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The relationship between breastfeeding, formula-feeding, and infant health

Shirley Mae Bass

To the Graduate Council:

I am submitting herewith a thesis written by Shirley Mae Bass entitled "The relationship between breastfeeding, formula-feeding, and infant health." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science in Nursing, with a major in .

Maureen Groer, Major Professor

We have read this thesis and recommend its acceptance:

Patricia Droppleman, Johnie Mozingo

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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and recommend its acceptance:

Patricia Gentry Doppleman

Johnnie M. Mozingo

Accepted for the Council:

C. W. Minkel
Associate Vice Chancellor
and Dean of the Graduate School

THE RELATIONSHIP BETWEEN BREASTFEEDING, FORMULA-FEEDING, AND INFANT HEALTH

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

Shirley Mae Bass

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ABSTRACT

A nonexperimental prospective study was conducted to determine if there is a relationship between breast milk feeding, formula feeding, and infant health. The purpose of the study was to determine within the conceptual framework of Roy's Adaptation Model, whether a specific relationship exists between infant's feeding method and infant health.

The researcher used questionnaires with data gathered at two collection times--1 month and 2 months, and demographic information forms to collect data. Breastfed infants showed less frequency of infectious illnesses than formula fed infants at 1 month and 2 months. Breastfeeding mothers reported fewer calls and visits to health care providers than did formula feeding mothers. Another finding was that breastfeeding infants took fewer prescription, nonprescription, and home remedies than did formula feeding infants.

While none of these differences taken together were statistically significant, a pattern appears to emerge suggesting the need for further research.

TABLE OF CONTENTS

CHAPTER		PAGE
I.	INTRODUCTION	1
	Overview of the Problem	3
	Conceptual Framework	4
	Problem Statement	6
	Research Question	6
	Subsidiary Questions	6
	Theoretical Definition	7
	Assumptions	7
	Summary	7
II.	LITERATURE REVIEW	9
	Antiinfective Properties of Human Milk	9
	Cow's Milk Versus Cow's-Milk-Based Formula	10
	Studies of Breastfed Infants Versus Bottlefed Infants	11
	Breastfeeding Practices in Developing Countries	14
	Breastfeeding Practices in Developed Countries	16
	Summary	23
III.	METHODS	25
	Operational Definitions	26
	Data Collection	27
	Protection of Human Subjects	27
	Subjects	28
	Instrumentation	29
	Procedures	29
	Data Analysis	30
IV.	RESULTS	31
	Testing of the Hypotheses	31
	Demographic Characteristics	31
	Hypotheses and Results	32
	Summary	39

CHAPTER PAGE

V. DISCUSSION AND IMPLICATIONS 42

Effect of Feeding Method on Infant Health 42
Effect of Mother's Demographic Characteristics on Infant Feeding Method 44
Practice Implications 45
Research Implications 47

REFERENCES 49

APPENDICES 54

APPENDIX A. LETTERS OF AUTHORIZATION AND APPROVAL 55

APPENDIX B. CONSENT FORM 60

APPENDIX C. INSTRUMENT FOR DEMOGRAPHIC AND INFANT HEALTH 63

APPENDIX D. WOMEN, INFANT, AND CHILDREN CRITERIA 68

VITA 70

LIST OF TABLES

TABLE		PAGE
1.	Breastfed and Bottlefed Infants' Weights (1 month)	33
2.	Breastfed and Bottlefed Infant's Lengths (1 month)	34
3.	Breastfed and Bottlefed Infants' Weights (2 months)	35
4.	Breastfed and Bottlefed Infants' Lengths (2 months)	35
5.	Comparison of Symptom Frequency of Breastfed and Bottlefed Infants (1 and 2 months) . . .	37
6.	Comparison of Infant Health Score by Feeding Method (1 and 2 months)	38
7.	Health Maintenance of Breastfed and Bottlefed Infants (1 and 2 months)	40

CHAPTER I

INTRODUCTION

Breast milk is known to be nutritionally and immunologically superior to formula. However, the practice of breastfeeding in the United States seems to be concentrated at the upper socioeconomic levels. Public agencies are recommending breastfeeding as the feeding method of choice (Haaga, 1986) through newspaper and other media. In 1990, the Tennessee Department of Health and Environment initiated a statewide program called "Best Start, Breastfeeding for Healthy Mothers and Healthy Babies." This program, a collaborative effort by eight southeastern states, addresses the extremely low rates of breastfeeding among economically and educationally disadvantaged women (Tennessee Hospital Association, 1990).

Why is there a current interest in promoting breastfeeding practices in developed countries? Goldfarb and Tibbetts (1980) cite several reasons for increasing interest in the consideration of this issue:

(a) scientific investigations have repeatedly demonstrated that formula feeding does not equate with breast milk

feeding, and (b) formula feeding is neither nutritionally nor immunologically equivalent.

Should Tennesseans be concerned regarding the extremely low rate of breastfeeding among economically and educationally disadvantaged women in this area and its significance to infant health? There are at least two reasons for concern. First, all infants need the immunological components contained in breast milk, but infants born into disadvantaged families are at greater risk for disease and hence have an even greater need for breastfeeding's nutritional, immunological, and antiallergenic benefits (Tennessee Department of Health and Environment, 1986). Second, the 1984 United States Surgeon General's Report on Breastfeeding and Human Lactation cited Tennessee as having one of the lowest rates of breastfeeding in the country. According to a survey conducted by Ross Laboratory and reported by the Tennessee Department of Health and Environment (1986), in 1983, 49.3% of new mothers were breastfeeding in hospitals in Tennessee as compared to 61.4% in the United States as a whole. At 5 to 6 months of age, approximately 21.2% and 28% of infants were experiencing the benefits of breast-feeding in Tennessee and the United States, respectively. Therefore, Tennesseans should be concerned about the problem of extremely low rates of breastfeeding because of the potential impact upon infant health in this state.

The research described in this thesis examined general infant health in Nashville, Tennessee, in relation to type of feeding. While much research has focused upon the psychological and nutritional value of breastfeeding, this research scrutinized the infant's general health particularly in relation to the incidence of infection. The sample included women of childbearing age from unrestricted ethnic and racial backgrounds, with low to midlow socioeconomic status, who were users of the public health system at the time of data collection.

Overview of the Problem

A gradual increase in breastfeeding practices among women in the United States occurred in the mid 1970s. Goldfarb and Tibbetts (1980) state that surveys in 1977 indicated that approximately one-half of newborns discharged from hospitals were being at least partially breastfed, compared to earlier estimates of 18% in 1966, and 21% in 1956. The World Health Organization (WHO) has identified trends toward breastfeeding among wealthier, better-educated women in the United States, which is in contrast to the situation existing in other countries where the practice appears more prevalent among the lower socioeconomic, less-educated groups. The preferred feeding practices among economically and educationally

disadvantaged women in the United States deprive their infants of immunological benefits inherent in breast milk.

Conceptual Framework

Sister Callista Roy

Sister Callista Roy (1984) has developed a useful theory for nursing care of infants through an adaptive approach to coping with ecological stressors and internal stressors. The pooled effect of these stimuli or stressors requires the person to adapt. Adaptation following Roy's (1984) definition includes "the process and product of coping with a changing environment," as well as the idea that "adaptation is located in the person/environment interaction" (p. 28).

