

To the Graduate Council:

I am submitting herewith a dissertation written by Srimathi Kannan entitled "Infant Feeding Practices and Beliefs of Anglo American and Asian Indian American Mothers in Knoxville, Tennessee: A Cultural Profile". I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

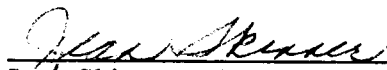


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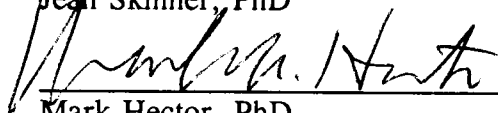
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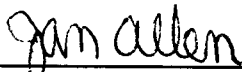
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Infant Feeding Practices and Beliefs of
Anglo American and Asian Indian American
Mothers in Knoxville, Tennessee: A Cultural Profile

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Doctor of Philosophy
Degree
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Srimathi Kannan

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Dedicated with affection to my parents

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ABSTRACT

This study was designed to address some of the issues related to infant feeding practices and beliefs of Asian Indian Americans residing in Knoxville, Tennessee and to compare these findings to a cohort group of Anglo American mothers. This involved three major areas: infant feeding practices, mothers' sources of information and beliefs about infant feeding practices, and the dietary adequacy and growth patterns of the infants.

Results of this study indicated that all Anglo American ($n=25$) compared to fewer Asian Indian American mothers ($n=19$) initiated breast-feeding immediately following birth of the baby. Anglo American mothers breast-fed their infants for a longer duration than Asian Indian American mothers. When formula was added to the diet, Anglo American infants were significantly older (3.2 ± 1.3 months) than Asian Indian American infants (2.8 ± 1.5 months; $P \leq 0.05$). When solid foods were introduced, Anglo American infants were significantly older (4.2 ± 1.5 months) compared to Asian Indian American infants (3.1 ± 1.3 months; $P \leq 0.05$).

Throughout the first year of life of Anglo American infants, mothers relied primarily upon health professionals for information about feeding. In contrast, Asian Indian American mothers sought information primarily from the family network in the first six months and relied more on health professionals in the second six months of the infant's life. Anglo American and Asian Indian American mothers differed in cultural beliefs involving: pre-lacteal feeds, infant feeding and health,

association of infant feeding and physiological maturity, and relationship between infant feeding and sleep patterns.

In the first and second six months, the diets of Anglo American and Asian Indian American infants exceeded 100% of the Recommended Dietary Allowances. Throughout the first 12 months, Asian Indian American infants had a significantly higher intake of calories and fat than Anglo American infants ($P \leq 0.05$).

Based on anthropometric means, infants in the two ethnic groups were growing and developing normally. At nine and 12 months, Asian Indian American infants weighed more than Anglo American infants ($P \leq 0.05$). At nine months, Anglo American infants' mean length was greater than that of Asian Indian American infants ($P \leq 0.05$). Throughout the first 12 months, the mean head circumference of Anglo American and Asian Indian American infants were not significantly different ($P \leq 0.05$). During the first 12 months of life, cumulative weight gain differed significantly ($P \leq 0.05$) between Anglo American and Asian Indian American infants. Cumulative length gain and cumulative head circumference gain did not differ significantly between the two groups of infants. At nine months, there was a significant difference in the body mass index between the two groups of infants ($P \leq 0.05$).

TABLE OF CONTENTS

CHAPTER	Page
I	INTRODUCTION 1
	Statement of the Problem 1
	Definition of Terms 4
	Objectives of the Study 5
	Hypothesis Testing 7
	Limitations and Assumptions 10
II	REVIEW OF THE LITERATURE 12
	Overview 12
	Cultural Differences in Infant Feeding Practices
	Across Ethnic Groups Residing in the United States 13
	Ethnic Trends in Incidence of Breast-feeding 14
	Ethnic Trends in Duration of Breast-feeding 20
	Ethnic Trends in Introduction of Formula 24
	Ethnic Trends in Introduction of Solid Foods 26
	Cultural Differences in Mothers' Sources of Information
	and Beliefs about Infant Feeding Practices 29
	Ethnic Trends in Mothers' Sources of Information
	about Infant Feeding Practices 29
	Ethnic Trends in Infant Feeding Beliefs 37
	Cultural Differences in Nutrient Adequacy of the Diet and
	Growth of Infants from Birth to 12 Months 41
	Ethnic Trends in Nutrient Adequacy in the First Year of Life 41
	Ethnic Trends in Growth Patterns of Infants 44
	Summary 46
III	METHODOLOGY 48
	Overview 48
	Human Subjects Approval 49
	Sample 49
	Criteria for Inclusion of Anglo American and
	Asian Indian American Mothers and Infants 50
	Recruitment Procedure 51
	Subject Consent 52
	Instrument Development 53
	Development of Infant Feeding Practice Questionnaire (IFBQ) 53
	Development of Feeding Belief Questionnaire 54
	Data Collection 57
	Data Collected Prior to First Interview 57

