Minchin, 1985; Verronen, 1982; Woessner, Lauwers, & Bernard, 1987).

The third stage of lactation, galactopoiesis, begins about three to four months postpartum and follows lactogenesis. Galactopoiesis is the maintenance of established milk secretion (Jelliffe & Jelliffe, 1978) and continues for the remainder of the breastfeeding period. Both periodic suckling and removal of milk from the breast are necessary in order to maintain lactation. While prolactin is necessary for the maintenance of lactation, the actual interplay of hormones in galactopoiesis is not yet certain (Tulchinsky, 1980). Few lactational crises are reported during this stage in contrast to those of the stage of lactogenesis.

Psycho-Social Elements of Breastfeeding

Breastfeeding is more than the physiological production of breast milk. It is a complex interaction between the mother and all the elements of her environment including the infant. Maternal breast milk is clearly a superior product to any alternative that has been devised. To better understand why mothers would abandon the best food for their infants, it is necessary to look at breastfeeding within the context of the society. In 1912, Griffith suggested that the inability of mothers to breastfeed their infants was greatly influenced by the undervaluing of breastfeeding by society. Unless a society values maternal breastfeeding the mother will be severely hampered in her efforts to pursue this worthy goal. More recently, lactation failure has been evaluated as follows:

> Lactation has been termed a 'confidence trick' and failure in healthy well-nourished women with normal full-term babies is most frequently due to the 'anxiety-nursing-failure cycle', based on emotional interference with the let-down reflex ... . In westernized communities, the basic anxiety is related to lack of knowledge and social support, to the realization that alternatives are feasible and available, and to competing professional and social pursuits for women during which breast-feeding may be culturally unusual or logistically impossible (Jelliffe and Jelliffe, 1978, p.22).

In Ghana, breastfeeding is considered important (although this is changing in some of the urban centres under Western influences) and is supported by the family and tribe. The three months following an infant's birth are a time for the mother and infant to establish breastfeeding. This period of time is co-incidentally also the approximate time required to establish lactation (lactogenesis). The mother is relieved of her duties save the nurturing and nourishing of her infant (J. Quarshie & M. Quarshie, personal communication, November, 1988).

The level of support reported during interviews (McClelland, 1988) with mothers who had borne infants in Canada between 1926 and 1960 remained consistent throughout this period of time. Characteristically, the women had not received instruction on breastfeeding from their mothers or older sisters and although the older women knew that most infants at the time were breastfed, they were not familiar with the sight of a woman breastfeeding her infant. One woman who wanted to breastfeed her infant described how the farm chores plus the extra laundry and house chores drained her so that she did not have enough milk to feed her baby. Like many others, she had no extra help in the first weeks postpartum.

Rubin (1975), emphasizing the difference between the normal condition of a woman and the normal postpartum condition of a woman, argued that our society fails to recognize this alteration of the psycho-social aspects as well as the physiology of a woman in the postpartum period. It is a sad commentary on our cultural valuation of maternal breastfeeding that we expect a new mother to add the responsibility of infant care to her other chores, whereas in cultures where maternal breastfeeding and children are valued, the new mother is usually relieved of many of her regular chores for a period of time to enable her to concentrate on nurturing and nourishing her infant. The value placed by a culture on maternal breastfeeding and children affects the amount and type of social support and knowledge about breastfeeding available to the mother.

Engorgement

Engorgement is probably caused by the retention of milk in the breasts and perhaps a secondary vascular stasis resulting when the pressure of the trapped milk inhibits vascular flow (Newton & Newton, 1951). The peak of occurrence is three to five days postpartum and the condition is well described by Waller (1946):

> In strongest contrast is a type [of woman] in whom the onset of secretion is sudden or even violent, and if any leakage occurs at all it ceases within a few hours. Tension rises rapidly, the breasts become hot and heavy and enlarged to perhaps twice their former size, their margins standing out as a sharp ridge from the chest wall. The skin is tightly stretched and glistening, the veins full and prominent. During the next four or five days hard lobules of breast tissue may be felt, or sometimes seen, separately outlined; the state to which the term 'knotted' has been given. But by far the most striking fact is that not only does milk not escape spontaneously but that at the height of the engorgement it cannot be induced to do so by any of the means usually employed and the baby's efforts to feed are wholly ineffectual. ...Meanwhile the woman experiences great discomfort, aching and sleeplessness to which, in a large proportion, is added the torture of suckling her child when her nipples are damaged.
>
> For in addition to the signs just described the breasts are oedematous and pit on pressure. The oedema is often most easily seen in the thickened fleshy condition of the areola, while if the surface of the nipple is closely examined, preferably through a lens, it will be found to have a watery swollen look; and should the baby have been put to the breast there is added a pale yellow glaze, a lymphatic exudate (p. 4).

Waller further stated that "There is some histological evidence whereby the increased milk pressure inhibits the rate of milk secretion and eventually leads to atrophy of the gland cells" (1946, p. 4). He suspected that failure of lactation secondary to the engorgement might be a result of these histological changes which were noted on autopsies following puerperal death. Histological changes in breast tissue are difficult to investigate because of the obvious interference with the function of the breast which would, in turn, interfere with lactogenesis. In an effort to prevent engorgement, Waller taught an experimental group of prenatal women during their third trimester to express their breasts. These women were then advised to use breast expression to treat early symptoms of engorgement in the postpartum period. He followed the women for six months postpartum to determine the incidence of exclusive breastfeeding, mixed feeding, and artificial feeding

by these mothers, of whom 25% of the experimental group and 56% of the control group experienced engorgement. In spite of bombings and other exigencies of war, he was able to collect data on 200 women. At six months, 83% of the experimental group were exclusively breastfeeding their infants compared to 42% of the controls, of whom 53% were artificially feeding their infants in contrast to 14% of the experimental group. Waller (1946) assumed that by six months "the possibility of any temporary advantage to the pupils [experimental group] from encouragement derived from their training in the ante-natal period" (p. 7) would be excluded. Furthermore, he felt "it is not reasonable to suppose any such influence could have persisted for as long as six months" (p. 7). However, in view of the importance of support and encouragement in the early postpartum period, this assumption may well be faulty and the excellent results which he obtained in the experimental group may be due more to the support and education than to the control of engorgement.

Newton and Newton (1951) stated "Postpartum engorgement of the breast is important because it can be extremely painful, because it may predispose to the development of nipple fissures and breast abscesses, and because it is associated with lactation failure" (p. 664). They demonstrated that milk is retained in the breast during engorgement and suggested three causes - failure of the let-down reflex, insufficient time for suckling, and usual hospital routines limiting both suckling time and frequency of infant feedings. Newton (1952) suggested that rooming-in and demand feeding from birth may well be the solution to prevent, or at least limit, engorgement. Fisher (1985) echoed Newton when she attributed the practices of limiting the duration of early breastfeedings as well as the frequency of these feeds in addition to the insistence that both breasts be used at every feeding. She stated that "In practice this can result in the baby and the breast being out of phase and engorgement occurring, with the mother believing that she does not have enough milk, and the baby being denied the high fat hind milk" (p. 48).

Jelliffe and Jelliffe (1978) described the "anxiety-nursing-failure cycle" (p.22) which occurs when the let-down reflex is inhibited and the infant receives only the low fat fore-milk. In a short time the infant is hungry and the mother becomes anxious about her ability to adequately nourish her infant and the ache in her engorged breasts further quells her let-down reflex, resulting in further engorgement and sore nipples as the infant attempts to grasp the engorged breast. The process is described as follows:

> Engorgement of the breast due to stasis of milk in the alveoli leads to decreased secretion, as a result of pressure on the secretory cells and on surrounding blood vessels. This lessens prolactin circulation. The swollen breast may make the nipple less easy for the infant's mouth to grasp, so that emptying of the milk stasis becomes more difficult. The combination of traumatized, even cracked nipples and breast engorgement due to poor milk drainage produce ideal circumstances for ascending infection, which can lead to infective mastitis, and if neglected, to breast abscess (Jelliffe & Jelliffe, 1978, p. 23).

The conditions predisposing to engorgement and the entire cycle described above include the practices of scheduled feedings, restricted feedings, and the routine use of supplementary and complementary feedings of non-breast milk substances. Not all professionals involved with the new mother recognize the problems connected to such practices. There appears to be a belief among some authors that engorgement is a normal event of the early postpartum period. Juneau (1979) states:

> About the third day postpartally, the breasts will become distended, hard, and painful. This condition will last for 24 to 36 hours, and is referred to as engorgement. When it subsides, lactation will follow. During lactation the breasts are softer and more comfortable (p.182).

Some authors still advocate the restriction of time the infant is allowed to breastfeed. Ingalls and Salerno (1983) advocated only three to five minutes on the first day with gradual increases to five to ten minutes per feeding but they advised that the breasts were to be completely emptied after each feeding. This position was changed in their subsequent book (Ingalls & Salerno, 1987) to reflect the importance of unrestricted feeding time to successful breastfeeding. Holmes and Magiera (1987), however, were still advising the restriction of feeding to five minutes due to "...the sensitivity of the nipples"

(p. 563). The let-down reflex does not usually occur immediately as the infant begins to feed. Restricted feedings, particularly in the early postpartum period, may result in let-down occurring after the infant has been removed from the breast with resultant engorgement leading to the anxiety-nursing-failure cycle.

Engorgement has been labelled iatrogenic (Fisher, 1984; Minchin, 1985) and there is considerable evidence to link rooming-in or even bedding-in and demand feeding from birth with prolonged exclusive breastfeeding and minimal complications of lactation (Ellis & Hewat, 1986; Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Fildes, 1986; Hewat & Ellis, 1986; Samuels, Margen, & Schoen, 1985; Starling, Fergusson, Horwood, & Taylor, 1979; World Health Organization, 1981; Wright & Walker, 1983). The role of early engorgement in the development of other complications is not well documented. Nevertheless, on the basis of available information on engorgement, the possibility exists that there is a connection between early engorgement and later complications of lactation.

Summary

The incidence of breastfeeding is increasing; however, the duration of exclusive breastfeeding is far short of the recommended six months. Mothers may terminate breastfeeding prior to their desired goal for a variety of reasons, although inadequate milk is the reason given most commonly by mothers for the termination of breastfeeding. Theoretically, a well nourished mother with a healthy infant who is breastfeeding on demand should have no lack of breast milk for her infant. The cause of inadequate milk in mothers committed to breastfeeding their infants requires investigation.

Transient lactation crisis is an appropriate term to describe the feeling that a breastfeeding mother may experience when she suspects that she may not have enough milk for the next feeding. The situation looms large and her perspective may be lost as she realizes the enormity of her responsibility to provide the nourishment for her infant. The intervention of knowledgeable and supportive persons as described by Verronen (1982)

may well be all that is needed to avert the crisis and encourage her to continue breastfeeding.

Nevertheless, as Waller (1946) has suggested, engorgement might result in damage to the glandular tissue, in which case lactogenesis might not become adequately established and consequently, a mother might not be able to produce sufficient milk regardless of her effort and desire. Insufficient milk, the reason so frequently given for early termination of breastfeeding, might be related to previous damage to the breast tissues from engorgement, mastitis, or milk stasis. Engorgement appears to predispose a mother to the occurrence and recurrence of breast soreness and infections which can lead to early termination of breastfeeding.

Correlation of socio-biological, cultural, mechanical and environmental factors has been undertaken in an effort to explain the short duration of breastfeeding in developed countries. An investigation of the relationship of early postpartum engorgement to the incidence of lactational complications and the duration of breastfeeding provided a somewhat different perspective on the puzzle of early termination of breastfeeding. In order to find answers to these questions, it was necessary to study mothers who had experienced engorgement in the early postpartum period and to compare the incidence of occurrence and recurrence of lactational complications and duration of breastfeeding with a similar group of mothers who had not experienced engorgement.

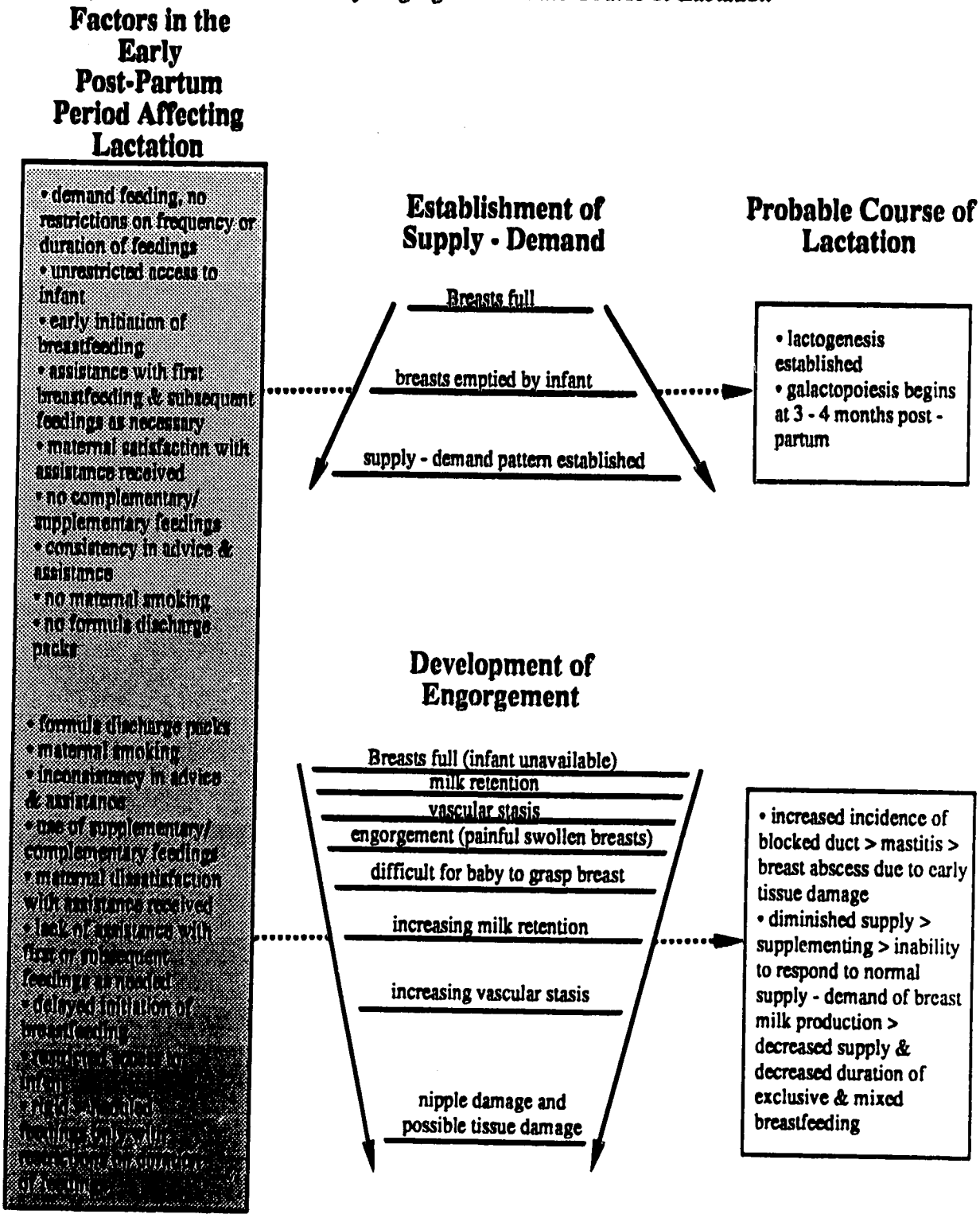
Based on the review of the literature, a conceptual framework and model (see Figure 1) were developed to provide direction for this study.

Conceptual Framework

If, as Waller (1946) has suggested, engorgement may result in damage to the glandular tissue, then lactogenesis might be inhibited and consequently, a mother who has experienced early engorgement might not be able to produce sufficient milk regardless of

Figure 1

Conceptual Model: Effect of Early Engorgement on the Course of Lactation



her effort and desire. Furthermore, early engorgement might also predispose a mother to the occurrence and recurrence of complications of lactation due to the tissue damage. Assessment of the physiologic effects of early engorgement on the course of lactation must be undertaken in a non-invasive manner in order not to interfere with lactation. Such interference would be both unethical and counter-productive. Given the complexity of breastfeeding, assessment of the effect of early engorgement must be undertaken in an indirect manner by comparing duration of breastfeeding and complications of lactation in mothers who have experienced early engorgement with those who have not. Similarity of the mothers on other factors known to affect the duration of breastfeeding must be established in order to ascertain the effect of early engorgement.

Conceptual Model

A model to illustrate the conceptual framework has been developed (see Figure 1). Critical factors influencing lactation and the development of engorgement in the early postpartum period have been identified from the literature. These factors include demand feeding with no restrictions on frequency or duration of feedings and unrestricted access to the infant (DeCarvalho, Robertson, Friedman, & Klaus, 1983; Elander & Lindberg, 1984; Ellis & Hewat, 1986; Hewat & Ellis, 1986; Newton & Newton, 1951; Newton, 1952; Samuels, Margen, & Schoen, 1985; Starling, Fergusson, Horwood, & Taylor, 1979; Waldenstrom, Sundelin, & Lindmark, 1987; Walter, 1982), early initiation of breastfeeding (Elander & Lindberg, 1984; Ellis & Hewat, 1986; Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Hewat & Ellis, 1986; Isenalumhe & Oviawe, 1987; McIntosh, 1985; Waldenstrom, Sundelin, & Lindmark, 1987; World Health Organization, 1981; Wright & Walker, 1983), assistance with first breastfeeding and subsequent feedings as necessary (Fisher, 1984; Jones & West, 1986; Solberg, 1981; Verronen, 1982), satisfaction with the assistance received (McIntosh, 1985), no complementary or supplementary feedings (Ellis & Hewat, 1986; Feinstein, Berkelhamer, Gruszka, Wong, &

Carey, 1986; Goodine & Fried, 1984; Isenalumhe & Oviawe, 1987; Samuels, Margen, & Schoen, 1985; Starling, Fergusson, Horwood, & Taylor, 1979), consistency in advice and assistance (Auerbach, 1985; Culpin, 1984; Ekwo, Dusdieker, Booth, & Seals, 1984; Ellis & Hewat, 1986; Fisher, 1984; Gunn, 1984; Hewat & Ellis, 1986; Houston, 1984a; Houston, Howie, Cook, & McNeilly, 1981; Jones & West, 1986; Jones. West, & Newcombe, 1986; Knauer, 1981; McIntosh, 1985; Sjolin, Hofvander, & Hillervik, 1979; Starling, Fergusson, Horwood, & Taylor, 1979; Tanaka, Yeung, & Anderson, 1987; Verronen, 1982; Waldenstrom, Sundelin, & Lindmark, 1987), no maternal smoking (Counsilman & MacKay, 1985; Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986; Goodine & Fried, 1984; Lyon, 1983; Whichelow, 1979; Wright & Walker, 1983; Yeung, Pennell, Leung, & Hall, 1981), and no discharge packs of formula (Bergevin, Dougherty, & Kramer, 1983, Minchin, 1985). These factors are listed in order of importance on the basis of current knowledge of the process of establishing lactation. For each of these favourable factors there is a contrary factor which has an antagonistic effect on the establishment of lactation. These contrary factors are listed in increasing order of importance, with the most important factors at the bottom (see shading in Figure 1).

The presence of some or all of the favouable factors enhances the establishment of the normal supply-demand pattern of lactation which results in a probable course of lactation unmarred by complications and enabling breastfeeding to continue for an extended period of time. On the other hand, when some or all of the contrary factors are present the development of engorgement may preclude the establishment of a normal supply-demand pattern of lactation. As the pattern of milk retention, vascular stasis, engorgement, and inadequate emptying of the breast by the baby occurs and recurs, damage to both the nipple and breast tissue may develop and affect the probable course of lactation adversely. Due to possible tissue damage there may be an increase in the incidence of complications of lactation such as blocked ducts, mastitis, and breast abscesses, in addition to a diminished supply of milk. The mother may begin to supplement the baby's feedings resulting in

predictable consequences for her milk supply as supplementation interrupts the normal supply-demand pattern of lactation and results in decreased milk production which may lead to a decreased duration of exclusive or mixed breastfeeding.