Roy (1984) further divides stimuli into three levels: focal, contextual, and residual. Focal stimuli are, by definition, the degree of environmental changes most immediately affecting the person, which requires an immediate response to environmental change. Contextual stimuli contribute to the behavior of the person by including immediate past environmental stressors and present environmental stressors. Residual stimuli represent the combined effects of attitudes and cultural patterns experienced in the past, whereby responses to environmental changes are learned behavior. Health and wellness states appear on a continuum from peak health to

death, as continuous adaptation occurs to meet these changing environmental stimuli.

Normally, the totally compensatory adaptive system is needed when persons are dependent on others for their continually expanding range of adapting and peak levels of health. Nursing, according to Roy (1984), is the promotion of adaptation using one or more of four modes. The totally compensatory nursing system is needed when clients are "biopsychosocially" dependent on others for their continued existence and well-being (p. 27). The partially compensatory nursing system involves situations where others provide physiological measures to manipulate environmental stressors to increase the range of adaptive coping.

An important mode for meeting infants' adaptive needs is the physiological mode. Adaptation, which promotes progression to higher levels of health during the perinatal period, is of primary importance. If this need for progression to higher levels of health is met, the result should contribute to the promotion of infant health in accord with human tolerance to environmental change (Roy, 1984).

In discussing adaptation requisites, Roy (1984) includes promotion of adaptation, which refers to the infant as a "biopsychosocial being" (p. 27) faced with continuous environmental change. In other words, each

person as a biological, psychological, and social being experiences the need for adaptation of himself or herself. This idea poses important implications for parents and nurses who are responsible for infants. It remains essential to enact the infant care that promotes the greatest range of adaptive behavior. If nurses assess deficiencies, it is their professional function to aid in promoting adaptation. This assistance especially includes infant nutrition and immunological factors.

Problem Statement

The purpose of this study was to explore the general health of infants born in economically and educationally disadvantaged circumstances in Nashville, Tennessee, in relationship to type of feeding.

Research Question

Is there a difference in infant health between breastfed and bottlefed infants?

Subsidiary Questions

1. Is there a difference in weight gain between breastfed infants and those fed by formula at 1 and 2 months?

2. Is there a difference in length gain between breastfed infants and those fed by formula at 1 and 2 months?

3. Is there a difference in the number of visits to health care providers between breastfed infants and those fed by formula at 1 and 2 months?

4. Is there a difference in the number of medications used between breastfed infants and those fed by formula at 1 and 2 months?

Theoretical Definition

Infant health is a state and process of successful adaptation that promotes being and becoming an integrated whole person, through the process of physiologically adapting to one's internal and external environmental stressors. The infant as an open system readily accepts nutrients to meet daily needs of growth and development, which is indicative of high levels of wellness (Roy, 1984).

Assumptions

Subjects answered all questionnaires honestly.

Summary

In summary, key aspects of the study were to explore the general health of infants born in economically and

educationally disadvantaged circumstances in Nashville, Tennessee, in relationship to type of feeding. The study employed Roy's conceptualization of adaptation. A brief review of Roy's (1984) principles indicate the appropriateness of their use in this study.

CHAPTER II

LITERATURE REVIEW

The impact of infant feeding method and general infant health are vital topics, and numerous investigative studies are being conducted to assess advantages and disadvantages. It is important to review studies assessing advantages and disadvantages of breastfed infants versus bottlefed infants, in developing and developed countries. Relevant literature review of studies include antiinfective properties of human milk, breastfed infants versus bottlefed infants, breastfeeding practices in developing countries, and breastfeeding practices in developed countries.

Antiinfective Properties of Human Milk

For more than 50 years, researchers have investigated the relationship between infant feeding and infectious illnesses. Research in developing countries indicates that breast milk protects infants from infections through immunological properties not present in formula (Glass & Stoll, 1989; Welsh & May, 1979). In contrast, in developed countries, research has not clearly demonstrated

the protective effects of breastfeeding compared to bottlefeeding (Goldfarb & Tibbetts, 1980). According to Goldfarb and Tibbetts, studies comparing breastfed with formula fed infants are difficult to evaluate, because sample size tends to be small in developed societies.

The antiinfective factors present in colostrum and breast milk include IgA, IgG, IgM, and IgD, white blood cells, complement, lactoferrin, lysozyme, and lactoperoxidase (Glass & Stoll, 1989; Goldfarb & Tibbetts, 1980). Of these elements, IgA remains the most important due to its concentration and biological characteristics (Goldfarb & Tibbetts, 1980). Many studies on breast milk antibodies have focused on anti-E. coli IgA. Lundequist, Nord, and Winberg (1985) describe E. coli as a ubiguitous organism commonly involved in infantile diarrhea.

Although there are numerous factors influencing the antiinfective properties of colostrum and breast milk, including maternal age and nutrition, parity, maternal estrogens, and progesterone (Lewis-Jones, Lewis-Jones, Connolly, Lloyd, & West, 1985). To date, the role and importance of breast milk's IgA in preventing illness is not clear, it is assumed to protect against infection.

Cow's Milk Versus Cow's-Milk-Based Formula

Relatively few nutritional problems with infant formulas have occurred during the past 30 years (Miller &

Chopra, 1984). Problems reported in the past included deficiency diseases and nutrient imbalances (Miller, & Chopra, 1984). Deficiencies reported prior to 1980 include vitamin A due to the use of defatted soy flour in formulas (Latham, 1977) and low level of vitamin C which causes scurvy (Knodel & Debavalya, 1980). Infants receiving commercially prepared formula deficient in vitamin B were at risk of having convulsive seizures (Chen, 1981; Lesthaeghe & Page, 1980). However, with the passage of the Infant Formula Act of 1980, Public Law 96-356, The Food and Drug Administration has strengthened the standards, assuring the quality of infant formula (Chen, 1981; United States Agency for International Development, 1978).

Studies of Breastfed Infants Versus Bottlefed Infants

When comparing the relative health of breastfed and bottlefed babies multiple factors are considered. For instance, despite widespread breastfeeding, diarrheal disease remains endemic in the world's developing areas. Because environmental influences in these settings appear significant, the occurrence of diarrheal disease among breastfed infants can be attributed more to environment than to maternal milk IgA deficiency (Cruz, Carlsson, Hofvander, Holes, & Hanson, 1985).

However, other significant factors noted by Cruz et al. (1985) are worthy of consideration. These factors include impaired capacity of mothers from less developed areas to produce milk IgA and the decreased volume of breast milk produced; apparently related to malnutrition and long periods of time mothers breastfeed.

Lundequist, Nord, and Winberg (1985) conducted a study to determine differences in aerobic faecal flora between breastfed and bottlefed infants from birth to 8 weeks and found Escherichia coli and Enterococci dominating among the aerobic bacteria in both feeding groups. However, a higher incidence of Staphylococci was found in breastfed infants. Many researchers report that in many cases infants swallow Staphylococci found on nursing mothers' nipples, but the bacteria become stable members of the intestinal flora of breastfeeding infants. Therefore, the bacteria do not interfere with infant wellness (Gothefors, 1975; Lundequist et al., 1985).

