THE DURATION OF BREASTFEEDING IN WOMEN OF LOW AND MIDDLE INCOME LEVELS AND THE EARLY INTRODUCTION OF FORMULA AND SOLID FOOD

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(ABSTRACT)

This study was conducted to investigate the factors that affect the duration of breastfeeding in low and middle income women, and to determine if low income women have a greater incidence of decreased duration of breastfeeding. Specifically, the effects of early introduction of formula and solid food and mother's perceived inadequate milk supply, on the duration of breastfeeding, was researched.

A questionnaire was developed and one on one interviews conducted on 147 women who breastfed a baby within the past five years. Data analysis included crosstabulation of selected variables, descriptive analyses, and chi square analyses.

Results indicated that the majority of the women surveyed introduced formula early, were long term breastfeeders, between the ages of 30-39, and college graduates. There was no difference in duration of breastfeeding between women of low and middle incomes,

however, women of middle income terminated breastfeeding early to return to work or school and tended to introduce formula earlier than low income women. Furthermore, mothers who introduced formula or solid foods early, were generally short term breastfeeders.

Mothers who introduced formula and solid foods early cited insufficient milk supply as their main reason for terminating breastfeeding. Therefore, mothers perceived to have an insufficient milk supply, tend to introduce formula and solid foods early, thus, contributing to a possible decrease in duration of breastfeeding.

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Chapter I

Introduction

Infant feeding practices in the United States have undergone many changes since the early 1900's. One of the major changes occurring at the beginning of the 20th century was a decline in the incidence and duration of breastfeeding (1). However, since the 1970's, there has been a reverse in this trend (1). More mothers are deciding to breastfeed and to do so for a longer duration. Although this increase has been reported at varying economic levels, there seems to be less of an increase among mothers of lower socioeconomic levels (2,3).

According to current guidelines published by the American Academy of Pediatrics and discussed within the literature review, infants should be breastfed for at least 4 to 6 months. However, many mothers do not breastfeed for this long. Factors associated with decreased duration of breastfeeding are early introduction of formula and solid food and the mother's perceived insufficiency of her milk supply. Many mothers routinely initiate early introduction of solid food or believe they have an inadequate milk supply, therefore introducing formula or solid foods as

early as 2 weeks to 2 months after birth. This can interfere with milk production and consequently cause a decreased milk supply.

The present study was conducted to investigate the factors that affect the duration of breastfeeding in low and middle income women, and to determine if low income women have a greater incidence of decreased duration of breastfeeding. The specific focus of this research was the effects of early introduction of formula and solid foods and mother's perception of inadequate milk supply on the duration of breastfeeding.

Justification

The investigation of the mother's economic status and its relationship to the duration of breastfeeeding was conducted to more clearly identify the population of women most in need of encouragement and educational support, for increased duration of breastfeeding. The economic parameter was chosen to broaden the minimal amount of research available that directly investigates this factor (2,3). This parameter also was chosen to help clarify researchers' opposing conclusions, discussed within the literature

review. In this study, the relationship between economic status and initiation of breastfeeding was not investigated because it has already been thoroughly researched.

To pinpoint a possible reason for decreased duration of breastfeeding, the relationship between early introduction of formula and solid food and mothers' perceived inadequate milk supply, on duration of breastfeeding, was specifically determined. These parameters are based upon research and conclusions discussed within the literature review.

Objectives

This researcher had three main objectives:

1. To determine duration of breastfeeding and factors that affect duration of breastfeeding in low and middle income women and if there was a correlation between specific factors and income levels.

2. To specifically determine if the early introduction of formula and solid foods decreases the duration of breastfeeding among the sample studied.

3. To investigate if mothers who perceived themselves to have insufficient milk introduce formula and solids early and, thus, decrease the duration of breastfeeding.

Hypotheses

The following hypotheses were developed.

1. There will be a significant difference in breastfeeding duration between women of differing incomes. Specifically, middle income women will breastfeed longer than low income women. However, there will not be a difference in the specific factors affecting breastfeeding duration. These hypotheses are based upon conclusions of the only 2 studies conducted that directly investigate the relationship of low and middle income levels and the duration of breastfeeding (2,3).

2. There will be a significant difference in the timing of formula and solid food introduction and breastfeeding duration. Mothers who breastfeed for a longer duration will generally delay the introduction of formula and solid foods until $\geq$4 months after birth.

3. There will be a significant difference in mothers perceived to have insufficient milk and the timing of the introduction of formula and solid foods. Mother's believing they have an inadequate milk supply will generally introduce formula and solid food earlier.

Definition of Terms

The following are definitions of recurring terms used throughout this paper:

1. Early formula and solid food introduction:
Supplementation with formula or solid food before 4 months of age, will be considered to be early introduction.

2. Breastfeeding mothers:
Mothers who have initiated breastfeeding within the past five years and have completed a breastfeeding experience.

3. Women, Infants, and Children Supplemental Food Program (WIC):
This supplemental food program is funded by the United States Department of Agriculture and administered through local health departments. It provides nutritional foods, as well as nutrition education to pregnant women, children

(from birth - 5 years old), post partum women and lactating women, who meet the eligibility criteria established within each state. Pregnant women enrolled in the program who decide to breastfeed post partum, are automatically eligible for up to 6 months to 1 year post partum, if they still meet the financial criteria.

4. Low income:

Mothers who meet the income eligibility criteria of the Women, Infants and Children Supplemental Food Program, or have incomes less than 200% of the United States poverty level.

5. Middle income women:

Mothers who do not meet the income eligibility criteria of the Women, Infants and Children Supplemental Food Program and/or with incomes of greater than 200%, but less than 400%, of the United States poverty level.

6. High income women:

Mothers who do not meet the income eligibility criteria of the Women, Infants and Children Supplemental Food Program and/or with incomes of greater than 400% of the United States poverty level.

Chapter II

Literature Review

Introduction

The focus of this literature review will be on research performed to determine factors that affect breastfeeding initiation, duration and termination. Also, a review of historical trends in the incidence and duration of breastfeeding will be presented. Background information on the physiology of lactation and the nutritional benefits of breastfeeding will precede the discussion of the above topics. Finally, the promotion of breastfeeding will be discussed briefly.

Physiology of Lactation

Anatomy of the Breast

To discuss and study the effects of early introduction of formula and solid food on the duration of breastfeeding, it is imperative to understand the initiation, establishment and maintenance of lactation. The production of sufficient human milk to nourish an infant adequately is the goal of the successful management of lactation. Mechanisms for milk synthesis and secretion will not operate properly if the mammary gland is not appropriately stimulated. This

stimulation is dependent upon a normally functioning maternal physiology and effective physical stimulation of the nipple and areola (4).

The female breast is a mammary gland that contains two distinct types of tissues:
(1) the glandular tissue which produces the milk and
(2) the supporting tissue, fat, ligaments, and blood vessels (5). The most prominent features of the breast are the nipple and areola. The surface of the areola appears rough because of the presence of large sebaceous glands. The fatty secretion of these glands is believed to lubricate the nipple (6). Bundles of smooth muscle fibers in the areolar tissue serve to stiffen the nipple for a better grasp by the suckling infant (7).

The nipple contains the openings of 10 - 15 lactiferous ducts. These ducts expand to form the short lactiferous sinuses within the nipple and below its base. Milk is stored within these sinuses. Towards the back of the breast, the ducts end in alveolar cells. Each alveoli consists of secretory cells surrounded by contractile myoepithelial cells. Multiple alveoli form a lobule, and in turn, multiple lobules form a lobe.

The nipple and areola contain smooth muscle fibers.

These smooth muscles contract the areola and compress the base of the nipple. This involuntary action helps empty the lactiferous ducts. If the baby's positioning of the mouth does not cover all of the nipple and areola, problems with milk excretion may occur.

Lactation: Initiation, establishment and maintenance

The initiation, establishment and maintenance of lactation is a complex neuroendocrine process. Adequate release of prolactin and oxytocin is essential for the establishment of lactation. Prolactin is a necessary hormone for the synthesis of milk. In contrast to the action of prolactin, progesterone has been demonstrated to inhibit milk synthesis (8). As pregnancy advances, prolactin and progesterone levels continue to rise. At childbirth, prolactin levels surge to encourage milk synthesis. With the expulsion of the placenta, progesterone levels fall, therefore, no longer inhibiting milk production. If lactation continues, elevated prolactin levels may be observed for as long as 2 years (9).

Oxytocin is necessary for milk ejection, generally termed the let-down reflex. Oxytocin release is directly responsible for the contraction of the myoepithelial cells that surround the alveoli within the mammary gland. This

contraction causes the expulsion of milk from the alveolar cells. Excitement of the sympathetic nervous system inhibits the let-down reflex by directly inhibiting the contraction of the myoepithelial cells. Failure of milk production during highly stressful periods is likely due to these responses (8).

The neuroendocrine process of lactation is as follows: The infant suckles at the mother's breast providing the stimulation needed from the nipple for hormonal stimulation. These impulses are carried to the hypothalamus and from the hypothalamus to the pituitary. The anterior pituitary will secrete prolactin, triggering milk production within the alveolar cells. At the same time, the posterior pituitary will secrete oxytocin, causing the myoepithelial cells to contract and, thus, activate milk ejection.

Benefits of Breastfeeding

Nutritional Benefits

Human milk is commonly believed to be the complete and perfect food for the human infant. For physiological, as well as psychological reasons, that are important to both the mother and infant, few would disagree that exclusive breastfeeding is the preferred mode of feeding for normal, healthy newborn infants (10). In the first few days after

the birth of the baby the mammary glands secrete a small amount of thick fluid called colostrum. Colostrum is lower in calories than mature milk (67 versus 75 kcal/100 ml) and contains more protein, less sugar, and much less fat than mature milk (6). Colostrum facilitates the establishment of intestinal flora in the digestive tract. There is an abundance of antibodies found in colostrum which may assist in providing protection against various gastrointestinal tract infections (11).

Colostrum changes to transitional milk between the third and sixth day. By the tenth day, mature milk is formed. Human milk has a low protein concentration as compared to that of other mammals, because of the comparably slower growth rate of the human infant. Overall, mature milk contains 0.8-0.9 g of protein per 100 ml, mostly in the form of casein and lactalbumin (12). Human milk protein is readily digestible and well absorbed. The low casein:lactalbumin ratio provides a soft, easily digestible curd. The concentration and types of protein result in fewer allergies (13).

The fat in human milk is the main source of calories and serves as a vehicle for transfer of fat soluble vitamins and essential fatty acids. Human milk fat is very

efficiently absorbed due to the presence of human milk lipases and the position of the palmitic acid in human milk triglycerides. The amount of fat received by a suckling infant depends on the mother's diet and the length of time spent suckling. The fat content increases as a nursing session progresses. The cholesterol content is very high and may facilitate myelinization of the central nervous system during the first months of life. (10).

The carbohydrate content of human milk is composed mostly of lactose, but there are also trace amounts of glucose, galactose, glucosamines, and other nitrogen containing oligosaccharides. Not only are these carbohydrates an energy source but, the presence of lactose in the gut of an infant stimulates the growth of microorganisms, which produce organic acids and many of the B vitamins. These acids protect the infant's gut from the growth of undesirable bacteria, thus enhancing the absorption of calcium, phosphorous and magnesium (6).

The major minerals found in mature human milk are potassium, calcium, phosphorous, sodium and chlorine. Iron, copper and manganese are found only in trace amounts. However, the absorption of iron in suckling infants is high, which may possibly be due to the low concentrations of

protein and phosphorous and the high contents of lactose and vitamin C in human milk (13,14). The total mineral content of human milk is fairly constant, but the specific amounts of individual minerals may vary with the status of the mother and the stage of lactation (15).

All the vitamins required for good nutrition and health are supplied in breastmilk, but the amounts vary markedly from one person to another (6). The levels of water soluble vitamins are more likely to reflect maternal dietary intake (16). Controversies exist over the amount and biological activity of vitamin D and its metabolites in human milk (17). Fomon (18) states that supplementation of vitamin D, iron and fluoride is recommended for breastfed infants. Overall, if maternal intakes of vitamins are adequate, the milk supply should also be adequate (10).

Historical Review

Trends in the Incidence and Duration of Breastfeeding

Before the 18th century, human milk from breastfeeding was the only major source of nutrients for infants at birth and continued to be predominant through 4 to 6 months of age (19). Artificial feeding as a substitute for the breast is not mentioned in the literature until the 18th century (20). Also the use of a wet-nurse, or the practice of

breastfeeding by someone other than the mother, was widespread. Overall, wet-nursing was thought to be far superior to artificial feeding. By the 19th century many reports indicated that 80% to 90% of infants who were not breastfed, died (21,22). Most of the deaths were attributed to improper bottlefeeding. Therefore, breastfeeding in the 19th century, either from the infant's mother or a wet- nurse, could be considered a life or death proposition for an infant.

By the early 20th century, one of the major changes in infant feeding practices was a decline in the incidence and duration of breastfeeding and a corresponding increase in artificial feeding. Hendershot (1) states that, "starting from very high levels in the 1940's, breastfeeding declined steadily to low levels in the early 1970's." This change can be initially attributed to the development and production of more safe and nutritious formulas, during the early 1900's. Cone (22) clearly describes the development of artificial feedings from 1885 to 1980. He states that by 1960, 80% of bottlefed infants in the United States were fed evaporated milk formulas and by the mid 1970's greater than 85% of bottlefed infants were fed humanized or prepared formula.

Formula use also became more popular as more women began to enter the work force. Sources of education and support related to breastfeeding declined. Women had fewer relatives and friends with breastfeeding experience and even medical professionals gave little encouragement to breastfeed (23). Formula feeding became accepted as the safe, convenient and modern feeding method (14).

A more recent trend, since the 1970's, indicates a sharp increase in the incidence and duration of breastfeeding. This increase has occurred at all ages and throughout all types of demographic characteristics (19). The following information will review research articles as they relate to the differing trends in the incidence and duration of breastfeeding.

Decline in the Incidence and Duration of Breastfeeding

Prior to 1948, studies of the incidence and duration of breastfeeding were few and so limited that neither the amount nor duration of breastfeeding, or the trend in the practice, could be clearly defined (24). However, Waller (25) from the British Hospital for Mothers and Babies, reviewed some statistics derived in England and Scotland on the incidence and duration of breastfeeding. He states that the Ministry of Health, 1944, estimates that about 80% of

babies leaving the hospital were fully breastfed; at the end of three months 50%, and at the end of six months 40% were still on the breast.

A limited study of the incidence of brestfeeding in the United States was conducted by Byington (26). Byington, the Director of a Child Welfare and School Health Department, initiated a "new plan" in 1942, that consisted of home health calls conducted by public health nurses. Newborns at the age of 1,6 12 and 18 weeks, were visited for a period of 3 months and information collected on the incidence of breastfeeding. Byington reported that for 4,059 infants, between the ages of 4 to 6 weeks, 37% were completely breastfed and 21.9% were partially breastfed. Therefore, a total of 58.9% received breastmilk in whole or part. No information was given concerning the incidence of breastfeeding of the older infants visited (ages greater than 6 weeks). The author concluded that the incidence of breastfeeding was declining and encouraged health professionals to initiate comments and suggestions as to how breastfeeding can be "stimulated."

Katherine Bain (24) made the first nationwide survey of infant feeding practices in American Hospital nurseries, excluding information on the duration of breastfeeding. She

challenged the statement that the incidence of breastfeeding is declining in the United States, declaring that this statement was, "based on a collection of individual impressions; there exist no data to confirm it".

In 1946, more than two-thirds of all hospitals in the United States, with 25 or more beds admitting maternity patients, were surveyed (24). Hospitals of all regions (rural or urban), with differing sizes, from 25 beds to greater than 250 beds, were included. Also, data from each state were imperative and collected. Data from feeding records of 39,171 infants at time of discharge were recorded for one week at each hospital. The author concluded that 38% of infants were on the breast only, 27% breast and bottle and 35% bottle only. There was a greater incidence of breastfeeding in areas away from metropolitan centers and bottle feeding was greater in middle sized hospitals (100 to 299 beds) than in small (25 to 99 beds) or large (250 or more beds) hospitals. The incidence of breastfeeding was highest in the southeast and southwest and lowest in the northeast. For the United States, as a whole, Bain concluded that two-thirds of the infants at time of discharge were on the breast or mixed bottle and breastfeedings and one -third were completely botttlefed.

However, to answer the question of breastfeeding trend, additional studies were needed.

To indicate a possible trend, a decade later, Meyer (27) conducted a survey similar to Bain's (24). The extent of breastfeeding in 1,904 hospitals including 2 and 1/4 million infants in 1956, was recorded. These data were then compared to those of Bain (24). In this study the question," what type of feeding did the infant receive upon discharge from the maternity nursery," was asked. However, in contrast to Bain (1948), the percentage discharged with breast only, mixed feeding, or artificial feeding only, rather than the exact number, was calculated. Therefore, only the percentages from these two studies were compared.

The percent of infants in the United States leaving the hospital breastfed decreased from 38% in 1946 to 21% in 1956. Mixed feedings also decreased from 27% in 1946 to 16% in 1956 and bottlefeedings increased from 35% in 1946 to 63% in 1956. In all of the geographic regions and in each state, there were more infants leaving the hospital with artificial feeding than there were 10 years previously. Meyer (27) states that, "if confirmed 10 or 20 years hence by comparable surveys, it could be said that a trend existed toward less breastfeeding in this country."

Another decade later, Meyer (28) conducted a follow-up survey and compared the results to the earlier studies of Bain (24) and Meyer (27). Hospitals across the United States, totaling 2,928, returned completed questionnaires with feeding information on 2,715,222 infants. It was concluded that only 18% of infants leaving the hospital were breastfed, a continued decline from ten and twenty years earlier. Some states did show an increase in the incidence of breastfeeding, of 2 to 11% in 1966, but in every state there was a decline from 1946. Mixed feedings declined to a low of 9% and bottlefeeding increased to 73%. Overall, a decline in breastfeeding from 38% in 1946, to 22% in 1956 and 18% in 1966 had occurred. Table 1 provides comparative data on the incidence of breastfeeding, mixed feeding and bottlefeeding, at ten year intervals, from the three surveys discussed (28). It is interesting to note that in contrast to Meyer's statement in 1958 (27) that a possible trend exists; Meyer (28) states that, "although our 1966 study may give a clue as to future trends in breastfeeding, 20 years is too brief a period to say that a real trend actually exists now."

Prior to Meyer's study (28), Salber (29) also surveyed mothers, who delivered in hospitals in Boston, to

Table 1. **Comparative data of three surveys on the type of feedings received by infants at hospital discharge**

Total US(%)	1946	1956	1966
Breast only	38	21	18
breast & bottle	27	16	9
bottle only	35	63	73

*data taken from Meyer (28).

determine incidence and duration of breastfeeding. Salber (29) obtained a response from 2,233 mothers, 91% of the target population with births during August and September of 1963. Twenty - two percent of the mothers attempted to breastfeed, while 77.3% did not. The majority of mothers who attempted breastfeeding (58%) weaned the infant prior to 4 months of age, while 23% continued to nurse for more than six months. Salber's statistics further verified Bain's (24) and Meyer's (27) conclusions that the incidence of breastfeeding was on the decline. She was also one of the first to propose that the duration of breastfeeding may also be declining.