CHAPTER 3

STUDY DESIGN AND METHODS

Design

In this quasi-experimental, longitudinal, comparison study (Fink & Kosekoff, 1985) a mailed, self-administered questionnaire was utilized to collect information from two groups of mothers on the duration of breastfeeding and the incidence of occurrence and recurrence of complications of lactation. Although quasi-experimental designs affect the generalizability of the findings to other groups they are, nevertheless, an appropriate method of investigation when an experimental method would be either impossible or impractical. Bennett and Ritchie (1975) noted that the main problem in the use of mailed questionnaires was the poor return rate. The benefits of mailed questionnaires include the opportunity, on a limited budget for time and personnel, to reach a greater number of subjects, anonymity for the subjects, and the opportunity for subjects to respond to the questionnaire at their convenience, taking whatever time they may need to consider their responses.

Research Hypotheses

The following research hypotheses have been formulated from the research questions for testing in this study.

1. Mothers who have experienced early engorgement will have more occurrences of complications of lactation than mothers who have not experienced early engorgement.

2. Mothers who have experienced early engorgement will have more recurrences of complications of lactation than mothers who have not experienced early engorgement.

3. Mothers who have experienced early engorgement will have a shorter duration of exclusive breastfeeding than mothers who have not experienced early engorgement.

4. Mothers who have experienced early engorgement will have a shorter duration of mixed breastfeeding than mothers who have not experienced early engorgement.

Sample

Subjects for this research study were recruited from a study on early engorgement (Robson, 1987) which was conducted during the immediate postpartum period in a large hospital in Edmonton. Subjects in the Robson (1987) study were mothers who had had a Caesarian section delivery and were breastfeeding their babies. The post-Caesarian section mothers were chosen as subjects since they usually remain in hospital longer than women having a normal vaginal delivery, who may be discharged from hospital before engorgement occurs. The mothers who met the requirements for inclusion in the Robson study were approached for consent and entered into the descriptive phase of that study on the second day postpartum. Breast engorgement was assessed on the morning of the third day postpartum using breast circumference measurement, and palpation to determine pain, distention, or edema. Subjects with positive signs of engorgement were administered the McGill Pain Questionnaire, Clinical Signs of Let-Down Questionnaire, and Clinical Signs of Engorgement Questionnaire. In addition, test weighing of the infants before and after two consecutive feedings was carried out. Mothers who were not engorged continued in the descriptive phase of the study. Mothers who were engorged were randomly assigned to either a treatment or control group. Those in the control group received the usual care for engorged breasts, which was not uniform as there was no standardized procedure in place. As a result the routine care was directed at pain control and could include such measures as analgesia, breast expression, and the use of hot and/or cold applications. Subjects assigned to the treatment group applied cold packs to their breasts for twenty minutes immediately following breastfeeding for a minimum of two occasions on day three or on day four in addition to receiving the usual treatment. A research assistant, blind as to each subject's group, visited the mothers on the evenings of days three and four to collect

data. In addition, the baby was test weighed after two feedings. Mothers who consented to participate in the Robson engorgement study received an explanation of this study on the effect of early engorgement on complications of lactation and duration of breastfeeding and a Permission for Contact form (see Appendix C) to sign if they were willing to be contacted for this study.

The convenience sample for this longitudinal study was, therefore, comprised of breastfeeding mothers from the Robson study who had completed a Permission for Contact form and who were in either the non-engorged group or the engorged control group. All subjects for this study had had a Caesarian section delivery and had been assessed as being either engorged or non-engorged during the Robson study. Excluded from the sample were mothers from the engorged treatment group and mothers who had experienced problems with breastfeeding due to extended separation from the baby or as a result of conditions of the mother or the baby, such as cleft palate, which would severely affect the baby's ability to feed. All mothers were required to be able to read and write English. Subjects remained in the group (i.e., non-engorged or engorged) to which they had been assigned during the Robson study. The final sample included 30 mothers who had experienced engorgement and 40 mothers who had not experienced engorgement.

All subjects responding to the mailed questionnaire were included in this study since the statistical methods used in the analysis did not require equal-sized samples. The two groups (non-engorged and engorged) were compared on factors known to influence breastfeeding (other than engorgement) in order to assess similarity of the groups. When similarity on factors other than the independent variable is present the factors are assumed to be operating equally in all groups and the control group provides the baseline measure of the independent variable. The effect of history, or the events which occurred between parturition and completion of the questionnaire, could not be controlled by the researcher in this study.

Instrument

Development

An appropriate questionnaire was not available from the literature reviewed; therefore, a questionnaire (see Appendix A) was designed by the researcher to gather the appropriate data on engorgement, factors associated with extended breastfeeding, complications of lactation, and duration of breastfeeding as well as biographic information for analysis. Questions were developed from the information in the literature review to incorporate relevant factors. The factors to be included and the references from which they were derived are listed in Appendix B.

The questions were then organized using basic principles of questionnaire design as outlined by Bennett and Ritchie (1975), Fink and Kosekoff (1985), and Woodward and Chambers (1980). The questions were designed to collect the maximum information with the least effort on the part of the respondents. Consequently most questions were of the multiple-choice type and required only to be checked off. The questions were arranged consecutively so as to enhance recall by the respondents.

The 41 items of the questionnaire (see Appendix C) were grouped into "questions about you and your baby" (#1-19), "questions about your baby at the present time" (#20-31), and "questions about you" (#32-41). The items in the section on "questions about you and your baby" covered the prenatal period through postpartum hospitalization. These questions were based on factors associated with a longer duration of breastfeeding and were included to assist in the establishment of similarity between the two groups of mothers. The "questions about your baby at the present time" were designed to obtain information about the course of breastfeeding from the time of hospital discharge to three months postpartum (12 weeks). Included in this section were questions 30 and 31 which were used to assess the occurrence and recurrence of complications of lactation. The initial occurrence of a specific problem occurring after discharge from hospital was counted as an

"occurrence", while subsequent incidents of the same problem were counted as "recurrences". The final section on "questions about you" contained items of a more personal nature. Some people might be reluctant to respond to information of a personal nature when such material is at the beginning of a questionnaire and consequently there might be a tendency not to complete the questionnaire. This section was, therefore, placed at the end in order not to jeopardize the collection of the primary information on the long-term effects of engorgement.

The date of baby's birth (#20) was included as a reference point for the researcher to verify the actual number of weeks between the infant's birth and the date of the completion of the questionnaire. This information was used infrequently, but was found to be of value. The rationale for the other questions and comments about their use are included in Table 1.

Table 1

Questionnaire Items by Number and Rationale

Question No.	Rationale
1	Five choices were offered to assess any patterns which might emerge
2	Calculate discrepancy between actual & intended duration
3	Open-ended to elicit reasons for breastfeeding
4, 5, & 6	Assess possible dissimilarity between the groups
7 & 8	Assess circumstances surrounding the birth
9, 10, & 11	Assess circumstances surrounding initial breastfeeding
12-15, 18 & 19	Assess the mother's access to the infant for feeding and nurturing
16 & 17	Assess possible dissimilarity between the groups
20	Reference point for researcher to check on duration of breastfeeding
21	Assess the present status of breastfeeding
22-25	Ascertain the pattern of breastfeeding
26 & 27	Assess the duration of exclusive and mixed breastfeeding
28	Elicit reasons for terminating breastfeeding (both forced choice and open-ended)
29	Elicit reasons for continuing to breastfeed - open-ended format
30 & 31	Information on occurrences & recurrences of complications of lactation
32 & 33	Assess possible dissimilarity between the groups
34-37	Assess possible dissimilarity between the groups
38 & 39	Establish parity and presence of child with mother - essential condition to breastfeed
40 & 41	Ascertain sources of assistance & satisfaction - also similarity between the groups

Validation of the Questionnaire

Content validity refers to the extent to which the questionnaire adequately encompasses the areas of the topic it purports to measure (Bennett & Ritchie, 1975). One method for assessing the content validity is to have the instrument reviewed by experts in the field. Content validity for this instrument was established by having a group of seven experts in lactation review the questionnaire. The reviewers inserted comments concerning both the content, the choices, and the format. Changes were then made to the questionnaire to incorporate the comments of the experts.

Pilot Test

According to Bennett and Ritchie (1975), face validity "refers to whether a questionnaire looks as though it measures what it is supposed to measure" (p. 28). Face validity was achieved through the pilot test of the questionnaire. The revised questionnaire was completed by a group of five breastfeeding mothers to check for problems with format or ambiguities. The mothers were recruited from a La Leche League group. Those completing the questionnaire had infants ranging in age from less than three months to more than six months. Minor revisions to clarify questions were made on the basis of the results. The approximate time required to complete the questionnaire (20 minutes) was also established during the pilot test.

Data Collection

The instrument (see Appendix A) was mailed to each subject at three months postpartum with a covering letter (see Appendix D) to explain the study and to request assistance by completing the questionnaire and returning it in the postage paid, addressed envelope. If the questionnaire had not been returned within four weeks from the date of mailing, another questionnaire with a second covering letter (see Appendix E) was mailed. Those mothers who were breastfeeding at three months received the same questionnaire

again at six months postpartum with a covering letter (see Appendix F). The same follow-up procedure was used with the six months questionnaire. If the questionnaire had not been returned within four weeks, another questionnaire was sent with a second covering letter (see Appendix G). Collection of data continued over a twelve month period from June 1988 to June 1989.

Data Analysis

Data were analysed using the Statsview statistical program with some calculations being completed by hand. Comparisons between groups were made using Chi-square for frequency data (with a continuity correction employed for all 2x2 tables) and t-test for differences between means for interval data. Degrees of freedom for the t-tests were calculated using the number of respondents and not the number of responses in order to obtain the mean number of responses. Descriptive statistics were calculated where appropriate. Qualitative data were sorted by comments into recurrent themes which were then reported by frequency. In addition, some comments were reported as descriptions to expand the quantitative data. The probability value of .05 ($p = .05$) was selected for this study to minimize the chances of not finding a significance where one exists.

Chi-square analysis was used for questions 1, 2, 4 - 19, 24, 32, 33, 35 - 39, 40, and 41. The Student's t-test for differences between means was used for questions 21, 22, 23, 25, 30, 31, and 34. Descriptive statistics alone were calculated for questions 28 and 29 as well as the mixed breastfeeding portion of questions 21 and 25. The six month data were analysed using descriptive statistics and reporting of subjects' descriptions.

Ethical Considerations

A consent for permission to be contacted was signed by all mothers prior to inclusion in the study. Return of the questionnaire indicated consent to participate in the study. Questionnaires were assigned a code to ensure anonymity of respondents. The

master code was kept in a secure place by a person not directly involved in the study. Follow-up of non-respondents was organized by this person. Upon completion of the study the master list was destroyed.

Limitations of the Study

Mailed questionnaires may result in a low return rate which would jeopardize the reliability and the validity of the study findings. The mothers in this study had consented in advance to be contacted and it was expected that their interest in the topic of breastfeeding would be high and that the return rate would also be high. Responses on a questionnaire are not subject to verification, therefore, data were limited by the ability of the respondents to report the pertinent information.

The present study utilized a sample consisting of mothers who had experienced operative delivery (Caesarian section) which may be associated with a decreased incidence and duration of breastfeeding. Results from this group will not be generalizable to the population of mothers who have experienced a vaginal delivery. Further research on other population groups must be conducted to determine the effect of engorgement on complications of lactation and the duration of breastfeeding.

Although the sample, consisting of 40 non-engorged subjects and 30 engorged subjects, is rather small, it is nevertheless adequate for statistical calculation.

The use of numerous Chi-square analyses of the data could result in a Type I error which is the rejection of the null hypothesis when it is in fact true. On the other hand, the small number of subjects in each group (n=40, n=30) and the use of primarily non-parametric statistics contribute to lower power. In such conditions one might not find a significant difference when in fact a difference does exist.

Summary

In Chapter 3 the research method was described including the research design, hypotheses, sample, instrument development and validation, data collection and analysis, ethical considerations and limitations of this study. The results obtained from the data are reported in Chapter 4.

CHAPTER 4

RESULTS

The results of the data analysis are presented in this chapter. The results from the three month questionnaires are presented in three sections. First, the characteristics of the sample are outlined to assess similarity of the groups. Second, each of the four hypotheses are presented with their respective results from the data followed by the examination of breastfeeding experience at three months. In the final section the results of the analysis of data from the six month questionnaires are presented.

The overall return rate of the questionnaires at three months was high at 82.3%. The potential number of subjects in each group was 50 and 35 for the non-engorged and engorged groups respectively. The return rate for the non-engorged and engorged questionnaires was 40/50 (80%) and 30/35 (85.7%) respectively. Of the non-engorged mothers 34/50 (68%) returned the questionnaires after the first letter, while a further 6/50 (12%) returned them after the follow-up letter was sent. The figures for the engorged mothers were 24/35 (68.6%) and 6/35 (17.1%) respectively at the three month mailings. Only 10/50 (20%) of the non-engorged mothers and 5/35 (14.3%) of the engorged mothers did not return the questionnaires (see Table 2).

The subjects in each group were approximately evenly divided between primiparous and multiparous mothers (see Table 7). The total number of subjects who were still breastfeeding at 12 weeks was 23/40 (57.5%) for the non-engorged group and 22/30 (73.3%) for the engorged group. Information from the three month questionnaires was available for two subjects in each group who breastfed longer than 12 weeks but had terminated breastfeeding before responding to the three month questionnaire. As a result, questionnaires were mailed to 21 subjects from the non-engorged groups and 20 subjects from the engorged group at six months postpartum. The overall return rate at six months

was 95.1%. The return rate was 95.2% for the non-engorged subjects and 95% for the engorged subjects. Only one subject in each of the groups required a follow-up letter at six months (see Table 2).

Table 2

Return Rate of Questionnaires - Number and Rate by Group and Time Period

	Three Months		Six Months	
Return of Questionnaire	Non-Engorged	Engorged	Non-Engorged	Engorged
Total Number Sent	50	35	21	20
Total Number Returned	40/50 (80%)	30/35 (85.7%)	20/21 (95.2%)	19/20 (95%)
Returned after Initial Letter	34/50 (68%)	24/35 (68.6%)	20/21 (95.2%)	19/20 (95%)
Returned after Follow-up	6/50 (12%)	6/35 (17.1%)	0	0
Non-Return	10/50 (20%)	5/35 (14.3%)	1 (4.8%)	1 (5%)

Characteristics of the Sample

This section describes the characteristics of the sample and the findings on the similarity of the two groups on the factors which were included in the questionnaire. There were no statistical differences noted between the two groups on any of these factors except for the problems in breastfeeding while in hospital (question 13). The factors of age, income level, education, marital/cohabiting status, parity and number of children will be addressed first followed by the factors from the beginning of the questionnaire.

Age (Question 34)

The mean age for the non-engorged and engorged mothers was 28.6 years (range 19 - 37 years) and 29.3 years (range 21 - 41 years) respectively (see Table 3).

Table 3

Mean, Standard Deviation, and Range of Subjects' Age in Years

	Mean	S.D.	Range
Non-Engorged	28.625	4.407	19-37
Engorged	29.333	4.376	21-41

Student's t-test for independent groups was applied to assess the similarity of the two groups. The $t_{obt.} = .669$, $df = 68$, $t_{crit.} = 2.000$, $p. > .05$ for a two-tailed test. There was no statistically significant difference in the mean age of the two groups. The average age of subjects in this study was about 29 years of age.

Income Level (Question 35)

The range of income categories for the non-engorged group was from 1 to 9, while the engorged group ranged from 2 to 9. The income groupings were collapsed into three groups for the statistical analysis as the small numbers in some of the cells would not enable accurate application of the statistical test. The first group encompassed the income levels from under 5000 to 24,999; the second group was from 25,000 to 54,999; while the third was 55,000 to over 75,000. The number of subjects in each of the income levels as well as the relative frequency and cumulative frequency for each group is listed in Table 4.

Table 4

Income Levels - Number and Frequencies by Group

	Non-Engorged			Engorged		
Income Level	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
1. Under $24,999	7	18.92%	18.92%	7	24.14%	24.14%
2. 25,000-54,999	20	54.05%	72.97%	15	51.72%	75.86%
3. 55,000 & over	10	27.03%	100%	7	24.14%	100%

The results of the Chi-square analysis of this data yielded a χ^2 (2, N = 66) = .278, p.= .87. Two subjects in the non-engorged group and one in the engorged group did not

respond to this question. Approximately half of the subjects were in the income range of $25,000 to $54,999 while a quarter were in each of the lower and upper groupings.

Educational Attainment (Question 36)

The question on the highest level of education attained was answered by all the subjects. Since all subjects had completed at least junior high school, the first two response choices are not included in Table 5. The educational attainment choices were also collapsed into three groups as follows: 1. junior high and high school; 2. vocational, technical, college, and nursing school, and 3. undergraduate and graduate university degrees. There were 2/16 (12.5%) subjects in the non-engorged group, classified as high school, who had only junior high school and all subjects in the engorged group had at least high school. Of the subjects in the non-engorged and engorged groups who had university degrees, 2/9 (22.2%) in the non-engorged group and 3/6 (50%) in the engorged group had graduate degrees.

Table 5

Educational Attainment - Number and Frequencies by Group

	Non-Engorged			Engorged		
Educ Attain.	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
1. High School	16	40.0%	40.0%	11	36.67%	36.67%
2. Voc.,Tech., College, Nurs.	15	37.5%	77.5%	13	43.33%	80%
3, University	9	22.5%	100%	6	20%	100%

Analysis of this data by Chi-square resulted in a χ^2 (2, $\underline{N}$ = 70) = .245, $\underline{p}$.= .885. Over half the subjects in this study had an educational attainment beyond high school.

Marital /Cohabiting Status (Question 37)

The responses to the question on marital/cohabiting status are listed in Table 6 with number of subjects, and relative and cumulative frequencies.

Table 6

Marital/Cohabitation Status - Number and Frequencies by Group

	Non-Engorged			Engorged		
Status.	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Not mar/cohab.	3	7.5%	5.0%	2	6.67%	6.67%
Married/cohabit	37	92.5%	100%	28	93.33%	100%

The Chi-square analysis yielded a χ^2 (1, N = 70) = .112 , p.= .7377. From Table 6 one can ascertain that most (37/40 [92.5%] and 28/30 [93.3%]) of the subjects were married or cohabiting with the father of their infant.

Parity and Number of Children Living With the Mother (Questions 38 & 39)

In only two cases (both in the non-engorged group) was there a discrepancy between the parity of the mother and the number of children living with the mother. In these cases, one subject had given birth to three children and had four children living with her; the other subject had given birth to four children and had three children living with her. Consequently, the number in each category and the frequencies remained the same for both question 38 and 39, so these two questions will be dealt with in one analysis (see Table 7). As the purpose of this question was to determine the balance of primiparous subjects to multiparous subjects, and since there were small numbers in the third and fourth choices, the data have been collapsed into two categories - primiparous and multiparous - to enable appropriate statistical analysis of the data.

Table 7

Maternal Parity and Children Living with Mother - Number and Frequencies by Group

	Non-Engorged			Engorged		
Parity Children	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
One	18	45.0%	45.0%	16	53.33%	53.33%
Two or more	22	55.0%	100%	14	46.67%	100%

The analysis of the data by Chi-square yielded a χ^2 (1, N = 70) = .201 , p.= .6536 for questions 38 and 39. The two groups were approximately evenly divided between primiparous and multiparous subjects.

Time of Decision to Breastfeed (Question 1)

The responses were divided into two categories - early or late time of decision to breastfeed. Early decision incorporated the first two choices (pre-conceptual and within the first trimester) while late decision was comprised of the last three choices (from the second trimester to the immediate postpartum). Table 8 contains the number of responses for each of the categories as well the relative and cumulative frequencies for each group.

Table 8

Time of Decision to Breastfeed - Number and Frequencies by Group

	Non-Engorged			Engorged		
Time of Decision	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Early	34	85%	85%	27	90%	90%
Late	6	15%	100%	3	10%	100%

Analysis of the data using Chi-square resulted in a χ^2 (2, N = 70) = . , p.= . Chi-square = .383, df = 1, and p. = .5363. The results indicate that early decisions were predominant with 34/40 (85%) of the non-engorged and 27/30 (90%) of the engorged subjects making an early decision to breastfeed. Of the six subjects in the non-engorged group who made a late decision to breastfeed, three were still breastfeeding at 12 weeks, two terminated at 10 weeks and one at four weeks. In the engorged group, one of the three subjects was still breastfeeding at 12 weeks while the other two terminated at 6 and 4.5 weeks respectively.