First Interview	57
Anthropometric Data of Anglo American and Asian Indian American Infants	61
Second, Third, and Fourth Interview	63
Fifth Interview	63
Data Analysis	63
Data Verification	63
Quantitative Data Analysis	64
Qualitative Data Analysis	65
Analysis of Feeding Belief Questionnaire	65
Dietary Data	67
Anthropometric Data	68
 IV RESULTS AND DISCUSSION	69
Sociodemographic and Ethnic Profile of Anglo American and Asian Indian American Parents	69
Cultural Differences in Infant Feeding Practices of Anglo Americans and Asian Indian Americans	71
Ethnic Trend in Incidence of Breast-feeding	71
Ethnic Trend in Incidence of Breast-feeding at One, Three, Six, Nine, and 12 Months	74
Ethnic Trend in Duration of Breast-feeding	75
Ethnic Trend in Introduction of Formula in the Infants' Diets	76
Ethnic Trend in Introduction of Solid Foods in the Infants' Diets	78
Cultural Differences in Mothers' Sources of Information and Beliefs about Infant Feeding	82
Ethnic Trend in Sources of Information about Infant Feeding	82
Ethnic Trend in Infant Feeding Beliefs	87
Cultural Differences in Nutrient Intake and Growth Patterns of Anglo American and Asian Indian American Infants	91
Ethnic Trend in Nutrient Intake of Infants at Six Months and from 6-12 Months	91
Ethnic Trend in Growth Patterns of Infants	99
 V SUMMARY AND CONCLUSION	106
Implications for Nutrition Educators and Health Professionals	109
Future Research Needs	112
 REFERENCES	114

	APPENDICES	Page
I	Revised Infant Feeding Practice Questionnaire	136
II	Revised Feeding Belief Questionnaire	151
III	Statement of Informed Consent	154
IV	Recruitment Poster	155
V	Telephone Interview	156
VI	Contact Letter	157
VII	Participation Questionnaire	158
VIII	Interest in the Study Letter	159
IX	Postcard Returned by Mothers	160
X	Follow up Letter	161
XI	Letter Thanking Mothers	162
XII	Letter Thanking Mothers with Reasons for Exclusion	163
XIII	Mothers Contacted and Reason(s) for Exclusion	164
XIV	Original Infant Feeding Practice Questionnaire	165
XV	Original Feeding Belief Questionnaire	183
XVI	Infant Feeding Practice Questionnaire Coding Scheme	186
XVII	Responses from Pilot Testing of Feeding Belief Questionnaire	201
XVIII	World Health Organization Reference Values for Weight and Height for Age from Birth to 12 Months	202
VITA		203

	LIST OF TABLES	Page
1.	Time Sequence and Description of Data Collected from Anglo American and Asian Indian American Mothers	59
2.	Testing for Significant Differences Between the Two Groups for the Study Variables	65
3.	Demographic and Socioeconomic Status of Anglo Americans and Asian Indian Americans	70
4.	Ethnic Trend in Incidence of Breast-feeding: Anglo American vs Asian Indian American Mothers	72
5.	Ethnic Trend in Introduction of Formula: Anglo American vs Asian Indian American Mothers	77
6.	Ethnic Trend in Introduction of Solid Foods: Anglo American vs Asian Indian American Mothers	79
7.	Ethnic Trend in Infant Feeding Beliefs: Anglo American vs Asian Indian American Mothers	88
8.	Recommended Dietary Allowances for Infants in the United States and for Infants in the Indian Subcontinent	92
9.	Ethnic Trend in Nutrient Intakes and Adequacy of Infants' Diets at Six Months: Anglo American vs Asian Indian American Infants	93
10.	Ethnic Trend in Nutrient Intakes and Adequacy of Infants' Diets from 6-12 Months: Anglo American vs Asian Indian American Infants	96
11.	Ethnic Trend in Mean Weight of Infants at Birth and at One, Three, Six, Nine, and 12 Months: Anglo Americans vs Asian Indian Americans	100
12.	Ethnic Trend in Mean Length of Infants at Birth and at One, Three, Six, Nine, and 12 Months: Anglo Americans vs Asian Indian Americans	102