Since the discovery of bifidobacteria by Tissier in 1899, there has been an almost general agreement that among breastfed infants bifidobacteria and Staphylococci dominate in the gastrointestinal tract, whereas in formula fed infants the predominant organisms are Enterococci. In the breastfed infant's intestines, Enterococci are maintained at a pH of approximately 5.0, in contrast to a more alkaline environment in the formula fed infant,

whereby bifidobacteria grows more slowly (Gothefors, 1989).

The value of bifidobacteria to the breastfeeding infant in breast milk is related to its lower protein and mineral content which inhibits the growth of other organisms (Gothefors, 1989). Gothefors credits the value of bifidobacteria to its lower buffering capacity, allowing the acid end-products from bacteria metabolism to accumulate in the breastfed infant's intestine. In formula fed infants, acid is also produced, but not allowed to accumulate due to the higher buffering capacity of the formula, and the pH of approximately 8.5, producing an alkaline condition. As a result, slow-growing bifidobacteria are unable to compete successfully with fast-growing enterobacteria. Even with modern formulas, which so closely resemble breast milk and can even initiate and support large populations of bifidobacteria, formulas are still unable to suppress the growth of pathogens to the same extent as breast milk (Gothefors, 1989).

In 1979, Ogra and Dayton reported the chief immunoglobulin of breast milk to be secretory IgA with the highest concentration present in colostrum in the first few days postpartum. Initially present at levels of 23 to 35 milligrams per gram of protein, this concentration falls progressively to a three to four basal level in

transitional milk by the fifteenth postpartum day. According to Tomasi (1972), breast milk immunoglobulins are important antiinfective agents. Also, Tomasi and other researchers support the theory that breast milk immunoglobulins are not absorbed in significant quantity from the infant's intestine, immunoglobulins presumably act at the mucosal surface of the intestine for a short, period, soon after birth for up to approximately 3 to 6 months. In turn, support is directed toward the theory that secretory IgA in breast milk is more resistant to acid conditions and to the proteolytic activity of intestinal enzymes, thus more stable than serum IgA. Also, Walker (1976) reported that the accepted theory is that secretory IgA attaches to the gastrointestinal lining promoting the establishment of gut antibodies.

Breastfeeding Practices in Developing Countries

In recent years, breastfeeding rates have declined in developing countries. Notzon (1984) reports that there is an increased use of infant-supplementation, a decline in duration of breastfeeding, and an increase in the number of infants never breastfed. These changing breastfeeding practices in many areas in the developing world are related to changing demographic characteristics (Notzon, 1984). One area where demographic influences are evident is in

Thailand. The National Longitudinal Study for Social Economic and Demographic Change provided data from a series of four surveys during the years 1969 to 1973, based on probability samples. The first survey covered samples of rural households in 1969 and urban households in 1970. In the second survey, the rural sample was reinterviewed in 1972, and the urban survey was repeated in the following year. The results show that in 1969 and 1972, the rural sample breastfed their infants a mean duration of 22.4 months in 1969, and 22.0 months in 1972. the urban sample in 1970 and 1973 breastfed their infants a mean duration of 12.9 months in 1970 and 9.9 months in 1973. These findings suggest a change in breastfeeding practices in the rural versus urban areas in developing countries beginning as early as 1970 (Knodel & Debavalya, 1980).

Another study of infant feeding practices in five African countries (Cameroon, Egypt, Liberia, Sierra Leone, and Togo) in the mid-1970s shows that changing demographic characteristics are not universal. The Center for Disease Control and The Nutrition Assessment Unit of UCLA conducted a study that showed nearly all children in the sample, greater than 90%, were breastfed during their first year of life. Particularly notable deviations from this pattern were wealthier urban families in the Philippines

with only 68% breastfeeding, and Guatemala with only 77% breastfeeding (Notzon, 1984).

Regardless of changing demographics in some areas in developing countries, other studies by the United States Department of Health and Human Services and the World Health Organization report the existence of an inverse relationship between breastfeeding and morbidity from diarrheal disease. Other diseases are strongly implicated as well (Brown, Black, Romana, & Kanashiro, 1989).

Breastfeeding Practices in Developed Countries

During the recent past, a marked increase has occurred in the number of breastfed infants in developed nations. In the United States, national surveys conducted by the Task Force on the Assessment of the Scientific Evidence Relating to Infant Feeding Practices and Infant Health indicate that in 1971, only 25% of newborns were breastfed after birth, compared with 61% in 1984. With this change in infant feeding practices, the advantages claimed for breastfeeding have become an important public health issue (Rubin et al., 1990). Studies to date investigating the relationship between infant feeding and infectious illnesses among infants in industrialized societies have provided conflicting data about whether

breastfeeding protects against common infectious illnesses early in life.

Rubin et al. (1990) used a case-control or cohort design in a university-affiliated community hospital in Copenhagen, Denmark, to study 500 infants for the first 12 months of life. Monthly mailed questionnaires focused on feeding practices and illnesses. The percentage of infants who were completely or mostly breastfed decreased from 88% at 1 month to 20% at 12 months of age. These data show minimal or no protection gained from breastfeeding against infections.

In contrast, Cunningham (1981a, 1981b, 1984a, 1984b) conducted two studies of infants to determine the impact of feeding methods on infant health and clearly identified breastfeeding as being associated with significantly fewer illnesses during the first year of life. Of the 326 infants studied in rural upstate New York, 162 were formula fed and 164 were breastfed at birth, while 4% were breastfed up to 1 year of age. Breastfeeding offers the greatest protection, according to Cunningham, during the early months and increases with duration of breastfeeding. Breastfed infants have fewer episodes of respiratory illness and otitis media. Due to numerous variables, diarrheal disease is uncommon in breastfed infants in the United States, and when affected, infants who are

breastfed do not become as rapidly dehydrated and toxic (Cunningham, 1981a, 1981b, 1984a, 1984b).

In separate studies, Holmes, Hassanein, and Miller (1983) and Kanaaneh (1972) reported important differences between breastfed and bottlefed infants in the incidence of morbidity associated with diarrhea, respiratory infections, otitis media, and pneumonia. The majority of reports favoring the breastfed group, cite significant advantages of breast milk feedings (Lawrence, 1989).

In another study of breastfed infants at a family practice office in Williamsburg, Iowa, Paine and Coble (1982) noted significantly fewer office visits for illnesses as well as fewer months of reported illnesses in breastfed babies. In comparison, bottlefed infants in Western countries may be afflicted with increased episodes of illness; however, the clinical picture remains unclear related to the many variables associated with bottle feeders. These variables include youth, low socioeconomic status, and inadequate education among mothers who are more likely to bottle feed (Lawrence, 1989).