One of the largest sets of data on the incidence and decline of breastfeeding was collected in two fertility surveys, from 1946 to 1965. Information from the 1973 National Survey of Family Growth (Cycle I) and the 1965 National Fertility Study was analyzed by Hirschman and Hendershot (30). Because the women interviewed in the two surveys had births in the period 1946 to 1965, estimates were made from both sources as to the incidence of breastfeeding of 9,800 infants. The two surveys were consistent in showing that breastfeeding declined regularly and greatly during this period. The average percentage of

infants breastfed upon release from the hospital declined from 53% in 1946 to 34% in 1965. The National Fertility Study also compiled data from 1936-1940 and 1941-1945 with estimates of 77% and 65% of infants being breastfed, respectively. It is important to note that these data refer only to those infants born to women who were married at the time of the interview (1965 or 1973), therefore, excluding those born out of wedlock. Hendershot (1) states that the incidence of breastfeeding tends to be lower for unmarried mothers. Also, estimates for periods long before the interview tend to be less accurate and should be viewed cautiously.

Hirschman and Butler (31) also analyzed the statistics derived from the 1965 National Fertility study and Cycle I, but directed their analysis towards the duration of breastfeeding for the years 1911-1950. They reviewed the proportion of mothers who breastfed their first child and the duration of breastfeeding in months. The mothers were grouped based on year of their birth, whether they breastfed their firstborn and for how long. It was concluded that the older the mother was the more likely she was to have breastfed and for a longer duration. For example, 70% of mothers who were born from 1911-1915 breastfed; 50%

breastfed for greater than 3 months. However, only 25% of mothers born from 1946-1950 breastfed and only 5% continued for greater than 3 months. Overall, it was concluded that the average length of breastfeeding declined by nearly half during this time period (1911-1950).

Another study by Hendershot (32) was based on the National Survey of Family Growth (Cycle II). This study was conducted in 1976 and shows the percent of infants breastfed during the period 1955 to 1969, from a sample size of 8,600 infants. Although the length of this data series is shorter than that of Cycle I and the 1965 Fertility study, the information is more representative of all infants born during that time period, since the estimates include births out of wedlock and second and higher order births. The percent of infants breastfed is as follows: 1955 to 1959, 32%; 1960 to 1964, 27%; and 1965 to 1969, 25%. Once again a steady decline in the incidence of breastfeeding is apparent.

Increase in the Incidence and Duration of Breastfeeding

The infant formula manufacturer, Ross Laboratories, Columbus, Ohio conducted a market research survey on a continuous basis over a period of many years, to determine the trend in the incidence of breastfeeding. These

retrospective studies conducted from 1955 to the early 1980's by Gilbert Martinez, follow the decline, as well as, the resurgence in the incidence of breastfeeding (19,33,34,36,37).

Martinez and Nalezienski (19) show the percent of babies who were breastfed at age one week from 1955 through 1970. Survey data were obtained from mothers through a questionnaire mailed to a sample representative of the national distribution of infants. For selected years, the published estimates are: 1955, 29%; 1960, 28%; 1965, 27%; and 1970, 25%. These figures also suggest a decline in the 1950's and 1960's. However, by the year 1971, the incidence of breastfeeding began to increase substantially at all infant ages surveyed (19). From 1971 through 1978, breastfeeding in hospitals almost doubled from 24.7% to 46.6%. Not only were more mothers breastfeeding, but more were continuing to do so for a longer period of time. At 2 months of life, the percentage of breastfed infants showed an increase from 13.9% in 1971 to 34.9% in 1978. For infants at 3 to 4 months, the incidence of breastfeeding more than tripled from 8.2% in 1971 to 26.8% in 1978. Lastly, at 5 to 6 months, the incidence of breastfeeding almost quadrupled from 5.5% in 1971 to 20.5% in 1978.

Subsequent research done by Martinez and co-workers (33,34,37) also verifies the increasing trend in the incidence of breastfeeding in the hospital and at each infant age throughout the first six months of life. In 1978, 45% of infants in hospitals were breastfed; 1979, 50%; 1980, 54%; 1981, 56.4; 1982, 60.5%, 1983, 59.9%; and the most recent figure, 61% in 1984. Table 2 shows for the percentage of infants breastfed at 1 week of age from 1955 through 1984, as documented by Martinez et al. (19,33,34,36,37). There was a slight decline in, or slowing down of, the incidence of breastfeeding between the years 1982 and 1983, before increasing slightly in 1984. Martinez and Krieger (37) state that, "since 1982 the increase in breastfeeding has been minimal in the hospital and at 2 months of age and has even declined slightly between 5 and 6 months of age." Cycle II of the National Survey of Family Growth, conducted by Hendershot (32) and discussed earlier, also involved the collection of statistics on the incidence of breastfeeding from 1971-1975. These data confirmed that the downward trend in breastfeeding had begun a reversal. According to Hendershot (32), the incidence of breastfeeding had increased from 25% in 1971 to 34% in 1975. Also, an increasing proportion of mothers began breastfeeding for

Table 2. **Percentage of infants breastfeeding at one week of age from 1955 through 1984**

Year	Percentage
1955	29.0
1960	28.0
1965	27.0
1970	25.0
1978	45.0
1979	50.0
1980	54.0
1981	56.4
1982	60.5
1983	59.9
1984	61.0

*taken from Martinez et al. (19,33,34,36,37)

durations of three months or more (increasing from 11% in 1971 to 20% in 1975), therefore, indicating an upward trend in longer term breastfeeding in the 1970's.

According to the 1969 and 1980 National Natality Surveys of postpartum women conducted by the National Center for Health Statistics (38), a significantly higher percentage of both black and white women exclusively breastfed their infants in 1980 than in 1969. At 3-6 months postpartum, questionnaires were mailed to a sample of married mothers in 1969 and 1980. Eighty-five percent of the 3,666 mothers in 1969 and 80% of the 7,825 mothers in 1980 responded. Breastfeeding among married women increased from 19% to 51% for whites and 9% to 25% for blacks.

A study conducted by Samuels et al. (39) also confirmed the increased incidence and duration of breastfeeding reported among American women. Of 632 women, delivering during the study period, 417 (66%) chose to breastfeed. Samuels et al. state, "In our population, the breastfeeding rate at hospital discharge (66%) was slightly higher than the national rate, documented in 1981 as 57.6% (36)." Duration of breastfeeding was also slightly longer than the national average. Of the 417 women, 42% were still breastfeeding at 4 months postpartum: whereas, in 1981 the

national figure at 4 months postpartum was 35% (36).

Demographic and Sociologic Characteristics Associated With Breastfeeding

Women Most Likely to Breastfeed

The number of demographic and sociologic characteristics of women most likely to breastfeed, that have been investigated, is quite large. The list includes, among others, race, income, education, occupation, employment status, geographic region of residence and birth order (1). The American woman who is most likely to breastfeed is one who is socioeconomically advantaged, does not belong to a racial minority, has an educational level beyond high school, does not work out of the home, and lives in a cultural environment that is supportive. Also, if the mother was breastfed as an infant, has successfully breastfed an infant before, has friends who breastfeed their infants, and receives support from health care professionals, she is more likely to breastfeed (40).

Although, as discussed earlier, there has been a reversing trend of increased breastfeeding since the 1970's, these national trends mask the fact that certain groups were not altering feeding patterns. In many studies, lower socioeconomic, ethnic minorities and less well educated

families were underrepresented (41). The studies conducted by Martinez et al. (19,33,34,36,37) all had this shortcoming. Therefore, Martinez and associates adjusted the data in an attempt to correct for the poorer response rate.

Data from a variety of sources indicate that infants in lower socioeconomic classes, and of lower maternal educational level, are less commonly breastfed than other infants (42). The best available information source for infants of this level is through the Special Supplemental Food Program for Women, Infants and Children (WIC). Because of the eligibility criteria, most of these infants are from low income families. Fomon compared 1971 data from Martinez and Nazlienski (19) and 1985 data from Ryan and Gussler (43), to calculate and compare the percent of breastfed infants enrolled and not enrolled in WIC. Large differences were apparent between the two groups. Infants who were enrolled in WIC, and thus considered low-income, were much less likely to be breastfed.

In order to overcome the "flaws" in Martinez and co-workers' (19,33,34) mail surveys, that generally reflected responses of a higher socioeconomic population, Rassin et al. (44) investigated the feeding practices of 358 lower

socioeconomic women. Only 27% of these mothers intended to breastfeed, as compared to 54% of mothers in 1980 as surveyed by Martinez et al. (34). The most predominant demographic characteristic associated with the incidence of breastfeeding, was that of ethnicity. Only 9.2% of the black American mothers intended to breastfeed. In contrast, 43.5% of the Anglo-American and 22.6% of the Mexican-American mothers intended to breastfeed.

Prior to Rassin et al. (44), Rivera (45) also had suspicions that the feeding patterns (including breastfeeding) among infants from lower and upper income families, were different. He mailed twenty questionnaires each to 175 private pediatricians in New York and San Francisco, requesting that they indicate the kind of milk consumed by infant patients on the day of their visit. Because it was thought that different feeding patterns might be common among infants from lower income families who normally might not be seen by pediatricians in private practice, questionnaires were also sent to 80 well baby clinics operated by the New York City Department of Health. It was concluded that of the 2,332 infants surveyed, frequency of breastfeeding among children of upper income families was about 25%, but only 5% for lower income

families. Rivera (1971) states," these data confirm the suspicions that there are fundamental differences in the infant feeding practices of upper and lower income urban families."

Lefevre et al. (46) found that women of middle income were more likely to breastfeed than women of lower or upper income. A questionnaire was mailed to 252 mothers of infants in the state of Missouri, to obtain information on the infants' method of feeding. All of the respondents were married and 94% were white. The incidence of breastfeeding was significantly greater among middle income women and persons with an educational level greater than high school.

While the preceding studies establish that lower socioeconomic families and minority ethnic groups generally breastfeed less, the incidence of breastfeeding among this population may be increasing. Women,Infants and Children participants were surveyed from 1977 to 1980 by Martinez and Stahle (35) to determine milk feeding practices. It was concluded that a growing percentage of WIC mothers breastfed their infants in the hospital and at all ages through six months. Subsequent research (37) confirms this increase, seen in families with annual incomes less than $7,000. Also, the greatest increase occurred among blacks. However,

the highest incidence of breastfeeding was still among white college educated women, at upper income levels. The lowest incidence of breastfeeding occurred among blacks, those younger than 20, at low income levels, and among the less educated.

The proportion of Mexican-American infants ever breastfed also increased substantially in recent years, as concluded by John and Martorell (47). Breastfeeding behavior of 2,402 Mexican-American infants born between 1970 and 1982 was investigated. Increases of 30.7% for 1970-1974, 38.1% for 1975-1978 and 47.6% for 1979-1982 were reported.

Although Mexican-American women are more likely to breastfeed than blacks, the national average of breastfeeding women who are white is still greater than that of the Mexican-American population (1,44). Wright et al. (41) investigated the differences in feeding practices between middle class Anglos and Hispanics. In a sample of 1,112 healthy infants, 80% Anglo-American and 20% Hispanic, 70% were breastfed. However, Anglos were more likely to breastfeed their babies and for a longer duration. Almost 75% of Anglo-American babies were breastfed at 2 months of age as compared to less than half of Hispanic infants.

Hispanics were less likely to breastfeed exclusively, stopped nursing earlier and introduced formula and solid foods earlier. In general, mothers who were better educated, married, those having their first baby, and those not working outside the home were more likely to breastfeed.

Chief among demographic characteristics is a mother's educational level beyond high school. There is a strong association between educational level attained and the incidence and duration of breastfeeding (48). Kurinij et al. (49) evaluated the incidence and duration of breastfeeding in 668 black and 511 white women delivering their first child in Washington, D.C. As expected, breastfeeding rates among whites (84%) were greater than those of black women (49%). However, maternal education level was strongly associated with breastfeeding, whereas the effect of ethnicity was moderate. Women with some college or some graduate school education had odds of breastfeeding of 2.6 and 5.2, respectively, compared with women with a high school education or less. Moreover, the association between education and choice of infant feeding type was independent of other maternal characteristics such as ethnicity, age, income, marital status, prenatal care, and hospital delivery. "Thus, it appears that the incidence

of breastfeeding is most dependent on maternal education and less dependent on ethnicity," state Kurinij et al. (49).

Participants in a New York City WIC program were surveyed by Bevan et al. (50) to determine significant differences in demographic, sociologic and educational characteristics of women who chose to breastfeed versus bottle feed their infants. Of a total of 103 WIC participants, 56.3% breastfed. An increased incidence of breastfeeding was seen in women who had a higher educational attainment, 38.8% among those with more than a 12th grade education compared to 34% among those with an education of 11th grade or less. Also, mothers who had previously breastfed were more likely to breastfeed again.

Recently, Ford and Labbok (51) conducted an all encompassing study to determine the demographic and socioeconomic variables that affect the probability of the incidence and duration of breastfeeding in white and black groups. Overall, more educated women were more likely to breastfeed, black women and Hispanic women were less likely than white women to breastfeed, and older mothers were less likely to breastfeed. Level of education had a strong association with breastfeeding duration among white women, but was not significant for black women. Mother's age also

increased the length of breastfeeding by a small amount.

The Breastfeeding Decision

Timing of the Infant Feeding Decision

The decision to breastfeed is a significant one and is usually made relatively early in the pregnancy, if not before (6). Lawrence (52) states that it is most effective to prepare for breastfeeding well in advance of delivery, " prospective parents should consider feeding plans for the infant during the prenatal period."

A study conducted on Canadian students in grades 8-12, verifies that decisions about infant feeding methods are indeed made early, even before pregnancy. Ellis (53) collected data from 302 females and 107 males. Seventeen percent of the students had decided to breastfeed only, 9% decided to bottle feed only, with the majority (72%) planning to use both breast and bottle. Ellis (53) states that there was no significant difference in infant feeding responses according to sex.

Of the 288 predominantly middle class women in the prospective study by Goodine et al. (54), 80% made an infant feeding decision prior to pregnancy. Over 85% of these women followed through with their earlier decision (14).

In 1983, Sarrett et al. (55) conducted three different

studies in the area of infant feeding choice. The first two studies determined when mothers decide to breastfeed or not and if they actually adopt this method of choice once the child is born. All three studies were conducted on a nationwide basis in both urban and rural areas, by an independent marketing research firm. However, both lower and upper socioeconomic groups were underrepresented. Study number 1 consisted of self administered mail questionnaires, while study number 2 consisted of telephone inquiries, to obtain data. Overall, the surveys showed that 85% to 92% of mothers decided on a feeding method before the end of the second trimester of pregnancy. Only 5% to 7% of mothers were undecided in the third trimester, and 96% to 97% fed their infants as previously planned.

Mackey et al. (56) interviewed fifty pregnant women in their third trimesters, and again five to six weeks postpartum. They were questioned about their infant feeding plans. Ninety-two percent of the women indicated an intention to breastfeed. At five to six weeks postpartum, 82% of these women were breastfeeding.

A study conducted by Ekwo et al. (57) researched when the decision to breastfeed was determined in 33 primigravidas and 39 multigravidas. Among the

primigravidas, 7 (21%) had always known they would breastfeed their child; 22 (67%) of the women decided to breastfeed the infant before they became pregnant, three women decided to breastfeed as soon as they knew they were pregnant, and one women decided to breastfeed within the first two months of pregnancy. No data were given for the multigravidas, but Ekwo et al. (57) state that most of the multigravidas decided to breastfeed shortly before pregnancy.

Factors Influencing the Breastfeeding Decision

The paths, by which a decision to breast- or bottle-feed an infant is made, may be short and straight or very complex (58). However, throughout the literature examined, there is an overwhelming number of mothers generally responding that the health and well being of the baby is the most important consideration when deciding to breastfeed. For example, Goodine et al. (54) found that 94% of 288 subjects decided to breastfeed, because it is "best for the baby." Also, Sarrett et al. (55) found that subjects in their study who chose to breastfeed thought "breast feeding was healthier or better" than formula feeding. Results from Mackey et al. (56) further verified that breastfeeding women, both prenatally and post partum, believe breatfeeding

is "best for the baby."

Mothers' reasons for choosing a particular feeding method can fall into 2 discrete categories, as described by Adair (58). They are, the "infant centered" responses, focusing on the health and emotional benefits to the baby and the "mother centered" responses, focusing on the biological and emotional benefits to the mother. Researchers hypothesize that breastfeeding women are more "infant centered", whereas, women who formula-feed tend to be more "mother centered" (59). Breastfeeding mothers in Adair's study (58) felt that their main reasons for choosing breast over bottle were the health benefits to the baby (" breastfeeding is healthiest") and that closeness or bonding with the baby is very important. These answers show a combination of infant centered and mother centered responses.

In 1985, a study conducted by Dusdieker et al. (60) attempted to clarify the motivation behind a mothers' choice of infant feeding methods. The authors state (60) that the consistent influences of the infant feeding decision can be summarized into four mutually exclusive categories. They are: the demographic parameters previously discussed, maternal attitudes, sources of support for breastfeeding and

the influence and attitudes of health care providers.

One hundred completely breastfeeding and 57 bottle feeding primigravida women were enrolled in this study (60) and completed a Likert-type questionnaire. Similar to Adair's results (58), Dusdieker et al. (60) also concluded that infant centered and mother centered beliefs were separate concepts, yet there is a large overlap between these separate focuses. " A woman's anticipation that her own needs will be satisfied by breastfeeding strengthens and reinforces her convictions that breastfeeding will benefit her child" (60). Maternal worries about lack of support and anxieties over fear of failure were strong indicators against breastfeeding. Although the sum of perceived support resources from the infant's father, family and medical personnel, were considered important influences on the infant feeding decision, Dusdieker et al. (60) argued that health care professionals have little or no <u>direct</u> influence on a woman's decision to breastfeed.

Ekwo et al. (57), also researched breastfeeding mother's reasons for choosing breastfeeding and the sources of influence upon this decision. In agreement with Adair (58) and Dusdieker et al. (60), the mothers cited that the two most important reasons for choosing breastfeeding were:

1) it is healthiest for the baby and 2) it establishes maternal-infant bonding. For example, 33% of the primigravidas and 36% of the multigravidas studied, felt breastfeeding enables the infant to receive protection against infections and, thus, is healthiest. Also, 33% of the primagravidas and 33% of the multigravidas felt that breastfeeding establishes a maternal bond. Persons and others sources that influenced the mothers to breastfeed were friends (52% primigravidas and 36% multigravidas), articles in magazines and books (51% primigravidas and 77% multigravidas), and their own mother (21% primigravidas and 13% multigravidas). Only 15% of the primigravidas and 18% of the multigravidas cited physicians or nurses as important sources of influence on the breastfeeding decision.

Ekwo et al. (57) state, it is not surprising that physicians and other health workers had a somewhat reduced influence on the maternal decision to breastfeed, since most of the mothers in the study had already decided to breastfeed before they were pregnant or as soon as they knew they were pregnant. Therein lies the significance of determining when breastfeeding decisions are made. Health professionals must be aware of the fact that many mothers

have already decided upon their method of feeding before their initial medical visit. Therefore, it is imperative to encourage women to develop positive attitudes to breastfeeding before pregnancy. However, it is also important to remember that some women do decide to breastfeed immediately before delivery, or shortly thereafter. In this case, advice from health care workers may be important and should be initiated.

As discussed, health care providers are rarely seen by breastfeeding mothers as sources of influence in the feeding decision. However, this is in contrast with the perceptions of health care providers themselves. In a survey of 2400 pediatricians, obstetricians, family physicians, and nurses, Lawrence (61) found that these professionals rated the prenatal class instructor, pediatrician, family physician, and obstetrician (in that order) as the most important sources of influence on mother's decisions about breastfeeding. They viewed as of secondary importance the influence of friends, husbands, and relatives.