Intended Duration of Breastfeeding (Question 2)

Intended duration of breastfeeding was answered by all respondents. The numbers of responses for each choice and the relative and cumulative frequencies are included in Table 9.

Table 9

Intended Duration of Breastfeeding - Number and Frequencies by Group

	Non-Engorged			Engorged		
Intended Duration	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Less than 3 mo.	3	7.5%	7.5%	2	6.67%	6.67%
3 to 6 months	20	50.0%	57.5%	13	43.33%	50.00%
More than 6 mo.	11	27.5%	85.0%	5	16.67%	66.67%
No definite plan	6	15.0%	100%	10	33.33%	100%

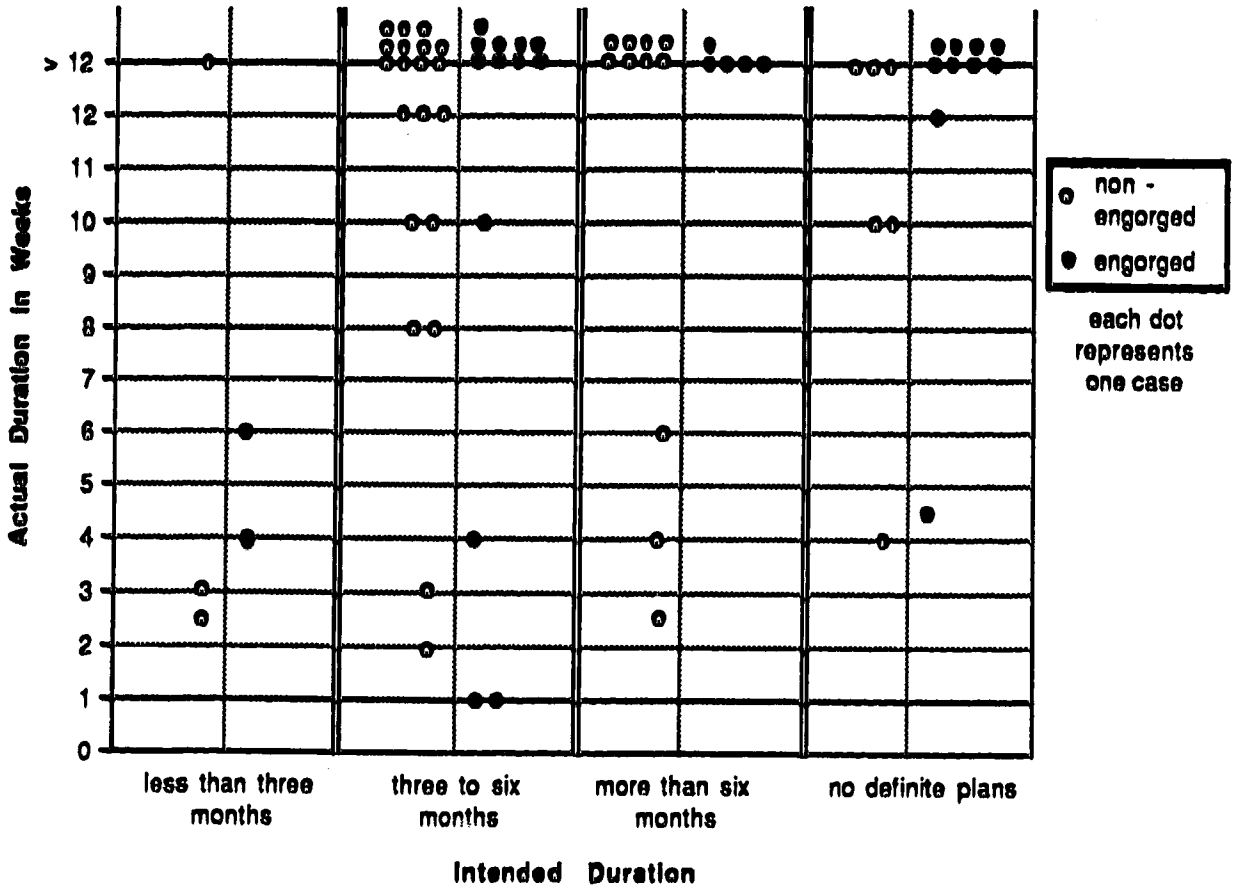
The analysis of the data by Chi-square yielded a χ^2 (3, N = 70) = 3.579 , p.= .31. Only 3/40 (7.5%) of the non-engorged and 2/30 (6.7%) of the engorged planned to breastfeed less than three months.

When intended duration is compared to the actual duration (see Figure 2) for the five subjects who planned to breastfeed less than three months, one subject in the non-engorged group was still breastfeeding at 12 weeks, while the other two subjects terminated breastfeeding at 2.5 and 3 weeks respectively. The two subjects in the engorged group who planned to breastfeed less than three months breastfed for 4 and 6 weeks respectively. Of the 20 subjects in the non-engorged group planning to breastfeed for three to six months 11 were still breastfeeding at 12 weeks, while 3 terminated at 12 weeks, 2 at 10 weeks, 2 at 8 weeks, 1 at 3 weeks and 1 at 2 weeks. For the 13 subjects in the engorged group planning to breastfeed from three to six months, nine were still breastfeeding at 12 weeks, one terminated at 10 weeks, one at 4 weeks and two at 1 week. Three of the 11 subjects in the non-engorged group who were planning to breastfeed more than six months terminated at 2.5, 4, and 6 weeks respectively, while all of the subjects in

the engorged group planning to breastfeed more than six months were still breastfeeding at 12 weeks. Of those who were undecided, three of the six in the non-engorged group were still breastfeeding at 12 weeks while two of the other three had terminated breastfeeding at 10 weeks and the third terminated at 4 weeks. In the engorged group, eight were still breastfeeding at 12 weeks, one terminated at 12 weeks and the other one terminated at 4 weeks.

Figure 2

Comparison of Intended and Actual Duration of Breastfeeding at 12 Weeks by Groups



Reasons for Breastfeeding (Question 3)

The reasons that subjects gave for choosing to breastfeed were listed and frequencies calculated for each reason (see Table 10). Most subjects gave several reasons

for breastfeeding so the total number does not equal the number of respondents. The mean number of responses were 2.4 and 2.6 per respondent for the non-engorged and engorged groups respectively. The category of response "best for baby" includes the nutritional

Table 10

Reasons for Breastfeeding - Number and Frequencies by Group

	Non-Engorged			Engorged		
Reasons for Breastfeeding	No. Responses	Relative Frequency	Cumulative Frequency	No. Responses	Relative Frequency	Cumulative Frequency
Best for baby	35	36.8%	36.8%	21	26.6%	26.6%
Convenience	19	20.0%	56.8%	10	12.6%	39.2%
Immunities and protection for the baby	5	5.2%	62.0%	9	11.3%	50.5%
Bonding and relationship with the baby	12	12.6%	74.6%	12	15.2%	65.7%
Economical	13	13.7%	88.3%	7	8.8%	74.5%
It is a mother's responsibility to her baby	0	0.0%	88.3%	1	1.3%	75.8%
Mother was breastfed as a baby	1	1.1%	89.4%	1	1.3%	77.1%
To decrease the possibility of allergies & colic for the baby	1	1.1%	90.5%	2	2.5%	79.6%
Best for mother	5	5.2%	95.7%	5	6.5%	86.1%
Heard it was a neat experience	0	0.0%	95.7%	4	5.0%	91.1%
Wanted to see if I could do it	0	0.0%	95.7%	1	1.3%	92.4%
Past experience with breastfeeding was pleasant	2	2.1%	97.8%	2	2.5%	94.9%
Most natural way to feed a baby	1	1.1%	98.9%	2	2.5%	97.4%
Past experience unsuccessful and wanted to try again	0	0.0%	98.9%	1	1.3%	98.7%
No reason not to breastfeed - reinforced by reading etc.	1	1.1%	100%	1	1.3%	100.0%

consideration of breast milk as better for the baby in addition to the general response that breastfeeding was better for the baby. The "bonding" category included those responses

dealing with the maternal-infant relationship and "closeness" with the baby in addition to statements of "bonding" with the baby. "Best for mother" included the effect of breastfeeding on uterine contractions, the weight loss associated with breastfeeding, and the opportunity for the mother to eat more. "Neat experience" encompassed such reasons as wanting to see what it was like, and having heard that breastfeeding was a 'neat' experience. One mother who was unsuccessful the first time she tried to breastfeed wanted to try again as she had heard that it was a neat experience.

Further statistical analysis of this data was not carried out due to the small numbers for many of the responses. The consideration of breastfeeding being the best for the baby was the most common reason for breastfeeding. Other reasons such as convenience, relationship with the baby, immunological protection, and economy were reported frequently.

Previous Breastfeeding Experience (Question 4)

The number of responses for each choice and the relative and cumulative frequencies are included in Table 11.

Table 11

Previous Breastfeeding Experience - Number and Frequencies by Group

	Non-Engorged			Engorged		
Breastfeeding Experience	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	19	47.5%	47.5%	16	53.33%	53.33%
Yes	21	52.5%	100%	14	46.67%	100%

Chi-square was used to test the similarity of the two groups and yielded a χ^2 (1, N = 70) = .058 , p.= .8091. The groups were about evenly divided with half of the subjects having previous experience in breastfeeding. Examination of the parity of the subjects results in an almost exact match in numbers, therefore, one can surmise that most of the multiparous subjects had previous breastfeeding experience.

Breastfeeding Experience of the Maternal Grandmother (Question 5)

All subjects completed this question asking whether the subject's own mother (grandmother of the infant) breastfed her children. The number of responses in each category, the relative frequency and the cumulative frequency are listed in Table 12.

Table 12

Breastfeeding by Subjects' Mothers - Number and Frequencies by Group

	Non-Engorged			Engorged		
Grandmother Breastfed	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	9	22.5%	22.5%	12	40%	40%
Yes	26	65%	87.5%	15	50%	90%
Don't Know	5	12.5%	100%	3	10%	100%

Chi-square analysis of the frequencies yielded a χ^2 (2, N = 70) = 2.592 , p.= .2862. At least half of the subjects had mothers who had breastfed children and would potentially have experience to share.

Encouragement of Breastfeeding by Husband/Partner (Question 6)

All but one subject in each group responded to this question. The numbers and frequencies are included in Table 13. No mother perceived her husband/partner as discouraging breastfeeding.

Table 13

Encouragement by Husband/Partner - Number and Frequencies by Group

	Non-Engorged			Engorged		
Encouraged	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Neutral	6	15.4%	15.4%	9	31.03%	31.03%
Encourages	18	46.1%	61.5%	11	37.93%	68.96%
Strongly Encour	15	38.5%	100.0%	9	31.03%	100%

Results of the Chi-square analysis were χ^2 (2, N = 68) = 2.37 , p.= .3057. Husband/partners were generally seen as encouraging breastfeeding.

Advance Planning for Caesarian Section and Reasons for Operative Delivery (Question 7)

Analysis of advance planning for a Caesarian section (C-section) and the reasons for the operative delivery was conducted in two parts. The first part was to assess the similarity of the groups on advance planning of the Caesarian delivery (see Table 14), while the second part was to assess the similarity in the reasons for the operative delivery (see Table 15 & 16).

Table 14

Advance Planning of Caesarian Section - Number and Frequencies by Group

	Non-Engorged			Engorged		
Planned in Advance	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	19	47.5%	47.5%	16	53.33%	53.33%
Yes	21	52.5%	100%	14	46.67%	100%

Chi-square analysis resulted in a χ^2 (1, N = 70) = .058 , p.=.8091. Approximately half of the operative deliveries were planned in advance with many of these being for repeat Caesarian section deliveries.

Table 15

Reasons for Caesarian Sections (Unplanned) - Number by Group

Reason	Number
NON-ENGORGED SUBJECTS:	
Failure to progress	11
Cephalo-pelvic disproportion	5
Vaginal Birth after Caesarian with cephalo-pelvic disproportion	2
Footling Breech	1
ENGORGED SUBJECTS:	
Fetal distress	4
Failure to progress in labour	4
Cephalo-pelvic disproportion	5
Vaginal Birth after Caesarian with failure to progress	1
Back problem with cephalo-pelvic disproportion	1
Overdue leading to induction leading to fetal distress	1

Table 16

Reasons for Caesarian Sections - Number and Frequencies by Group

	Non-Engorged			Engorged		
Reason	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Failure to prog.	11	57.9%	57.9%	4	25.00%	25.00%
CPD	5	26.3%	84.2%	5	31.25%	56.25%
VBAC with CPD	2	10.5%	94.7%	0	0%	56.25%
Footling breech	1	5.3%	100%	0	0%	56.25%
Fetal distress	0	0.0%	100%	4	25.00%	81.25%
VBAC-failure to progress	0	0.0%	100%	1	6.25%	87.50%
Back problem	0	0.0%	100%	1	6.25%	93.75%
Overdue	0	0.0%	100%	1	6.25%	100%

Failure to progress and cephalo-pelvic disproportion were the most common causes overall with fetal distress being noted in the engorged group by 4/16 (25%) of the respondents.

Type of Anaethesia (Question 8)

The number of subjects receiving general or epidural anaesthetic as well as the relative and cumulative frequencies was recorded in Table 17.

Table 17

Type of Anaesthetic - Number and Frequencies by Group

	Non-Engorged			Engorged		
Type of Anaesthetic	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
General	32	80.0%	80%	23	76.67%	76.67%
Epidural	8	20.0%	100%	7	23.33%	100%

Analysis of this data by Chi-square provided the following results; χ^2 (1, N = 70) = .002 , p.= .9665. In spite of approximately half the operative deliveries being planned in advance, only 15/70 (21.4%) used alternative anaesthetic methods. One of the epidural anaesthetic cases was not planned in advance but was a result of an induction with an epidural anaesthetic. When complications developed, an unplanned operative delivery was the result.

Time of First Breastfeeding (Question 9)

There was only a small number of subjects who breastfed their infants within the first hour. Therefore, the first two choices (Less than One Hour and One to Four Hours) were collapsed into one group for the purpose of analysis. The number, relative and cumulative frequencies for time of first breastfeeding are listed in Table 18.

Table 18

Time of First Breastfeeding - Number and Frequencies by Group

	Non-Engorged			Engorged		
Time	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Up to 4 hr.	6	15.38%	15.38%	4	13.33%	13.33%
5 to 8 hr.	9	23.08%	38.46%	9	30%	43.33%
9 to 12 hr.	17	43.59%	82.05%	5	16.67%	60.00%
More than 12 hr.	7	17.95%	100%	12	40%	100%

Chi-square analysis resulted in a χ^2 (3, N = 69) = 7.21 , p.= .0655. Largely due to the effects of the anaesthesia, many subjects reported that they were not recovered and

fully awake for 12 to 24 hours and then they still had to deal with the consequences of surgery in addition to learning how to handle a sometimes active baby. One subject, a multiparous woman, described how she bundled her active baby and positioned him so that his wriggling would not affect her incision area. In addition some subjects described their need for a full night's sleep around the third night postpartum when they would request that their baby remain in the nursery for the night.

Assistance with First Breastfeeding (Question 10)

The number, relative and cumulative frequencies for assistance with the first breastfeeding are listed in Table 19. The categories included in the table are "none" for no assistance, "nurse" for assistance by a nurse, and "other" for assistance from husband/partner, mother, or other person. Although some mothers received no assistance, other mothers received assistance from one or more persons, therefore the numbers do not correspond to the number of subjects.

Table 19

Assistance with First Breastfeeding - Number and Frequencies by Group

	Non-Engorged			Engorged		
Assistance	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
None	14	32.6%	32.6%	9	30.00%	30.00%
Nurse	24	55.8%	88.4%	16	53.33%	83.33%
Other	5	11.6%	100%	5	16.67%	100%

Chi-square analysis resulted in a χ^2 (2, $\underline{N}$ = 73) = .384 , $\underline{p}$.= .8253. Just over half of the mothers were given assistance with the first breastfeeding. One mother (primipara) described how a nurse brought her baby in for the first feeding, handed the infant to her and told her to feed it and left. Another subject (multipara) described how grateful she was for the assistance of the researchers involved with the Robson study in getting her and her baby off to a good start in breastfeeding. Another multiparous subject

who didn't receive assistance from the nurses reported that she guessed that the staff must have thought since this was her third child that she didn't need any help. A common theme in the reporting was the difficulty of getting positioned for breastfeeding when there was pain from the incision and the need to protect the incision area from further trauma.

Satisfaction with Assistance Received at First Breastfeeding (Question 11)

The level of satisfaction with the assistance received at the first breastfeeding was recorded by one mother in the non-engorged group who did not receive assistance in addition to those mothers who did receive assistance (see Table 20). The categories were collapsed to facilitate the statistical analysis. The first two choices (Very Dissatisfied and Dissatisfied) were collapsed as one category labelled "Dissatisfied", and the last two choices (Satisfied and Very Satisfied) were also collapsed into one category labelled "Satisfied".

Table 20

Satisfaction with Assistance - Number and Frequencies by Group

	Non-Engorged			Engorged		
Satisfaction Category	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Dissatisfied	6	20.69%	20.69%	7	26.92%	26.92%
Neutral	2	6.9%	27.59%	6	23.08%	50.00%
Satisfied	21	72.41%	100%	13	50%	100%

Chi-square analysis resulted in a χ^2 (2, N = 55) = 3.807 , p.= .149.

Comments on the assistance were made by some subjects. The list of comments compiled from the comments of both groups is included in Table 21 with the number of times a comment was noted.

Table 21

Comments on Assistance Received at First Breastfeeding

Comments	Number
Some nurses were unhelpful, rushing, pushing, discouraged breast, encouraged bottle	10
The research nurses were very helpful	7
Some nurses were a great help	6
Help hard to come by - nurses too busy	6
Inadequate support & assistance especially after a Caesarian section	2
Nurse handed baby to primiparous mother, said to start breastfeeding, then left	1
Inadequate information given	1
Ward nurses not as helpful as private room nurses	1

Demand Feeding (Question 12)

Mothers were asked whether or not they breastfed their babies on demand. The number, relative and cumulative frequencies of their responses are listed in Table 22.

Table 22

Demand Feeding - Number and Frequencies by Group

	Non-Engorged			Engorged		
Demand Feeding	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	4	10.0%	10.0%	5	16.67%	16.67%
Yes	36	90.0%	100%	25	83.33%	100%

Analysis of the data resulted in a χ^2 (1, N = 70) = .215 , p.= .6247. There were few comments made about the feeding schedule and demand feeding in hospital. The ones made are as follows: "nurses insisted on a three to four hour schedule"; "hospital routine dictated that baby couldn't be fed on demand for the first 24 hours and I wanted to"; "nurses only brought baby in when I rang"; "baby brought in except when I had the blues and took medication to sleep".

Problems with Breastfeeding While in Hospital (Question 13)

Mothers were asked whether they had experienced any problems in breastfeeding their babies while in the hospital. A difference was noted between the non-engorged and engorged subjects in the reporting of problems with breastfeeding in the hospital. Table 23 contains the number of subjects in each group as well as the relative and cumulative frequencies.

Table 23

Breastfeeding Problems in Hospital - Number and Frequencies by Group

	Non-Engorged			Engorged		
Problems	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	21	52.5%	52.5%	8	26.67%	26.67%
Yes	19	47.5%	100%	22	73.33%	100%

Analysis of the data resulted in a χ^2 (1, N = 70) = 3.71 , p.= .0541. Although engorgement had been diagnosed in all the subjects in the engorged group during the Robson study, eight of the subjects in the engorged group reported no problems with breastfeeding while in the hospital and one mother from the engorged group who reported other problems commented that engorgement did not present any difficulties in nursing her baby. Engorgement was reported as a problem that affected breastfeeding by only nine subjects in the engorged group. For some reason, the majority of mothers who had experienced early engorgement did not consider it a problem in the breastfeeding of their babies, although other problems were sometimes reported by these subjects. One subject in the non-engorged group who had not been diagnosed as engorged did report engorgement. There is a possibility that the engorgement reported by this subject may be related to fullness rather than engorgement.

The problems encountered were noted by some subjects and are listed in Table 24.