However, some studies show conflicting results in developed societies. These results may be related to research methodological techniques, reported difficulties include failure to:

(a) collect data prospectively at frequent intervals for active surveillance of the detection of

> infections and of feeding practice, (b) control for confounding variables including social class or the presence of siblings in the household, (c) specify clearly what was meant by infectious illness and breastfeeding, and (d) apply appropriate statistical strategies to a population in which both feeding and exposure to illness changed over a period of time. (Rubin et al., 1990, p. 465)

Rubin et al. (1990) found evidence that in developing countries breastfeeding is valuable in decreasing infection. However, this evidence cannot be uniformly applied to rural or poor urban populations in developed nations because of various competing circumstances that potentially influence study results, including ecological differences, as well as other variables of income, education, maternal age and marital status, nutrition, culture, and ethnic differences.

Since the resurgence of breastfeeding, differences in morbidity between infants fed by breast and by bottle have become even more complex to study in industrialized countries. Mothers who choose to breastfeed may be inherently different from those who choose formula (Lawrence, 1989). The "one-way flow" system of infants from the breastfed to the bottlefed group, without the likelihood that an infant may change from bottle to breast, makes documenting breastfeeding effects difficult especially when the possibility exists that some bottle feedings are included in the infant's diet, or

that solid foods have entered the diet (Lawrence, 1989, p. 24).

Published studies related to infant feeding have focused mainly on breastfeeding and the sample population has tended to be white, middle-class mothers. However, Aberman and Kirchhoff (1985) noted that the incidence of breastfeeding seems low among lower socioeconomic and minority groups. These researchers studied 51 low-income, single, black mothers to determine when these mothers decided on infant feeding methods and what factors influenced their decisions. More than one-half of the sample reported that external factors, such as prenatal classes on infant feeding, books and pamphlets, and their mothers, friends, and husbands influenced their final decisions about infant feeding. Even though 80% of these mothers reported that they did not attend prenatal classes, more than half of the 20% who attended prenatal classes reported that the discussions on infant feeding influenced their final decision. "Teaching on infant feeding" was defined as not only how to breastfeed and/or bottlefeed, but also the advantages and disadvantages of each method (Aberman & Kirchhoff, 1985, p. 396).

Because it is possible that nurses have prioritized their teaching according to their preconceived ideas of maternal needs, mothers who discussed infant feeding with nurses reported that the content of the discussion dealt

more frequently with how to feed the infant than advantages and disadvantages of different feeding methods. A review of nurse-influence on maternal decision to breastfeed found that more than half of the mothers felt that the nurses caring for them had no preference for one feeding method over the others (Aberman & Kirchhoff, 1985).

In addition to the influence of the nurse, influences from other factors are involved in the mother's decision-making process. A similar study by Sarett, Bain, and O'Leary (1983) found that acquisition of new information about infant feeding methods can influence a mother's decision-making process. The promotion of breastfeeding and fostering of good infant feeding practices requires early education about the advantages and disadvantages of each method. Ryan and Martinez (1989) report breastfeeding occurs least among mothers in lower income groups who do not work outside the home and who are black. Regardless of working status, both black and white mothers in lower income groups who are younger than 20 years of age and who are less well educated are least likely to breastfeed their infants.

It remains unclear why black mothers are less likely to initiate breastfeeding. Ryan and Martinez (1989) hypothesize that these factors include prenatal training, family income, age, education, and marital status among a

multitude of factors which may influence the infant feeding decision. Because most mothers make the decision to breastfeed before pregnancy, special efforts should target young women from poor families if breastfeeding is deemed to be a desirable outcome influenced by health professionals (Ryan & Martinez, 1989). According to Yoos (1985), young mothers may be developmentally at an egocentric stage and they fail to understand fully the benefits of breastfeeding for both themselves and the health of their infants.

In 1984, Kovar compiled a national survey of studies done in the United States. The National Center for Health Statistics reports relevant information relevant about the health status among black infants in the 1950s. At that time, breastfeeding was more common among the poorly educated individual (less than 8 years of education) and the well-educated black mother (greater than 16 years of education). This phenomenon also prevailed at the extremes of income. In contrast, by the late 1960s and early 1970s, economically and educationally deprived American mothers were more likely to bottlefeed than breastfeed (Kovar, Serdula, & Fraser, 1984). Similar changes occurred over time in that such mothers are more likely to be unmarried and younger, and the circumstances in which they live are often more similar to those in developing countries than their middle- and upper-class

counterparts. Among infants of married women, the proportion breastfed rose from 25% in 1965-69 to 29% in 1970-75, whereas among infants born to unmarried women the proportion breastfed decreased from 17% to 11% in the same period (Kovar et al., 1984).

As breastfeeding declined slightly in the early 1980s, it is important to note that there was little or no change in infant mortality rates. Possible reasons are the enhancement of infant formulas through the passage of the Infant Formula Act of 1980 (Chen, 1981) and the fact that infant mortality is multifactorial. Infant mortality rates may be influenced more by changing demographic characteristics of mothers (age, income, education, working status, and marital status) than by feeding method (Lawrence, 1989).

Summary

This chapter has surveyed relevant literature concerning components of breast milk and infant health in relationship to breastfeeding practices in developing and developed countries. The value of breast milk feeding in developing countries has been proven, but in developed countries the picture remains obscure. Based on research studies conducted in developed societies, an association between breast milk feeding, infectious illnesses and infant health has been implicated. Therefore, more

investigative studies are needed to update earlier results and increase the understanding of how infant's feeding method may affect infant health.

CHAPTER III

METHODS

A description of the design and methodology employed in this investigation is presented in the following sections: (a) research design, (b) operational definitions, (c) data collection, (d) subjects, (e) instrumentation, (f) procedures, and (g) data analysis.

The research design was a non-experimental, prospective panel study, with data gathered at two collection times--1 month and 2 months. Data collection took approximately 12 months. The sample was a convenience sample of breastfeeding and formula feeding mothers who agreed to participate in the study. All mothers were enrolled in the Women, Infant, and Children (WIC) program in Davidson County, Tennessee, from 1990 to 1991. The supplemental food program for Women, Infant, and Children provides participants with supplemental foods and nutrition education. The WIC participants are eligible pregnant, postpartum, and breastfeeding women, infants, and children up to their fifth birthday. According to Batten, Hirschman, and Thomas (1990), to

receive from the supplemental foods, nutrition education, and adjunct health care services, a participant must meet categoric, income, and nutritional risk criteria (see Appendix D).

Operational Definitions

1. Infant health. The score on the infant health checklist and the physical growth of the infant at 1 and 2 months.

2. Infant weight gain and length gain. The weight and length gains of the infant at 1 and 2 months beyond birth weight and birth length.

3. Drug. The prescription and non-prescription drugs or home remedy used by the infant at 1 and 2 months.

4. Number of visits to the health care provider. The actual number of visits to the health care provider of the infant because of illness at 1 and 2 months.

5. Number of calls to the health care provider. The actual number of calls to the health care provider at 1 and 2 months because of infant illness.

6. Breastfed. An infant who is fed only breast milk beginning at birth and continuing for at least 1 or 2 months.

7. Bottlefed. An infant who is fed only cow's-milk formula beginning at birth and continuing for at least 2 months.

8. Breastfed with supplementation. An infant who is fed both breast milk and cow's-milk formula at 1 month and/or 2 months.