Some researchers hypothesize that persons, viewed as influential in the breastfeeding decision, vary with the mothers' ethnicity. Baranowski et al. (62) obtained completed questionnaires from 368 mothers who delivered at

their hospital during July 1981, of whom 44% of Anglo-Americans, 23% of Hispanic, and 9% of black mothers breastfed. The mothers were asked which two persons or things were most important in influencing them to breastfeed or bottlefeed their babies. The source of influence varied by ethnic group; the male partner was the most important influence for Anglo-Americans, the subjects' mothers for Hispanics, and close friends for black women.

Bryant (63) studied a sample of 76 families in Florida, divided almost evenly among Puerto Ricans, Cubans, and Anglo-Americans. Her findings matched Baranowski's: Anglo-Americans viewed husbands and friends as having an important impact on the feeding decision. For Puerto Ricans and Cubans, however, mothers were more often consulted on infant feeding matters.

A survey of 103 mothers enrolled in the Women, Infants and Children Supplemental Food Program, conducted by Bevan et al. (50), also concluded that " the feeding method preference of the baby's father significantly influenced the incidence of breastfeeding." A more recent study conducted in 1990 by Black et al. (64) found that the feeding method preferred by the father was the second most important variable influencing 120 pregnant women, enrolled in the

Maternal and Infant Care Program in Georgia. This finding supports the study by Bevan et al. (48). However, since both studies consisted of predominantly black populations, their findings contrast with those of Baranowski (62) and Bryant (63), who identified close friends as the most influential variable upon the breastfeeding decision among black women.

Duration and Termination of Breastfeeding

Factors Influencing the Duration and Termination of Breastfeeding

Current guidelines for infant feeding, published by the American Academy of Pediatrics, state that infants should be breastfed for 4 to 6 months (65). However, many mothers do not breastfeed this long, as described earlier in the section " Trends in the Incidence and Duration of Breastfeeding." Variables most frequently associated with decreased duration of breastfeeding include, early introduction of formula and solids, the mother's perceived insufficient milk supply and maternal employment outside the home (2).

During the past decade, the American Academy of Pediatrics Committee on Nutrition has recommended that supplementary foods be introduced to either breastfed or

bottlefed infants at 4 to 6 months of age, rather than at earlier ages (66). It has been well documented that a trend towards early introduction of solid foods has occurred, particularly since the 1950's (67,68,69). "It seems certain that most infants in the United States now receive beikost by 6 weeks of age and many receive beikost before 4 weeks of age," states Fomon (70). As stated by Guthrie (69) "the wisdom of such a procedure before the child is 3 months old is questionable, since the infant has no need for the additional nutrients, is not physiologically and developmentally capable of handling them, and may experience an increased susceptibility to allergy." Furthermore, a possible relationship between early feeding patterns and the development of adolescent obesity has been postulated (71). Other problems associated with early solid food introduction are: 1) increasing the workload of the kidney to handle electrolytes and reduce the fluid available for excretion, and 2) establishing an unhappy attitude towards feeding, through encouraging a child to eat food which he is not ready for and cannot easily eat from the spoon (69). Many mothers believe that an infant fed solid food in the evening is more likely to sleep through the night. However, 2 studies failed to confirm this belief (72,73).

Brogan et al. (3) studied the feeding practices of 202 infants, 100 from low income and 102 from middle income families. Fifty-six percent of the infants were breastfed. It was concluded that, more infants from low - than from high - income families were breast weaned before the age of 1 month. By the time the infants were 3 to 5 months old, 75% of the low income and 78% of the middle income mothers, had terminated breastfeeding. Beikost was introduced by 3 months of age to 59% of the middle income and 76% of the low income infants. Also, infants fed only breast milk were introduced to solids later than infants fed only formula or a combination of both formula and breastmilk. These results suggest that breastfeeding mothers with higher incomes, tended to introduce solids later. However, both groups introduced solids earlier than the current recommendations (65). Brogan (3) states that the early feeding of solids is now being discouraged because of the questionable adequacy of milk intake available to meet the infant's needs. No correlations were made as to the effects of the early solid food introduction on the duration of breastfeeding. However, it can be hypothesized that since both the termination of breastfeeding and the introduction of solid food occurred primarily at 3 months of age, there is some

type of correlation between the two. The correlation may be that breastfeeding was terminated because of early solid food introduction.

Results from Bevan et al. (50) suggest that, although the early introduction of solid foods (66% before the infants were 4 months old) was common among both breast-and bottle-feeding mothers, the timing of the introduction of solid foods by the breastfeeding mother, did not influence the duration of breastfeeding in 103 participants. Early introduction of breast-milk substitutes (formula or cow's milk), however, was associated with a shorter duration of breastfeeding. More than two-thirds of the women surveyed reported introducing breast-milk substitutes to the infant by 1 month of age.

The influence of the introduction of formula on the duration of breastfeeding has been more adequately researched than that of the introduction of solid food. Moreover, the effects of formula supplementation in the hospital and the practice of giving free sample packets of infant formula to new mothers, has also been investigated. In 1975, Sloper et al. (74) conducted a survey of 129 infants in a maternity ward to determine the incidence of breastfeeding. Eighteen subjects (14%) were breastfed only

and 17 subjects (13%) were both breast-and bottle-fed. The authors felt that the low percentage of breastfed infants was a direct result of "the ward routine of giving each mother a bottle together with her baby at feed time, and of giving bottle feeds to breastfed babies in the night." Following these results, the authors (74) held a seminar with the ward staff emphasizing the advantages of breastmilk and the possible interference of regular bottle complements with the incidence and duration of breastfeeding. The survey was again conducted, displaying a rise in breastfeeding from 27% to 37% and a virtual disappearance of "complementary feeds." A year later (1974) a follow up survey was conducted (74) on 62 infants of the same maternity ward. Forty-two percent of the infants were breastfed only and none were given bottle complements.

Samuels et al. (39) found similar results to those of Sloper et al. (74). One of the most significant impacts on the duration of breastfeeding in Samuels et al. (39) study, was receiving formula in the hospital. Formula supplementation in the hospital was associated with a shorter breastfeeding period.

Bergevin et al. (75) took things one step further and decided to investigate the effects of giving free sample

packets of infant formula, to new mothers upon release from the hospital, on the duration of breastfeeding. For the overall group of 406 mothers, the receipt of formula was associated with a trend toward earlier cessation of breastfeeding. Seventy-eight percent of mothers who had received a sample were still breastfeeding at 1 month, versus 84% for those who had not received a sample. Also, those, receiving samples, were significantly more likely to have introduced solids by 2 months than those not receiving samples. These results suggest that receipt of infant formula samples by breastfeeding mothers may lead to a shorter duration of breastfeeding and hasten the introduction of solids. Furthermore, the authors state, (75) that the potential harm of these samples could be greatest in lower socioeconomic women, since they are known to be more likely to discontinue breastfeeding and to introduce solids earlier.

In contrast to the four studies discussed above (39,50,74,75) Feinstein et al. (76) did not find a significant effect of formula samples given at discharge upon the duration of breastfeeding. However, partial breastfeeding (supplementing with more than 1 bottle of formula per day) was associated with shorter duration of

breastfeeding. Gray-Donald et al. (77) also found that restricting formula supplementation in the hospital and upon discharge did not have an effect upon the duration of breastfeeding. They suggest (77) that formula supplementation is not the cause of breastfeeding discontinuation, as described by other investigators (75,78), but that it may be merely an associated finding in mothers who are less strongly committed to breastfeeding or those who had difficulty with the establishment of breastfeeding. Thus, supplementation was a marker, rather than a cause, of breastfeeding discontinuation.

Both the introduction of formula and solid foods, as well as the mothers' perceived success with breastfeeding, and their effects upon the duration of breastfeeding, were investigated by Hawkins et al. (2). Forty-seven breastfeeding mothers enrolled in the Women, Infants, and Children Supplemental Food Program were interviewed to determine predictors of the duration of breastfeeding. Also, the subject's perception of breastfeeding success was measured on a 7 point Likert scale (unsuccessful [1] to successful [7]) by the question, "How would you describe your most recent breastfeeding experience?" Results showed that 12.8% of the mothers breastfed for only 4 weeks (short-

term breastfeeders) and introduced formula feedings at that time. Fifty-seven percent of mothers, who breastfed until the infant was 5 to 24 weeks (moderate-term breastfeeders), introduced formula supplements between 5 and 15 weeks of age. All those mothers who delayed giving their infants formula supplements until after 6 months of age (29%), breastfed for 25 weeks or longer (long-term breastfeeders). The introduction of solid foods had a moderate effect on the duration of breastfeeding. Analysis with stepwise multiple regression showed that postponing the introduction of solid foods by 1 week increased the duration of breastfeeding by 0.5 weeks. Therefore, delay of formula and solid food introduction was positively correlated with increased duration of breastfeeding. Furthermore, the earlier the mother introduced formula supplements, the less likely she was to indicate success at breastfeeding on the 7-point Likert scale.

The most striking finding of Hawkins et al. (2) was that inadequate milk supply was cited by 100% of the short-term, 48% of moderate-term, and none of the long-term breastfeeders, as their major reason for terminating breastfeeding. This seems to be the most common reason given by women who wean their infants before the recommended

time (8,65). Furthermore, it is not clear whether inadequate milk supply was responsible for mothers giving their infants formula or solid foods, or whether supplementation led to inadequate milk supply. Lawrence states (79) that lactation failure does occur, but it is a relatively uncommon condition. Lactation failure is preventable in almost all cases if "sound physiological principles are applied during the initiation, establishment, and maintenance periods of lactation" (8). According to Newton and Newton (80) the widespread lactation failure in our society seems to be triggered by psychologic factors, such as the definition of the female role in society and the "attitudes fostered by interaction with others in modern industrial culture."

In Cole's study (81), the 3 most frequent reasons given for weaning were: not enough milk, felt tired and baby's doctor told me to stop. Two studies described earlier (76,50) also cited insufficient milk as the most common reason for breastfeeding discontinuation.

In a study conducted by Yeung et al. (82), 317 breastfeeding mothers were questioned as to when and why they terminated breastfeeding. By the first month, 30% of the mothers terminated breastfeeding, and by the second

month, 48% of the mothers terminated breastfeeding. The main reason for cessation of breastfeeding by the first month post partum, was lack, or fear of a lack of sufficient quantity of breastmilk (51%). By 3, 6, and 12 months post partum, 38%, 19%, and 11% respectively, cited insufficient milk as the reason for terminating breastfeeding. Other less significant variables were, painful breasts (16%), inconvenience (13%) and the baby rejected the breast or milk (11%).

West (83) found that of 49 women surveyed, who weaned before six weeks of age, 57% did so because of "inadequate milk supply." Similar results of Manstead et al. (84), show that 27% of 26 women in this study who discontinued nursing during the first week post partum, did so due to "insufficient milk." O'Herlihy (85) found that milk insufficiency was cited by 24.6% of the mothers surveyed, who discontinued breastfeeding within the first 3 months post partum.

The effects of maternal employment upon the initiation and termination of breastfeeding has also been investigated, as a possible deterrent to both processes. Participation in the labor force by women with infants, has risen dramatically over the last 10 years (86). In 1977, 32% of

women with a child under 1 year old worked outside the home, increasing to 43% in 1982 and 52% in 1987 (87). A study conducted by Auerbach et al. (88) was undertaken in 1984 to determine how employment affects breastfeeding. The relative importance of the timing of return to work to the duration of breastfeeding, and the maternal perceptions of the impact of employment on breastfeeding, were specifically investigated. Questionnaires of 567 women were returned, with responses of 676 different mother-infant experiences (some mothers reported working-breastfeeding experiences for more than one chid). Respondents were most likely to return to work 6 to 12 weeks after the baby's birth. Results showed that the combined effect of timing of maternal return to work and the number of hours worked, had a notable effect on infant weaning age. Mothers returning to work full-time before their babies were 16 weeks old, had the highest likelihood of early weaning. However, when the mother returns to work had a greater effect than how many hours she worked per week. "Those breastfeeding mothers who worked 40 hours or more, but who did not do so until four months post partum or later, were more likely to continue nursing longer than did women who worked less than 20 hours per week but who returned to work before their babies were 16 weeks old"

(88). Maternal perceptions of the breastfeeding-working experience showed that mothers returning to work after their infants were 4 months or older, were less likely to feel that employment negatively affected breastfeeding. Mothers returning to work before their infants were 16 weeks, and who weaned before 6 months, were nearly twice as likely to report that working had negatively affected breastfeeding.

Women who begin working after 16 weeks may have a more positive attitude towards the working-breastfeeding relationship because by this time, they probably have a well established milk supply, and feel a little more comfortable with breastfeeding, therefore, lending greater encouragement to continue breastfeeding while working.

Recently, Kurinij et al. (86) also investigated the relationship between maternal employment and the initiation and duration of breastfeeding among white and black women. They assessed whether the intention of mothers to return to work post partum affects their decision to breastfeed, whether the duration of breastfeeding differs between women who return to work and those who do not, and the effect of occupation, timing of return to work, and hours worked, on the duration of breastfeeding. Six hundred and sixty-eight black and 511 white breastfeeding women were interviewed at

1,3, and 7 months post partum. Breastfeeding rates were significantly lower for white, and to a lesser extent for black, women who planned to return to work in the first 2 months post partum. Black women who returned to work had a shorter duration of breastfeeding than those not returning to work, whereas there was no significant effect in white women. Both black and white women returning to professional occupations, as opposed to clerical or technical jobs, had a longer duration of breastfeeding. Timing of return to work and hours worked did not have a significant impact on either group's duration of breastfeeding. The authors state (86) that breastfeeding for 6 months post partum is difficult for most employed women and especially for those women employed in non-professional occupations.

Promotion of Breastfeeding

There have been longstanding efforts to promote breastfeeding at national, state, and local levels, as well as in the private sector. The Department of Health and Human Services (DHHS) and the U. S. Department of Agriculture (USDA) have proclaimed a national effort for the promotion of breastfeeding in the U.S. (89). The Public Health Service (PHS), a section of the Department of Health and Human Services, has set a goal of increasing the

proportion of breastfeeding women to 75% at hospital discharge and 35% at 6 months of age, by 1990 (90). The Public Health Service has particularly emphasized the promotion of breastfeeding through training of health care professionals in the Title V Maternal and Child Health block grant Program and the Indian Health Service (91). They have also co-sponsored a symposium on human lactation in 1979 (92) and funded the Surgeon General's Workshop on Breastfeeding and Human Lactation in 1984 (93).

Other national programs committed to the promotion of breastfeeding and funded primarily through the U. S. Department of Agriculture and through state efforts, are the Women, Infants and Children Supplemental Food Program (WIC), the Extension Service's Expanded Food and Nutrition Education Program (EFNEP), and the Commodity Supplemental Food Program (CSFP) (89). The U.S. Department of Agriculture has developed and distributed an abundance of publications and educational materials, to teach participants and staff of the Women, Infants and Children Supplemental Food Program and the Commodity Supplemental Food Program, about breastfeeding. In 1979, the U. S. Department of Agriculture also funded three grants for projects to be conducted on identifying barriers to

breastfeeding and how to develop or improve breastfeeding education programs (89).

The Department of Health and Human Services and the U.S. Department of Agriculture again joined efforts to promote breastfeeding through a nationwide video-teleconference, presented in April of 1983 (94). Approximately 10,000 health professionals viewed and listened to information on breastfeeding and prenatal substance abuse. The Healthy Mothers, Healthy Babies Coalition has also joined efforts with the U.S. Department of Agriculture and the Department of Health and Human Services for a national campaign on the promotion of breastfeeding and subsequently, the development of a breastfeeding kit for professionals.. This organization (the Healthy Mothers, Healthy Babies Coalition) is a partnership of more than 60 governmental, professional, and voluntary organizations and agencies, committed to increasing the awareness of pregnant women about the importance of good health for themselves and their unborn babies (95). In 1981, 2 task forces were established through the Assistant Secretary of Health from the Public Health Service. They both researched problems of infant feeding (thus relating to breastfeeding as well as other

areas of infant feeding) (94).

State and local agencies, through local health departments and hospitals, have also taken the initiative to develop breastfeeding promotional programs. The Maternal and Child Health agency publishes state and local projects each year, in an abstract of active projects (96,97). For example, in 1988, the Ohio State Research Foundation initiated a promotion of breastfeeding project for a low income urban population of Ohio (98). Women delivering babies at the Ohio State University Hospital received one-on-one bedside teaching about breastfeeding and a series of telephone calls to their homes, at specific intervals following discharge. Also, a 24 hour "Breastfeeding Hotline" was established, to assist mothers with breastfeeding questions or problems. Furthermore, the promotion of breastfeeding education programs were established for staff, breastfeeding mothers and mother's support persons (98).

Prenatal clinics in Philadelphia, Pennsylvania, were the site for another promotion of breastfeeding program, with emphasis on mothers "at the worksite and in the neighborhood" (99). A 3 part strategy was employed; a maternal education program and peer counseling for mothers,

an educational program for professionals, and a program designed to facilitate changes in the childcare and employment settings to accommodate breastfeeding women who return to work.

The Tennessee Department of Health and Environment initiated a promotion of breastfeeding project involving both the private and public sectors (100). Strategies included a series of educational contacts for all prenatal clients entering the Tennessee Health Department prenatal program. Also, a network was established with the private health care sector through forming a breastfeeding task force and providing a community health professional breastfeeding conference. Furthermore, a peer counselor support system was implemented, to be available in both the clinic and private health agencies (100).

An abundance of other promotion of breastfeeding projects are identified and discussed through the Maternal and Child Health abstracts (96,97), as discussed earlier. However, many programs, especially those conducted through hospitals, have also been described through other professional literature.

Winikoff et al. (101,102) implemented a two part program to, first, understand the constraints to

breastfeeding in a large municipal hospital (101) and, secondly, to initiate a program to overcome the obstacles discovered (102). In 1986, "data were collected through direct observation, chart review and questionnaires distributed to patients and staff" (101). Results indicated that 37% of women who wanted to breastfeed, had not initiated breastfeeding within 24 hours post partum. Within this hospital, only 16% of 95 babies included in the review were breastfed. More than half of the women who chose not to breastfeed did so for the following reasons; they would be returning to work, fear of pain or fear of producing insufficient milk. Eighty-nine percent of breastfeeding mothers were also using supplemental formula, and half of these women stated that they did so because of their perception of insufficient milk. The authors (101) state that some practices that prevented successful breastfeeding were prolonged separation of mother and infant, routine provision of infant formula, and inconsistent identification of breastfeeding infants. Also, staff knowledge about breastfeeding management was inadequate, and the staff underestimated mothers' interest in breastfeeding.

Due to all the problems recognized in 1986 by Winikoff et al. (101), a follow-up program was implemented in 1987,

to help this hospital overcome the obstacles perceived by Winikoff et al. (102). Staff education, intensive physician and nurses' training, development of educational materials, and employing a breastfeeding counselor were all implemented. A nearby hospital served as the control and comparisons between the two hospitals were made. Statistics for the incidence and pattern of breastfeeding were made before, midway through and after the project. Results showed that the incidence of breastfeeding increased from 15% to 56% and exclusive breastfeeding increased from 0% to 15%. At the control site, the respective changes were from 28% to 41% and from 5% to 7%. Similar to the earlier study in 1986 (101), the usual reason, given by breastfeeding mothers for the use of supplemental formula, was perceived insufficient milk production (102). The authors conclude (102) that the process to overcome institutional constraints to breastfeeding is difficult but feasible.