Table 24

Problems with Breastfeeding Encountered in Hospital with Incidence by Group

Problem	Non-Eng.	Eng.
Cracking/sore nipples	5	6
Engorged breasts	1	9
Baby hated breastfeeding - screamed until got bottle	1	0
Baby didn't latch on well	6	10
Sleepy baby	2	3
Inadequate breastmilk	4	2
Incisional pain - problems moving and positioning baby	5	2
Night nurses wanted to feed formula in nursery & not wanted breastfeeding	1	0
Wriggly, fussy baby	1	0
Feeding time restricted by staff	1	0
Baby allergic to dairy products eaten by mother	1	0
Colicky baby	0	1
Baby wanted to feed every 2 hours.	0	1

The correct positioning of the infant was a common concern as were problems to do with the nipples, engorged breasts, and incisional pain as noted above.

Rooming-In During the Day After the First 24 Hours (Question 14)

The responses on rooming-in during the day after the first 24 hours are listed in Table 25 with the number, relative and cumulative frequencies.

Table 25

Rooming-in During the Day - Number and Frequencies by Group

	Non-Engorged			Engorged		
Type	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No rooming-in	2	5.0%	5.0%	2	6.67%	6.67%
All the time	27	67.5%	72.5%	17	56.67%	63.34%
For feeding only	11	27.5%	100%	11	36.66%	100%

Analysis of the data resulted in a χ^2 (2, $\underline{N}$ = 70) = .862 , $\underline{p}$.= .6499. Over half of the subjects in each group reported having their babies rooming-in with them throughout the day.

Rooming-In During the Night After the First 24 Hours (Question 15)

The mothers were also asked to indicate the type of rooming-in during the night after the first 24 hours which they experienced. The responses are listed in Table 26 with the number, relative and cumulative frequencies.

Table 26

Rooming-in During the Night - Number and Frequencies by Group

	Non-Engorged			Engorged		
Type	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No rooming-in	11	27.5%	27.5%	10	33.33%	33.33%
All the time	12	30.0%	57.5%	3	10%	43.33%
For feeding only	17	42.5%	100%	17	56.67%	100%

Analysis of the data resulted in a χ^2 (2, N = 70) = 4.103 , p.= .1286. In this aspect of care there are differences between the groups in that 12/40 (30%) of the subjects in the non-engorged group had rooming-in throughout the night and only 3/30 (10%) of the subjects in the engorged group reported having their babies with them throughout the night.

There was a definite difference in the frequency of rooming-in throughout the day and rooming-in throughout the night. Where 44/70 (62.9%) of the mothers had rooming-in throughout the day, only 15/70 (21.4%) of the mothers had rooming-in throughout the night.

Supplemental/Complemental Feedings After the First 24 Hours (Question 16)

The responses on the supplementing and/or complementing of breastfeeding after the first 24 hours are listed in Table 27.

Table 27

Supplementation/Complementation of Breastfeeding - Number and Frequencies by Group

	Non-Engorged			Engorged		
Supplement or Complement	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	8	20.0%	20.0%	4	13.33%	13.33%
Yes	32	80.0%	100%	25	83.33%	96.66%
Don't Know	0	0.0%	100%	1	3.33%	100%

Analysis of the data resulted in a χ^2 (2, N = 70) = 1.801 , p.= .4063. At least 80% of the infants received some amount of supplementary/complementary feedings. For some of these infants the feedings occurred when the mother needed extra rest, however, not all the mothers were aware of the amount or the reasons for the feedings other than being told that this was "hospital practice".

In addition, respondents were asked how many times their baby was supplemented/complemented after the first 24 hours. Many mothers were unsure how often their baby had received these feedings and indicated this on the questionnaire, while other mothers gave a range of probable times, from one occurrence to every feeding.

Receipt of Discharge Formula Packs (Question 17)

The question on receipt of discharge formula packs resulted in the data compiled in Table 28 on the number and frequencies for each group.

Table 28

Receipt of Free Formula on Discharge from Hospital - Number and Frequencies by Group

	Non-Engorged			Engorged		
Receipt of Formula	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	19	47.5%	47.5%	18	60%	60%
Yes	21	52.5%	100%	12	40%	100%

Analysis of the data resulted in a χ^2 (1, N = 70) = .632 , p.= .4267. Approximately half of the subjects received free formula on discharge. Only one subject reported that she had asked for the formula.

Separation from Infant for More Than Four Hours During the Day After the First 24 Hours (Question 18)

Analysis of the question on separation from the baby for more than four hours during the day (after the first 24 hours) resulted in the numbers and frequencies seen in Table 29. Reasons for the separation were given by some mothers and included the following: baby was sleeping in the nursery; couldn't pick up the baby due to Caesarian section; unable to get a private room for her; baby slept on a 6-7 hour schedule; and baby had fluid on lungs and was in a different nursery.

Table 29

Separation from Infant for More Than Four Hours During the Day - Number and Frequencies by Group

	Non-Engorged			Engorged		
Separation	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	35	87.5%	87.5%	27	90%	90%
Yes	5	12.5%	100%	3	10%	100%

Analysis of the data resulted in a χ^2 (1, N = 70) = .003 , p.= .9568. Most subjects were not separated from their baby for more than four hours during the day.

Separation from Infant for More Than Four Hours During the Night After the First 24 Hours (Question 19)

The numbers and frequencies of separation of mothers from their babies during the night are recorded in Table 30. Reasons for the separation were given by some mothers and included the following: babies were kept in the nursery and fed by the nurses (7); in order for the mother to sleep (7); baby slept 5-7 hours at a time (5); standard procedure for

C-section (1); mother was ill from surgery (3); mother requested formula for 36 hours (1); and baby had fluid on lungs and was in a different nursery (1).

Table 30

Separation from Infant for More Than Four Hours During the Night - Number and Frequencies by Group

	Non-Engorged			Engorged		
Separation	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	24	60.0%	60.0%	19	65.52%	65.52%
Yes	16	40.0%	100%	10	34.48%	100%

Analysis of the data resulted in a χ^2 (1, N = 69) = .046 , p.= .8296. Just over a third of the subjects in each group were separated from their infants for more than four hours during the night.

There were no significant findings in this section which described the characteristics of the sample. There were, however, some possible trends noted. The subjects in the engorged group tended to be more likely to have no definite plans for the length of time they planned to breastfeed; to be somewhat less satisfied with the assistance received with the first breastfeeding; and to be less likely to have rooming-in throughout the night. These trends would need further study to establish their veracity. On the basis of the results of this section, the antecedent variables which may influence breastfeeding are assumed to be operating equally between the non-engorged and engorged groups of subjects in this study.

Testing of the Hypotheses

In this section each hypothesis was tested in turn using the data from the questionnaire to assess the validity of the hypothesis. The Student's t-test for differences between means of independent groups was used in the first three hypotheses to determine whether the two groups were similar.

Occurrences of Complications of Lactation (Question 30)

1. **Mothers who have experienced early engorgement will have more occurrences of complications of lactation than mothers who have not experienced early engorgement.**

Respondents were instructed to report problems experienced since returning home from the hospital. In the non-engorged group there were 15 mothers (37.5%) who reported no complications of lactation while 7 mothers (24.1%) in the engorged group reported no complications. The total number of complications reported, and the mean, standard deviation, and range are listed for each of the groups in Table 31.

Table 31

Occurrences of Complications - Number, Mean, Standard Deviation, and Range

	Number	Mean	S.D.	Range
Non-Engorged	37	.925	.859	0-3
Engorged	51	1.7	1.466	0-6

The $t_{obt.} = 2.58$; $df = 68$; $t_{crit.} = 2.000$, $p. < .05$ for a two-tailed test. There was a statistically significant difference in the mean number of occurrences of complications of lactation between the two groups. From Table 31 it is apparent that the engorged mothers had a greater number of complications of lactation following discharge from hospital than the non-engorged mothers. Thus Hypothesis 1, that there would more occurrences of complications of lactation in the engorged group, was not rejected.

Table 32 lists the number of occurrences of complications of lactation following discharge from hospital and the percentage of subjects experiencing each one. The number of subjects reporting complications in the non-engorged group was 25 and 23 in the engorged group. The "other" category includes leaking, inadequate filling of the breasts, and insufficient milk.

Table 32

Complications of Lactation Occurring After Discharge From Hospital - Number and Frequency by Group

	Non-Engorged		Engorged	
Reasons	Number	Per Cent	Number	Per Cent
Sore Nipples	15	60%	15	65.22%
Cracked/Bleeding Nipples	7	28%	4	17.39%
Sore Breasts	6	24%	11	47.83%
Blocked Duct of Breast	2	8%	3	13.04%
Engorgement after Discharge	5	20%	11	47.83%
Breast Infection	2	8%	2	8.69%
Other	0	0%	5	21.74%

Sore nipples were experienced by 30/48 (62.5%) of the subjects who had complications of lactation and were reported almost equally by the two groups. On the other hand, sore breasts and engorgement occurring after discharge from hospital were reported by 47.8% and 47.8% respectively of the subjects from the engorged group and by only 24% and 20% of the non-engorged subjects respectively.

Recurrences of Complications of Lactation (Question 31)

2. Mothers who have experienced early engorgement will have more recurrences of complications of lactation than mothers who have not experienced early engorgement.

Of the 25 mothers in the non-engorged group who experienced complications of lactation, 11 (44%) had no recurrences. In the engorged group, 14 (60.9%) of the 23 mothers experiencing complications had no recurrences. The number of recurrences reported, and the mean, standard deviation, and range are listed for each of the groups in Table 33.

Table 33

Recurrences of Complications - Number, Mean, Standard Deviation, and Range

	Number	Mean	S.D.	Range
Non-Engorged	29	.725	1.32	0-6
Engorged	28	.931	1.85	0-8

The $t_{obt.} = .5124$; $df = 67$; $t_{crit.} = 2.000$, $p. > .05$ for a two-tailed test. There was no statistically significant difference in the mean number of recurrences of complications of lactation between the two groups. Thus Hypothesis 2, that there would be more recurrences of complications of lactation experienced by the engorged group, was rejected.

Table 34 lists the number of recurrences of complications of lactation reported by the 14 subjects in the non-engorged group and the 9 subjects in the engorged group. The "other" Category includes leaking of breast milk and insufficient milk. Since any one subject might account for most of the recurrences in a particular category, only the number is reported.

Table 34

Recurrences of Complications of Lactation - Number and Frequency by Group

	Non-Engorged	Engorged
Reasons	Number	Number
Sore Nipples	6	3
Cracked/Bleeding Nipples	1	4
Sore Breasts	2	8
Blocked Duct of Breast	1	0
Engorgement after Discharge	4	11
Breast Infection	1	0
Other	0	4

Sore nipples continued to be more common amongst the non-engorged group. Sore breasts and engorgement occurring after discharge from hospital, which might be related, were reported more commonly by those in the engorged group.

Duration of Exclusive Breastfeeding (Question 25)

3. Mothers who have experienced early engorgement will have a shorter duration of exclusive breastfeeding than mothers who have not experienced early engorgement.

Exclusive breastfeeding at 12 weeks postpartum was reported by 13/40 subjects (32.5%) in the non-engorged group and 16/30 subjects (53.3%) in the engorged group. Of

those who had terminated exclusive breastfeeding, the mean duration was 5.7 weeks and 5.8 weeks for the non-engorged and engorged groups respectively. Table 35 presents the data on those subjects who had terminated exclusive breastfeeding.

Table 35

Duration of Exclusive Breastfeeding - Number, Mean in Weeks, Standard Deviation, and Range in Weeks

	Number	Mean	S.D.	Range
Non-Engorged	27	5.704	4.241	0-12
Engorged	14	5.786	4.246	0-12

The $t_{obt.} = .0587$; $df = 39$; $t_{crit.} = 2.021$, $p. > .05$ for a two-tailed test. The results are not significant. Thus Hypothesis 3, that there would be a shorter duration of exclusive breastfeeding in the engorged group, was rejected.

The frequency of subjects terminating exclusive breastfeeding at four time periods was determined in order to ascertain whether a pattern might exist in either group (see Table 36). The time periods selected were: 1) up to four weeks; 2) five to eight weeks; 3) nine to twelve weeks; and 4) more than twelve weeks.

Table 36

Termination of Exclusive Breastfeeding - Number and Frequencies by Group

	Non-Engorged			Engorged		
Time Period	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Up to 4 weeks	13	32.5%	32.5%	7	23.33%	23.33%
5 to 8 weeks	7	17.5%	50.0%	3	10.00%	33.33%
9 to 12 weeks	7	17.5%	67.5%	4	13.33%	46.66%
12+ weeks	13	32.5%	100%	16	53.33%	100%

While approximately a third of the non-engorged mothers were exclusively breastfeeding at 12 weeks, just over half of the engorged mothers were exclusively breastfeeding. The proportion of subjects terminating exclusive breastfeeding at any one

time period was consistently higher for those in the non-engorged group, which is contrary to the expected results.

Duration of Mixed Breastfeeding (Questions 21 & 25)

4. Mothers who have experienced early engorgement will have a shorter duration of mixed breastfeeding than mothers who have not experienced early engorgement.

The duration of mixed breastfeeding at 12 weeks was calculated by removing those subjects who were exclusively breastfeeding at 12 weeks and those who had terminated breastfeeding without a period of mixed breast milk-formula feeding. There were 10 subjects in the non-engorged group and 6 in the engorged group who terminated exclusive breastfeeding without a period of mixed breastfeeding. There was a total of 17 subjects who practised mixed breastfeeding in the non-engorged group and 9 in the engorged group. Only 10/17 of the non-engorged group (58.8%) and 6/9 of the engorged group (66.7%) were still breastfeeding at 12 weeks. The times of termination of mixed breastfeeding for the 7 non-engorged and 3 engorged subjects are listed in Table 37.

Table 37

Termination of Mixed Breastfeeding by Time and Group

Time	Number
NON-ENGORGED SUBJECTS:	
4 weeks	1
8 weeks	2
10 weeks	3
12 weeks	1
ENGORGED SUBJECTS:	
1 week	1
10 weeks	1
12 weeks	1

Further statistical analysis was not conducted due to the small number of subjects who were practising mixed breastfeeding.

In the interpretation of this section it is important to note that there were 10 and 6 subjects in the non-engorged and engorged groups respectively who reported terminating breastfeeding without a period of mixed breastfeeding. This pattern is not expected except in extreme situations where the mother is suddenly unavailable to breastfeed, often due to sudden and severe illness of the mother. The pattern, therefore, might be an artifact of the questionnaire design. In question 21 the subject was asked whether she was breastfeeding at the present time. If not, she was directed to go to question 26, thereby missing question 25 which defined "foods in addition to breast milk". In some cases question 26 was interpreted by the respondent to mean solid foods and not formula. This problem was not detected during the testing stage which employed breastfeeding mothers.

The testing of the research hypotheses resulted in the failure to reject the first hypothesis on the occurrence of complications of lactation and the rejection of the last three hypotheses on the recurrences of complications of lactation and the duration of exclusive and mixed breastfeeding.

Breastfeeding Experience at Three Months

This section compares the experience of breastfeeding of the two groups of subjects on such areas as patterns of breastfeeding at three months, patterns of maternal smoking and oral contraceptive use during the breastfeeding period, reasons for terminating breastfeeding and reasons for continuing to breastfeed, as well as sources of help and advice and the level of satisfaction with the assistance received.

Breastfeedings per 24 Hour Period at Three Months (Question 22)

Information on the average number of feedings in a 24 hour period at three months (see Table 38) was requested and analysed using Student's t-test for independent groups.

Table 38

Breastfeedings per 24 Hour Period at Three Months - Number, Mean, Standard Deviation, and Range

	Number	Mean	S.D.	Range
Non-Engorged	21	5.667	1.354	0-8
Engorged	20	6.000	1.487	0-8

The $t_{obt.} = .7486$; $df = 39$; $t_{crit.} = 2.021$, $p. > .05$ for a two-tailed test. The results were not significant. The infants of both groups were breastfeeding approximately the same number of times a day.

Average Length of Breastfeedings at Three Months (Question 23)

The two groups were compared on the average length of breastfeedings in minutes (see Table 39) using the Student's t-test for independent groups.

Table 39

Length of Breastfeeding in Minutes at Three Months - Number, Mean, Standard Deviation, and Range

	Number	Mean	S.D.	Range
Non-Engorged	21	19.524	7.567	10-40
Engorged	20	18.55	8.204	6-30

The $t_{obt.} = .3946$; $df = 39$; $t_{crit.} = 2.021$, $p. > .05$ for a two-tailed test. The results are not significant. The length of feedings is approximately the same for both groups.

Night Breastfeedings at Three Months (Question 24)

The analysis of data on night feedings of the infants (see Table 40) was conducted using a Chi-square.

Table 40

Breastfeeding at Night - Number and Frequencies by Group

	Non-Engorged			Engorged		
Night Feedings	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	15	71.43%	71.43%	8	40%	40%
Yes	6	28.57%	100%	12	60%	100%

The χ^2 (1, $\underline{N}$ = 41) = 2.931, $\underline{p}$.= .0869. Examination of Table 40 shows a difference in the frequency of night feedings between the two groups. Where 15/21 (71.4%) of the non-engorged subjects reported no night feedings, only 8/20 (40%) of the engorged subjects were not breastfeeding at night. This difference may be an artifact of group size.

Use of Oral Contraceptives at Three Months (Question 32)

All subjects responded to the question on oral contraceptive use (see Table 41) with one subject adding a note on the problems of concurrent use of oral contraceptives and diminished breast milk quantity and quality and emphatically stating that breastfeeding mothers should not be using oral contraceptives.

Table 41

Use of Oral Contraceptives - Number and Frequencies by Group

	Non-Engorged			Engorged		
Oral Contraceptives	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	34	85%	85%	28	93.33%	93.33%
Yes	6	15%	100%	2	6.67%	100%

Analysis of the data resulted in a χ^2 (1, $\underline{N}$ = 70) = .497, $\underline{p}$.= .4809. As few respondents were using oral contraceptives, the potential effect of these on the duration of breastfeeding cannot be adequately assessed in this study.

Smoking at Three Months (Question 33)

All but one of the respondents answered the question on smoking. The number and frequencies of responses are contained in Table 42.

Table 42

Smoking - Number and Frequencies by Group

	Non-Engorged			Engorged		
Smoking	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No	31	79.49%	79.49%	23	76.67%	76.67%
Yes	8	20.51%	100%	7	23.33%	100%

Analysis of the data resulted in a χ^2 (1, N = 69) = 1.638, p.= .9898.

The 21.7% of the subjects who smoked were divided about equally between the two groups. The average number of cigarettes smoked in a day by the 8 smokers in the non-engorged group was 11.5 (Range = 4 - 20), while the average number smoked per day by the 7 subjects in the engorged group was 14.3 (Range = 2 - 40). Five of the non-engorged smokers were still breastfeeding at 12 weeks while the other three had terminated at 3, 4, and 6 weeks. Only one of the engorged smokers continued to breastfeed at 12 weeks. The other six terminated breastfeeding at 1 (two subjects), 4, 4.5, 6, and 12 weeks. The potential effect of smoking on the duration or patterns of breastfeeding cannot be adequately assessed in this study due to the small number of subjects who smoked. Nevertheless, it is of interest to note that of the 14 subjects who terminated breastfeeding by six weeks (see Figure 2), eight (57.1%) were smokers. Yet smokers comprised only 21.7% of the total sample.

Sources of Help/Advice (Question 40)

Help or advice was sought by all but four subjects in each group. Most subjects who sought help did so from more than one source. Subjects requested help from a variety of sources with an average of 2.35 and 2.0 sources reported by the non-engorged and

engorged groups respectively. The sources of help are listed in Table 43 with the number of respondents citing each source and the frequencies. The two choices of "La Leche League" and "Lactation Consultant" have been incorporated into one category of "lactation resource" due to the small numbers for each choice. Similarly the two choices of "Husband/Partner" and "Other" have been incorporated into one category called "Husband/Sister". The responses to the "Other" category all indicated a sister or sister-in-law as the other source of help.

Table 43

Sources of Help and Advice - Number Citing Each Source and Frequencies by Group

	Non-Engorged			Engorged		
Source	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
No One	4	4.26%	4.26%	4	6.78%	6.78%
Lactation resource	4	4.26%	8.52%	3	5.08%	11.86%
Nurse	16	17.02%	25.54%	8	13.56%	25.42%
Books etc.	18	19.15%	44.69%	17	28.81%	54.23%
Doctor	16	17.02%	61.71%	5	8.47%	62.70%
Friend	15	15.96%	77.67%	8	13.56%	76.26%
Mother	14	14.89%	92.56%	5	8.47%	84.73%
Husband/Sister	7	7.45%	100%	9	15.25%	100%

Analysis of the data resulted in a χ^2 (7, $\underline{N}$ = 150) = 7.637, $\underline{p}$.= .3657. The importance of books and pamphlets as a source of help was demonstrated in the results, particularly for the engorged group.