Data Collection

Data were collected at the Metropolitan Health Department (see Appendix A). The researcher arranged appropriate times to meet with WIC participants, explained the purpose of the study to potential subjects, and asked for volunteers. In some cases, mailing was done to eligible potential subjects; this mailing included forms which explained the purpose of the study, requested volunteers, and obtained informed consent from potential subjects (see Appendix B). Questionnaires were then administered or mailed to volunteers (see Appendix C). Returned data were stored in a locked file cabinet located in my office. Data collection problems included incorrect addresses and phone numbers of potential subjects, limited number of signed consent forms and completed questionnaires returned to the researcher. Also, there was a limited number of breastfeeding subjects available to participate in the research study.

Protection of Human Subjects

Protection of subjects' rights and privacy was insured by including only those persons who agreed to

participate by giving their informed, written consent. Those subjects who agreed were informed of their right to withdraw their participation should they decide to do so. Privacy was further protected through anonymity and confidentiality. No names or other identifying information were used on data collecting forms or in data reporting procedures. Consent forms with code numbers were placed on a separate sheet and kept in a locked file cabinet that was monitored by the principal investigator. Completed questionnaires did not carry any identifying information, such as names and addresses. No risks or inconveniences to subjects or the agency were anticipated.

Subjects

The principal site was the Lentz Health Center because of its central location and the availability of times for meeting subjects (i.e., five times per week). The criterion for being in the study was only that women were breastfeeding or formula feeding their infants at 1 month and 2 months. One hundred and sixteen consent forms and questionnaires (see Appendices B and C) were mailed or administered by the researcher to WIC participants in an attempt to obtain the most representative sample possible. There were 46 subjects who returned usable questionnaires of the 116 distributed for a 40% return rate.

Instrumentation

The questionnaire used for the collection of data was a researcher-made instrument that consisted of a symptom checklist to assess the health of infants at 1 month and 2 months. Because the health questionnaire has neither established reliability nor content validity, it was evaluated by two Davidson County pediatricians (see Appendix A). No modifications were recommended by the experts, and Part 1 and Part 2 of the questionnaire were used without revisions. A copy of the entire questionnaire as used is presented in Appendix C. Part 1 asks for demographic information. Parts 1 and 2 are concerned with the subject's feeding method and infant health based on growth and wellness of the infant. The symptom checklist component consists of 20 symptoms of common infectious illnesses, with responses of check marks, yes, no, and explain.

Procedures

The researcher obtained permission for the study from the University of Tennessee, Knoxville, Human Subjects Committee (see Appendix A) and the Davidson County Metropolitan Health Department (see Appendix A). After permission was granted by the University of Tennessee and the Metropolitan Health Department, consent forms with the

questionnaires were distributed to subjects by mail and personal contact. The consent forms included a clear, concise explanation of the study.

Data were collected over a 12 month period during July 1990 to July 1991. Subjects who returned consent forms and questionnaires did so in a self-addressed stamped envelopes and in person to the researcher. After all data were collected, the questionnaires were coded for data management purposes. The data were then entered into the VAX Cluster computer system at the University of Tennessee, Knoxville.

Data Analysis

Data were examined by univariate analysis for normality and data were tested by $\underline{t}$ tests, chi-square, and frequency distributions.

CHAPTER IV

RESULTS

Chapter IV presents the results of the study. Each hypothesis is stated and followed by information on statistical testing and results.

Testing of the Hypotheses

As stated in Chapter III, this was a descriptive, nonexperimental panel study. The data were treated statistically as nominal level and interval and analyzed by parametric and nonparametric techniques to test hypotheses. In addition to independent samples t tests, chi-square (χ^2) and frequency distributions were also used. A significance level of $p \leq .05$ was used with all statistical analyses.

Demographic Characteristics

Demographic characteristics of breastfeeding and bottlefeeding mothers in this study included mother's age, race, marital status, number of children, and income. There were 46 mothers, age range 16-39 years (3 mothers did not report age). There were 14 blacks, 23 whites, and

2 mothers of other races, with 7 mothers not reporting race. There were 22 single, 17 married, 4 separated, and 1 widowed mother, with 1 mother not reporting marital status. A total of 21 mothers had one child, 15 mothers had 2 children, and 8 mothers had 3 or more children; 2 mothers did not report the number of children. The majority of mothers in this study had incomes below $14,000 ($n$ = 36), 8 had incomes above $14,999, and 2 mothers reported an income of $24,000 and $34,000, respectively. The breastfeeding mothers' mean age was 27 years compared to the bottlefeeding mothers' mean age of 24 years. Only 7 out of 19 breastfeeding mothers were married. Bottlefeeding mothers had more children and were more likely to have incomes of less than $14,000 annually.

Hypotheses and Results

Hypothesis 1

Hypothesis 1 stated: There is no difference in the weight of breastfed infants and bottlefed infants at the end of 1 month. An independent sample t test was used to compare mean weights of breastfeeding infants and bottlefeeding infants. Weights were not statistically different between breastfeeding and bottlefeeding infants. The breastfed group mean weight gain was 1 ounce greater than the bottlefed group, but this was not statistically significant (t = 0.14, p = .886). However, it is

important to note that the weights of 5 (5 out of 19) breastfed infants and the weights of 3 (3 out of 21) bottlefed infants were not recorded. Thus, the sample sizes were respectively reduced. Table 1 represents mean weight difference in breastfed and bottlefed infants.

Table 1. Breastfed and bottlefed infants' weights (1 month).

Mean Weight	n	Mean Ounces Gained	SD
Breastfed	14	28.3	18.7
Bottlefed	18	27.3	18.3

Hypothesis 2

Hypothesis 2 stated: There is no difference in the length of breastfed infants and bottlefed infants at the end of 1 month. An independent sample t test was used to compare mean lengths of breastfed and bottlefed infants. Length gained was not statistically different ($t = 1.68$, $p = .106$) at the end of 1 month between the two groups. Again, 8 out of the 19 breastfed infants' and 7 out of 21 bottlefed infants' lengths were not reported and these subjects were excluded from the calculations. Table 2 represents mean lengths of breastfed and bottlefed infants.

Table 2. Breastfed and bottlefed infants' lengths (1 month).

Mean Length	n	Mean Inches Gained	SD
Breastfed	11	1.16	.761
Bottlefed	14	.67	.685

At the end of 1 month, the length difference between feeding groups was less than half an inch. Average monthly length gain is normally one inch (Engel, 1989). This sample of breastfed and bottlefed infants is representative of the norm at the end of 1 month; however, it is important to note that measurements were taken by different people. At the end of 1 month a mixed feeding group of breastfed and bottlefed infants (n = 6) were not included in the study.

Hypothesis 3

Hypothesis 3 stated: There is no difference in the weight of breastfed infants and bottlefed infants at the end of 2 months. Infant weights in the two feeding groups count not be statistically compared, due to unequal sample size. By 2 months, the number of breastfeeding infants had decreased to n = 9, (with two cases not reporting) and an increase of bottlefeeding infants (n = 25). The seven cases that did not report weights were excluded from these

calculations. Table 3 represents mean weight of breastfed and bottlefed infants.

Table 3. Breastfed and bottlefed infants' weights (2 months).