An interesting program set up for breastfeeding mothers in the workplace, was supported and implemented through the Department of Pediatrics at the Hunterdon Medical Center in New Jersey. Encouragement and time was provided for breastfeeding mothers to pump their milk during working hours. Storage for the expressed milk was also provided.

Katcher et al. (103) performed a telephone questionnaire to determine the results of this program. Nineteen employees (group 1) who had taken maternity leave before the program was implemented, and 22 employees (group 2) who had returned to work during the support program, were surveyed. All 22 mothers of group 2 nursed their infants at birth and did not discontinue prior to returning to work. Sixteen of the 19 mothers in group 1 nursed their infants at birth, but 7 discontinued prior to returning to work. Also, mothers in group 1 nursed for an average of 6 months in contrast to the group 2 mothers, who nursed an average of 11.7 months. The researchers suggested that the support and time given by this company probably influenced both the likelihood that an employed mother will continue to nurse her baby and the duration (103).

The American Academy of Pediatrics Committee on Nutrition has also taken part in the promotion of breastfeeding (40,104). They have outlined specific strategies to be initiated among health professionals and those involved in the promotion of breastfeeding (which have been implemented by many professionals, as described earlier). Public education was greatly emphasized as an effective method to the promotion of breastfeeding. Also,

utilization of television, newspapers, magazines and radio to present factual information on breastfeeding, was encouraged. Improved education about breastfeeding techniques in medical, nursing and residency programs, was suggested. The suggestion that fathers should always be included in any prenatal class or contact, since many fathers have a direct or indirect impact upon a mothers breastfeeding decision, was made. Furthermore, obstetricians and family physicians should be encouraged to promote breastfeeding during their prenatal contacts. Factors that can specifically be directed to breastfeeding mothers were, encouragement of rooming in after delivery, decreased degree of sedation during childbirth, avoidance of routine supplemental formula feedings and formula discharge packets, and the development of day nurseries adjacent to work places or encouragement of breast pumping, to enable mothers to breastfeed while working.

Summary

Although the incidence and duration of breastfeeding has been steadily increasing since the 1970's, many constraints still remain and interefere with the decision to breastfeed; and the continuation of breastfeeding. Therefore, the promotion of breastfeeding should be

continued and emphasized throughout the medical profession. Also, further research, to elucidate the predictors of the initiation and duration of breastfeeding, is encouraged. These goals can be partially met by studies specifically designed to investigate the effects of early introduction of solid food and formula on the duration of breastfeeding, in low and middle income women, as is proposed by this investigator.

Chapter 3

Methodology

Selection of Subjects

Income Eligibility

The average annual pay per household, as of 1987, for the United States is $20,855. In the state of Virginia, this figure is $19,963, which is comparable to that of the United States (105). However, the projected median income for 1990, of families within the counties of Montgomery, Pulaski, and the city of Radford are $34,031, $32,537, and $38,300, respectively (105). These counties were the target population for this study. The average poverty threshold for a family of 4 in the United States, as of 1991, is $13,400 (106). The Women, Infants, and Children Supplemental Food Program has its income eligibility set at 196% of poverty. To distinguish between low and middle income subjects, a compromise among the above values was made. A distinction between middle and high income women was also determined to more clearly define "middle" income women. Subjects with incomes of less than 200% of poverty were considered low income. Subjects with incomes of greater than 200% of poverty, but less than 400% of poverty, were considered middle income. Those women with

income levels greater than 400% of poverty were considered high income. Table 3 depicts the income values of each group.

There are 5 areas within the New River Health District. Subjects were obtained from 3 of these 5 areas including, Montgomery and Pulaski counties, and the city of Radford. Some low income subjects were obtained through the Women, Infants, and Children Supplemental Food Program. Clients of this program must meet all three of the following eligibility criteria: 1) Reside within the designated area served by the health district, 2) fall within present income guidelines based on family size, and 3) have a medical/nutritional risk factor (Appendix A).

The number of women enrolled in the Women, Infants and Children Supplemental Food Program within the 3 areas studied, from October 1990 to September 1991, are seen in Table 4. Since the number of breastfeeding women within this population is small, the projected number of low income subjects for this study was 50, with a comparable number of middle income subjects. No projected number of high income women was established, since the high income grouping was specifically developed in order to set an upper limit to the middle income values. Other methods of obtaining subjects

Table 3. Income guidelines of breastfeeding study, 1992

# of people in household	Income $ Low	Middle	High
2	< 18,000	to 36,000	>36,000
3	18 - 22,999	to 45,998	>45,998
4	23 - 26,999	to 53,998	>53,998
5	27 - 31,999	to 63,998	>63,998
6	32 - 35,999	to 71,998	>71,998
7	36 - 40,999	to 81,998	>81,998
8	41 - 44,999	to 89,998	>89,998

Table 4. The number of breastfeeding women enrolled in the Women, Infants and Children Supplemental Food Program, October 1990 through September 1991*

	New River District		
month	Montgomery	Pulaski	Radford
1990			
Oct	26	5	4
Nov	28	5	3
Dec	30	5	5
1991			
Jan	31	1	5
Feb	30	7	5
March	32	10	6
April	26	11	6
May	28	11	7
June	25	11	8
July	23	12	8
Aug	23	12	8
Sept	27	9	8

*data obtained from Radford City Health Department

were through the Montgomery county and city of Radford La Leche Leagues (not available in Pulaski County), Headstart Programs sponsored through New River Community Action, Inc., and through advertisements in newspapers and posters distributed throughout the specified areas.

Description of Survey Tool

A questionnaire was developed to determine breastfeeding duration in low and middle income women, as well as, factors that may influence the decision to discontinue breastfeeding (Appendix C). A cover letter describing the questionnaire and reviewing the criteria needed in order to participate in the study was also included (Appendix B). To obtain retrospective information concerning breastfeeding duration, only subjects who had breastfed a baby within the past five years were asked to participate. If the mother had breastfed more than one child, she was advised to answer the questionnaire for only the last child she breastfed (but who was not breastfeeding anymore).

The first question was designed to ensure that the mother was answering the questions for the youngest child who had been breastfed, but was not breastfeeding anymore. Questions 2, 3, 9, and 10 related to objectives 2 and 3: was

introduction of formula and solid food initiated early and did a mother's perception of insufficient milk supply affect this early introduction? Questions 4 and 11 dealt with breastfeeding duration and reasons for terminating breastfeeding. Demographic information, including age, household income, number of adults in the household and education, were adressed in questions 5, 6, 7 , and 8, respectively. The combination of when breastfeeding was completely stopped (question 4) and household income (questions 6 and 7), were used to determine the relationship between the duration of breastfeeding and income level.

Data Collection

Questionnaires were completed through a face to face interview with this investigator, during the months of April and May 1992. Some participants were not available for a face to face interview and were interviewed via the telephone or mailed a questionnaire (to be described in Results and Discussion: Description of the Study Group).

Data Analysis

Data analysis included crosstabulation of the selected variables, followed by a chi-square analysis to determine significant differences between variables. Data analysis was carried out using the Knowledge Seeker statistical

software package (107). The Knowledge Seeker package computed a specific categorical data analysis of frequencies and chi-square values.

Chapter IV

Results and Discussion

Description of the Study Group

A total of 153 questionnaires were administered, with 147 questionnaires completed and used for statistical analysis. Fifty one low, 77 middle, and 19 high income women were surveyed. Six questionnaires received through the mail were considered incomplete and not included in the total 147 questionnaires analyzed. Approximately 25 questionnaires were completed and mailed to this investigator in lieu of a face to face interview. This was mainly done for the convenience and preference of the participating mother. For example, some mothers had a very busy work and home schedule, and felt it would be easier to complete and return the questionnaire at their convenience. These participants were encouraged to call the investigator if they had any questions.

Data Analysis

FREQUENCIES AND PERCENTAGES

Introduction of Formula and Solid Foods: Data on the introduction of formula and solid foods are presented in Table 5. Many of the women surveyed (32.6%) indicated that they never used formula. Approximately 18% (17.6) of

Table 5. Data on the age of child at the introduction of formula and solid foods

Age of Introduction	FOOD TYPE formula frequency	formula percent	solids frequency	solids percent
<1 month	26	17.6	0	0.0
1-2 months	27	18.3	5	3.4
>2-3 months	12	8.1	19	12.9
>3-4 months	10	6.8	39	26.5
>4 months	24	16.3	84	57.1
never use	48	32.6	0	0.0

mothers introduced formula at less than 1 month old, 18.3% at 1-2 months old, 8.1% at >2-3 months old and 6.8% at >3-4 months old. Therefore, a total of 51% of the mothers introduced formula at ≤4 months of age, whereas 16.3% of the mothers introduced formula at >4 months of age. This indicates that the majority of women surveyed introduced formula at ≤4 months of age, considered by this investigator as early introduction.

None of the mothers indicated that they started solid food at less than 1 month old, as opposed to the statements of Fomon (70). Approximately 3% (3.4) of mothers indicated that they started solid foods at 1-2 months old, 12.9% at >2-3 months old, and 26.5% at >3-4 months old. Therefore, a total of 42.8% of mothers indicated that they started solid foods at ≤ 4 months of age, which is less than 57.1% of mothers who introduced solids at >4 months of age. These findings indicate that, although a majority of women introduced solid foods at the appropriate time, there was still a high percentage of mothers who introduced solid foods early.

Duration of Breastfeeding, Mother's age and Education: Data on the duration of breastfeeding, mother's age and education are presented in Table 6. The values analyzed for the

Table 6. Data of the duration of breastfeeding, mother's age and education

Variables	Categories	Frequency	Percent
BF Duration*	short	39	26.5
	medium	20	13.6
	long	88	59.9
Age (years)	under 20	0	0.0
	20-29	46	31.2
	30-39	93	63.2
	40+	8	5.4
Education	some HS**	5	3.4
	HS graduate	15	10.2
	some college	41	27.8
	college graduate	86	58.5

*BF=breastfeeding
short=<4months
medium=≥4-6months
long=>6months
**HS=high school

duration of breastfeeding were categorized into three groups, determined by this investigator through information derived from the review of literature. Since it is recommended that mothers breastfeed for at least the first 4 months to 6 months of age (65), mothers breastfeeding a baby from birth to less than 4 months old were considered short term breastfeeders. Those mothers breastfeeding a baby from 4 to 6 months old were considered medium term breastfeeders, and those mothers breastfeeding a baby 6 months or longer were considered long term breastfeeders.

Breastfeeding was terminated when a child was a mean age of 9.78 months. The majority of the mothers were considered long term breastfeeders (59.9%), whereas 26.5% were short term breastfeeders, and only 13.6% were medium term breastfeeders. This finding is in contrast to that of Salber and Feinleib (29) who found that a greater number of women (58%) were short term breastfeeders (<4 months), whereas only 23% continued to nurse for more than 6 months. It should be noted, however, that Salber's (29) study was conducted in 1966, during a period of decreased breastfeeding initiation and duration. More recent studies of Hawkins et al. in 1987 (2), Martinez and Nalezienski in 1979 (19), Hendershot in 1981 (32), and Samuels et al. in

1985 (39), support the findings of this investigator, that the duration of breastfeeding is increasing, especially to greater than 6 months duration.

The majority of the mothers were also between the ages of 30-39 (63.2%), whereas 31.2% were 20-29, and only 5.4% were 40 or older. None of the mothers surveyed were under 20 years old.

Most of the mothers surveyed were college graduates (58.5%) or had some college (27.8%), as opposed to only 10.2% graduating from high school and 3.4% with some high school education. This supports the findings of the American Academy of Pediatrics (40), Hendershot (1), Kurinij et al. (49), and Bevan et al. (50), in which women of higher educational level were more likely to breastfeed. Furthermore, the area in which the survey was conducted consists of 2 university towns, Blacksburg and Radford, Virginia, posssibly increasing the chances of obtaining women of higher educational status.

Income and Household Number: Data on income and the number of people in the household are presented in Tables 7 and 8, respectively. These 2 variables were combined to formulate categories of low, middle and high income, as described in the Methodology. Refer to Table 9 for income categories.

Table 7. Data of household income

Income Categories	Frequency # of participants	Percent of participants
<$18,000	16	10.8
$18 - $22,999	15	10.2
$23 - $26,999	16	10.8
$27 - $31,999	21	14.2
$32 - $35,999	13	8.8
$36 - $40,999	26	17.6
$41 - $44,999	9	6.1
>$45,000	31	21.0

Table 8. Data for number of people in household

Number of People in household	Frequency # of households	Percent of households
2	1	0.6
3	44	29.9
4	65	44.2
5	27	18.3
6	7	4.7
7	1	0.6
8	1	0.6
9	1	0.6

Table 9. Data of income categories

Income Categories	Frequency	Percent
Low	51	34.6
Middle	77	52.3
High	19	12.9

The majority of the mothers surveyed; (52.3%) were of middle income level. Of these, 21% had a household income of greater than $45,000, and a total of 4 persons per household (44.2%). The projected value of obtaining at least 50 low and middle income women, to be surveyed, was met.

Influences on the Introduction of Formula and Solid Foods and Breastfeeding Termination: Data on factors which influenced mothers to start formula are shown in Table 10; to start solid foods, in Table 11, and to stop breastfeeding, in Table 12. Results discussed below are indicative of only those mothers who answered very much to each individual response.

The most frequently occurring reason influencing mothers to start formula was returning to work or school (22.4%). The second most frequently reported reason was lack of breastmilk (13.6%), followed by, my baby wasn't satisfied with breastmilk alone (11.6%), advice from a doctor or nurse (10.9%), to help the baby sleep through the night (1.4%) and encouragement from family and friends (0.7%).

A large proportion of mothers indicated that they started solid foods because they felt their baby was big enough to eat the foods (61.9%). Many mothers also felt

Table 10. Factors that influenced mothers to start formula

Factor	Not	Some	Much	Never
Return to work or school	35.4* (52.0)	9.5 (14.0)	22.4 (33.0)	32.7 (48.0)
Satisfied with breast-feeding	51.0 (75.0)	4.8 (7.0)	11.6 (17.0)	32.7 (48.0)
Help baby sleep	60.5 (89.0)	5.4 (8.0)	1.4 (2.0)	32.7 (48.0)
not enough breastmilk	49.0 (72.0)	4.8 (7.0)	13.6 (20.0)	32.7 (48.0)
Advice from doctor	53.1 (78.0)	3.4 (5.0)	10.9 (16.0)	32.7 (48.0)
Friends/family influence	61.9 (91.0)	4.8 (7.0)	0.7 (1.0)	32.7 (48.0)

*=percent(%)
( )=frequency

Table 11. Factors that influenced mothers to start solid foods

Factor	Not	Some	Much
Baby not satisfied with breastmilk	49.7* (73.0)	28.6 (42.0)	21.8 (32.0)
Help baby sleep	64.6 (95.0)	23.1 (34.0)	12.2 (18.0)
Not enough breastmilk	89.8 (132.0)	6.1 (9.0)	4.1 (6.0)
Friends/family influence	75.5 (111.0)	17.0 (25.0)	7.5 (11.0)
Advice from doctor	41.5 (61.0)	21.8 (32.0)	36.7 (54.0)
Baby big enough for solids	17.7 (26.0)	20.4 (30.0)	61.9 (91.0)

*=percent (%)
( )=frequency

Table 12. Factors that influenced mothers to stop breastfeeding

Factor	Not	Some	Much
Baby rejected breast	86.4* (127.0)	4.8 (7.0)	8.8 (13.0)
Breastfeeding hurt	91.8 (135.0)	2.7 (4.0)	5.4 (8.0)
Not enough breastmilk	78.2 (115.0)	7.5 (11.0)	14.3 (21.0)
BF interfered with lifestyle**	66.7 (98.0)	21.1 (31.0)	12.2 (18.0)
Returned to work or school	77.6 (114.0)	8.2 (12.0)	14.3 (21.0)
Child lost interest in BF	57.8 (85.0)	16.3 (24.0)	25.9 (38.0)
Child too old to BF	73.5 (108.0)	11.6 (17.0)	15.0 (22.0)
Advice from doctor	88.4 (130.0)	3.4 (5.0)	8.2 (12.0)
Husband/boyfriend said stop	94.6 (139.0)	5.4 (8.0)	0.0 (0.0)

*=percent (%) **BF=breastfeeding
()=frequency

that advice from a doctor or nurse to begin solid foods was important (36.7%). Approximately 22% (21.8) of mothers felt their babies were not satisfied on breast milk alone and decided to introduce solid foods. Less frequent were these reasons: 1) to help baby sleep through the night (12.2%), 2) encouragement from family and friends (7.5%), and 3) lack of breastmilk (4.1%).

The foremost reason for stopping breastfeeding was the child losing interest in breastfeeding (25.9%), indicating that the locus of control is with the child and not the mother. Four of the reasons cited had similar influences on the cessation of breastfeeding: the child was too old to breastfeed (15%), mother having to return to work or school (14.3%), lack of breastmilk (14.3%), and breastfeeding interfered with my lifestyle (12.2%). Reported less frequently were: the baby rejected the breast (8.8%), a doctor's or nurse's advice (8.2%), breastfeeding hurt too much (5.4%), and my husband/boyfriend wanted me to stop (0.0%). These results are in contrast to those of Cole (81), Yeung et al. (82), Bevan et al. (50), Hawkins et al. (2), and West (83), who report that lack of, or insufficient breastmilk, was cited as the most important reason for weaning from the breast. However, samples in these studies

mostly consisted of low income women with minimal education, in contrast to those of this study.

CHI SQUARE ANALYSIS

To determine if there were any significant differences among variables, chi square analysis was conducted (107). For the purpose of this study, a probability level of $p \leq 0.05$ was considered to be statistically significant.

Association of the Duration of Breastfeeding With:

The Introduction of Formula and Solid Foods: Tables 13 and 14 depict the association of the timing of formula and solid food introduction on the duration of breastfeeding. Categories "less than 1 month" through ">3-4 months" were combined into one group, since there were no significant differences between the two. The category "less than 1 month old" was deleted from the solid food analysis, since none of the participants chose this answer. Chi square analysis showed that there was a significant relationship between the timing of the introduction of formula and solid foods on the duration of breastfeeding.