13.	Ethnic Trend in Mean Head Circumference of Infants at Birth and at One, Three, Six, Nine, and 12 Months: Anglo Americans vs Asian Indian Americans	103
14.	Ethnic Differences in Mean Weight, Length and Head Circumference Gain from Birth to One Month, One to Three Months, Three to Six Months, Six to Nine Months, and Nine to 12 Months: Anglo Americans vs Asian Indian Americans . .	105

	LIST OF FIGURES	Page
1.	Comparison of Ethnic Minority Groups Residing in the United States (1940-1990)	2
2.	Sources of Information Used by Anglo American Mothers . . .	83
3.	Sources of Information Used by Asian Indian American Mothers	85

CHAPTER I

INTRODUCTION

Statement of the Problem

Infancy is the stage of life when the foundation for nutritional habits and nutritional adequacy for future life is laid (1-5). It is also the stage where the initial contact with and orientation with one's culture is established (6). Hence, it is imperative to examine the dietary patterns of infants from a cultural perspective (5,7-14).

Infant feeding practices have been reported for Anglo Americans, the largest ethnic group residing in the United States (5,15-27). Infant feeding practices of African Americans, the largest ethnic minority also have been reported (13,28). Infant feeding practices of Hispanics, the second largest minority group, also have been studied by several investigators (13,29-33).

Although infant feeding data exist for Anglo American, African American, and Hispanic groups, these kinds of data are not available for Asian American mothers. This is the third largest ethnic minority in the United States (34; Figure 1).

In regard to changes in the diversity of the population residing in the United States, the current immigration wave consists primarily of Asians, who represent 34% of the total immigrant population (34). In 1990, the Asian American population numbered 7,274,000 with 15,000 of these represented by Asian Indian Americans.