Consistency of Advice (Question 41)

The advice received was generally considered to be consistent, with no subject noting that the advice she received was "very inconsistent". The choices "somewhat inconsistent" and "neutral" have been combined in order to compensate for the small numbers for those choices and has been labelled as "inconsistent". The numbers and frequencies are included in Table 44.

Table 44

Consistency of Help and Advice - Number and Frequencies by Group

	Non-Engorged			Engorged		
Consistency	No.	Relative Frequency	Cumulative Frequency	No.	Relative Frequency	Cumulative Frequency
Inconsistent	4	10.81%	10.81%	8	30.77%	30.77%
Somewhat Consistent	18	48.65%	59.46%	8	30.77%	61.54%
Very Consistent	15	40.54%	100%	10	38.46%	100%

Analysis of the data resulted in a χ^2 (2, N = 63) = 4.393., p.= .1112. The non-engorged group tended to report the help and advice as more consistent than the engorged group whose responses were fairly evenly divided between the three categories.

Some subjects explained their response to question 41; their comments (see Appendix H) are quite thought-provoking and point out some of the problems of inconsistent advice from the mothers' perspectives.

Reasons for Terminating Breastfeeding (Question 28)

There were 18 respondents from the non-engorged group and 10 from the engorged group who provided the reasons for terminating breastfeeding. Most subjects gave more than one reason with an average of 2.72 reasons (Range = 1 - 6) for the non-engorged group and 3 reasons (Range = 1 - 5) for the engorged group. The only choice from the questionnaire not indicated by any subject as a reason for terminating breastfeeding was "illness of the baby". The reasons, number and per cent of subjects in each group who indicated a reason are listed in Table 45. The percentages do not total 100% due to the multiple responses made by subjects. Further comparison between groups was not conducted due to the small numbers selecting most reasons.

Table 45

Reasons for Terminating Breastfeeding - Number of Responses and Per Cent by Group

	Non-Engorged		Engorged	
Reasons	Number	Per Cent	Number	Per Cent
Insufficient Milk	11	61.11%	3	30%
Illness of Mother	3	16.67%	1	10%
Baby not gaining weight	4	22.22%	0	0%
Baby cries a lot	5	27.78%	1	10%
Too physically demanding	3	16.67%	5	50%
Dissatisfied with breastfeeding	0	0%	2	20%
Baby not sucking well	2	11.11%	2	20%
Problems with mother's nipples	5	27.78%	1	10%
On the advice of the doctor	2	11.11%	2	20%
Inconvenient	3	16.67%	3	30%
I was returning to work	4	22.22%	4	40%
I felt fatigued	2	11.11%	2	20%
Baby dislikes breastfeeding	1	5.56%	2	20%
I thought breast milk not adequate	1	5.56%	1	10%
Other	3	16.67%	1	10%
Total Number of Responses	49		30	

Insufficient milk was reported as a reason for terminating breastfeeding by 11/18 (61%) of the non-engorged subjects and by only 3/10 (30%) of the engorged group. The reason that was given by 5/10 (50%) of the engorged group who responded was "too physically demanding".

Many of the subjects explained their reasons further and these are grouped in Appendix I according to the intended duration of breastfeeding. The actual duration in weeks of breastfeeding follows the comment of the mother and is bracketed.

Reasons for Continuing Breastfeeding (Question 29)

Reasons for continuing to breastfeed were remarkably similar to the reasons given by the respondents for deciding to breastfeed. This question was answered by 22 subjects in the non-engorged group and 21 in the engorged group. Their responses have been grouped and are listed in Table 46. The category "Other" includes the reasons: it provides an easy way to calm and soothe the baby, allergies in the family, baby refuses the bottle,

breastfeeding before and after work only, and "colicky" baby so doctor suggested a supplement.

Table 46

Reasons for Continuing to Breastfeed - Number and Per Cent by Group

	Non-Engorged		Engorged	
Reasons	Number	Per Cent	Number	Per Cent
Best for baby, nutrition,	14	63.64%	10	47.62%
Bonding, closeness to baby	10	45.45%	9	42.86%
Thriving, content, happy baby	6	27.27%	6	28.57%
Convenience and ease	12	54.55%	7	33.33%
Economical	7	31.81%	7	33.33%
Going so well & getting better	2	9.09%	2	9.52%
Rewarding, satisfying	8	36.36%	5	23.81%
Other	1	4.55%	4	19.05%
Total Number of Responses	60		50	

The total does not equal 100% since many subjects gave more than one reason for continuing to breastfeed. The satisfaction that was apparent in the responses of many of the subjects who were breastfeeding at 12 weeks suggested that breastfeeding had become a satisfying part of the mothering experience.

The examination of reported breastfeeding experience at three months revealed no significant differences between the two groups. There might, however, be some trends in the breastfeeding experiences differentiating the two groups of subjects. Subjects in the non-engorged group were more likely than the subjects in the engorged group to report "insufficient milk" as a reason to terminate breastfeeding; to indicate that the help or advice received was consistent; and were less likely to breastfeed their infants during the night.

Breastfeeding Experience Between Three and Six Months

Data collected at six months postpartum were analysed descriptively and qualitatively as there were not adequate numbers for quantitative testing methods. The sample at six months consisted of 22/40 (55%) of the non-engorged subjects and 21/30

(70%) of the engorged subjects. Of the 22 non-engorged subjects, 10 (45.5%) were primiparous and 12 (54.5%) were multiparous, while 10 (47.6%) of the 21 engorged subjects were primiparous and 11 (52.4%) were multiparous (see Table 47).

The average age of subjects in the two groups was 29.1 years (Range = 22 - 37) for the non-engorged group and 29.0 years (Range = 21 - 38) for the engorged group (see Table 47). There was little difference between the mean age of those who continued to breastfeed and those who terminated by 12 weeks.

Table 47

Mean, Standard Deviation, and Range of Subjects' Age in Years and Parity by Group and Time

	AGE			PARITY	
Time Period	Mean	S.D.	Range	Primiparous	Multiparous
Three Months					
Non-Engorged	28.625	4.407	19-37	18 (45.0%)	22 (55.0%)
Engorged	29.333	4.376	21-41	16 (53.3%)	14 (46.7%)
Six Months					
Non-Engorged	29.1	4.268	22-37	10(45.5%)	12 (54.5%)
Engorged	29.0	3.873	21-38	10 (47.6%)	11 (52.4%)

Occurrence and Recurrence of Complications of Lactation Between Three and Six Months (Questions 30 & 31)

There were 18/22 (81.8%) subjects in the non-engorged group and 18/21 (85.7%) subjects in the engorged group who did not experience any complications of lactation between 12 weeks and 24 weeks postpartum. In the non-engorged group there were six occurrences of complications experienced by 4/22 (18.2%) subjects. The complications consisted of engorgement experienced at 18 weeks during weaning of the infant; blocked ducts and engorgement occurring over the period from 12 to 22 weeks; an incident of sore and cracked nipples at 22 weeks; and one infant refusing the left breast since 20 weeks. The subject who experienced engorgement during weaning and the subject with sore and cracked nipples terminated breastfeeding after 12 weeks but prior to 24 weeks while the

other two subjects continued to breastfeed at 24 weeks. The two subjects who reported more than one complication also experienced recurrences of the complications. There were four recurrences of engorgement and blocked ducts experienced by one subject and one recurrence of sore and cracked nipples. There were three occurrences of complications of lactation in the engorged group experienced by 3/21 (14.3%) subjects. A single occurrence of breast infection at 22 weeks was experienced by one subject with no recurrence during the study period. There were two subjects who reported intermittent engorgement which occurred when the baby did not breastfeed regularly. This recurred throughout the study period. These occurrences and recurrences are summarized in Table 48. All three of the subjects in the engorged group who experienced complications continued to breastfeed at 24 weeks.

Table 48

Occurrences and Recurrences of Complications by Group at Six Months

Complication	Non-Eng.	Eng.
Occurrence		
1. Engorgement during weaning at 18 weeks	1	0
2. Blocked ducts and Engorgement from 12 to 22 weeks	1	0
3. Cracked nipple at 20 weeks	1	0
4. Baby refusing left breast since 20 weeks	1	0
5. Breast infection at 22 weeks.	0	1
6. Engorgement	0	2
Recurrences		
1. Engorgement from #2 above	4	0
2. Cracked nipple from #3 above	1	0
3. Engorgement from #6 above - intermittent	0	several

Duration of Breastfeeding Between Three and Six Months (Questions 21 & 27)

One subject in the engorged group failed to indicate the time of termination of breastfeeding and has not been included in the calculation of duration. Of the 22 subjects in the non-engorged group, 14 (63.6%) were still breastfeeding at 24 weeks while 13 (61.9%) of the 21 subjects in the engorged group were breastfeeding. The mean duration

of breastfeeding for the eight subjects in the non-engorged group who had terminated by 24 weeks was 18 weeks (Range = 13 - 22) while the mean duration for the seven subjects in the non-engorged group for whom data were available was 16.2 weeks (Range = 13 - 19).

Intended Duration versus Actual Duration of Breastfeeding Between Three and Six Months (Questions 2, 21, & 27)

The actual duration of breastfeeding was compared with intended duration of breastfeeding (see Figure 3). There was one subject in the non-engorged group who had planned to breastfeed for less than 3 months and she continued to 13 weeks. Of the 12/22 (54.5%) in the non-engorged group and 10/21 (47.6%) in the engorged group who indicated that they planned to breastfeed for three to six months there were 4/12 (33.3%) in the non-engorged group and 7/10 (70%) in the engorged group who terminated as planned. There were 8/12 (66.7%) subjects in the non-engorged group and 3/10 (30%) subjects in the engorged group who exceeded their planned time of breastfeeding. Of the subjects who planned to breastfeed for more than six months, all four subjects (100%) in the non-engorged group and five (83.3%) of the six subjects in the engorged group continued to breastfeed at 24 weeks. The subject in the engorged group who terminated before 24 weeks did not indicate the time of termination of breastfeeding. There were five subjects in each of the non-engorged and engorged groups who had no definite plans. Two (40%) of the non-engorged and all five (100%) of the engorged subjects continued to breastfeed at 24 weeks (see Figure 3).

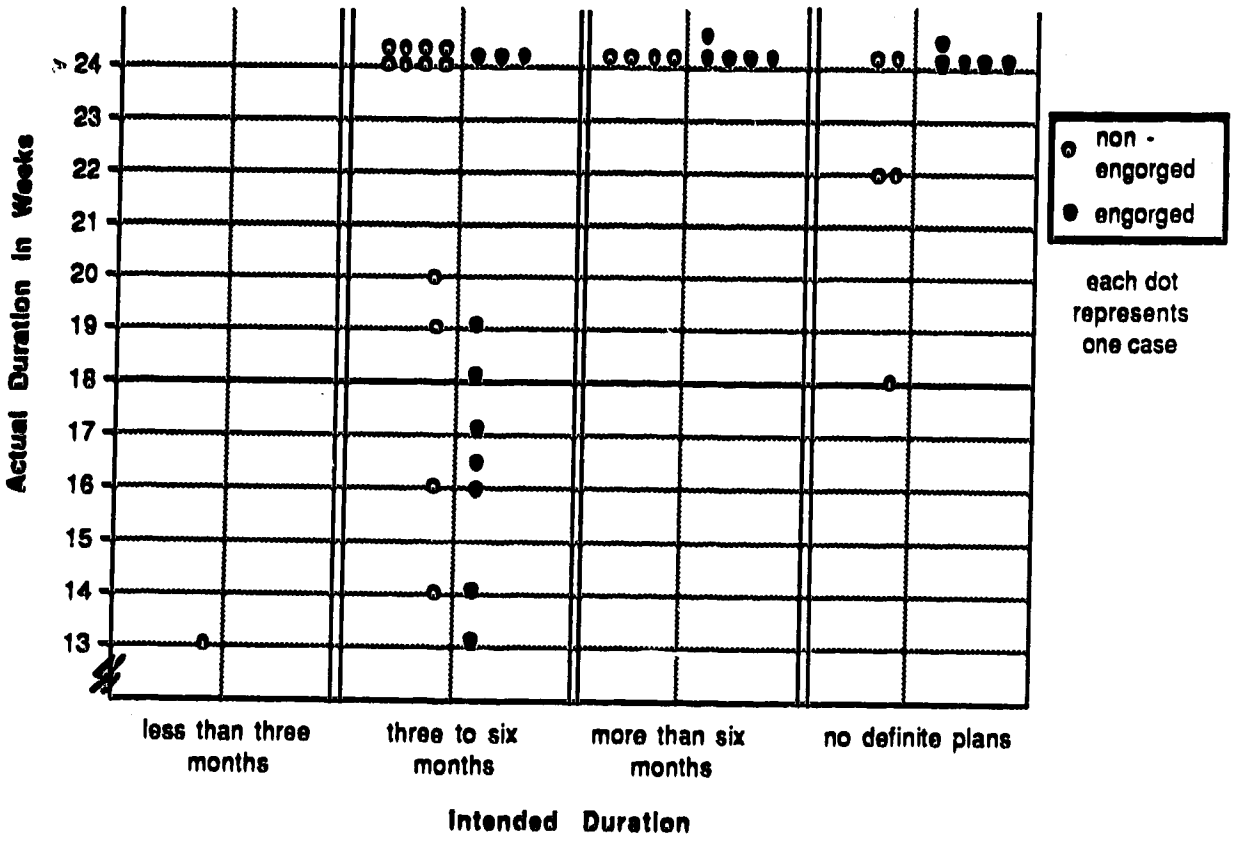
Duration of Breastfeeding and Parity (Questions 38, 21, & 27)

The duration of breastfeeding was also compared to parity to determine whether primiparous or multiparous subjects breastfed longer. There were five (62.5%) primiparous subjects and three (37.5%) multiparous subjects in the non-engorged group who terminated breastfeeding between 12 and 24 weeks and four (50%) primiparous and four (50%) multiparous subjects in the engorged group who also terminated during the

same period. Based on this limited data, parity did not influence the termination of breastfeeding.

Figure 3

Comparison of Intended and Actual Duration of Breastfeeding at 24 Weeks by Groups



Introduction of Other Foods (Questions 25 & 26)

At six months only two subjects in the non-engorged group were breastfeeding exclusively leaving a total of 20 subjects who had introduced foods other than breast milk. In the engorged group, two subjects did not complete question 26 and all others had introduced foods other than breast milk. The mean age of introduction of foods other than breast milk was 13.8 weeks (Range = 1 - 24) and 15.9 weeks (Range = 1 - 24) for the non-engorged and engorged groups respectively. Early introduction of other foods did not

correspond with earlier termination of breastfeeding, although such a trend would be hard to establish on such small numbers.

Patterns of Breastfeeding (Questions 22, 23, & 24)

For those subjects who were breastfeeding at six months, the patterns of feeding were compared between the two groups. Data were incomplete for one subject in the non-engorged group. The average number of feedings in a day were 3.8 (Range = 2 - 7) and 5.2 (Range = 3 - 9) for the non-engorged and engorged groups respectively. The mean length of feedings was 16 minutes (Range = 10 - 25) and 14.2 minutes (Range = 5 - 30) for the non-engorged and engorged groups respectively. Regular night feedings were the pattern for five of the non-engorged subjects and six of the engorged subjects. A further two subjects in the non-engorged group and one subject in the engorged group reported occasional night feedings. As a group, the mothers in the non-engorged group did not feed their babies as often as those in the engorged group, however, they tended to feed for a longer time at each feeding. It is interesting to note that the infants of the two subjects practising exclusive breastfeeding do not feed during the night.

Smoking and Oral Contraceptive Use (Questions 32 & 33)

Smoking and the use of oral contraceptives were explored in relation to duration of breastfeeding. Five subjects in the non-engorged group smoked, consuming a mean of 11.8 (Range = 8 - 20) cigarettes per day. Three of these subjects continued to breastfeed at 24 weeks. Only one subject in the engorged group smoked, consuming 20 cigarettes per day. She had terminated breastfeeding.

Oral contraceptives were used by five of the subjects in the non-engorged group and three in the engorged group. Of these eight subjects only one, in the non-engorged group, continued to breastfeed at six months. This subject also smoked 20 cigarettes per day in addition to using oral contraceptives. There were two other subjects who smoked and used oral contraceptives but they had both terminated breastfeeding.

Reasons for the Termination of Breastfeeding (Question 28)

There was a mean of 1.8 reasons given by the nine subjects in the non-engorged group and 1.8 reasons given by the ten subjects in the engorged group for terminating breastfeeding. The reasons and the number of subjects indicating each reason are listed in Table 49 and indicate no consistent pattern. The reasons given in the "Other " category included constipation of the baby, a desire to terminate since going away for a holiday, very frequent feedings with baby wanting a bottle, baby teething and chewing on mother's nipples, mother felt that six months was long enough to breastfeed, and illness of a sibling.

Table 49

Reasons for Termination of Breastfeeding Between 12 and 24 Weeks - Number of Responses by Group

	Non-Engorged	Engorged
Reasons	Number	Number
Insufficient milk	1	3
Illness of mother	0	1
Baby not gaining weight	1	0
Baby cries a lot	1	0
Too physically demanding	1	2
Mother dissatisfied with breastfeeding	0	1
Baby not sucking well	1	1
On the advice of the doctor	1	0
Inconvenient	2	3
Mother was returning to work	3	2
Mother felt fatigued	0	1
Baby dislikes breastfeeding	1	2
Mother thought breast milk not adequate	1	0
Other	4	3

Some of the subjects described their reasons in further detail and these descriptions in Appendix J are worth examining. The reasons are grouped according to the intended duration and the actual duration in weeks is indicated in brackets at the end of each comment.

Reasons for the Continuation of Breastfeeding (Question 29)

The reasons subjects continued to breastfeed are listed in Table 50. Of the 14 subjects in the non-engorged group who continued to breastfeed, 9 gave reasons as did 8 of the 13 subjects in the engorged group. In addition, three subjects in each group did not give reasons for continuing to breastfeed but did advise that they were in the process of weaning which was usually described as "baby weaning self". The subjects in the non-engorged and engorged groups presented a mean of 3.2 and 3 reasons respectively for continuing to breastfeed.

Table 50

Reasons for Continuing to Breastfeed at 24 Weeks - Number by Group

Reason	Non-Engorged Number	Engorged Number
Best nutrition/best for baby	4	2
Convenience	4	2
Enjoy the closeness of mother and baby	3	3
Economical	1	0
Satisfying	1	1
Content, happy, healthy, thriving baby	2	4
Calming, soothing effect on baby	2	0
Exclusive time with baby (multiparous subject)	1	0
Having no problems with breastfeeding	2	2
Baby/mother wants/enjoys breastfeeding	2	2
Protection from allergies, infections	0	2
Baby refuses bottle	1	1

A number of subjects described their reasons for continuing to breastfeed more fully as detailed in Appendix K. Throughout the comments of these mothers there runs a theme of enjoyment and competence with breastfeeding the baby.

Summary

The results of this study on the complications of lactation and the duration of breastfeeding associated with early engorgement in the postpartum period were analysed

using several quantitative and qualitative methods. Student's t-test was used to assess differences between means, Chi-square to determine differences between frequencies, descriptive statistics to describe data and qualitative reporting to clarify and expand the statistical reporting of the data.

The data from the first section on the characteristics of the sample were collected in order to ascertain the similarity of the groups on factors known to affect breastfeeding. There were no significant differences noted between the two groups and they were therefore considered to be similar on the antecedent factors which may affect breastfeeding. The four hypotheses were tested and significance was established on the first one concerning the occurrences of complications of lactation. The subjects in the engorged group experienced more complications of lactation than those in the non-engorged group. The next section dealt with the breastfeeding experience of the subjects at three months. Although there were no significant differences noted, there were some possible trends identified. The subjects in the non-engorged group were more likely to report help and advice as consistent, report insufficient milk as a reason to terminate breastfeeding, and less likely to breastfeed their babies at night. Subjects in the engorged group were more likely to report breastfeeding as being too physically demanding as a reason to terminate breastfeeding.