Mothers who introduced formula at <1 month to 4 months old, were less likely to be long term breastfeeders (30.7%), than were mothers who introduced formula at >4 months old (75%) or who never used formula (97.9%). Those who never

Table 13. The association of the timing of the introduction of formula with the duration of breastfeeding

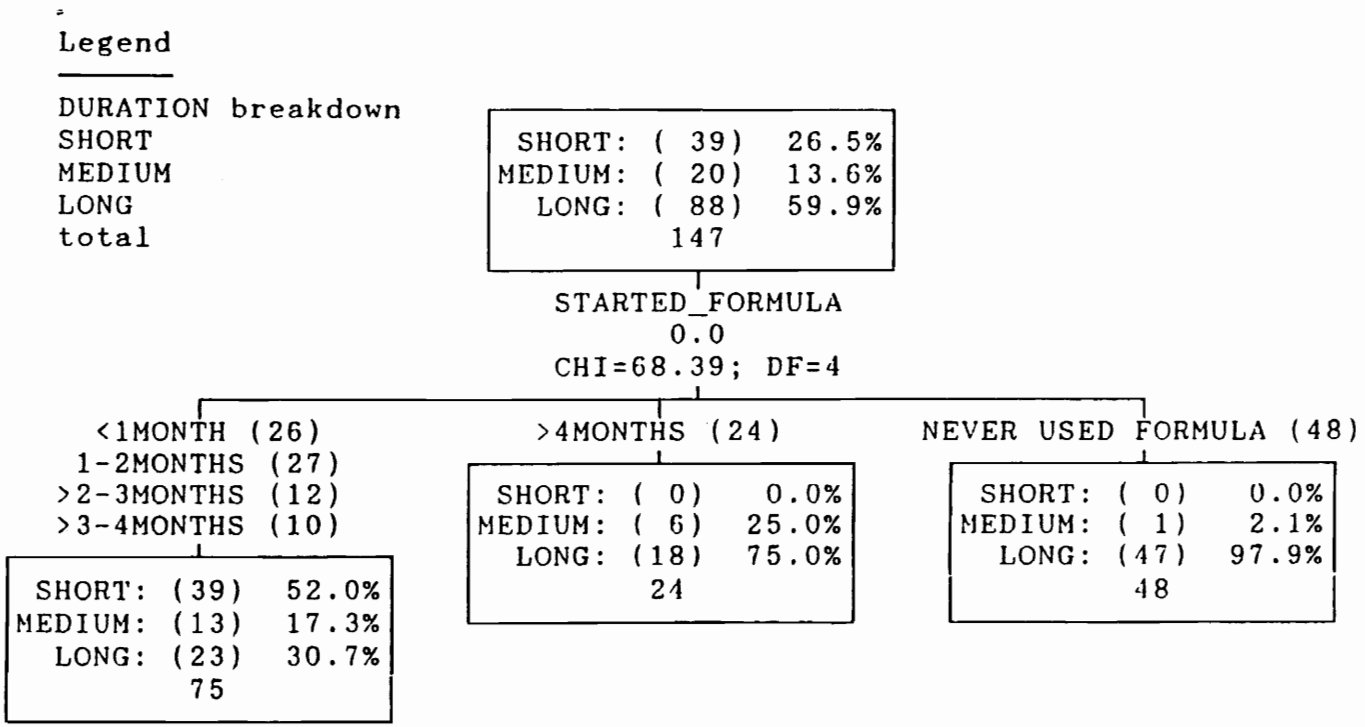
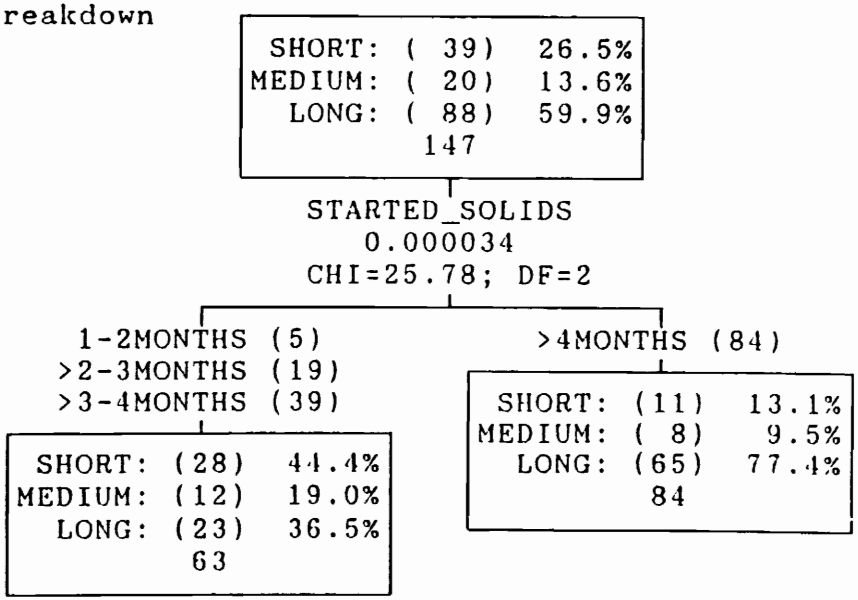


Table 14. The association of the timing of the introduction of solid foods with the duration of breastfeeding

Legend

DURATION breakdown
SHORT
MEDIUM
LONG
total



used formula had the greatest chance of being long term breastfeeders. All (100%) of the mothers who were short term breastfeeders introduced formula at ≤ 4 months of age. These findings suggest that use of supplemental formula, especially before 4 months of age, is associated with a decreased duration of breastfeeding. Early introduction of formula has also been associated with a shorter duration of breastfeeeding by Hawkins et al. (2), Bevan et al. (50), Sloper et al. (74), Samuels et al. (39), and Bergevin et al. (75). However, this finding differs from that of Feinstein et al. (76) and Gray-Donald et al. (77).

Mothers who introduced solid foods early (≤4 months old) were also less likely to be long term breastfeeders (36.5%), as compared to those mothers who introduced solid foods at >4 months old (77.4%). Furthermore, a majority of mothers who introduced solid foods early, were considered short term breastfeeders (44.4%), rather than long term breastfeeders (36.5%). Therefore, in groups similar to this sample, introduction of solid foods before 4 months of age may predispose mothers to a decreased breastfeeding duration. This finding was in contrast to that of Bevan et al. (50), who found that timing of the introduction of solid foods did not influence the duration of breastfeeding.

Their sample (50) consisted of only low income mothers who genrally introduced solid foods early (66% before the infant was 4 months old). The majority of mothers in this study did not introduce solid foods early and were of middle income.

Mother's Age: Survey results, as shown in Table 15, suggest that the age of the mother had an effect on the duration of breastfeeding. Older mothers were more likely to be long term breastfeeders. Eighty - eight percent (87.5) of mothers, 40 or older, were long term breastfeeders, as compared to 63.4% of mothers, 30-39, and 47.8% of mothers, 20-29. There were no short term breastfeeders in the 40 or older group and a greater majority of women in the 30-39 group were long term breastfeeders (63.4%) rather than short term breastfeeders (19.4%). In the 20-29 group, there was not much difference between the percent of short term and the long term breastfeeders. These findings are somewhat comparable to those of Ford and Labbok (51), who found that the mother's age increased the length of breastfeeding by a small amount.

Income: As seen in Table 16, there was not a strong or significant association between income and the duration of breastfeeding. Approximately 55-60% of low, middle and high

Table 15. The association of mother's age with the duration of breastfeeding

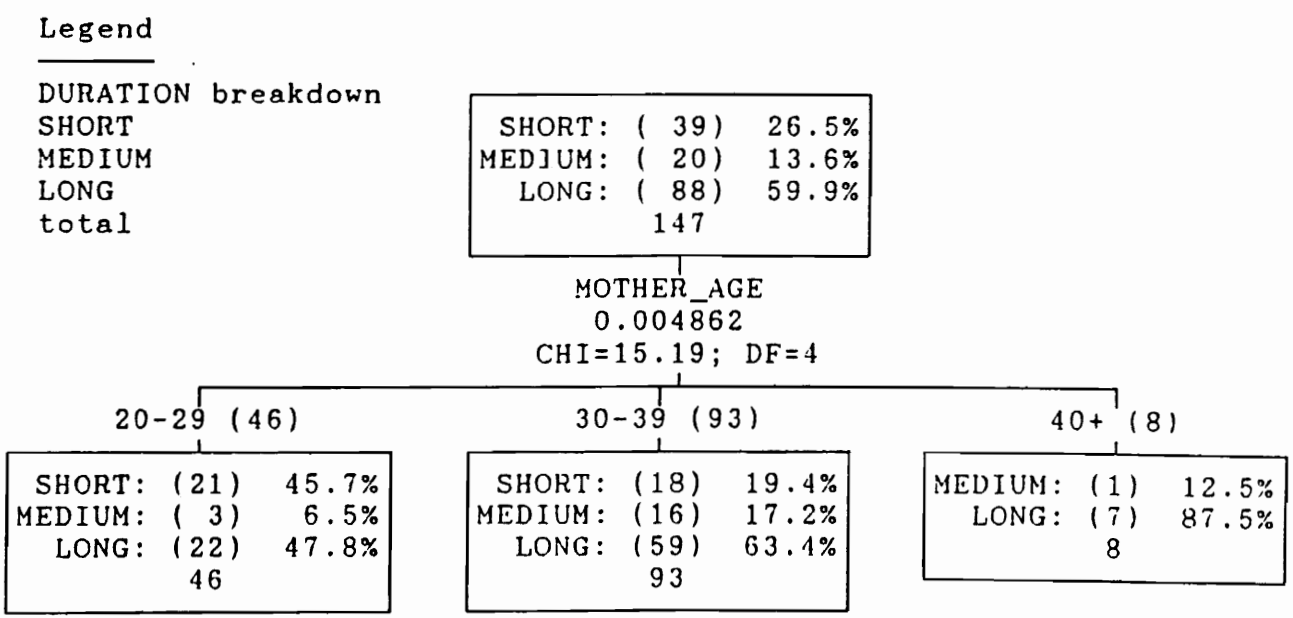
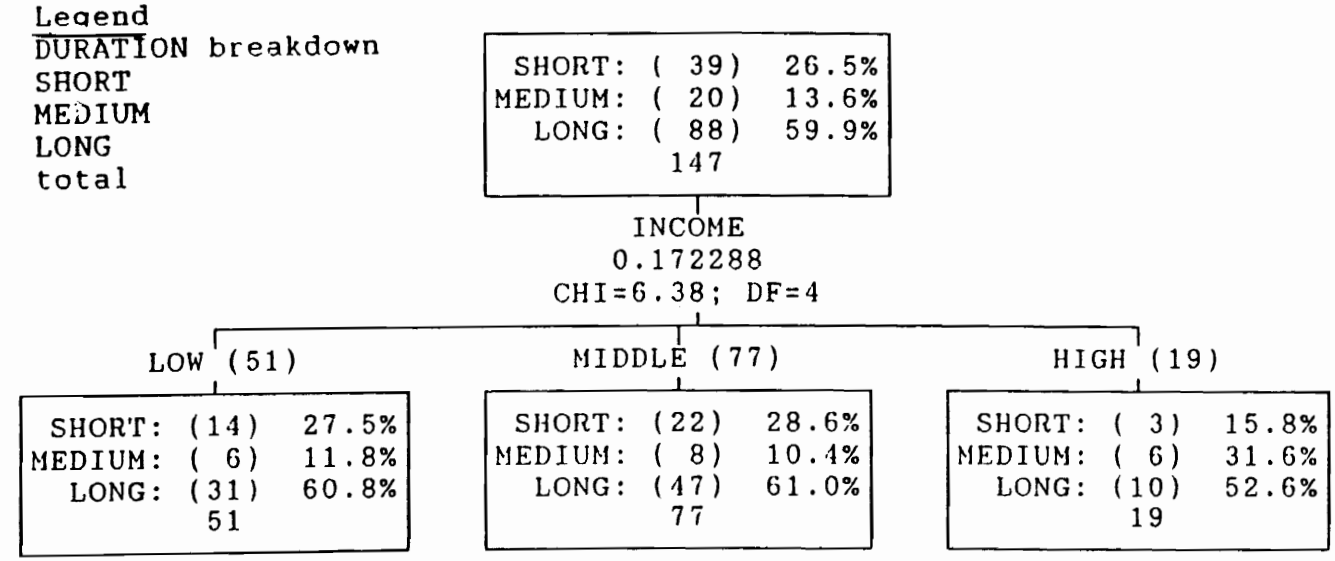


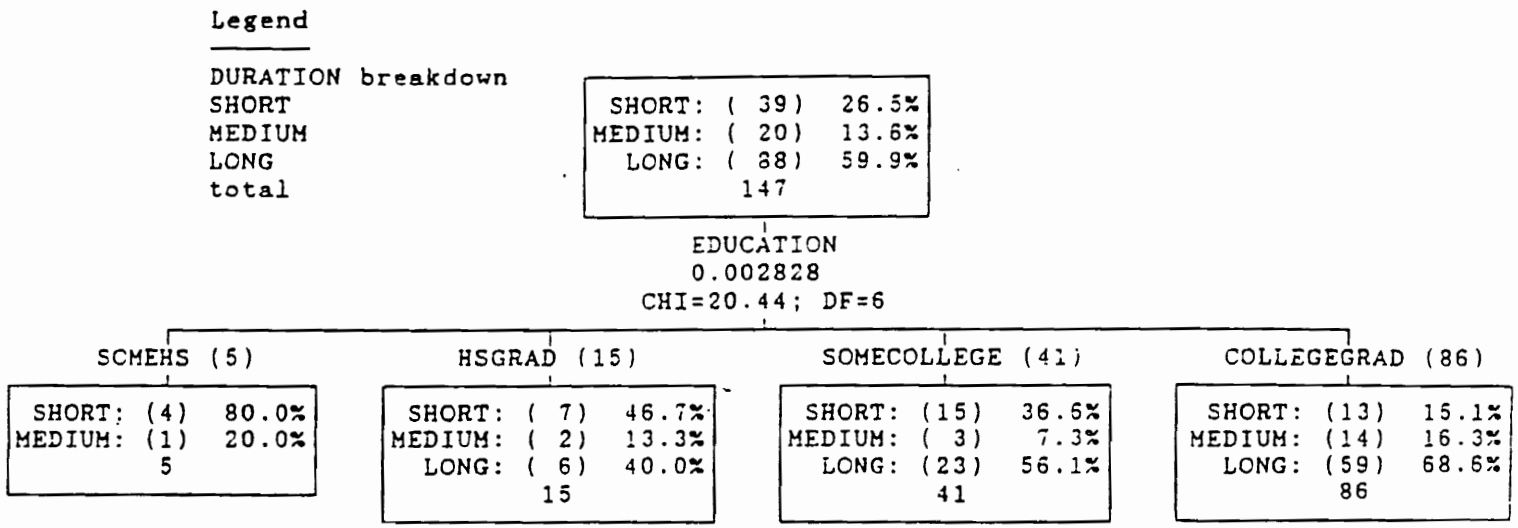
Table 16. The association of income levels with the duration of breastfeeding



income mothers were long term breastfeeders. Whereas, approximately 16-29% of low, middle and high income mothers were short term breastfeeders. Brogan (3) found that more infants from low than from high income families were weaned from the breast at less than one month old; however, there was no difference between income level and breast weaning at greater than one month old. Therefore, Brogan et al.'s (3) findings are in contrast to this investigators when comparing infants weaned at <1 month old. When comparing infants at >1 month old, results of this study and Brogan et al.'s (3) are comparable.

Education: There was a significant association between educational level and the duration of breastfeeeding, as seen in Table 17. More highly educated mothers tended to breastfeed for a longer duration. Sixty nine percent (68.6) of college graduates were long term breastfeeders, as compared to 15.1% short term breastfeeders. Mothers with some high school were more likely to be short term breastfeeders (80%) than medium term breastfeeders (20%). There were no long term breastfeeders in the "some high school" category. As educational level increased, so did the percent of long term breastfeeding; 0% of those individuals with some high school were long term

Table 17. The association of mother's educational level with the duration of breastfeeding



breastfeeders, 40% of those individuals with a high school diploma were long term breastfeeders, 56.1% of those individuals with some college were long term brestfeeders, and 68.6% of those individuals with a college degree were long term beastfeeders. Level of education also had a strong association with the duration of breastfeeding in studies conducted by Ford and Labbok (51) and Kurinij et al. (49).

Association of Income With:

The Introduction of Formula and Solid Foods: There was a significant association between income level and timing of the introduction of formula at the 0.03 probability level; however, there was no significant association between income level and the introduction of solid foods, as seen in Tables 18 and 19. Mothers of high (63.3%) and middle (52%) income were more likely to introduce formula at $\leq$ 4 months of age, which is considered by this investigator to be early formula introduction. However, mothers of low income (45%) were less likely to introduce formula early.

Reasons influencing the Introduction of Formula and Solid Foods and the Termination of Breastfeeding: Of the reasons influencing the introduction of formula, "I returned to work or school," was the only reason significantly affected by

Table 18. The association of the timing of the introduction of formula with income level

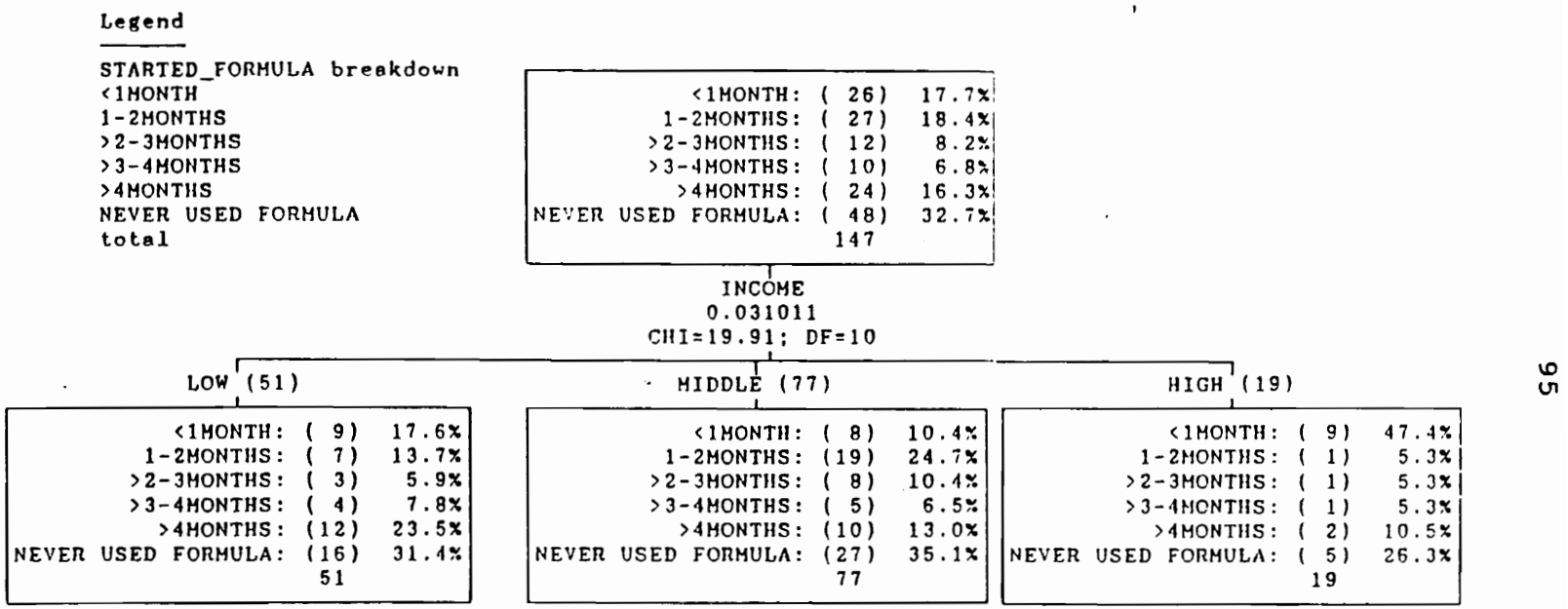
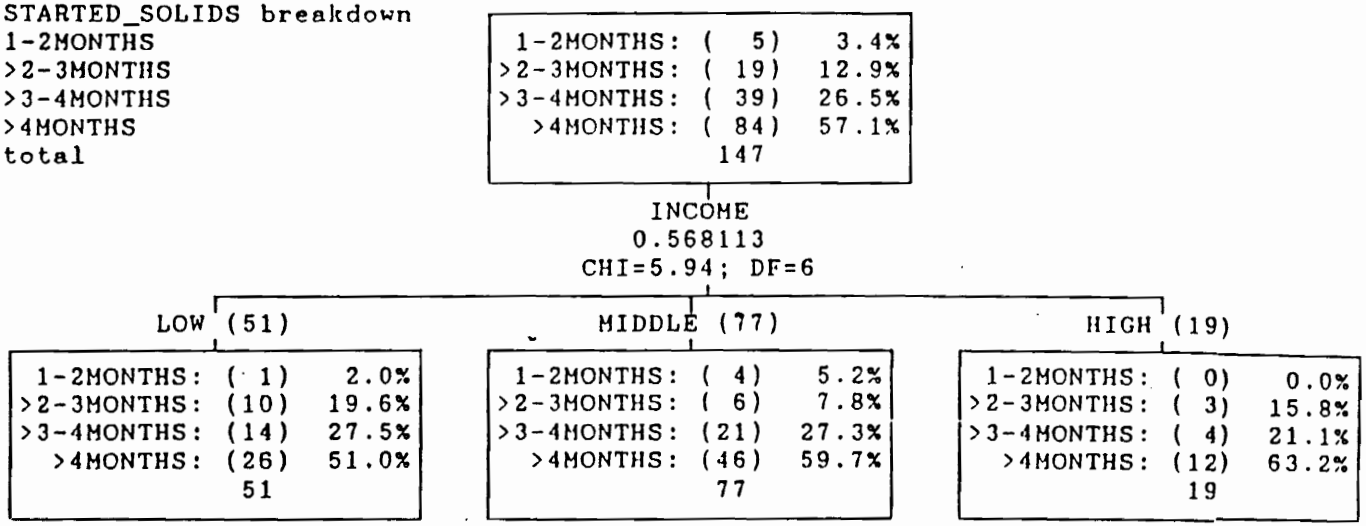