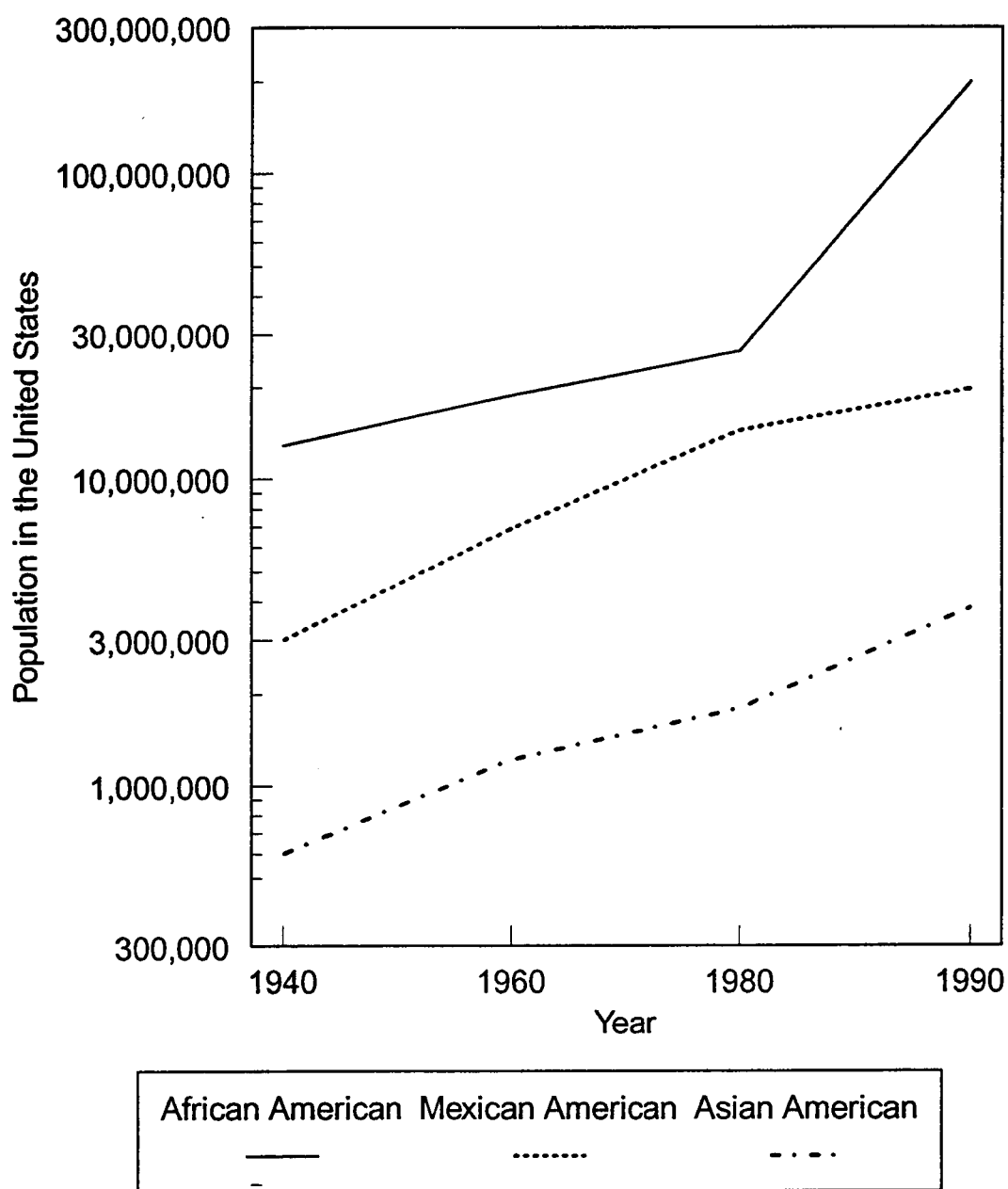


FIG 1. Comparison of ethnic minority groups residing in the United States, 1940-1990. Data source reference: 34.

This segment of the population is projected to double by the year 2010 (35). Between 1980 and 1990, there was a 126% change in the Asian Indian American population of the United States (34).

In addition to projected changes in the population, the findings of the 1986 Select Commission on Hunger Fact Sheet reflect that malnutrition rates are higher among immigrants than among any other subpopulation in the United States (36). Infants of migrant families specifically have been identified as a high risk population with reference to nutrition and health (37). To be able to design and implement nutrition and health intervention strategies targeted at infants of any ethnic group, an awareness of the infant feeding practices of that particular ethnic group is essential.

Because of the dearth of information about Asian Indian American mothers' infant feeding practices and of increasing malnutrition in some minority groups, there is an urgent need to address this area of research. This study was designed to address some of the issues related to infant feeding practices of Asian Indian American mothers residing in Knoxville, Tennessee and to compare these findings to a cohort group of Anglo American mothers. This study also will determine if there is a difference and the nature of the difference (if any) in infant feeding practices and beliefs of Anglo American and Asian Indian American mothers in the study group.

Definition of Terms

In this study, terminology is used to describe the sample and feeding practices of Anglo American and Asian Indian American mothers. These terms are exclusive to the study and may not reflect general usage.

Infant: A person less than 12 months of age.

Anglo American Mother: Any white mother who was born in the United States and is of Anglo descent.

Asian Indian American Mother: Any Asian Indian mother of Pacific Indian origin who has lived in the United States of America for at least one year and for not more than eight years.

Colostrum: First milk secreted by the mammary gland after the baby is born.

Pre-lacteal Feed: Any substance fed to the neonate prior to breast-feeding and/or prior to colostrum feeding.

Breast-feeding: Breast milk given exclusively at any period in the first 12 months of the infant's life or a combination of breast feeding and bottle feeding.

Formula feeding: Formula fed during the first 12 months of the infant's life.

Bottle feeding: Any food or beverage fed in a bottle during the first 12 months of the infant's life.

Solid Food: Any non-breast-milk food given to the infant in the first 12 months of life.

Non-breast-milk Liquid: Any non-breast-milk liquid including formula and beverages given in the first 12 months of the infant's life.

Nutrient Adequacy: Nutrient intake calculated from the dietary recalls and expressed as a percentage of the Recommended Dietary Allowances (38) that meets at least 100% of the RDA.

Objectives of the Study

This study involves three major areas: infant feeding practices, mothers' sources of information and beliefs about infant feeding practices, and the dietary adequacy and growth patterns of the infants. The following objectives are grouped under these major foci of the study.