The final section was used to describe the experience of subjects from three months to six months. Some possible trends emerged from the data, although further research would be necessary to establish the veracity of these. There was a higher percentage of the subjects in the engorged group who continued to breastfeed at 12 weeks than in the non-engorged group. In general, the subjects from the non-engorged group were more likely to exceed their planned duration of breastfeeding, although all of the subjects in the engorged group who were undecided continued to breastfeed at 24 weeks. The subjects in the engorged group tended to introduce other foods at a later age and to have a breastfeeding pattern of more frequent but shorter feedings than the subjects in the non-engorged group.

Qualitative data have been inserted in the appendices to enhance the quantitative data. Some rather strong emotions which have surfaced in some of this data range from guilt and despondency to tremendous satisfaction and enjoyment and emphasize that breastfeeding is much more than a physiological process.

The following chapter contains a discussion of the results with conclusions and implications for nursing.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

Summary of the Study

This study was designed to investigate the effects of early engorgement on occurrences and recurrences of complications of lactation and on the duration of exclusive and mixed breastfeeding. Two groups of mothers, one comprised of mothers who had experienced early engorgement and the other comprised of mothers who had not experienced early engorgement, were recruited from the Robson (1987) study and sent mailed questionnaires at three months postpartum and again at six months postpartum if they were still breastfeeding at the three month period. Data were analysed, and reported in four sections: the similarity of the two groups of subjects on factors other than the early engorgement, the hypotheses, patterns of breastfeeding at three months, and the breastfeeding experience between three and six months. No significant differences were found between the two groups on the factors other than early engorgement, or in the experience of breastfeeding at three months and at six months. Significant differences were found only on the first of the four hypotheses.

All of the mothers in this study had Caesarian section deliveries, which have been associated with a decreased incidence and a limited duration of breastfeeding (Ellis & Hewat, 1984a; Samuels, Margen, & Schoen, 1985). In addition, about half of these were unplanned and the subjects, therefore, would not have had time to adjust to an abrupt change in their expectations of labour and delivery. The long-term effect on the mother-infant relationship of the unexpected change in the course of labour and delivery was beyond the scope of this study.

At 12 weeks there were 22/40 (55%) subjects in the non-engorged group and 21/30 (70%) subjects in the engorged group who were breastfeeding. Of these, 13/40 (32.5%)

and 16/30 (53.3%) in the non-engorged and engorged groups respectively were exclusively breastfeeding. Over 60% of the subjects who were breastfeeding at 12 weeks continued to breastfeed at 24 weeks. A number of the mothers breastfeeding at 24 weeks were practising what Morse, Harrison, and Prowse (1986) refer to as minimal breastfeeding, in which the breastfeeding is used more for comfort than for nutritional requirements. Only two subjects, both in the non-engorged group, continued to breastfeed exclusively at 24 weeks.

The reason(s) that the mothers gave for terminating breastfeeding can be categorized into groups on the basis of a maternally controlled or voluntary decision (albeit somewhat reluctantly in some cases) and an uncontrolled or involuntary decision where the mother was caught up in a series of events that were detrimental to successful breastfeeding. In the first group are the mothers who decided to terminate breastfeeding because of a return to work, or who felt that they had reached their goal in breastfeeding. The second group is comprised of mothers who were no longer able to manage the breastfeeding of their babies, whether from lack of knowledge about breastfeeding, from lack of active support, from lack of social support, or because of illness. In many cases, their situations were similar to the "transient lactation crisis" reported by Sjolin, Hofvander, and Hillervik (1979) and Verronen (1982). Many of the problems noted by the mothers as reasons for terminating breastfeeding are known to respond to appropriate and adequate management of breastfeeding. The involuntary termination was more common during the first three months, while voluntary termination was common during the second three months. During the three to six months period, only two subjects indicated that termination had been involuntary.

The interest of the subjects in this research was reflected in the unusually high response rate and in the many respondents who requested a summary of the research. Disbrow (1963) similarly noted the tremendous interest of her subjects in the research. Women are interested in breastfeeding and want to assist in the development of a

knowledge pool which will enable breastfeeding mothers in the future to benefit from their experiences. This interest is illustrated by the quote in the preface to this study.

Conclusions

This study was based on the research by Waller (1946), in which early failure of breastfeeding was investigated. An experimental group was trained during the last trimester to practice breastmilk expression and were advised to use this technique during the early postpartum period to control engorgement. Waller (1946) found that the mothers in the experimental group had a much higher incidence of exclusive breastfeeding at six months than did the mothers in the control group. He hypothesized that engorgement might result in tissue damage which would inhibit milk production and result in failure of lactation. Although the role of early engorgement is unclear, engorgement has been linked to lactation failure by other researchers (Fisher, 1984; Jelliffe & Jelliffe, 1978; Minchin, 1985; Newton & Newton, 1951).

Four research questions concerning early engorgement and the complications of lactation and the duration of breastfeeding were developed to guide the study. The conclusions related to each of these are considered in turn. In addition, a conclusion not related to the hypotheses, concerning the potential effect from contact of the engorged subjects with the researchers, became apparent from the data.

Occurrences of Complications

1. Do mothers who have experienced early engorgement have more occurrences of complications of lactation than mothers who have not experienced early engorgement?

The initial occurrence of a specific problem after discharge from hospital was counted as an "occurrence of complication of lactation", while all subsequent occurrences of the same problem were counted as "recurrences of complications of lactation". As the mothers were asked to report problems occurring since returning home, it is assumed that

complications which were experienced during the hospital stay, such as engorgement, were not reported at three months. Therefore, engorgement when reported on the questionnaires by those mothers who were in the engorged group refers to secondary engorgement following discharge from the hospital.

There were 62.5% of the non-engorged and 75.9% of the engorged subjects who reported occurrences of complications of lactation at the three month data collection period. There was a mean of .93 occurrences in the non-engorged group and 1.7 in the engorged group. Use of the Student's t-test for differences between means resulted in a significant finding at the $p = .05$ level of significance. The review of the literature suggested that early engorgement was linked with complications of lactation (Jelliffe & Jelliffe, 1978; Newton & Newton, 1951; Waller, 1946). Although the extent to which complications are linked with engorgement has not been documented, there was an expectation, on the basis of the literature, that the engorged subjects would have more occurrences of complications of lactation than their non-engorged counterparts. This expectation was met for the three month data collection period.

The nature of the complications of lactation reported by the two groups was of interest. The non-engorged group tended to report localized complications such as sore nipples while the engorged group tended to report more generalized complications such as engorgement or sore breasts in addition to sore nipples. The differences between "sore nipples" and "sore breasts" or "engorgement" imply a distinction that appears to differentiate the two groups: localized (nipple) or mechanical complications possibly resulting from incorrect positioning versus generalized (breast) or physiological complications resulting from possible damage to breast tissue. This differentiation is not unexpected, as the subjects in the engorged group would be expected to have more generalized complications due to the hypothesized effect of early engorgement on breast tissues.

There were few reported occurrences of complications of lactation between three and six months, and the groups did not differ in the incidence of these complications. This situation may be a result of the galactopoiesis stage (Jelliffe & Jelliffe, 1978) having been reached when breastfeeding had become established. Two subjects in the engorged group reported intermittent engorgement occurring whenever their babies did not feed regularly. Although no further description of this condition was given, it is possible that they might be labelling "fullness" as engorgement due to previous sensitization to that term.

There was a statistically significant difference between the two groups on occurrences of complications of lactation during the first three months, as expected. Nevertheless, it may be useful to examine the proportions of subjects in each group reporting problems or complications. There was no statistical difference between the two groups in the number of subjects experiencing breastfeeding problems while in the hospital. A trend was noted, however, since only half (47.5%) of the non-engorged group reported problems with breastfeeding compared to nearly three-quarters (73.33%) of the engorged group. When this is compared to the proportion of subjects reporting complications of lactation during the first three months (62.5% of the non-engorged and 75.9% of the engorged), there is a similarity, although proportionally more of the non-engorged subjects reported complications during the first three months than during the hospital stay. The finding of a significant difference in the occurrences of complications during the first three months is not surprising, since proportionally more of the engorged subjects reported problems while in the hospital and were expected to experience more problems due to the hypothesized physiological effects of early engorgement.

Of interest is the finding that only 9 (40.9%) of the 22 engorged subjects reported engorgement as a problem while in the hospital. Early engorgement might have been viewed as a confirmation of the mother's ability to produce adequate milk to feed her infant, although this possibility was not explored in the present study.

Recurrences of Complications

2. **Do mothers who have experienced early engorgement have more recurrences of complications of lactation than mothers who have not experienced early engorgement?**

There were no statistically significant differences noted between the two groups on recurrences of complications of lactation. This finding was unexpected. On the basis of the literature (Jelliffe & Jelliffe, 1978; Newton & Newton, 1951; Waller, 1946), and the findings on occurrences of lactation, there was an expectation that there would be more recurrences of complications in the engorged group. While 44% of the non-engorged subjects who had experienced complications of lactation had no recurrences, 60.9% of the subjects in the engorged group who had reported complications experienced no recurrences. On the basis of the literature on the physiology of lactation (Jelliffe & Jelliffe, 1978), the process of engorgement (Newton & Newton, 1951; Waller, 1946), and the association between engorgement and complications of lactation (Newton & Newton, 1951) there was an expectation that the effects of early engorgement would lead to damage to the breast tissues, resulting in not only more occurrences of complications, but also in more recurrences of those complications.

Nevertheless, for those subjects who reported recurrences, there were more instances of recurrences amongst the subjects in the engorged group than amongst those in the non-engorged group. Information on the degree of early engorgement experienced by the mothers was not available, but there is a possibility that those who experienced more severe engorgement might have been more subject to recurrences. Alternately, there is a possibility that those who were less aware of the management of breastfeeding might have experienced more complications. As with the occurrences of complications, sore nipples were reported most by the non-engorged group while secondary engorgement and sore breasts were reported most commonly by the engorged group.

The unexpected finding of proportionally fewer subjects in the engorged group experiencing recurrences might be attributed to careful management of initial occurrences.

thereby averting the more serious long-term sequelae and leading to a pattern of breastfeeding that promotes frequent emptying of the breasts. The data on the three month patterns of breastfeeding indicated that the non-engorged group breastfed fewer times a day than the engorged group, 5.667 versus 6.0 respectively, and fed during the night less than the engorged subjects, 28.57% versus 60% respectively. Emptying of the breasts frequently throughout the 24 hours of the day might compensate for the tendency toward complications. There is also the possibility that the subjects in the engorged portion of the Robson study received more initial assistance with breastfeeding because of their engorgement and the requirements of the research, and that on discharge they were more knowledgeable and assured about the management of both normal lactation and such lactational complications as engorgement.

Duration of Exclusive Breastfeeding

3. Do mothers who have experienced early engorgement have a shorter duration of exclusive breastfeeding than mothers who have not experienced early engorgement?

There were no statistically significant differences noted between the two groups in relation to exclusive breastfeeding at 12 weeks. This finding was unexpected. From the literature there was an expectation that the engorged mothers would have more complications, which would interfere with their ability to exclusively breastfeed their infants. At 12 weeks, the overall percentage of mothers exclusively breastfeeding was 41.4%. This rate is similar to figures presented by some researchers (Ellis & Hewat, 1986; Piu et al., 1984) but lower than those presented by Sjolin, Hofvander and Hillervik in 1979. There were proportionally fewer mothers from the non-engorged group (32.5%) exclusively breastfeeding their infants at 12 weeks than in the engorged (53.33%) group. There was no difference in the duration of exclusive breastfeeding between the groups for those mothers who terminated exclusive breastfeeding prior to 12 weeks.

A possible explanation for this unexpected finding might be found in the patterns of breastfeeding, incorporating more frequent feedings as well as night feedings, as noted above, as well as the possibility that the engorged mothers were more assured about the management of breastfeeding and therefore less apt to supplement. Just over 50% of the non-engorged mothers and 40% of the engorged mothers received free formula on discharge. Minchin (1985) has suggested that such formula provides a temptation to the new breastfeeding mother when the first problem occurs to solve it with formula - a practice which is detrimental to breastfeeding and may lead to a decreased milk supply. The frequency with which "insufficient milk" was reported as a reason to terminate breastfeeding prior to 12 weeks may be linked to this practice of distributing free formula samples. Furthermore, this practice is an implicit endorsement of formula feeding as superior to breastfeeding and may well undermine the confidence of the breastfeeding mother about her ability to nourish her infant.

The overall percentage of mothers exclusively breastfeeding at 24 weeks was 2.9%, which is somewhat lower than figures noted by other researchers (Ellis & Hewat, 1986; Piu et al.,1984; Sjolin, Hofvander & Hillervik, 1979). Only 2 of the 40 mothers (5%) in the non-engorged group continued to breastfeed exclusively at 24 weeks while none of the mothers in the engorged group reported exclusive breastfeeding at 24 weeks. Since there were few complications experienced by either group during the period from three to six months, the low incidence of exclusive breastfeeding may be related more to environmental/social factors than to problems of lactation. Certainly, a number of mothers indicated that a return to work was their reason to use mixed feeding and it may be that similar factors influenced most of the mothers to terminate exclusive breastfeeding.

Duration of Mixed Breastfeeding

4. Do mothers who have experienced early engorgement have a shorter duration of mixed breastfeeding than mothers who have not experienced early engorgement?

Due to the small numbers of subjects who used mixed breastfeeding and terminated by three months, statistical tests were not used. Nevertheless, there were no apparent differences between the seven non-engorged subjects who terminated breastfeeding at a mean of 8.86 weeks and the three engorged subjects who terminated at a mean of 7.67 weeks. Of interest were the ten subjects from the non-engorged group and the six from the engorged group who terminated exclusive breastfeeding without a period of mixed breastfeeding. This finding might well be an artifact of the questionnaire design, which directed respondents who had terminated breastfeeding to go to question 26, thereby missing question 25, which described the term "foods other than breast milk". There were some respondents who indicated that their infants did not receive any "foods other than breast milk" until some weeks after they stopped breastfeeding. Thus they may not have considered formula to be a food other than breast milk.

Overall there were 27/70 (38.6%) of the subjects who continued to breastfeed at 24 weeks. There were 14/40 (35%) of these subjects in the non-engorged group and 13/30 (43.3%) in the engorged group. The period between three and six months, the galactopoiesis stage, tended to be characterized by few problems and and a sense of competence in breastfeeding. Over 60% of the mothers who were breastfeeding at 12 weeks continued to breastfeed at 24 weeks. Although there were very few (2/70) mothers who continued to exclusively breastfeed to the recommended six months, minimal breastfeeding was being practiced by many of those who continued to breastfeed at 24 weeks.

The effect of engorgement on the duration of breastfeeding might have been masked by the influence of mixed breastfeeding. The use of mixed breast and formula feeding early in the postpartum period has been linked to an early termination of breastfeeding (Ellis & Hewat, 1986; Feinstein, Berkelhamer, Gruszka, Wong & Carey, 1986; Minchin, 1985; Wright & Walker, 1983), and over 80% of the infants in this study received supplementation or complementation with formula while in the hospital. Furthermore, no

comments can be made on the effect of formula, received by approximately half of the subjects on discharge from hospital, on the duration of breastfeeding as this issue was beyond the scope of this study.

Support of Breastfeeding

The importance of appropriate and adequate support for breastfeeding mothers and the need for a long-term perspective of breastfeeding were clearly demonstrated through the comments and data of this study. The importance of this support must be emphasized. Many authors (Auerbach, 1985; Culpin, 1984; Ekwo, Dusdieker, Booth & Seals, 1984; Ellis & Hewat, 1984a; Ellis & Hewat, 1984b; Ellis & Hewat, 1986; Fisher, 1984; Gunn, 1984; Hewat & Ellis, 1986; Houston, 1984a; Houston, 1984b; Houston, Howie, Cook, & McNeilly, 1981; Humenick & Steenkiste, 1983; Jones & West, 1985; Jones, West, & Newcombe, 1986; Knauer, 1981; McIntosh, 1985; Minchin, 1985; Sjolin, Hofvander, & Hillervik, 1979; Starling, Fergusson, Horwood, & Taylor, 1979; Tanaka, Yeung, & Anderson, 1987; Verronen, 1982; Waldenstrom, Sundelin, & Lindmark, 1987) have referred to support and the effect of support on the duration of breastfeeding. Houston (1984b) has noted that the factors which affect breastfeeding are very complex. The complexity and interrelatedness of the many factors identified as affecting breastfeeding were apparent in this study, where a distinct difference was also noted between the two collection periods paralleling the stages of lactogenesis and galactopoiesis. The first three months, the stage of lactogenesis, are a time of rather delicate balance when the mother and baby are adjusting to one another and to the breastfeeding process. Complications were more common and involuntary termination of breastfeeding more likely to occur during this period. During galactopoiesis there were few complications and a greater sense of enjoyment of breastfeeding by both mother and infant.

New mothers need appropriate assistance with the first breastfeeding and every feeding until they are ready to undertake the feedings on their own (Auerbach, 1985;

Ekwo, Dusdieker, Booth & Seals, 1984; Ellis & Hewat, 1984a; Ellis & Hewat, 1984b; Gunn, 1984; Houston, 1984a; Humenick & Steenkiste, 1983; Jones & West, 1985; Jones, West, & Newcombe, 1986; McIntosh, 1985; Tanaka, Yeung, & Anderson, 1987; Waldenstrom, Sundelin, & Lindmark, 1987). This is particularly so when the mother has had an operative delivery and has an incision with its consequent problems to cope with, in addition to learning to position and breastfeed her infant. Approximately 30% of the mothers in this study received no assistance with the first breastfeeding and approximately 39% of those receiving assistance were either neutral or dissatisfied with the assistance they received. But appropriate support, assistance, and education while the mother is in the hospital is not enough.

There were a great many comments by the mothers on the importance of appropriate and adequate support throughout the breastfeeding period. Some of these comments were related to the termination of breastfeeding. The reasons given for terminating breastfeeding, particularly during the first three months were often of the type that Sjolin, Hofvander, and Hillervik (1979) and Verronen (1982) labelled transient lactation crises. With appropriate and adequate support many of the mothers in these studies continued to breastfeed. Perhaps with such support there might have been fewer mothers terminating breastfeeding involuntarily.

Accuracy and consistency in help and advice are very important. McIntosh (1985) noted that three-quarters of those terminating breastfeeding had sought help, mostly from health professionals, and had been advised to start bottle feeding. Certainly, most of the mothers in this present study had sought assistance or advice from several sources. The satisfaction (or dissatisfaction) with the accuracy of the information and the consistency between sources was noted as a problem by mothers in this study. Generally, those mothers rating information as consistent either limited the number of sources or kept looking until they found one that suited them. In other cases, the subjects apparently weren't able to satisfactorily resolve the conflicting information and expressed their

frustration in their comments, in addition to indicating that help or advice was inconsistent. The importance of consistency and accuracy of sources in responding to the mother's particular situation in order to assist her in continuing to breastfeed must not be underestimated.

In supporting breastfeeding mothers, a change in the prevailing perception of the postpartum condition may be needed. Rubin (1975) emphasized the difference between the "normal condition" of a woman and the "normal postpartum condition" of a woman and argued that our society fails to recognize this alteration of the physiological and psycho-social dimensions in the postpartum period. Perhaps one of the most important findings of this study is that the differentiation between "normal" and "normal postpartum" was evident from the mothers' comments and the frustration and disappointment of the mothers who involuntarily terminated breastfeeding or of those mothers who persisted until they finally found a solution to their problem. There is also a necessity to recognize the differentiation between lactogenesis and galactopoiesis and to understand the delicate balance of the lactogenesis stage of breastfeeding and to communicate this understanding to breastfeeding mothers and society as a whole.

Gunn (1984) reports clearly that mothers who are unsuccessful at breastfeeding are unlikely to try again with subsequent infants. Although at least two subjects in this study had unsuccessful previous experiences and were attempting to breastfeed again, only one of them reported her breastfeeding experience as satisfactory. The other mother terminated breastfeeding because of insufficient milk, which was the same problem in her previous attempt to breastfeed. Moreover, there is a suggestion from some literature that unsuccessful breastfeeding may have detrimental effects on the mother's self-esteem (Disbrow, 1963; Humenick & Van Steenkiste, 1983). The effect that poor self-esteem resulting from unsuccessful breastfeeding may have on the parenting relationship is hard to predict.