Table 19. The association of the timing of the introduction of solid foods with income level

Legend

STARTED_SOLIDS breakdown
1-2MONTHS
>2-3MONTHS
>3-4MONTHS
>4MONTHS
total



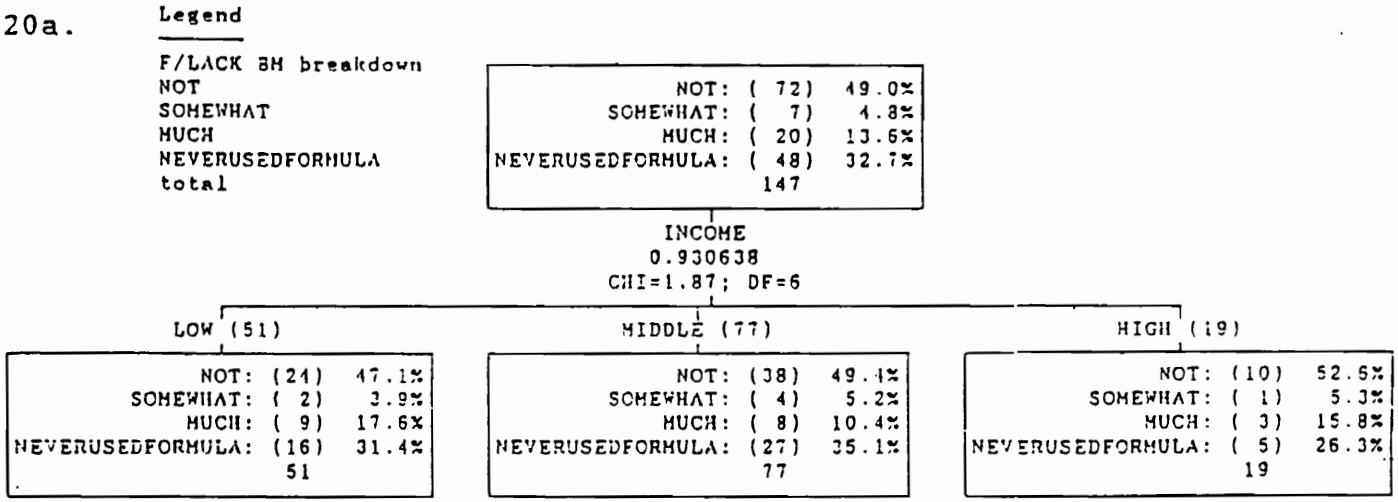
the mother's income level. Mostly middle income (31.2%), as compared to 11.8% low income and 15.8% high income women, felt that returning to work or school "very much" influence them to introduce formula. Refer to Table 20 for data.

Of the reasons influencing the introduction of solid foods, "I felt my baby was big enough for solid foods," was the only reason significantly associated with the mother's income level. Middle income (70.1%), low income (54.9%) and high income women (47.4%) felt strongly that solid foods should be introduced when the baby is big enough to ingest and digest them. However, it should be noted that this association was not strongly significant, due to a probabiltiy level of $p \leq .056$. Refer to Table 21 for data.

Two reasons for the termination of breastfeeding, were significantly associated with income level; "I had to return to work or school," and "the child lost interest," both at the 0.02 probability level. In general, more women stated that "the child lost interest in breastfeeding (25.9% very much)," than, "I had to return to work or school (14.3% very much)." However, middle income women were most concerned about having to stop breastfeeding due to returning to work or school, probably contributing to their increased need to start formula early. Of the 77 middle income women

Table 20. The association of reasons that influenced mothers to introduce formula with income level

20a.



20b.

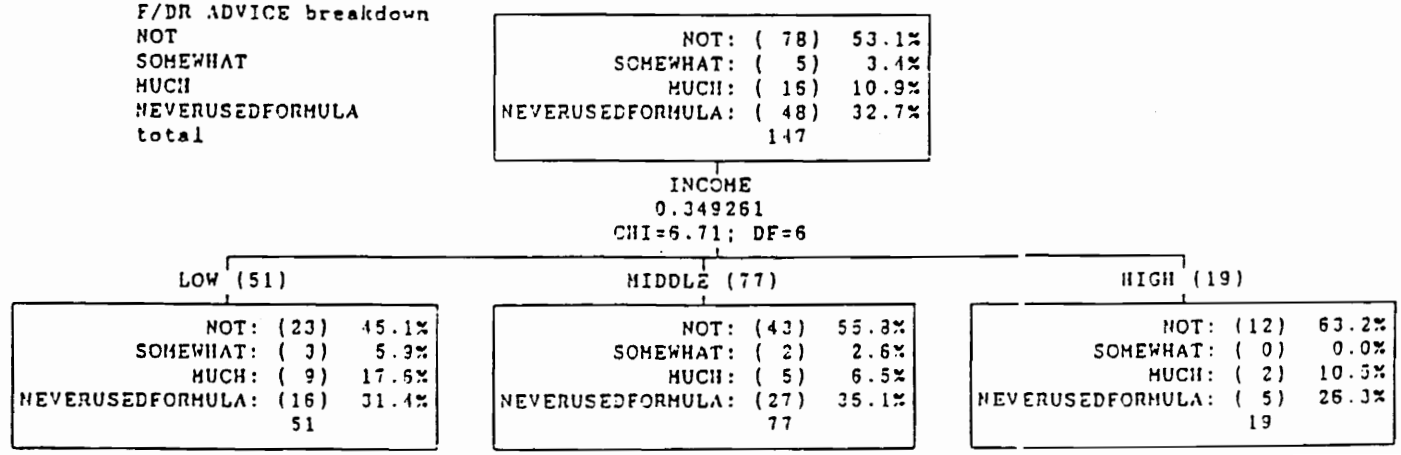
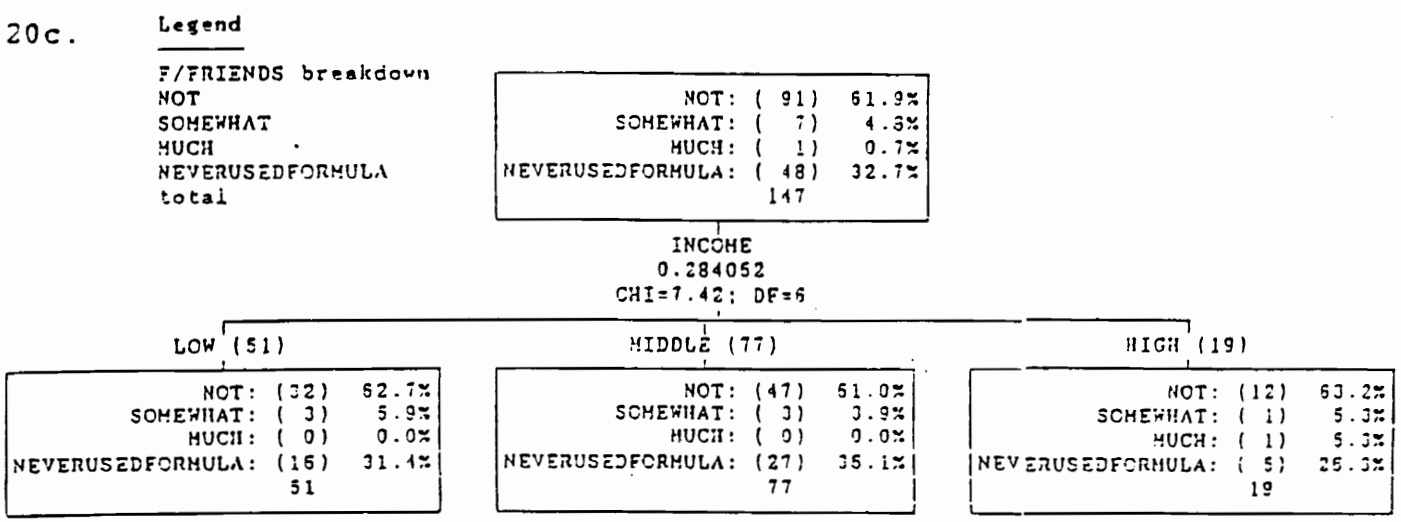


Table 20. continued

20c.



20d.

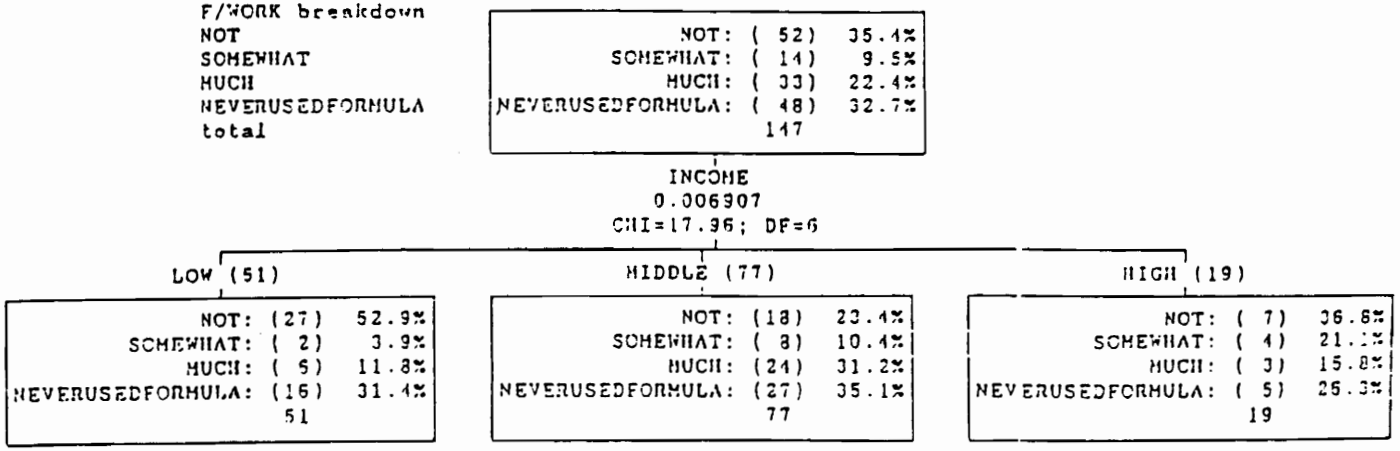
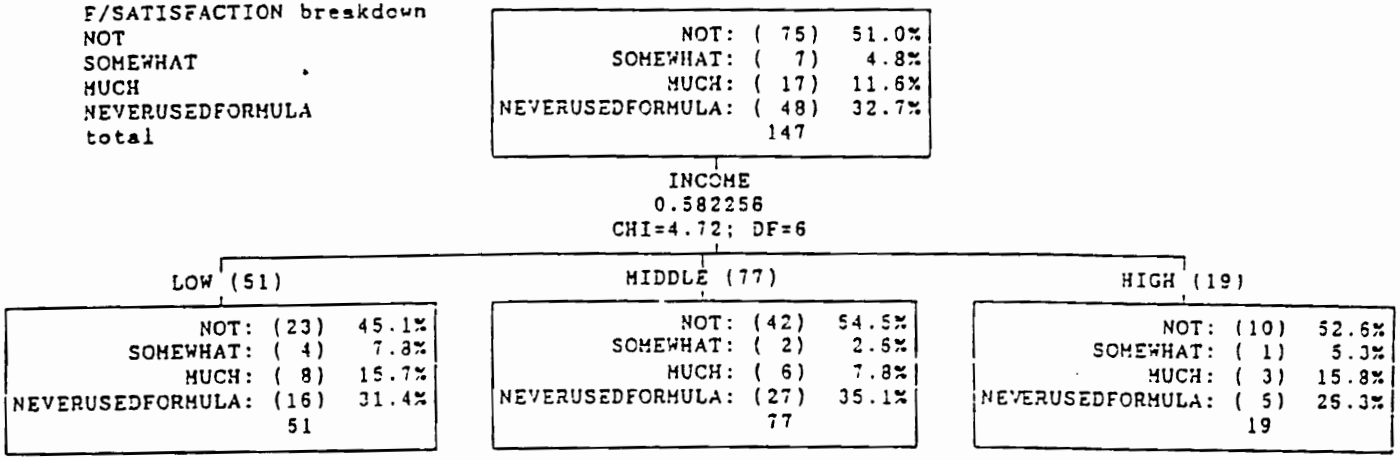


Table 20. continued

20e.

Legend

F/SATISFACTION breakdown
NOT
SOMEWHAT
MUCH
NEVERUSEDFORMULA
total



20f.

Legend

F/SLEEP breakdown
NOT
SOMEWHAT
MUCH
NEVERUSEDFORMULA
total

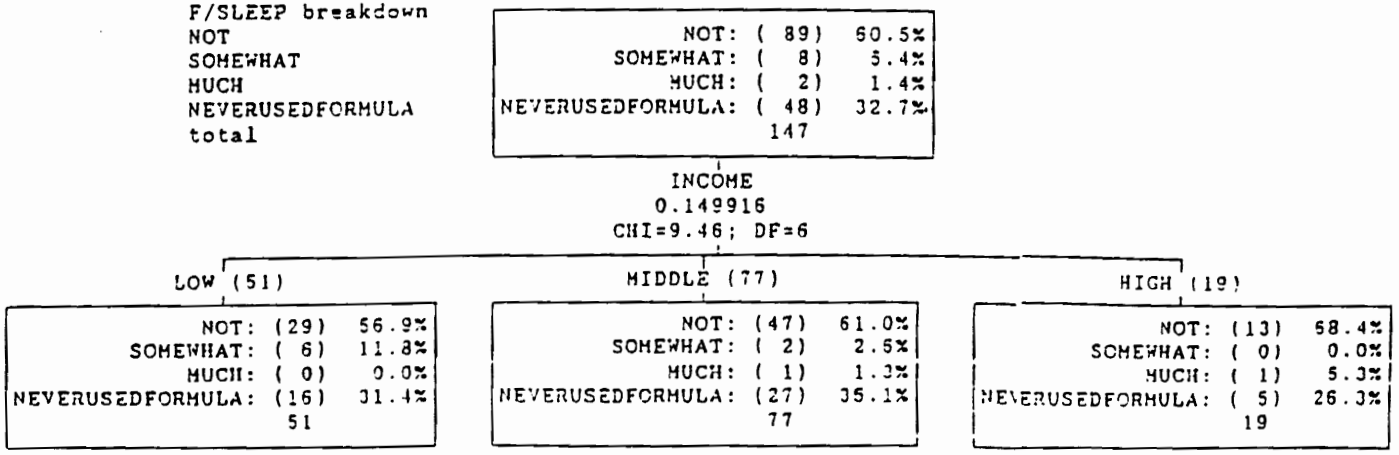
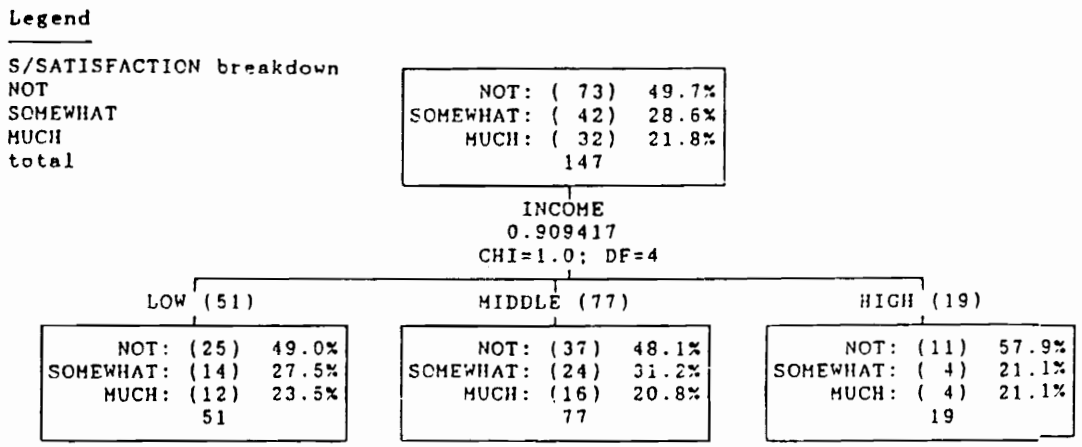


Table 21. The association of reasons that influenced mothers to introduce solid foods with income level

21a.



21b.

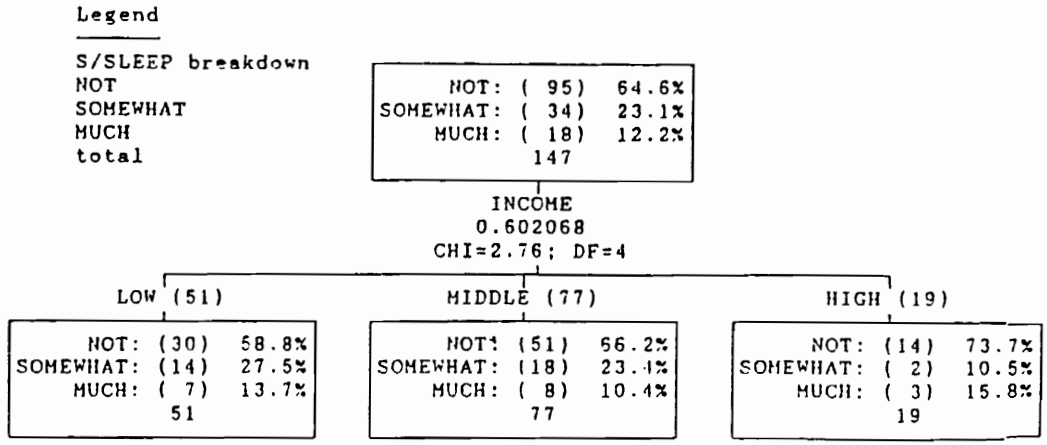
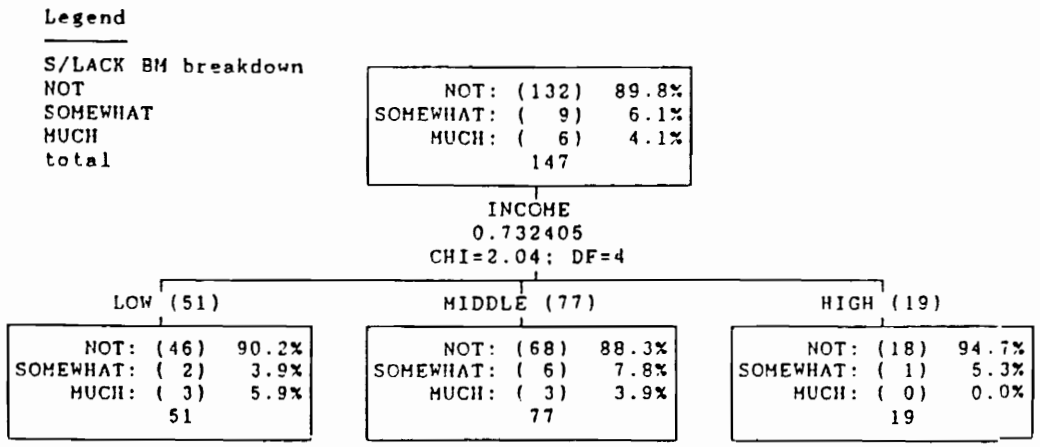


Table 21. continued

21c.