I. Infant Food Practices

- A. To compare the incidence of breast-feeding in Anglo American mothers with that of Asian Indian American mothers. The incidence of breast-feeding among Anglo American and Asian Indian American mothers includes hospitalization following birth of the baby and after hospital discharge.
- B. To compare the time of initiating breast-feeding, following birth of the baby, for Anglo American and Asian Indian American mothers.
- C. To determine the duration of breast-feeding among Anglo American and Asian Indian American mothers. This comparison reflects the number of Anglo American and Asian Indian American mothers who breast-fed at one, three, six, nine, and 12 months.
- D. To compare age of the infant when formula is introduced (patterns of introduction of formula) to the infant's diet by Anglo American and Asian Indian American mothers.

- E. To determine the patterns of introduction of solid foods to the infant's diet by Anglo American and Asian Indian American mothers. This component of the study compares the mean ages of the Anglo American and Asian Indian American infants when the first solid food is introduced and what type of solid food is introduced.

II. Mothers' Sources of Information and Their Feeding Beliefs

- A. To determine whether the sources of information about infant feeding practices in Anglo American mothers are different from those of Asian Indian American mothers. The infant feeding sources of information used by Anglo American and Asian Indian American mothers will be compared in regard to breast-feeding, formula feeding, and introduction of solid foods to the infant's diet in the first year of life.
- B. To compare the infant feeding beliefs of Anglo American mothers with those of Asian Indian American mothers. These feeding beliefs include selected aspects related to breast-feeding, introduction of formula, use of non-breast-milk-liquids, solid foods, and other foods introduced to the infant's diet from birth through 12 months.

III. Nutrient Adequacy and Growth

- A. To determine if nutrient intake and adequacy of the infant's diet from birth to 12 months of age in Anglo American infants is different from that of Asian Indian American infants. Energy and nutrient adequacy parameters to be compared between these two groups include calories, carbohydrate, fat, protein, calcium, iron, vitamin A, and vitamin C.
- B. To determine if growth patterns in the first year of life of Anglo American infants are different from those of Asian Indian American infants. Growth parameters include body weight, recumbent length, and head circumference.

Hypothesis Testing

The objectives of the study as previously stated will be tested using the following hypotheses:

I. Infant Food Practices Related Objectives

- H_0 : An equal number of Anglo American and Asian Indian American mothers breast-feed at birth, following hospital discharge, and at one, three, six, nine, and 12 months.
- H_r : A greater number of Anglo American mothers breast-feed their infants throughout the first year of life than Asian Indian American mothers.

H_0 : The time of initiating breast-feeding following birth of the baby is similar in Anglo American and Asian Indian American mothers.

H_r : Anglo American mothers initiate breast-feeding at an earlier time than Asian Indian American mothers.

H_0 : Anglo American and Asian Indian American mothers breast-feed for the same duration (in months).

H_r : Anglo American mothers breast-feed for a longer duration than that of Asian Indian American mothers.

H_0 : Anglo American and Asian Indian American mothers introduce formula to the infant's diet at similar ages.

H_r : Anglo American mothers introduce formula to the infant's diet at a later age than Asian Indian American mothers do.

H_0 : Anglo American and Asian Indian American mothers introduce solid foods to the infants' diets at similar ages.

H_r : Anglo American mothers introduce solid foods to the infant's diet at a later age when compared to Asian Indian American mothers.

II. Infant Feeding Sources of Information and Infant Feeding Beliefs Related Objectives

- H_0 : An equal number of Anglo American and Asian Indian American mothers use health professionals as their primary source of information about infant feeding.
- H_r : A greater number of Anglo American mothers use health professionals as their primary source of information about infant feeding compared to Asian Indian American mothers who rely more upon family members for infant feeding information.
- H_0 : Anglo American and Asian Indian American mothers' beliefs with regard to feeding their infants are similar.
- H_r : Anglo American mothers' beliefs with regard to feeding their infants are different from those of Asian Indian American mothers' beliefs.

III. Nutrient Adequacy and Growth Related Objectives

- H_0 : The nutrient intake and adequacy of Anglo American and Asian Indian American infants' diets are similar.
- H_r : The nutrient intake of Anglo American infants in the first year of life is more adequate, based on the Recommended Allowances, than that of Asian Indian American infants.

H₀: The growth rate in the first year of life of Anglo American and Asian Indian American infants is similar.