Mean Weight	n	Mean Ounces Gained	SD
Breastfed	7	46.3	24.6
Bottlefed	18	34.4	23.1

Hypothesis 4

Hypothesis 4 stated: There is no difference in the length of breastfed infants and bottlefed infants at the end of two months. Differences between groups could not be compared at the end of two months due to unequal sample size. Table 4 represents mean lengths of breastfed and bottlefed infants.

Table 4. Breastfed and bottlefed infants' lengths (2 months).

Mean Length	n	Mean Inches Gained	SD
Breastfed	5	1.80	.447
Bottlefed	13	1.31	.601

Hypothesis 5

Hypothesis 5 stated: There is no difference in health status of breastfed infants and bottlefed infants at the end of 1 and 2 months, as measured by frequency of symptoms on the symptoms checklist. A chi-square test was used to test whether the frequency of each symptom on the symptoms checklist differed between the two groups. The analysis revealed that this sample of breastfed and bottlefed infants did not show statistical difference in individual symptom frequency. Table 5 represents general health status (summation of occurrence of the 10 symptoms) of breastfed and bottlefed infants at 1 and 2 months.

A nonparametric test of samples with unequal variance was used to further test infant health status by feeding method at 1 and 2 months. A Wilcoxon Scores (rank sums) test was used for the health variable at 1 and 2 months to compare breastfeeding and bottlefeeding infants' health score. Scores on the instrument were not truly ordinal, because data were not normally distributed. The health score of the breastfeeding group did not show statistical significance ($p = 0.118$ and $p = 0.173$) at 1 and 2 months respectively. Table 6 represents a comparison of infants' health score by feeding methods at 1 and 2 months.

Results revealed no significant difference in infants' health score according to feeding method. However, the

Table 5. Comparison of symptom frequency of breastfed and bottlefed infants (1 and 2 months).

	1 month				2 months			
	Breastfed (n = 19)		Bottlefed (n = 21)		Breastfed (n = 9)		Bottlefed (n = 25)	
Illness	f	%	f	%	f	%	f	%
Fever	1	5	--	0	--	0	3	12
Ear Infection	--	0	1	5	--	0	3	12
Runny Eyes	3	16	2	10	1	11	3	12
Diarrhea	2	11	2	10	--	0	2	8
Thrush	2	11	5	24	--	0	3	12
Cold	4	21	9	42	1	11	10	40
Colic	1	5	5	24	1	11	2	8
Vomiting	1	5	6	29	--	0	4	16
Skin Infection	--	0	1	5	1	11	2	8
Rash	2	11	6	29	1	11	4	16

Table 6. Comparison of infant health score by feeding method (1 and 2 months).

	n	Mean	SD	p
1 month				
Breast	19	0.84	.95	t = 0.126
Bottle	21	1.76	1.72	p = 0.118
2 months				
Breast	9	0.55	0.73	t = 0.182
Bottle	25	1.44	1.58	p = 0.173

symptom checklist showed a greater frequency of reported symptoms in bottlefed infants at 1 and 2 months compared to breastfed infants at 1 and 2 months.

Hypothesis 6

Hypothesis 6 stated: There is no difference in health maintenance required of breastfed and bottlefed infants at 1 and 2 months, as measured by frequency of visits to (a) health care providers, (b) number of calls to health care providers for assistance, (c) frequency of prescription drugs, (d) frequency of nonprescription drugs, and (e) frequency of home remedy. The analysis revealed this sample of breastfed infants at 1 and 2 months had fewer visits and calls to health care providers, used fewer prescription drugs, and home remedies.

Therefore, health status differences between breastfed and bottlefed infants at 1 and 2 months may be inferred, but statistical evidence is not significant. The general health status of infants also differed as indicated by mothers' reports at 1 month, demonstrate that 17 of the breastfeeding mothers said their babies were healthy, while 12 of the bottlefeeding mothers said their babies were healthy; at 2 months, all of the breastfeeding mothers (n = 9) said their babies were healthy while 16 bottlefeeding mothers said their babies were healthy. Table 7 represents health maintenance required of breastfed and bottlefed infants at 1 and 2 months.

Health maintenance of infants was indicated by breastfeeding mothers' reports at 1 month of 12 calls and 10 visits to health providers, compared to bottlefeeding mothers' reports of 15 calls and 14 visits to health care providers. Also, significant was prescription use at 1 month, as bottlefed infants used twice as many prescription and nonprescription drugs compared to breastfed infants.

Summary

In conclusion, statistical differences were not demonstrated in this study between bottlefed and breastfed infants in weight and length at 1 and 2 months; health status measured by frequency of symptoms on the symptoms

Table 7. Health maintenance of breastfed and bottlefed infants (1 and 2 months).

	1 month						2 months					
	Breastfed			Bottlefed			Breastfed			Bottlefed		
	n	f	%	n	f	%	n	f	%	n	f	%
Visit	19			19			9			25		
Health Department		1	5		3	14		--	0		3	12
Emergency Room		1	5		5	24		--	0		5	20
Physician		10	53		14	68		7	89		15	60
Calls to Physician	19	12	63	21	15	71	9	4	44	25	12	48
Prescription	18	3	16*	21	7	33	9	1	11	25	8	16
Nonprescription		3	16*		7	33		2	22	9	36	
Home Remedy		4	21*		6	29		1	11		3	12*
Take Medication	18			19						25		
Everyday		0			1			1			1	
Sometimes		7	95*		5	91		2	100		9	100
Never		11			13			6			15	

* = One missed case
= Two missed cases

checklist; and health maintenance required by infants at 1 and 2 months. However, there were generally fewer reported symptoms and less health maintenance required for breastfed infants, compared to bottlefed infants.

CHAPTER V

DISCUSSION AND IMPLICATIONS

Chapter 5 consists of a discussion of the research findings in relation to the research and subsidiary questions. This discussion will be followed by a description of the possible clinical and research implications of these findings.

Effect of Feeding Method on Infant Health

Growth

Engel (1989) reports that weight gains of 5 to 7 ounces per week and length gain of one inch per month may be indicative of good health. Both breastfed and bottlefed infants demonstrated adequate growth. While not statistically significant, the observation of greater weight gain in these infants may indicate a real difference if a larger sample was studied. Breastfed infants generally are not fed solid foods, which are frequently introduced early in bottlefed infants. Also, there is a greater chance of overfeeding bottlefed infants (Dudek, 1987; Yeung, Pennel, & Leung, 1981).

Infants fed commercially prepared formulas usually double their birth weight by the third or fourth month (Dudek, 1987). By comparison, infants fed human milk double their birth weight by the fifth or sixth month (Dudek, 1987).

Illness Occurrence

The findings regarding health status of breastfed infants and bottlefed infants at the end of 1 and 2 months indicate that in the sample studied, the feeding method did not show a statistically significant effect on symptom occurrence. However, an impressive trend emerged in this study, in that there were twice as many symptoms reported by mothers of bottlefed infants as compared to breastfed infants at 1 month. Breast milk studies in industrialized countries, unlike developing countries, have difficulty detecting statistically significant differences (Bauchner, Leventhal, & Shapiro, 1986). However, in the present study, the research findings related to subsidiary Question 5 (Is there a difference in health status of breastfed infants and bottlefed infants at 1 and 2 months?), showed no significant difference in infant health. One possible explanation for this finding could be the small sample (N = 46).