21d.

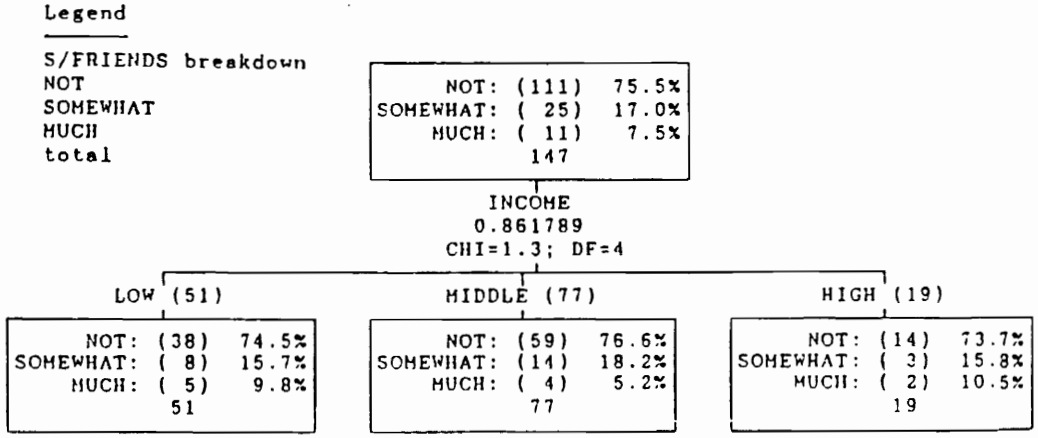
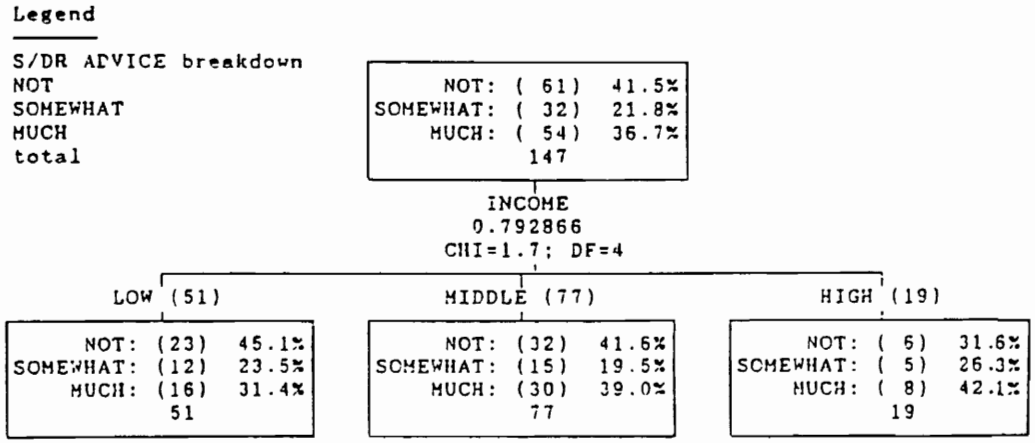
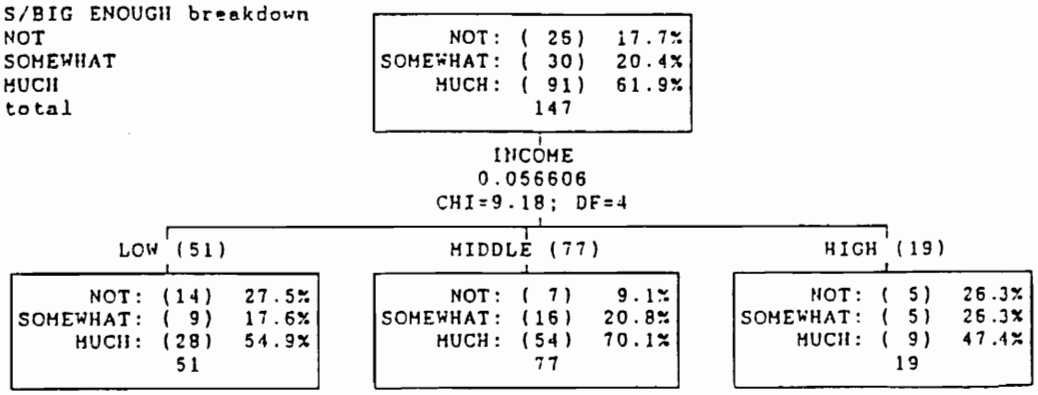


Table 21. continued

21e.



21f.



surveyed, 19.5% of them chose having to return to work or school as a big factor influencing the termination of breastfeeding (responding "very much"), as compared to only 9.8% low income and 5.3% high income mothers. High income women were more apt to respond "the child lost interest in breastfeeding," as the factor influencing the termination of breastfeeding. Results show that 52.6% of high income, 25.5% low income and 19.5% middle income mothers cited "very much," to this response. Refer to Table 22 for data.

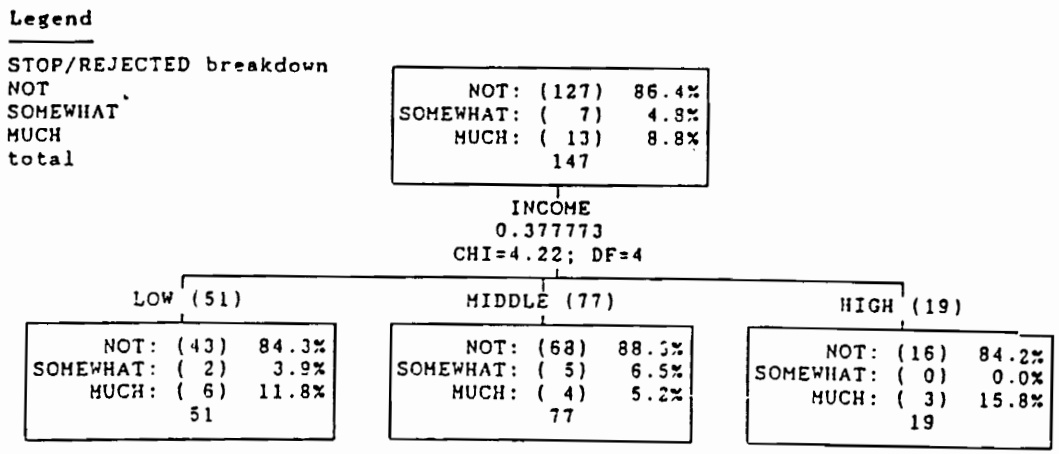
Association of Insufficient Breastmilk and the Timing of the Introduction of Formula and Solid Foods

To investigate whether there was a significant difference in mothers perceived to have insufficient milk and the timing of the introduction of formula and solid foods, a Chi Square analysis was performed. Results indicated, that the timing of the introduction of formula and solid foods was significantly associated with the percent of mothers citing insufficient milk supply as a major influence on terminating breastfeeding.

Of the mothers who introduced formula at ≤ 4 months, 20% stated insufficient milk as a major reason for the termination of breastfeeding. However, of the mothers who started formula at > 4 months, only 16.7% identified

Table 22. The association of reasons that influenced mothers to stop breastfeeding with income level

22a.



22b.

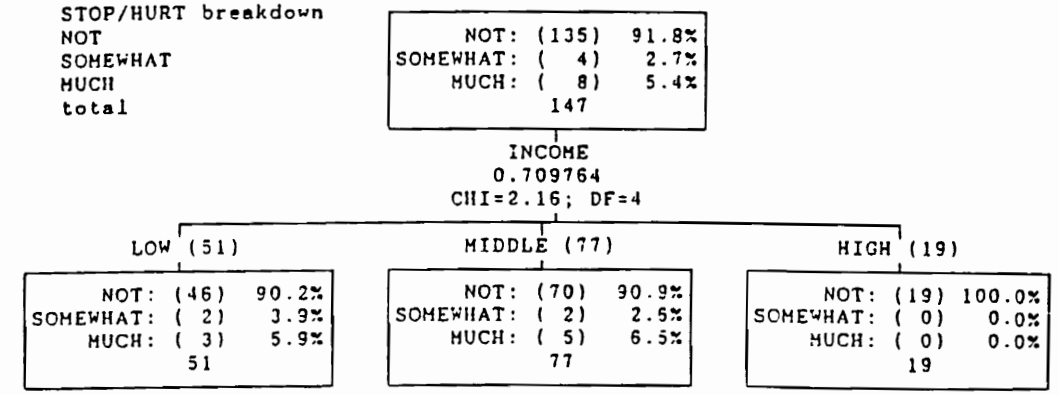
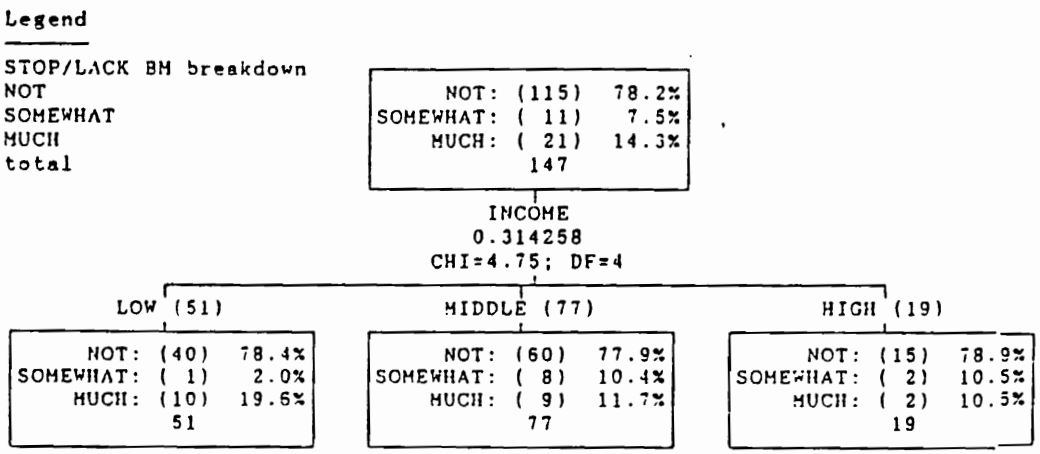


Table 22. continued

22c.



22d.

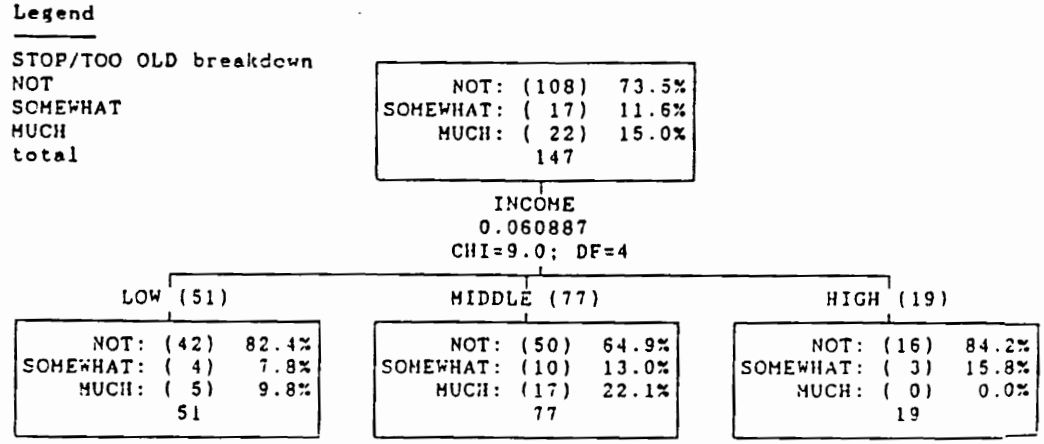
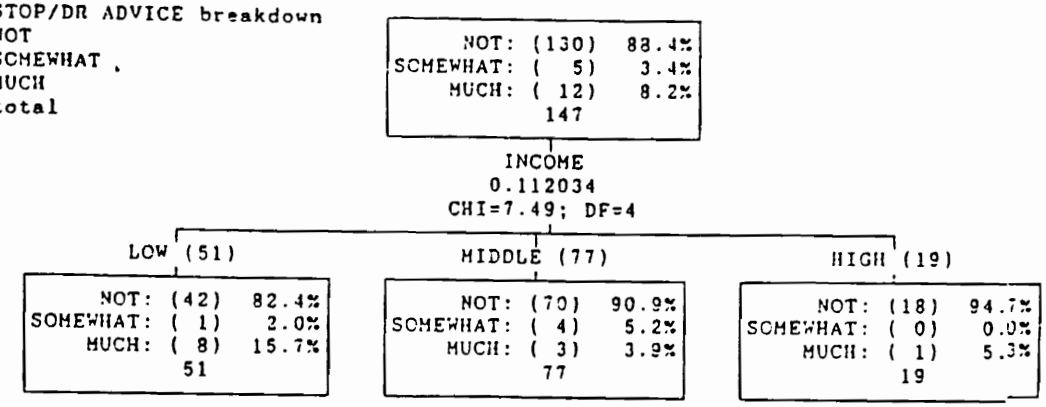


Table 22. continued

22e.

Legend

STOP/DR ADVICE breakdown
NOT
SOMEWHAT
MUCH
total



22f.

Legend

STOP/HUSBAND breakdown
NOT
SOMEWHAT
MUCH
total

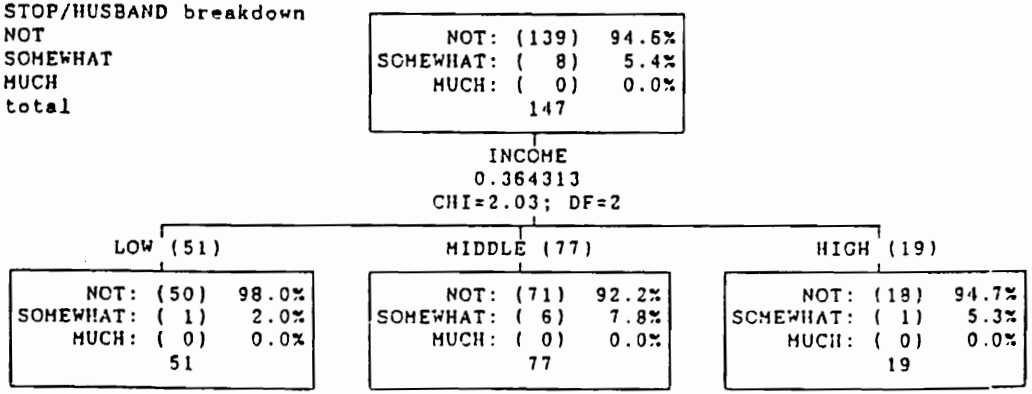
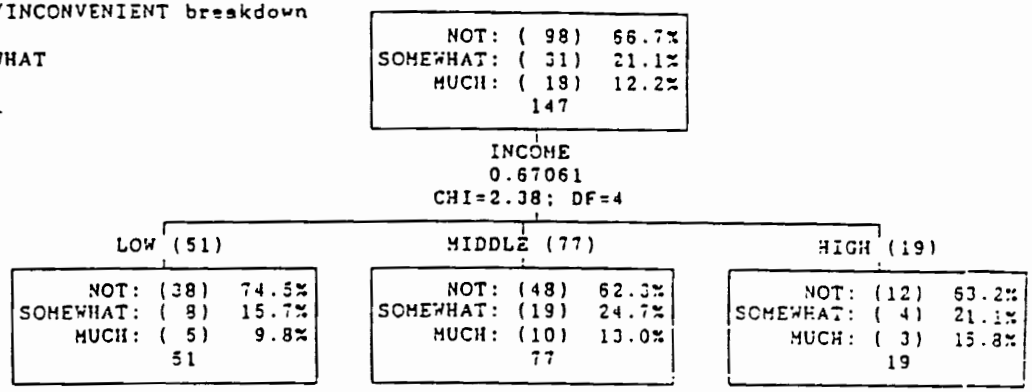


Table 22. continued

22g.

Legend

STOP/INCONVENIENT breakdown
NOT
SOMEWHAT
MUCH
total



22h.

Legend

STOP/WORK breakdown
NOT
SOMEWHAT
MUCH
total

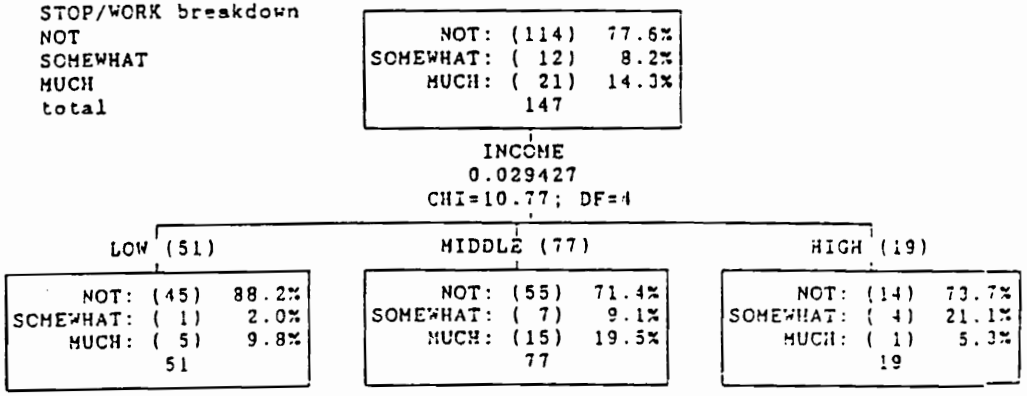
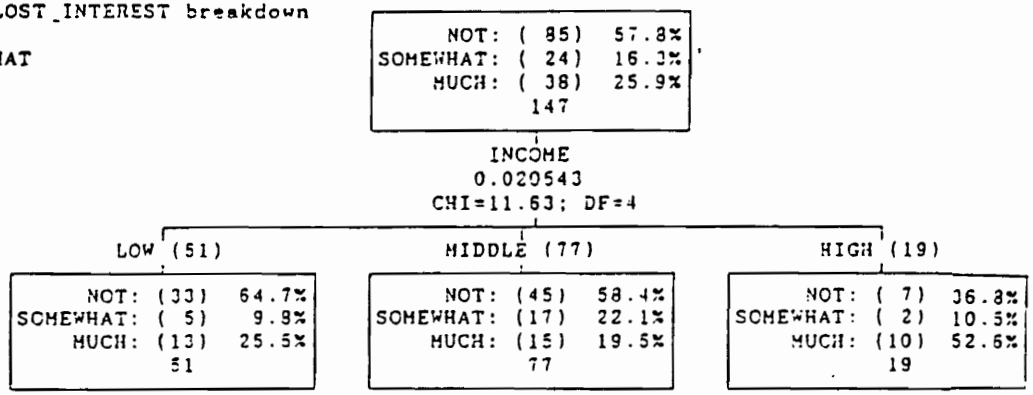


Table 22. continued

22i.