H_r: The growth rate in the first year of life of Anglo American infants is greater than that of Asian Indian American infants.

Limitations and Assumptions

This study involved 125 interviews conducted with Anglo American and Asian Indian American mothers during the first 12 months of their infants' lives. The sample size (Anglo American=25; Asian Indian American=25) limits the generalizability of the findings of this study to Anglo American and Asian Indian American mothers and infants residing elsewhere in the United States. The findings of this study also are limited to middle income Anglo American and Asian Indian American mothers and infants living in Knoxville; thus, findings cannot be generalized to a similar group of infants living in other geographical areas within the United States.

Dietary intakes and growth patterns vary by gender. However, the small sample size does not allow for studying the influence of gender on the food intake of and growth patterns of infants. Breast-feeding, formula feeding, and bottle feeding are not mutually exclusive infant feeding practices. This creates sub-cohorts, which could probably create confounding variables within each of the two ethnic groups. However, data size within each of these sub-cohorts is not big enough for adequate

statistical analysis to address the above concern.

Dietary intake was measured using the 24 hour recall method. This is valid in explaining group patterns. However, this process is subject to variability in nutrient intake within individuals (39). The use of food records in addition to 24 hour recalls would have increased the validity of the food intake data. However five food records per infant gives a strong group response to evaluate dietary intake data.

Assumptions are made about the homogeneity of the Asian Indian American sample in this study. Asian Indian American mothers are originally from different geographical areas in India. Every state in India has its language and cultural belief systems. Hence, clustering all 25 Asian Indian Americans in one group does not take into account the potential heterogeneity of this sample.

CHAPTER II

REVIEW OF THE LITERATURE

Overview

This literature review describes available information on breast-feeding practices, (including the incidence and duration of breast-feeding), introduction of formula, and introduction of solid foods in the first year of life of infants who were born to mothers belonging to the largest ethnic groups and who reside in the United States, eg Anglo Americans, African Americans, and Mexican Americans. This review also includes research findings about mothers' sources of information about infant feeding practices and feeding beliefs of Anglo American, African American and Mexican American mothers. The reported nutrient adequacy of the infants' diets and growth patterns of Anglo American and Asian Indian infants will be described. In addition, the few studies done on infant feeding beliefs of Haitian Americans are presented. No studies were found in the literature about other groups of Asian mothers, ie Asian Indian American mothers and their beliefs about infant feeding.

Cultural Differences In Infant Feeding Practices Across Ethnic Groups Residing In The United States

In the United States, data about infant feeding practices have been provided by national surveys conducted by the government (40,41). Demographic characteristics including culture are significant components of infant feeding practices (6,8,21,42-53). In spite of research findings documenting the cultural influence as a demographic variable influencing infant feeding practices, there is a dearth of infant feeding information on selected ethnic minority groups (26,27,54,55).

Investigators have evaluated and reported the infant feeding practices exclusively of Anglo Americans (16-18,20,24,25,56,57), of African Americans (13,28) and of Mexican Americans (29,32,59-63). Other investigators have reported cultural differences in infant feeding patterns based on comparative studies of Anglo American and Mexican American mothers (5,30,64-65) and of Anglo Americans and African American mothers (28,66). Reports based on cultural differences in infant feeding practices also are available from comparative studies done in triethnic populations consisting of Anglo American, African American and Mexican American mothers (14,15,21,23,66-69). Surveys conducted by manufacturers of infant formula have yielded results that reinforce the differences in infant feeding practices among Anglo American, African American, and Mexican American mothers (23,66,69-71).

There is some information available on infant feeding practices of Hawaiian and Filipino mothers residing in the United States (72,73). Infant feeding practices of Southeast Asian American mothers have been reported (52,67,74). However, there is

a dearth of research on infant feeding practices of mothers belonging to selected ethnic minority groups of Asian Indian Americans.

Ethnic Trends in Incidence of Breast-feeding

According to Barnes et al (75), 60% of infants born in the United States are currently breast-feeding in the immediate postpartum period. Because this is an overall nationally representative incidence of breast-feeding, this percentage varies among different ethnic groups.

Incidence of Breast-Feeding: Anglo Americans. The ethnic trend in the incidence of breast-feeding among middle income Anglo American mothers has been examined by Skinner et al (25). These researchers examined the breast-feeding and formula feeding practices of 98 middle income Anglo American mothers living in East Tennessee. Mothers were interviewed in their home when infants were two, four, six, eight, and 10 months old. At each of the above time periods, 34, 33, 12, 12, and 9% of mothers, respectively, were exclusively breast-feeding their infant. At four months of age, about one-third of the mothers in this ethnic group were breast-feeding.