Support for the breastfeeding mother is of paramount importance as has been well stated by the World Health Organization. "There is no reason to accept the premise that breast-feeding is incompatible with modern industrialized society, and every reason to believe that, with adequate social sensitivity to the needs of mothers and children and with appropriate supportive measures to help meet those needs, breast-feeding can retain its integral place in the process of human reproduction and child development" (World Health Organization, 1981 p. 9).

Utility of the Model

The conceptual model of the effect of early engorgement on the course of lactation was developed to illustrate the conceptual framework which was based on the review of the literature. Although this research was not designed specifically to test the utility of the model, the results of the research would indicate that the model has value as an instrument to enable professionals to recognize the long-term consequences of events in the early postpartum period. This model is based on the physiology of lactation and does not illustrate the importance of appropriate and adequate support throughout the breastfeeding period. The results of this research would suggest that support is at least as important as optimum physiological conditions and perhaps appropriate and adequate support may overcome some of the difficulties caused by less than optimum physiological conditions. Further research in this area is necessary.

Implications for Nursing

There appears to be a potential relationship between early postpartum engorgement and an increased incidence of complications of lactation in the first three months postpartum. Engorgement has been described as an iatrogenic condition and nurses, as the usual care-givers for hospitalized postpartum mothers, must be aware not only of the

etiology of engorgement but also of means of preventing engorgement. Certainly, prevention is preferable.

The importance of knowledgeable assistance for the breastfeeding mother cannot be over-emphasized. Respondents indicated that competent, supportive assistance in the early postpartum period greatly enhanced their ability to breastfeed their babies. Nurses must be aware of the critical effect of their assistance to the new mother in hospital, as well as in the community, in getting the mother off to a good start in breastfeeding. Nurses may well have to unlearn some old patterns and "knowledge" of breastfeeding and update their information on practices which are beneficial to breastfeeding. There needs to be a synthesis of the theoretical knowledge of lactogenesis with the practical function of breastfeeding during the first three to four months.

There are two areas, education and support, in which nurses are ideally suited to participate in the promotion of breastfeeding. Nurses are in an ideal position to ensure that breastfeeding mothers understand the physiology of lactation. Respondents indicated that such knowledge gave them the confidence and competence to assess difficulties, such as temporary lack of milk, and to respond appropriately. The importance of appropriate education of nurses and breastfeeding mothers on the underlying physiology of lactation as well as the proper technique of breastfeeding must be emphasized in order to enable the mother to manage her lactation successfully. In addition, respondents indicated that they were not prepared for the range of normal infant behaviour, in particular, the sleep-wake and feeding patterns of their infants and would have appreciated such information.

In the area of support, nurses can advocate the increased availability of resources, both monetary and otherwise, for the support of breastfeeding, in addition to their direct support of breastfeeding mothers. This support must actively acknowledge the distinction between "normal" and "normal postpartum" and endeavour to ensure that all breastfeeding mothers have the assistance which they require to enable them to breastfeed their infant.

Nurses also have excellent opportunities to learn directly from breastfeeding mothers who may be willing to share their experiences for the benefit of other mothers. Several of the subjects in this study included comments on how nurses could improve their practice in relation to caring for breastfeeding mothers. Mothers do want to breastfeed their infants and the support of nurses may have a tremendous influence on their success.

Limitations of the Study

Quasi-experimental designs affect the generalizability of the findings and this study was limited to subjects who had experienced an operative delivery. The findings are not, therefore, generalizable to the population of mothers not experiencing operative delivery.

The small sample size of this study limits the statistical power and might contribute to a non-significant finding when in fact there may be a difference between the groups. Moreover, corroboration of the trends identified must be based on research utilizing larger samples.

The use of a newly developed questionnaire resulted in some confusion by the respondents on one question. Consequently, some data were missing.

Recommendations for Further Research

Research on a larger sample of breastfeeding mothers to investigate the long-term effects of engorgement in the early postpartum period is necessary to confirm the results of this research. Ideally, such research would utilize subjects having a normal vaginal delivery, in order to control for any effect of the operative delivery.

Much of the information on lactation tends to focus on the reasons why mothers terminate breastfeeding; however, this focus needs to be balanced by information on the course of lactation of mothers who have been "successful" at breastfeeding. There is a need for research on the parameters of the normal course of extended breastfeeding to both

prepare mothers for extended breastfeeding and to enable others, including nurses, to develop appropriate and adequate support for breastfeeding mothers.

There has been an historical change in the characteristics of mothers who breastfeed. Research to uncover the underlying reasons why mothers breastfeed and conversely, why mothers don't breastfeed, would assist in the appropriate promotion of breastfeeding.

There is little research on the sequelae of a discrepancy between a mother's expected duration of breastfeeding and her actual duration. There has been a suggestion that the self-esteem of the mother and possibly her relationship with her child may be adversely affected by a perceived failure in the duration of breastfeeding. There is a need for research in this area.

There was a perception by a number of the subjects that their infants were exhibiting weaning behaviour prior to six months of age. There is little information available on the normal course of breastfeeding, but there is a suggestion that the perceived weaning behaviours, such as gazing around while feeding, might be related to developmental stages and not to weaning behaviour. Further research to describe infant weaning behaviours and to compare these to developmental behaviours at different ages is needed in order to assist mothers and others to assess the "message" of the behaviours.

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APPENDIX A

Questionnaire

I.D. # ___

QUESTIONNAIRE ON BREASTFEEDING, COMPLICATIONS AND DURATION

Please indicate the date when this questionnaire was completed. _____

These questions are about you and your baby

1. When did you first decide you wanted to breastfeed your baby? (Circle the number of your answer)
   1. BEFORE I BECAME PREGNANT
   2. IN THE FIRST THREE MONTHS OF PREGNANCY
   3. IN THE SECOND THREE MONTHS OF PREGNANCY
   4. IN THE LAST THREE MONTHS OF PREGNANCY
   5. JUST AFTER THE BABY WAS BORN

2. How long had you planned to breastfeed your baby when you made this decision?
   1. LESS THAN THREE MONTHS
   2. THREE TO SIX MONTHS
   3. MORE THAN SIX MONTHS
   4. NO DEFINITE PLANS IN ADVANCE

3. What were the reasons you decided to breastfeed? (Please describe below)

   _____

   _____

   _____

4. Have you breastfed a baby before? (Circle the number of your answer)

   1. NO 2. YES

5. Did your mother breastfeed any of her children? (Circle the number of your answer)

   1. NO 2. YES 3. DON'T KNOW

6. Does your husband/partner encourage you to breastfeed the baby? (Circle the number of your answer)

   1. STRONGLY DISCOURAGES 2. DISCOURAGES 3. NEUTRAL 4. ENCOURAGES 5. STRONGLY ENCOURAGES

7. Was your Caesarian section planned in advance of your labour beginning? (Circle the number of your answer)

   1. NO 2. YES

   ↓

   (Please indicate the reasons for your Caesarian-section in the space below)

   _____

8. What type of anaesthetic was used for your Caesarian section? (Circle the number of your answer)

1. GENERAL ANAESTHETIC 2. EPIDURAL (SPINAL) 3. OTHER_____

9. The first time you breastfed the baby was _____ hours after the birth.(Please circle the number of your answer)

1. LESS THAN ONE HOUR
2. ONE TO FOUR HOURS
3. FIVE TO EIGHT HOURS
4. NINE TO TWELVE HOURS
5. MORE THAN TWELVE HOURS (Please Describe) _____

_____

10. Did you have assistance with the first breastfeeding? (Circle the number of your answer)

1. NO 2. YES
(please indicate who assisted you)

A. HUSBAND/PARTNER
B. MOTHER
C. NURSE
D. OTHER_____

11. Were you satisfied with the assistance you received? (Circle the number of your answer)

1. VERY DISSATISFIED 2. DISSATISFIED 3. NEUTRAL 4. SATISFIED 5. VERY SATISFIED

(please comment in the space below)

_____

_____

_____

12. Did you breastfeed your baby on "demand" (whenever the baby wanted to feed) after the first 24 hours? (Circle the number of your answer)

1. NO 2. YES
(please comment on the reasons in the space below)

_____

_____

_____

13. Did you experience any problems breastfeeding your baby while in hospital? (Circle the number of your answer)

1. NO

2. YES
(please describe the problems below)

_____

_____

_____

14. Did you have your baby in your room with you (after the first 24 hours) during the day? (Circle your answer)

1. NO

2. YES

A). ALL THE TIME

B). FOR FEEDING ONLY

15. Did you have your baby in your room with you (after the first 24 hours) during the night? (Circle your answer)

1. NO

2. YES

A). ALL THE TIME

B). FOR FEEDING ONLY

16. To the best of your knowledge, did your baby receive formula, glucose (sugar) water, or water (after the first 24 hours) while in the hospital? (Circle the number of your answer)

1. NO

2. YES
(please indicate the number of times in the space below)

3. DON'T KNOW

_____

17. Did you receive free formula from the hospital to take home with you? (Circle the number of your answer)

1. NO

2. YES

18. Were you separated from your baby for more than four hours during the day (after the first 24 hours) while in hospital? (Circle the number of your answer)

1. NO

2. YES
(please indicate the number of times and the reasons in the space below)

_____

_____

_____

19. Were you separated from your baby for more than four hours during the night (after the first 24 hours) while in hospital? (Circle the number of your answer)

1. NO

2. YES
(please indicate the number of times and the reasons in the space below)

_____

_____

_____

These questions are about your baby at the present time

20. What is your baby's date of birth?

(PLEASE INDICATE THE DATE IN THE SPACE BELOW)

_____

21. Are you breastfeeding your baby at the present time? (Circle the number of your answer)

1. NO

(Please go to question 26)

2. YES

22. On the average, how many times does your baby currently breastfeed in a 24 hours period?

(PLEASE INDICATE THE NUMBER OF TIMES IN THE SPACE BELOW)

_____

23. On the average, how long does your baby currently feed at each breastfeeding?

(PLEASE INDICATE THE NUMBER OF MINUTES IN THE SPACE BELOW)

_____

24. Does your baby currently breastfeed during the night (from 11 p.m. to 6 a.m.)? (Circle the number of your answer)

1. NO

2. YES

25. Is your baby receiving any food (such as juice, formula, pablum) in addition to breastmilk ? (Circle the number of your answer)

1. NO ↓ (Please go to question 29)

2. YES

26. How old (in weeks) was your baby when he/she began to receive foods in addition to breastmilk (do not include formula feedings in hospital)?

(PLEASE INDICATE YOUR BABY'S AGE IN WEEKS IN THE SPACE BELOW)

_____

27. If you answered 'NO' to question 21, how old (in weeks) was your baby when you stopped breastfeeding?

(PLEASE INDICATE YOUR BABY'S AGE IN WEEKS IN THE SPACE BELOW)

_____

28. What was your reason(s) for giving up breastfeeding? [Circle the number of your answer(s) and describe the reason(s)]

1. INSUFFICIENT MILK
2. ILLNESS OF MYSELF
3. ILLNESS OF THE BABY
4. BABY NOT GAINING WEIGHT
5. BABY CRIES A LOT
6. TOO PHYSICALLY DEMANDING
7. I WAS DISSATISFIED WITH BREAST-FEEDING
8. BABY NOT SUCKING WELL
9. PROBLEMS OF MY NIPPLES
10. ON THE ADVICE OF THE DOCTOR
11. INCONVENIENT
12. I WAS RETURNING TO WORK
13. I FELT FATIGUED
14. BABY DISLIKES BREASTFEEDING
15 I THOUGHT BREASTMILK NOT ADEQUATE FOR BABY
16 OTHER_____

(please explain reason(s) in the space below)

_____

_____

_____

_____

_____

29. If you are breastfeeding, what are your reason(s) for continuing to breastfeed? (Please explain reasons in the space below)

_____

_____

_____

_____

_____

_____

30. Here is a list of problems which may be experienced by breastfeeding mothers. Please circle the problem number(s) of those which you have experienced since returning home from the hospital.

1. SORE NIPPLES
2. CRACKED OR BLEEDING NIPPLES
3. SORE BREASTS
4. BLOCKED DUCT(S) OF BREAST
5. ENGORGEMENT
6. BREAST INFECTION
7. OTHER_____

31. For each problem which you circled on the list above, please fill in the forms using the definitions below as guides. The first one is an example as a guide. If you require further spaces, please use the back of the page.

Problem Number: Please indicate the problem number from the list above.

Baby's Age: Please indicate your baby's age (in weeks) when the problem first occurred.

Number of Times: Please indicate the number of times that this problem has occurred.

Description of Problem: Please describe such things as events that contributed to the problem, how you felt, and specifically how the problem may or may not have affected breastfeeding.

What did you do?: Please describe such things as any assistance you sought for information or treatment, what you did to treat or eliminate the problem.

Problem Number_____ Baby's Age_____ Number of Times_____

Description of Problem:_____

_____

What did you do? _____

_____

Problem Number_____ Baby's Age_____ Number of Times_____

Description of Problem:_____

_____

What did you do? _____

_____

Problem Number_____ Baby's Age_____ Number of Times_____

Description of Problem:_____

_____

What did you do? _____

_____

Problem Number_____ Baby's Age_____ Number of Times_____

Description of Problem:_____

What did you do? _____

Problem Number_____ Baby's Age_____ Number of Times_____

Description of Problem:_____

What did you do? _____

Problem Number_____ Baby's Age_____ Number of Times_____

Description of Problem:_____

What did you do? _____

These questions are about you

32. Are you currently using oral contraceptives (birth control pills)? (Circle the number of your answer)

1. NO 2. YES

33. During the period you were breastfeeding, did you smoke? (Circle the number of your answer)

1. NO 2. YES
(please indicate the number of cigarettes smoked/day in the space below)

_____

34. How old (in years) were you when your baby was born?
(PLEASE INDICATE YOUR AGE IN YEARS IN THE SPACE BELOW)

_____

35. Which of the income categories below indicates your total family income for this past year? (Circle the number of your answer)

1. UNDER 5000
2. 5000 - 14,999
3. 15,000 - 24,999
4. 25,000 - 34,999
5. 35,000 - 44,999
6. 45,000 - 54,999
7. 55,000 - 64,999
8. 65,000 - 74,999
9. 75,000 AND OVER

36. What is the highest level of education that you have completed? (Circle the number of your answer)

1. NO SCHOOLING
2. ELEMENTARY SCHOOL
3. JUNIOR HIGH SCHOOL
4. HIGH SCHOOL
5. VOCATIONAL, TECHNICAL OR NURSING SCHOOL
6. COLLEGE DIPLOMA OR CERTIFICATE
7. UNIVERSITY BACHELOR'S DEGREE
8. UNIVERSITY GRADUATE DEGREE

37. Are you currently married or living with the father of your baby? (Circle the number of your answer)

1. NO
2. YES

38. Including this baby, to how many live children have you given birth? (Circle the number of your answer)

1. ONE
2. TWO
3. THREE
4. FOUR OR MORE

39. Including this baby, how many children do you have living with you? (Circle the number of your answer)

0. NONE
1. ONE
2. TWO
3. THREE
4. FOUR OR MORE

40. Where have you gone for help or advice about breastfeeding this baby? (Circle the number(s) of your answer)

1. NO ONE
2. LA LECHE LEAGUE
3. LACTATION CONSULTANT
4. NURSE
5. BOOKS, PAMPHELETS, ETC.
6. DOCTOR
7. FRIEND
8. MOTHER
9. HUSBAND OR PARTNER
10. OTHER _____

41. Did you find that the information you received from those you contacted was consistent? (Circle the number of your answer)

1. VERY INCONSISTENT
2. SOMEWHAT INCONSISTENT
3. NEUTRAL
4. SOMEWHAT CONSISTENT
5. VERY CONSISTENT

(please explain below)

_____

_____

_____

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

APPENDIX B

Questionnaire Items and the Reference Sources

Number	Questionnaire Item	References
1.	Time of decision to breastfeed	Aberman & Kirchoff, 1985 Goodine & Fried, 1984 Gunn, 1984 Jones, West, & Newcombe, 1986 Lynch, Koch, Hislop &Coldman,1986 McIntosh, 1985 Solberg, 1981
2.	Intended duration of breastfeeding	Disbrow, 1963 Gunn, 1984 Humenick & Van Steenkiste, 1983 Sjolin, Hofvander, & Hillervik, 1977 Starling, Fergusson, Horwood, & Taylor, 1979
3.	Reasons for deciding to breastfeed	Knauer, 1981 McIntosh, 1985 Yeung, Pennell, Leung, & Hall, 1981
4.	Previous breastfeeding experience	Fisher, 1984 Gunn, 1984 Yeung, Pennell, Leung, & Hall, 1981
5.	Mother of subject breastfed her children	Solberg, 1981 Yeung, Pennell, Leung, & Hall, 1981
6.	Support of husband/partner	Auerbach, 1985 Ekwo, Dusdieker, Booth, & Seals, 1984 Ellis & Hewat, 1984a Ellis & Hewat, 1984b Gunn, 1984 Houston, 1984a Humenick & Van Steenkiste, 1983 Jones & West, 1986 Jones, West, & Newcombe, 1986 McIntosh, 1985 Tanaka, Yeung, & Anderson, 1987 Waldenstrom, Sundelin, & Lindmark, 1987
7.	Caesarian section planned in advance	Goodine & Fried, 1984 Humenick & Van Steenkiste, 1983 Samuels, Margen, & Schoen, 1985

8.	Type of anaesthetic	La Leche League International,1981 LaCerva, 1981 Varney,1987
9.	Time of first breastfeeding	Elander & Lindberg, 1984 Ellis & Hewat, 1986 Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986 Hewat & Ellis, 1986 Isenalumhe & Owiawe, 1987 McIntosh, 1985 Waldenstrom, Sundelin, & Lindmark, 1987 World Health Organization, 1981 Wright & Walker, 1983
10.	Assistance with first breastfeeding	Fisher, 1984 Jones & West, 1986 Solberg, 1981 Verronen, 1982
11.	Satisfaction with assistance received	McIntosh, 1985
12.	Demand feeding	DeCarvalho, Robertson, Friedman, & Klaus, 1983 Elander & Lindberg, 1984 Ellis & Hewat, 1986 Hewat & Ellis 1986 Newton & Newton, 1951 Newton, 1952 Samuels, Margen, & Schoen, 1985 Starling, Fergusson, Horwood, & Taylor, 1979 Waldenstrom, Sundelin, & Lindmark, 1987 Walter, 1982
14, 15, 18, 19.	Rooming-in during the day and night with unrestricted access to infant	DeCarvalho, Robertson, Friedman, & Klaus, 1983 Elander & Lindberg, 1984 Ellis & Hewat, 1986 Hewat & Ellis 1986 Newton & Newton, 1951 Newton, 1952 Samuels, Margen, & Schoen, 1985 Starling, Fergusson, Horwood, & Taylor, 1979 Waldenstrom, Sundelin, & Lindmark, 1987 Walter, 1982

16.	Supplementation or complementation of breastfeeding infants	Ellis & Hewat, 1986 Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986 Goodine & Fried, 1984 Isenalumhe & Owiawe, 1987 Samuels, Margen, & Schoen, 1985 Starling, Fergusson, Horwood, & Taylor, 1978
17.	Free formula in discharge packs	Bergevin, Dougherty, & Kramer, 1983 Minchin, 1985
22, 23, 24.	Patterns of infant feeding	Ekwo, Dusdieker, Booth & Seals, 1984 Helsing, 1982 Hewat & Ellis, 1986 Humenick & Van Steenkiste, 1983 La Leche League International, 1981 Minchin, 1985
28.	Reasons for terminating breastfeeding	Auerbach & Guss, 1984 Ekwo, Dusdieker, Booth, & Seals, 1984 Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986 Goodine & Fried, 1984 Gunn, 1984 Hewat & Ellis, 1986 McIntosh, 1985 Rogers, Morris, & Taper, 1987 Salariya, Easton, & Cater, 1979 Sjolin, Hofvander, & Hillervik1977 Stahlberg, 1985 Starling, Fergusson, Horwood, & Taylor, 1979 Tanaka, Yeung, & Anderson, 1987 Verronen, 1982 Whichelow, 1979 World Health Organization, 1981 Yeung, Pennell, Leung, & Hall, 1981
29.	Reasons for continuing to breastfeed	Knauer, 1981 McIntosh, 1985 Minchin, 1985 Yeung, Pennell, Leung, & Hall, 1981
30, 31.	Complications of lactation	La Leche League International, 1981 LaCerva, 1981 Helsing, 1982 Minchin, 1985 Woessner, Lauwers, & Bernard, 1987