Legend

STOP/LOST_INTEREST breakdown
NOT
SOMEWHAT
MUCH
total



insufficient milk supply as a major reason for the termination of breastfeeding. An even smaller amount of women (4.2%), in the never used formula category, identified insufficient milk supply as a major reason for the termination of breastfeeding. It should be noted that the probability level was 0.056, determined to be significant, but not strongly associated. Refer to Table 23 for data.

Sixty percent of mothers who introduced solid foods between 1-2 months cited insufficient milk as a reason for the termination of breastfeeding. However, as the timing of solid food introduction increased to >2-3 months, >3-4 months and >4 months, the percentage of women indicating insufficient milk supply as a reason for the termination of breastfeeding, decreased. Refer to Table 24 for data.

Table 23. The association of the timing of the introduction of formula with insufficient breastmilk

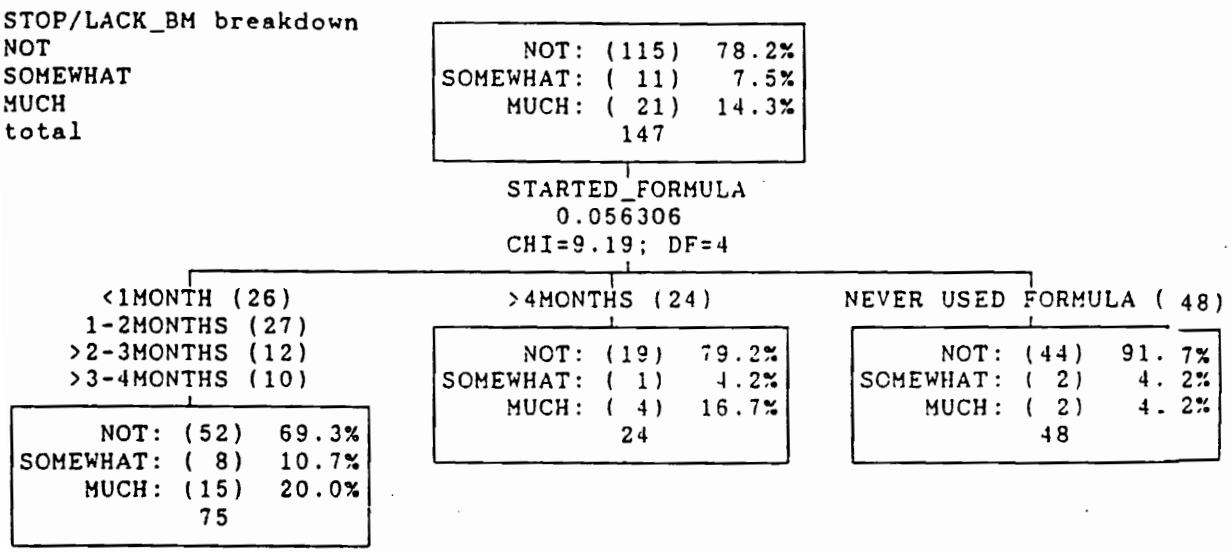
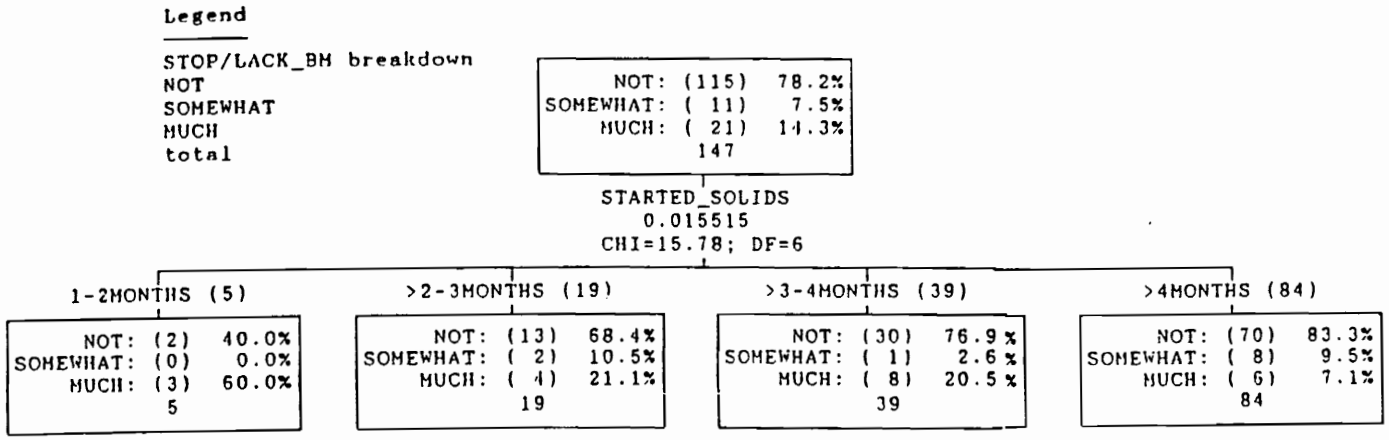


Table 24. The association of the timing of the introduction of solid foods with insufficient breastmilk



Chapter V

Summary and Conclusions

This researcher had three main objectives:
(1) to determine duration of breastfeeding and factors that affect duration of breastfeeding, in low and middle income women,
(2) to determine if the early introduction of formula and solid foods decreases duration of breastfeeding, and
(3) to investigate if mothers who perceived that they have insufficient milk introduce formula and solid foods early and, thus, decrease duration of breastfeeding.

The results of this survey were used to assess the above objectives, as well as, to clarify some general information concerning breastfeeding mothers. In general, the majority of the women surveyed introduced formula, (but not solid foods), early. They were long term breastfeeders, between the age of 30-39, and college graduates. The most influential reason for formula introduction was the mother returning to work or school. The most influential reason for solid food introduction was that the mothers felt their babies were big enough for solids. Mothers terminated breastfeeding at a mean age of 10 months mostly due to the

child losing interest.

The first hypothesis, that there will be a significant difference in duration of breastfeeding between women of differing income levels, was not supported by the data. Furthermore, there was no difference in the specific factors affecting duration of breastfeeding.

There was not a significant difference in duration of breastfeeding between women of low and middle income, versus those women of high income. The high income group was represented by a very small sample size, thus, decreasing the generalizability of this group's results. However, it was important to set an upper limit to the middle income values, thus, producing a high income category.

There was a difference among income levels in one particular factor affecting duration of breastfeeding. Women of middle income had greater concerns over having to terminate breastfeeding to return to work or school, than those of low or high income. This may occur since many of the low income mothers do not have a job and the high income mothers do not need a job. It was further determined that women of middle income tend to introduce formula earlier than low income women. This may possibly be due to their need to return to work, thus necessitating early termination

of breastfeeding and initiation of formula. Obviously, as the number of women in the work force increases, a mother's opportunity to continue breastfeeding for more than 6 weeks may decrease. Women of low and high income categories more frequently chose the response, "my child lost interest in breastfeeding," showing that these women may have a greater opportunity to continue breastfeeding for as long as the child would like, and not have to worry so much about returning to work or school.

The second hypothesis, that there would be a significant relationship between the timing of formula and solid food introduction and duration of breastfeeding, was supported by the data. Mothers who introduced formula or solid foods early, $\leq$4 months old, were generally short term breastfeeders. Whereas, mothers who introduced formula or solid foods at the recommended age (66), >4-6 months, were generally long term breastfeeders. Mothers who never used formula had the greatest chances of being long term breastfeeders. These results show that the timing of formula supplementation and/or solid food introduction, may be an important factor in determining exactly how long a mother will breastfeed. It is important to mention that any form of formula introduction, whether supplemental or total,

was considered "introduction." Therefore, this investigator is not stating that as soon as formula or solid foods were introduced, breastfeeding was discontinued. It was still ossible for these mothers to continue breastfeeding following introduction of beikost. There are many possible reasons for why early introduction of formula or solid food decreases the duration of breastfeeding. The supplemental foods may have interfered with breastmilk production; the mother may have felt bottle feeding was easier or more appropriate for her baby and herself; or it may just be the natural progression for the baby and mother to increase the supplemental foods if the baby is doing well on them.

The third hypothesis, that there would be a significant association between mother's who perceived themselves to have insufficient milk and the timing of formula and solid food introduction, was also supported by the data. In this study, insufficient milk was not considered to be a major reason influencing mothers to terminate breastfeeding. However, lack of breastmilk was the second most important reason why mothers initiated formula and was somewhat influential in breastfeeding termination. Do mothers, who believe they have an insufficient milk supply, introduce formula and solid foods early, thus, possibly decreasing the

duration of breastfeeding? A greater percentage of mothers who introduced formula and solid foods early (as compared to >4 months or never using formula), cited insufficient milk supply as their reason for terminating breastfeeding. We know, from the results of this study discussed earlier, that mothers who introduce formula and solid foods early tend to have a shorter duration of breastfeeding. Therefore, it could be stated that mothers, perceived to have an insufficient milk supply, tend to introduce formula and solid foods early, thus, contributing to a possible decrease in duration of breastfeeding. The formula or solid foods can be used to replace the breastmilk completely, or in the case of supplemental feedings, they may interfere with breastmilk production and eventually lead to an earlier weaning from the breast.

Limitations of this study included the limited sample of low income women who breastfed. All of the mothers had to contact the investigator if they wanted to participate in the study, thus, increasing the chances that those mothers will have had a long and successful breastfeeding experience. If this investigator could have acquired referrals from the Health Department or Social Services, or local hospitals, the sample might have been larger. But,

due to the need for confidentiality between client and professional, this was not feasible.

This study produced a great deal of useful information, when dealing with a breastfeeding population. Although nutritionists and medical professionals agree that breastfeeding is best, there needs to be a continued emphasis on breastfeeding initiation and duration. It was encouraging to discover that 60% of the mothers surveyed were long term breastfeeders and that the average age of weaning from the breast was 10 months old. These statistics substantiate the findings of Martinez and co-workers (19,33,34,36,37), Hendershot (32), and Samuels et al. (39) that breastfeeding duration is increasing. However, the results of this study did not substantiate the hypothesis that women of lower income tend to have a shorter duration of breastfeeding than do women of middle income. Therefore, it may not be practical to direct efforts for increased duration of breastfeeding to low income women alone, but rather to the general public. There should be a continued effort to educate the public about breastfeeding techniques and the appropriate timing of the introduction of formula and solid food. Mothers should be encouraged to talk to their doctors, nutritionists or lactation

consultants if any problems or questions arise while breastfeeding, especially when an insufficient milk supply is perceived.

To more effectively educate the public, it is important to be aware of the subtle messages portrayed by the media (television, magazines, books, etc.), that may influence a womens breastfeeding experience. Messages that portray the breast as a sex symbol, rather than a means for milk for an infant, may interfere with a mothers decision to breastfeed. Furthermore, those mothers that may have initiated breastfeeding, but then felt embarassed breastfeeding around others, may terminate breastfeeding early. Subtle messages such as these, may greatly influence the breastfeeding experience.

Chapter VI

Suggestions for Future Research

It is suggested by this investigator that further investigation of the affects of having to return to work or school upon the duration of breastfeeding, especially in mothers of middle income, should be conducted. If it is verified that having to return to work or school decreases the duration of breastfeeding, then possible solutions to this problem should be researched.

It would also be valuable to continue research on the effects of early formula and solid food introduction on the duration of breastfeeding and mother's perceived inadequate milk supply, to substantiate the few studies that investigate these topics.

A seperate study investigating the same principles within this study yet, focusing on teenagers, would be appropriate. Women of this age category may have many different concerns than that of older women, seen in this study.

Finally, a more in depth study on the support of families (both financially and socially) of breastfeeding. Do these parameters affect breastfeeding initiation and

duration? Mothers who have families that support breastfeeding and who are financially stable, may be more apt to initiate breastfeeding for longer durations.

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APPENDIX A
MEDICAL/NUTRITIONAL RISK FACTORS FOR BREASTFEEDING WOMEN

Iron Deficiency and/or Anemia

A. Hemoglobin of less than 12 grams/100ml. or hematocrit less than 37%. An EP value greater than or equal to 35mcg/dl of whole blood.

High Risk Pregnancy

B. Woman of less than 19 years of age at time of conception.

C. Woman of 35 years of age or older at time of conception.

D. Poor past pregnancy outcome-
Any pregnancy resulting in any of the following problems:

still birth
low birth weight
neonatal death
fetal death
infant with congenital anomaly
multiple birth
pregnancy-induced conditions (gestational diabetes, hypertension, toxemia)
SGA infant (<2500 grams or diagnosed by a physician)
LGA infant (>4000 grams or diagnosed by a physician)
premature delivery (less than 37 weeks)
sudden infant death (SIDS)

E. Frequent conception (including spontaneous or operative abortions)
1. High parity: more than 4 previous pregnancies.
2. Less than 24 months between the date of the last delivery and date of conception.

F. Previous High-Risk Pregnancy as defined (F) prenatal (most recent pregnancy only).

G. Smoking one or more cigarettes/ day at any time during previous pregnancy or currently.

H. Alcohol abuse at any time during the previous pregnancy or currently.
   a) Regular use of alcohol (more than 1 ounce of absolute alcohol per day) or
   b) Occasional excessive (>2 ounces of absolute alcohol consumption).

I. Drug use in pregnancy or currently.

Abnormal Pattern of Weight Gain/Growth

J. Inadequate weight gain in pregnancy:
   -any weight loss during pregnancy
   -failure to gain any weight in the first trimester
   -weight gain which fell below the appropriate curve on the WIC Prenatal Weight Gain Grid

K. Underweight--10% or more under standard weight for height.

L. Obesity--20% or more above standard weight for height.

Dietary Deficiencies That Impair or Endanger Health

M. Presence of inadequate/inappropriate diet or poor eating habits documented by diet history or dietary recall - three or more servings missing from the total recommended from the four food groups for a participant of that age and category; all recommended servings of one group missing; deficiency of any major nutrient; an excessive use of fat, sugar or salt; an omission of two meals/day or other dietary patterns the CPA documents as inadequate or inappropriate.

N. Presence of pica documented by dietary history or dietary recall.

Other

O. Poor dentition (several missing or decayed teeth) or physical anomalies which preclude proper ingestion of food such as cleft palate or cerebral palsy.

P. Other current documented nutritionally related medical conditions which preclude or restrict the use of conventional foods such as: food allergy, food intolerance, clinical signs of nutritional deficiencies, long-term antibiotic treatment, Thalassemia, sickle cell anemia, pernicious anemia, other nutritionally related complications of pregnancy.

Q. Breastfeeding eligible -- if breastfed infant is found nutritionally at risk for the program the mother is automatically eligible.

APPENDIX B

COLLEGE OF HUMAN RESOURCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061-0430

DEPARTMENT OF HUMAN NUTRITION AND FOODS

March 1992

Dear Fellow Mom:

When is the best time to stop breastfeeding? This question has no easy answer! Each mother and baby have their own needs and preferences. Please help me learn more about your breastfeeding experience, by answering the following questions.

This questionnaire is for moms who have breastfed a baby within the past five years. If you have breastfed more than one child, please answer the questions for <u>just</u> the last child you have 'finished' breastfeeding - a child that is no longer breastfeeding.

You may receive a summary of our results by writing your name and address on the mailing label I am providing. Please do not write your name on the questionnaire. All answers will be completely confidential and anonymous.

For the results to be accurate and useful, it is important that each questionnaire be completed and returned! Thank you for your time!

Sincerely,

Carol Moriarty, B.S.
Graduate Student
Human Nutrition and Foods

APPENDIX C

BREASTFEEDING QUESTIONNAIRE

1. How old now is your youngest child who was breastfed, but is not breastfed anymore?

   _____

2. How old was that child when you first started formula?
   (even if you were still breastfeeding)?

   a. Less than 1 month old
   b. 1 - 2 months old
   c. older than 2 months to 3 months old
   d. older than 3 months to 4 months old
   e. older than 4 months
   f. I never used formula

3. How old was your child when you first started solid foods?

   a. less than 1 month old
   b. 1 - 2 months old
   c. older than 2 months to 3 months old
   d. older than 3 months to 4 months old
   e. older than 4 months

4. How old was your child when you completely stopped breastfeeding?
   _____ (months)

5. What age category are you in ?

   a. Under 20
   b. 20-29
   c. 30-39
   d. 40 or older

6. Please circle the combined income of everyone (including yourself) in your household.

   a. less than $15,000
   b. $15,000 to $17,999
   c. $18,000 to $22,999
   d. $23,000 to $26,999
   e. $27,000 to $30,999
   f. $31,000 to $34,999
   g. $35,000 to $39,999
   h. $40,000 or more

7. How many people, including yourself, are there in your household? _____

8. Please circle your level of education:

   a. some high school
   b. high school graduate
   c. some college
   d. college graduate

9. Which of these reasons influenced you to START USING FORMULA?

(PLEASE CIRCLE 1,2 OR 3)

	1 = NOT AT ALL	2 = SOMEWHAT	3 = VERY MUCH
a. I returned to work or school	1	2	3
b. My baby wasn't satisfied with breastmilk	1	2	3
c. To help the baby sleep through the night	1	2	3
d. I did not have enough breastmilk	1	2	3
e. Advice from a doctor or nurse	1	2	3
f. Encouragement from friends or family	1	2	3

10. Which of these reasons influenced you to start offering SOLID FOODS?

	1 = NOT AT ALL	2 = SOMEWHAT	3 = VERY MUCH
a. My baby was not satisfied	1	2	3
b. To help the baby sleep through the night	1	2	3
c. I did not have enough breastmilk	1	2	3
d. Encouragement from friends or family	1	2	3
e. Advice from a doctor or nurse	1	2	3
f. I felt my baby was big enough for solid foods	1	2	3

11. Which of these reasons influenced you to STOP breastfeeding?

	1 = NOT AT ALL	2 = SOMEWHAT	3 = VERY MUCH
a. The baby rejected the breast	1	2	3
b. Breastfeeding hurt too much	1	2	3
c. I did not have enough breastmilk	1	2	3
d. Breastfeeding interfered with my lifestyle	1	2	3
e. I had to return to work or school	1	2	3
f. The child lost interest in breastfeeding	1	2	3
g. The child was too old to breastfeed	1	2	3
h. Advice from a doctor or nurse	1	2	3
i. My husband/boyfriend wanted me to stop	1	2	3

VITA

CAROL ANN MORIARTY

Carol Moriarty was born in Bucks County, Pennsylvania on January 19, 1963. She was graduated from James Madison University with a Bachelor of Science in Dietetics in May, 1987. From July, 1987 to March, 1988 she worked as a nutritionist and WIC Director for the Hoke County Health Department in Raeford, North Carolina. From March, 1988 to May, 1989 she continued as a nutritionist for the Cumberland County Health Department, in Fayetteville, North Carolina. She entered the graduate program at Virginia Polytechnic Institute, as a full time student, in August, 1989. Carol is married, with two young daughters, and presently residing in Dublin, Virginia.

Carol Ann Moriarty