Bauchner et al. (1986) and Rubin et al. (1990) report other contributing factors in breastfeeding studies, such

as combining nonrelated infections and treating them as equivalent events, and including infants with certain infections who may be predisposed to frequent recurrences that are unrelated to feeding mode. Also, attendance at group day care centers may enhance the transmission of infectious illnesses and be a confounding variable. In studies of breastfeeding in industrialized countries, the greatest problem that may influence scientific validity and/or the generalizability of the results are methodological flaws in study designs.

Findings regarding health maintenance required of breastfed and bottlefed infants at 1 and 2 months, indicate that in the sample studied, the feeding method did not affect health maintenance in a statistically significant manner. Again, evidence of a trend favoring the breastfed group emerged in the present study showing that bottlefed infants did indeed, use the health care system more frequently for illness related reasons than breastfed infants did at 1 and 2 months.

Effect of Mothers' Demographic Characteristics on Infant Feeding Method

Mothers who breastfed were older (mean age 27 years), married, had higher incomes and fewer children, compared to bottlefeeding mothers who had a mean age of 24 years. A notable factor that emerged was that many mothers who

initiated breastfeeding were not breastfeeding by the second month. The number of breastfeeding mothers dropped from 19 to 9, with a resultant increase in bottlefeeding mothers by the 2nd month. These findings are similar to findings by Aberman and Kirchhoff (1985) who reported that the incidence of breastfeeding seems lowest among lower socioeconomic and single mothers. Also, decreases in duration of breastfeeding after one month was especially discouraging in this study. In other studies, similar reports of decreases in duration of breastfeeding in the early phase are reported; contributing factors are lack of prenatal education that includes advantages and disadvantages of breastfeeding, medical and nursing support, and family support (Aberman & Kirchhoff, 1985; Ryan & Martinez, 1989)

Practice Implications

Roy (1984) points out the role of the nurse is to promote the mother-infant dyad in adapting to stressors in the environment. The mother-newborn infant dyad, because of the many stressors encountered in the environment, often has a need for nursing intervention to maintain optimal health. There are three areas for possible clinical utilization. These areas will be discussed in this portion of the paper.

The findings of this study may have clinical relevance. Because breastfeeding does appear to have positive effect on infant health, this study indicates a need to discuss advantages and disadvantages of infant feeding method prior to pregnancy, especially since a mother's decision to breastfeed is usually made before pregnancy. Because adolescents and young adults seldom seek medical and nursing services, family planning clinics and high schools are ideally suited to provide prepregnancy education that includes infant feeding methods.

Data from this study provide support for the need of well-baby home health nurses to assess, teach and reinforce infant care information. The decrease in breastfeeding by the 2nd month indicates a need for nursing interventions to support breastfeeding mothers in the home.

The final area of clinical significance is the need to educate health care providers about the advantages and disadvantages of breastfeeding. If breastfeeding is important to the urban poor infant's health, as potentially indicated by this study, then breastfeeding should be reinforced and encouraged in women of child-bearing age and to the public at-large.

The promotion of breastfeeding through well planned inservices that provide nurses with information concerning

advantages and disadvantages could possibly improve nurses' ability to assist the mother-infant dyad, as the infant adapts to the extrauterine environment.

Research Implications

The findings from this study indicate a need for further nursing research in several areas. There is a need for replication of this study in the same setting with a larger sample in order to validate the findings of this study and increase generalizability of the results.

Because not all benefits of breast milk feedings are well accepted in industrialized countries, there is a need for validation, with infants, of the effectiveness of breast milk feeding and infant health. There also appears to be a need for development of new tools, more suited to measure feeding method more effectively, and more effective reporting of infectious illnesses of infants.

The effectiveness of measures directed at improving longitudinal data collection of infant feeding and illnesses are also areas in need of further research. It may be that a lack of nurse-patient teaching is at least partially related to a knowledge deficit concerning the long-term advantages of breast milk feedings and infant health. If nurses can become aware of the importance of breast milk feeding, preventive aspects of infant health might take on a higher priority.

Another possible researchable area related to investigation of factors affecting breastfeeding would be in relation to breastfeeding attitudes of nurses. Possibly questions might include whether or not breastfeeding is beneficial to the infant, how important breastfeeding is considered to be by the nurse in comparison to formula feeding, and how the nurse learned about the value of breast milk.

Finally, the findings of the study indicate that further research should be done on factors that influenced mother's choice to breastfeed or bottlefeed. Such a study might yield valuable information concerning patient teaching goals.

Roy (1984) reminds us that nurses are responsible for promoting patient/environment adaptation. In this case, the role of nursing in relation to infant feeding is providing information to mothers that maximize infant health. As nurses assist patients in health promotion during the immediate postnatal period, infant's adaptation to environmental stressors may be improved, and nurses may be able to make a significant impact on overall infant outcomes.

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APPENDICES

APPENDIX A

LETTERS OF AUTHORIZATION AND APPROVAL

THE UNIVERSITY OF TENNESSEE
KNOXVILLE

Office of the
Vice Provost
for Research

CRP #: 2999 B DATE: 07/09/90

Title: Examination of the influences of anxiety, depression and social support on immunological variables in breast milk

Bass, Shirley
Nursing
3412 Panorama Drive
Nashville, TN 37218

Groer, Dr. Maureen
Nursing
1200 Volunteer Blvd.
Campus

This is to notify you that your request for renewal with changes in the protocol of your project listed above has been approved.

This approval is for a period ending one year from the date of this letter. Please make timely submission of renewal or prompt notification of project termination (see item #3 below).

Responsibilities of the investigator during the conduct of this project include the following:

1. To obtain prior approval from the Committee before instituting any changes in the project (Form D).

2. To retain signed consent forms from subjects for at least three years following completion of the project.

3. To submit a Form D to report termination, to renew approval, or to report changes in the project at intervals of 12 months or less.

We wish you continued success in your research endeavor.

Sincerely yours,

Sheadrick A. Tillman, IV, Ed.D.
Associate Vice Provost for Research

cc: Dr. Sylvia E. Hart
1200 Volunteer Blvd.

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY

FREDIA S. WADLEY, M.D.
Director of Health

METROPOLITAN HEALTH DEPARTMENT
311-23rd Avenue, North
Nashville, Tennessee 37203
(615) 327-9313

May 1, 1990

Ms. Shirley Bass, RN, CFNP
3412 Panorama Drive
Nashville, TN 37218

Dear Ms. Bass:

This letter is to confirm your nursing research project to be conducted at the Metropolitan Nashville Davidson County Public Health Department during the month of May. You will be supervised under the Division of Maternal and Child Health. Ms. Betty Thompson is the director. We will assist you in whatever way that we can.

We are pleased to have you with us for this project and are looking forward to your clinical rotation here in the fall.