32.	Use of Oral Contraceptives	Helsing, 1982 Jelliffe & Jelliffe, 1978 La Leche League International, 1981 Minchin, 1985 Whichelow, 1979
33.	Smoking	Counsilman & McKay, 1985 Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986 Goodine & Fried, 1984 Lyon, 1983 Whichelow, 1979 Wright & Walker, 1983 Yeung, Pennell, Leung, & Hall, 1981
34.	Maternal age	Aberman & Kirchhoff, 1985 Ekwo, Dusdieker, Booth, & Seals, 1984 Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986 Hewat & Ellis, 1986 Lynch, Koch, Hislop, & Coldman, 1986 McIntosh, 1985 Piu et al., 1984 Samuels, Margen, & Schoen, 1985 Sjolin, Hofvander & Hillervik, 1977 Starling, Fergusson, Horwood, & Taylor, 1979 Wright & Walker, 1983 Yeung, Pennell, Leung, & Hall, 1981
35.	Income Level (socio-economic status)	Gunn, 1984 Jones, West, & Newcombe, 1986 McIntosh, 1985 Sjolin, Hofvander & Hillervik, 1977 Stahlberg, 1985 Wright & Walker, 1983 Yeung, Pennell, Leung, & Hall, 1981
36.	Educational attainment	Feinstein, Berkelhamer, Gruszka, Wong, & Carey, 1986 Goodine & Fried, 1984 Lynch, Koch, Hislop, & Coldman, 1986 Piu et al., 1984 Sjolin, Hofvander & Hillervik, 1977 Starling, Fergusson, Horwood, & Taylor, 1979 Wright & Walker, 1983 Yeung, Pennell, Leung, & Hall, 1981

37.	Marriage or co-habitation with the father of the baby	Gunn, 1984 Samuels, Margen, & Schoen, 1985 Sjolin, Hofvander & Hillervik, 1977 Starling, Fergusson, Horwood, & Taylor, 1979
38, 39.	Parity	Gunn, 1984 Jones, West, & Newcombe, 1986 Samuels, Margen, & Schoen, 1985
40, 41.	Sources of help or advice and consistency in help or advice received	Auerbach, 1985 Culpin, 1984 Ekwo, Dusdieker, Booth, & Seals, 1984 Ellis & Hewat, 1986 Fisher, 1984 Gunn, 1984 Hewat & Ellis, 1986 Houston, 1984a Houston, Howie, Cook, & McNeilly, 1981 Jones & West, 1986 Jones, West, & Newcombe, 1986 Knauer, 1981 McIntosh, 1985 Sjolin, Hofvander, & Hillervik, 1979 Starling, Fergusson, Horwood, & Taylor, 1979 Tanaka, Yeung, & Anderson, 1987 Verronen, 1982 Waldenstrom, Sundelin, & Lindmark, 1987

APPENDIX C

Permission for Contact

PERMISSION FOR CONTACT REGARDING A BREASTFEEDING FOLLOW-UP STUDY

I agree to be contacted if a follow-up study on breastfeeding is conducted. Such a survey is currently being planned by another researcher. This proposed survey would be carried out in the first six months postpartum and may consist of one or two questionnaires which would be mailed to me at my home address.

By providing my name, address, and telephone number, I indicate that I am willing to be contacted.

A letter of information would be sent to me at which time I may make a decision as to whether or not to participate in the study.

_____
Signature

_____
Name (Please Print)

_____
Date

_____

_____

_____
Address (Please Print)

_____
Telephone

APPENDIX D

Covering Letter for Questionnaire Mailed at Three Months

«DATA Mailmerge 1»

519 B Michener Park
Edmonton, Alberta
T6H 4M5

June 1 1988

«name»
«address»
«city», «province».
«code»

Dear «name»,

I appreciate your consent, given in the hospital following the birth of your baby, to agree to be contacted for study on breastfeeding. The purpose of this study is to learn about breastfeeding patterns and problems, since we know very little about breastfeeding once a mother and baby are at home. Please complete the questionnaire even if you are no longer breastfeeding your baby. The answers on the questionnaire will help us learn more about breastfeeding.

Enclosed is the questionnaire being sent to all participants. No names will be used in the study or the reporting of the results. The I.D. # at the top of the questionnaire is for the purpose of knowing which group you are in and bears no relation to your name. I realize that you are probably very busy with your baby and other responsibilities, so the questionnaire requires a minimum of time and effort to complete. It is very important that the questionnaire be returned as soon as possible. Please complete the questionnaire within the next week and return it in the enclosed, postage paid envelope. Your participation is voluntary and much appreciated.

If you have any questions or comments please feel free to contact me at my home address or write your questions/comments on the questionnaire. If you wish to receive a summary of the study results, please indicate this on the bottom of your questionnaire.

Thank you for your participation.

Sincerely,

Patricia McClelland R.N., B.Sc.N.

APPENDIX E

Follow-up Covering Letter for Questionnaire Mailed at Three Months

«DATA Mailmerge 2»

519 B Michener Park
Edmonton, Alberta
T6H 4M5

June 14 1988

«name»
«address»
«city», «province».
«code»

Dear «name»,

This is a reminder to complete and mail the questionnaire on breast-feeding which you recently received. Your participation is voluntary and much appreciated. In case you have mislaid your original questionnaire, a second one identical to the first, has been included. If you have already completed and mailed the original questionnaire, please disregard this letter and questionnaire and accept my appreciation for your participation.

The purpose of this study is to learn more about breastfeeding patterns and problems, since we know little about breastfeeding after the mother and baby leave the hospital. The answers on the questionnaire will help us learn more about breastfeeding For this reason I would appreciate having you complete the questionnaire even if you are no longer breastfeeding.

I realize that you are probably very busy with your baby and other responsibilities, so the questionnaire requires a minimum of time and effort to complete. No names will be used in the study or the reporting of the results. The I.D. # at the top of the questionnaire is for the purpose of knowing which group you are in and bears no relation to your name. It is very important that the questionnaire be returned as soon as possible. Please complete the questionnaire as soon as possible and return it in the enclosed, postage paid envelope.

If you have any questions or comments please feel free to contact me at my home address or write your questions/comments on the questionnaire. If you wish to receive a summary of the study results, please indicate this on the bottom of your questionnaire.

Thank you for your participation.

Sincerely,

Patricia McClelland R.N., B.Sc.N.

APPENDIX F

Covering Letter for Questionnaire Mailed at Six Months

«DATA Mailmerge 1»

519 B Michener Park
Edmonton, Alberta
T6H 4M5

June 1 1988

«name»
«address»
«city», «province».
«code»

Dear «name»,

Thank-you for completing the questionnaire on your experience of breastfeeding at three months. I would appreciate your cooperation in completing a second questionnaire on your experience of breastfeeding at six months. As information on the early months was recorded on the first questionnaire, please complete this questionnaire with the information pertaining to the last three months. This will be the last questionnaire as the purpose of this study is to learn about breastfeeding patterns and problems during the first six months. The answers on the questionnaire will help us learn more about breastfeeding.

Enclosed is the questionnaire being sent to all participants. No names will be used in the study or the reporting of the results. The I.D. # at the top of the questionnaire is for the purpose of knowing which group you are in and bears no relation to your name. I realize that you are probably very busy with your baby and other responsibilities, so the questionnaire requires a minimum of time and effort to complete. It is very important that the questionnaire be returned as soon as possible. Please complete the questionnaire within the next week and return it in the enclosed, postage paid envelope. Your participation is voluntary and much appreciated.

If you have any questions or comments please feel free to contact me at my home address or write your questions/comments on the questionnaire. If you wish to receive a summary of the study results, please indicate this on the bottom of your questionnaire.

Thank you for your participation.

Sincerely,

Patricia McClelland R.N., B.Sc.N.

APPENDIX G

Follow-up Covering Letter for Questionnaire Mailed at Six Months

«DATA Mailmerge 2»

519 B Michener Park
Edmonton, Alberta
T6H 4M5

June 14 1988

«name»
«address»
«city», «province».
«code»

Dear «name»,

This is a reminder to complete and mail the final questionnaire on breast-feeding which you recently received. Your participation is voluntary and much appreciated. In case you have mislaid your original questionnaire, a second one identical to the first, has been included. If you have already completed and mailed the questionnaire, please disregard this letter and questionnaire and accept my appreciation for your participation.

Thank-you for completing the questionnaire on your experience of breastfeeding at three months. I would appreciate your cooperation in completing a second questionnaire on your experience of breastfeeding at six months. This will be the last questionnaire as the purpose of this study is to learn about breastfeeding patterns and problems during the first six months. The answers on the questionnaire will help us learn more about breastfeeding.

Enclosed is the questionnaire being sent to all participants. No names will be used in the study or the reporting of the results. The I.D. # at the top of the questionnaire is for the purpose of knowing which group you are in and bears no relation to your name. I realize that you are probably very busy with your baby and other responsibilities, so the questionnaire requires a minimum of time and effort to complete. It is very important that the questionnaire be returned as soon as possible. Please complete the questionnaire within the next week and return it in the enclosed, postage paid envelope. Your participation is voluntary and much appreciated.

If you have any questions or comments please feel free to contact me at my home address or write your questions/comments on the questionnaire. If you wish to receive a summary of the study results, please indicate this on the bottom of your questionnaire.

Thank you for your participation.

Sincerely,

Patricia McClelland R.N., B.Sc.N.

APPENDIX H

Comments of Subjects on Consistency of Help and Advice Received (Question 41)

It would have been nice if the public health nurse was a bit more aware of how to treat sore breasts as she was very concerned and kept in close touch with me.

Lots of information - tried everything and stuck with what worked best for me at the time.

Everyone has their own thoughts and ideas. My husband wanted the best for me. My mother felt we were healthy on bottles so don't worry, my friend felt it was inadequate stopping breastfeeding and it was not good for my baby.

-breast feeding very natural - problems and otherwise - all information was basically same with same problem namely never knowing how much baby drank - were they crying for hunger, colic, or what? With my baby's appetite I found this quite disturbing especially since the nurses were so adamant about the 4 hour schedule.

Well, I guess everybody is different on their opinion, depending on how comfortable they are on breastfeeding and the experiences they had, how much knowledge of it.

no definite position as to whether it is best to switch from one breast to the other during feeding or if better to do one breast each feeding.

only contacted a few, very knowledgeable people.

Friend who had had two children and one on the way, during the first two weeks spent a lot of time advising me - including use of vitamin A cream.

Doctor told me not to feed on infected breast. La Leche League told me to feed on the breast. I fed on the breast during the infection.

Was usually told you would always have enough milk. As I learned with my first baby this is not always the case.

A lot of people I have spoken to stress that the baby should be fed a bottle on occasion and not to worry about giving him formula once in a while - but all the literature I've read states this is not necessary. I'm worried now that I'll have a problem weaning him from the breast because he has only had a bottle once or twice and doesn't seem to know what to do with it.

I received a lot of advice, all different but I tuned out and did what I found worked the best for us.

My doctor just assured me my baby was doing well, healthy and growing, to keep up the nursing.

But it didn't work. The problem improved over time on it's own and perseverance. I am referring to the sore flat nipple problem.

Breastfeeding depends on mother and child in each case. Supply, expression of milk, desires, abilities - needs of babies different. Demands on mother different - Attitudes and beliefs re. children differ.

Different pamphlets and books said conflicting things. Found consistency in La Leche League info.

Our family is from Portugal and it is the norm to breastfeed. I had a lot of support.

I have a very dear neighbour who is a public health nurse and the help and assistance, as well as encouragement, that she gave me was just wonderful!

I listened to what was said and tried it but it didn't always work. I read some books and pamphlets also I tried most of the things I read. It did help a little.

- both the health nurse and the hospital staff said the same things.

I had only one book.

Information inconsistent as to how often to breastfeed.

Bev Robson told me all I needed to know and offered such TREMENDOUS support that I didn't need to go anywhere else! I would like to start a "Bev Robson" Fan

Club!!! Also, I would like to request that studies of this type be used to establish a program to be used by all nurses who assist mothers in their first attempts (with each baby they have) at breastfeeding. I found it VERY important to know the correct technique AND the consequences of improper technique. Nothing like the threat of pain as a strong motivator for doing something right the first time! I wish this study had been going on when I had my first child. Then, due to inconsistent and incomplete information I received in hospital, I suffered through severe and unnecessary physical and mental anguish. Even though I persevered and breastfed my first child till he decided to quit (at 9 months), I found that after the birth of my second child, I needed to be shown (and monitored until I got it right) again. I would love to hear that a printed guideline would be offered in conjunction with one nurse being assigned to assist in getting mothers who choose to breastfeed off to a good start. My milk supply (and mental health) flourished as a result of this study.

APPENDIX I

Comments of Subjects on Reasons for Termination of Breastfeeding Within the First Three Months

Less Than Three Months

I retained water - that was all that came out of me. [2.5 weeks]

Baby was wanting to eat all the time it was too too demanding. At my 4 week checkup & baby's, the Pediatrician told me to put him on bottle if it made me feel better. I would not breastfeed him in public - too uncomfortable. [4 weeks]

Upon returning to work I tried to continue breast feeding once/day - my baby wasn't entirely cooperative - I might not have had sufficient milk. [6 weeks]

Three to Six Months

The baby did not gain well from birth. She lost weight and was up to her birth weight at 4 wks of age. The doctor advised supplemental formula feedings. By 12 wks. her weight gain still wasn't satisfactory so I gave up breastfeeding and her weight gain has been normal. [12 weeks]

Always felt very uncomfortable about nursing around anybody but my husband and it seemed someone was always around so I would supplement. But, every time you supplement your milk decreases. Also in first 7 weeks had to spend a lot of time waking up the baby. He wanted to nurse forever and we ended up putting clocks all over house. Then he still was hungry and we needed to supplement. Also I hated having such big breasts! [8 weeks]

I am returning to work at the beginning of [month] and I felt that my son should be weaned so that my husband would be able to feed him while I was away. I considered pumping but felt that it was a little inconvenient. [12 weeks]

Moved [3 weeks postpartum] and during packing, unpacking etc. I basically ran out. [3 weeks]

I began supplementing at 5 weeks because he was always hungry and took all I had to offer and still wanted more. My husband and I felt it was important for us to take a vacation on our own on our anniversary and so I decided to stop nursing about 1 week ago in anticipation of this. [10 weeks]

Just could not handle physical symptoms of breastfeeding, nausea and discomfort. Believe now that I should have persevered - had lots of milk. Baby didn't seem to want it either. [less than 1 week]

Baby's face broke out in a rash. Baby experienced some regurgitation. Always tired - first child was 21 months old. Nipples were bruised from baby sucking. Also experienced engorgement of right side off and on throughout the 4 weeks, tried to wean, missed one feeding and the right side leaked enough to get my whole shirt wet. [4 weeks]

Mainly because I was going back to work and I didn't want to spend every lunch hour pumping. Also, the baby was beginning to latch on and pull himself off constantly so it was taking too long and he wasn't eating well because I'd get upset. [10 weeks]

Have another small child which kept me active and not producing enough milk. A lot of people were coming over the first month. [1 week]

More Than Six Months

My milk flow was decreasing - even though I pumped to increase demand. I came down with a very bad cold and was put on medication. Nipples recovered by the time [baby's name] was 3 1/2 weeks old. [6 weeks]

Baby not gaining weight - would not eat breastmilk. Baby cries a lot - screamed and therefore would not feed. Baby not sucking well - hated sucking nipple. I bought a micon shield but still did not suck. I had huge amounts of milk. [4 weeks]

Baby was very sleepy and would only nurse for very short time. As well I did not have sufficient milk with my first baby and felt I would not have enough this time as well. [2.5 weeks]

No Definite Plans In Advance

I had an operation when he was 6 weeks old. For two days I bottle fed then went back to breastfeeding. I felt tired after operation so breastfed and bottle fed for about 3 weeks then went to bottle. [10 weeks]

Baby seemed too hungry come feeding time. He seemed to prefer the bottle because he got the milk faster. [12 weeks - supplemented since 1 week]

I had to be on medications due to illness caused by the birth and it was too painful to hold or pick up baby. I had an infection in my lower parts and baby was getting the infection through my milk. [4.5 weeks]

APPENDIX J

Comments of Subjects on Reasons for Termination of Breastfeeding Between Three and Six Months

Less Than Three Months

When I decided to breastfeed I was only going to do it for three or four weeks. Baby and I both enjoyed it very much, but by three months I felt I had enough and with getting ready for Christmas etc., I decided to stop. I feel he had a very good start in life and that was what mattered most. [13 weeks]

Three to Six Months

I felt that after 29 weeks (4 months) [sic] [in fact the baby was less than 26 weeks when the questionnaire was completed] he had had enough of my milk to be healthy. He is a large boned baby & was getting a very big eater. [20 weeks]

My oldest son and I both came down with the flu and I felt it was too much for me to continue. I probably would have continued nursing for about one (1) more more month. [16 weeks]

I wanted to. Also we went away for a week and I didn't want any problems with pumping or her not feeding from me. [16 weeks]

I was supplementing and she realized it was much easier & faster from a bottle. [19 weeks]

He had his first tooth and was developing his second, and was using my nipples as a teething ring. Also, I was going back to work. [19 weeks]

We were going on holiday - skiing. [18 weeks]

I was returning to work and since she would not take the bottle as long as I was nursing her, I decided to discontinue breastfeeding completely. [14 weeks]

No Definite Plans In Advance

Baby didn't enjoy breastfeeding and only ate until he was slightly full - about 5 min. - then he would be hungry again in about 1 hr. He wanted a bottle and fussed when I tried to breastfeed. [22 weeks]

It appeared that he was not gaining weight as was constantly wanting to nurse. I felt he was not getting sufficient liquids as he was producing pretty hard stools. [22 weeks]

APPENDIX K

Comments of Subjects on Reasons for Continuing to Breastfeed at Six Months

-we both enjoy it, -easier than feeding formula out of a bottle, - better for her than formula

I find it to be convenient and easy. I very much enjoy the closeness and dependency of my daughter. Further, it is very satisfying to see how content and healthy she is.

Everything is going so well and I see no reason to quit. He seems to be cutting himself down, so I don't imagine it will be too long before he's totally on food.

We are going through a slow weaning period, baby only has 50% milk intake through breast.

-convenient, - calming effect on baby-helps to settle & sleep, - good nutrition.

-best for babe before 6 months, - babe didn't develop use of bottle (mom didn't persevere with it) - I also have a toddler and breastfeeding gives me exclusive time with babe that I might not get otherwise.

No problems and we both enjoy it. He eats vegetables, fruit, prosobee and pablum so the breast is more a closeness rather than a feeding.

I believe any other form of food is hard for baby to digest up to 6 months of age. It provides a quiet, close time for Mom & baby. Baby is doing <u>really</u> well (gaining weight well & is very content)

My daughter is at present weaning herself from me. With the introduction of vegetables and fruit she has decided she is not all that interested in the breast. I feed her at night before she goes to sleep and as a pacifier in the middle of the night, after a bottle feeding of whole milk if she is unsettled.

It is so convenient! The main reason though is that my little son has done so well on the breast milk. He is a very content baby.

- baby refuses to take any bottle, have tried many nipples. - breast feeding very convenient . - baby is thriving! (21 lbs. at 6 months)

The baby seems to enjoy my breast milk and I enjoy doing it.

1. Closeness & relaxation after work & daycare, 2. Good for her, 3. Baby wants to.

safeguard baby against onset of allergies. - protects baby against infection-bacteria & viruses. - closeness is great for baby & mother.

- baby <u>loves</u> breastfeeding - baby gaining extremely well (95 percentile) -closeness to baby - baby appearing to have many allergies starting to show up.

My baby won't take a bottle.

I continued as long as I did because of the immune properties and it was cheaper, and also after six months you can begin to give them homo milk rather than buying formula which is much cheaper [sic].

Things are still going fairly smoothly, so there is no need to stop. I plan to continue until my daughter indicates that she is ready to be weaned. She is showing some signs that weaning will occur fairly soon (i.e. losing interest in nursing on the left side - also, nursing is becoming more like "Stampede Wrestling" time...).

-healthy for baby