Sincerely,

Stephanie B. C. Bailey, MD
Director of Medical Services

Ann P. Duncan, RN
Director of Nursing Services

SBCB/APD/eg

ROSS FLEMING, JR., M.D.
Pediatrics & Adolescent Medicine

3803 Hydes Ferry Rd. Suite D
Nashville, Tennessee 37218
Telephone: 254-8720

July 24, 1991

Mrs. Shirley Bass
3412 Panorama Drive
Nashville, TN 37218

Dear Mrs. Bass:

In response to your request I have reviewed Appendix A of your questionnaire, Infant Health Check List. In my opinion because of its simplicity in design for the collection of data relative to one and two month old infants it is adequate.

I think it will provide the information necessary for the assessment of those infants.

I feel honored having been asked to review this portion of you proposal.

Sincerely,

Ross Fleming, Jr., M.D.

Roderick I. Bahner, M.D.
2209 Buchanan Street
Nashville, Tennessee 37208

August 8, 1991

Dear Mrs. Bass,

I have reviewed the proposed questionaire you prepared for your investigative assessment of infants at ages one and two months. As you requested I apprised the protocol for omissions, additions and deletions as I deemed necessary. I am happy to give your protocol full endorsement as in its present form.

Sincerely,

Roderick Bahner MD

Roderick I. Bahner, M.D.

APPENDIX B

CONSENT FORM

CONSENT FORM

Shirley Bass, RN, BSN, a student from the University of Tennessee, College of Nursing, is conducting a study of the relationship between breast milk feeding, formula feeding, and infant health.

As part of this research, you will be asked to fill out three questionnaires, which take about 20 minutes to complete. The researcher will provide you with these questionnaires. Also, initially, a demographic questionnaire is completed and placed in an envelope and sealed. Ms. Bass will call you on the phone or visit you at 4 weeks and 8 weeks after your baby's birth to ask questions about the infant's health. All information will be confidential and will be kept in a locked filing cabinet in Ms. Bass's office. If any reports or publications are written as the result of this research, you will not be identified in any way. You may also withdraw from this research study at any time. You or your infant will not in any way be penalized for not participating.

There is no known risk to you from participation in this project, and it is hoped that the results of this study will prove to be of benefit to the health of both mothers and babies.

Signature on the line below indicates your willingness and full consent to participate in this project. Any questions that you may have can be directed to the researcher listed at the bottom of this page.

_____ _____

Name Date

_____

Signature

Dr. Maureen Groer, Faculty Advisor
The University of Tennessee, College of Nursing
1200 Volunteer Blvd.
Knoxville, TN 37996-4110
(615) 974-4151

Student Researcher: Shirley Mae Bass, RN, BSN
(615) 255-0202

APPENDIX C

INSTRUMENT FOR DEMOGRAPHIC AND INFANT HEALTH

PART 1

DEMOGRAPHIC QUESTIONNAIRE

Thank you for participating in this research study. Please fill out the questionnaire and return it to the WIC staff/researcher in a sealed envelope. I would like to know a little bit about you, so please answer the questions.

1. Name: _____

2. Age: _____ Race: _____

3. Marital status (circle one):

single married separated divorced widowed

4. Address: _____

_____

5. Phone number: _____

6. Number of children: _____

7. Income (check one):

less than $14,999 per year ___
$15,000 to $24,999 per year ___
$25,000 to $34,999 per year ___
$35,000 to $49,999 per year ___
greater than $50,000 per year ___

THANK YOU FOR PROVIDING THIS INFORMATION.

PART 2

INFANT HEALTH CHECK LIST

(Check one)

1. Follow-up at 1 month ___
2. Follow-up at 2 months ___
3. Feeding: All breast milk ___

   All bottle (formula) ___

   Breast fed and some formula fed ___

   If some formula, how much? _____

   Stopped breast feeding at age of _____

SYMPTOMS CHECK LIST

(Check all that apply)

Describe for each: How long sick? Did you call/see a doctor?

1. ___ Fever (temperature of 101^{o} or above) _____

   _____

2. ___ Ear infection (stuffy or runny nose, fed poorly) _____
3. ___ Runny eyes (drainage, pus, unable to open lids)

   _____

4. ___ Diarrhea (number of stools, water, pus, odor)

   _____

5. ___ Thrush (whitish coating in mouth, unable to remove with wet cloth) _____

   _____

6. ___ Cold (cough, stuffy or runny nose, fever)

_____

7. ___ Colic (stomach ache, restless, crying, can't sleep, fed poorly) _____

_____

8. ___ Vomiting (amount, color, consistency, odor)

_____

9. ___ Skin infections (signs of irritation, reddened area, lesion, pus) _____

_____

10. ___ Rash (location, reddened area, texture, discoloration, irritation) _____

_____

(Answer all that apply)

1. Number of trips to public health department _____
2. Number of trips to emergency room _____
3. Number of times visited the doctor _____
4. Number of times called the doctor _____
5. Birth weight _____ Weight gain _____
6. Birth length _____ Length gain _____
7. Medication over-the-counter _____

   Prescription _____
8. Home remedies: No ___ Yes ___

   If yes, list: _____

9. Medication: Everyday _____ Sometimes _____

   Never _____

10. Describe your baby over the last month.

_____

_____

_____

_____

_____

APPENDIX D

WOMEN, INFANT, AND CHILDREN CRITERIA

WOMEN, INFANT AND CHILDREN CRITERIA

1. Categoric criteria: pregnant, postpartum, and breastfeeding women; infants from birth to 12 months of age; and children from 1 to 5 years of age.

2. Income criteria: maximum federal limit of 185% of the U.S. poverty guideline (e.g., $22,385 for a family of four as of July 1, 1989).

3. Nutritional risk criteria, defined as one or more of the following:

   a. Detrimental or abnormal nutritional conditions detectable by biochemical or anthropometric measurements.
   b. Other documented, nutritionally related medical conditions.
   c. Dietary deficiencies that impair or endanger health.

Note. From "Impact of the Special Supplemental Food Program on Infants" by S. Batten, J. Hirschman, & D. Thomas, 1990, Journal of Pediatrics, 117, pp. S101-102.

VITA

Shirley Mae Bass was born in Nashville, Tennessee on August 10, 1940. She attended public schools in that city. Several years later she entered The University of Tennessee, Nashville, and in May, 1975 she received an Associate of Arts degree in Nursing. The following fall she accepted a nursing position at Meharry Medical College Comprehensive Health Center, in Nashville, as coordinator of outpatient clinical services. After six years of experience, she entered The University of New York State External Degree Program, Albany, New York and Meharry Medical College Family Nurse Practitioner Program, Nashville, Tennessee. In May, 1983 she received a certificate from Meharry Medical College and in December, 1987 she received a Bachelor of Science degree in Nursing.

During the next two years, practical experiences included a teaching position at Tennessee State University Nursing Program and a nurse management position at a pediatric outpatient clinic. In the fall of 1989 she entered The Graduate School of The University of Tennessee, Knoxville and began study toward a Master's degree in Nursing. This degree was awarded in December, 1991.

The author is a member of Chi Eta Phi Nursing Society, American Nurses' Association, and Tennessee Nurses' Association. Ms. Bass will be employed by a private pediatric group in Nashville, Tennessee, after graduation.