Incidence of Breast-feeding: Mexican Americans. Littlefield (16)

found that the breast-feeding rate among Mexican Americans was 20%. In the Mexican American component of the Hispanic Health and Nutrition Examination Survey (36), the incidence of breast-feeding patterns of 2402 infants born between 1979 and 1982 was assessed. The Hispanic subjects were from Texas, Colorado, New Mexico, Arizona, and California. Data were collected using a questionnaire. Results indicated that 48% of Mexican American mothers had breast-fed their infants; but 39% of the infants were weaned before the age of three months.

Confirmatory findings about the influence of ethnicity were reported by Kokinos and Dewey (29). In this study, it was observed that 68% of Mexican American mothers initiated breast-feeding in the hospital; 32% of mothers in this study had given pre-lacteal feeds, eg herbal tea, formula or glucose water, before initiating breast-feeding. Another study documents a similar rate of incidence of breast-feeding in Mexican American mothers; 62% of Mexican American mothers initiated breast-feeding (46). In this study, Mexican American mothers initiated breast-feeding 5.4 hours after birth.

Lower rates of breast-feeding have been reported for Mexican American immigrants by several other researchers (5,30,32,61-62); the percentage rates vary among studies. O'Malley et al (32) reported that the incidence of breast-feeding among Mexican American mothers in his study was 14%. Wright et al (30) and John and Martorell (61) published higher breast-feeding rates than Littlefield (16), eg 48% and 70%, respectively among Mexican American mothers. Yet another study by

Lopez and Berce (62) documented a similar incidence rate of 64% among Mexican American mothers residing in southern California.

Incidence of Breast-Feeding: Anglo Americans vs Mexican Americans. In a comparison between infant feeding practices of Anglo American and Mexican American mothers, the influence of ethnicity as a major factor on breast-feeding practices of these groups were reported by Wright et al (30). Infant feeding data were collected at 2, 4, 6, 9, and 12 months of the infant's age. The study population was mostly Anglo American mothers (80%). Although 75% of Anglo American mothers reported to have breast-fed their infants, only 50% of Mexican American mothers reported doing so.

The most up to date documentation on the relationship between ethnicity and incidence of breast-feeding is available from a study by Zive et al (5). This study was conducted on a low income population of Anglo Americans and Mexican Americans residing in California. The mothers were interviewed at home, using a verbally administered questionnaire. The authors reported that at birth of the infant, 90% of Anglo American mothers were breast-feeding, but only 77% of Mexican American mothers reported breast-feeding their infants.

Incidence Of Breast-feeding: Anglo Americans vs African Americans. Ryan et al (23) conducted a mail survey to determine the incidence of breast-feeding in mothers belonging to different ethnic groups and residing in the United

Incidence Of Breast-feeding: Anglo Americans vs African Americans. Ryan et al (23) conducted a mail survey to determine the incidence of breast-feeding in mothers belonging to different ethnic groups and residing in the United States. They found that 61% of Anglo Americans and 25% of African Americans were breast-feeding.

Incidence Of Breast-Feeding: Anglo Americans vs African Americans vs Mexican Americans. In a study by Andrew et al (15), breast-feeding patterns of Anglo American, African American, and Mexican American mothers were compared. Andrew et al (15) found that while 43% of Anglo American mothers breast fed their infants, only 26% of African American mothers and 18% of Mexican American mothers did so. As noted earlier, Anglo American mothers reportedly have the highest incidence of breast-feeding (15,23,30) compared to other ethnic groups.

In a later study, Gabriel et al (21) examined the ethnic differences in breast-feeding patterns of Anglo American, African American, and Mexican American mothers. Personally administered questionnaires were used in data collection. Ethnicity was found to be a significant factor, especially in regard to incidence of breast-feeding. The incidence was 66% for Anglo Americans, whereas among African Americans and Mexican Americans, the breast-feeding incidence rates were 25% and 42%, respectively.

In 1989, Ryan and Martinez (69) reported the findings of a national mail survey that investigated the incidence of breast-feeding among these ethnic groups

African Americans and Mexican Americans. Although 59% of Anglo American mothers were breast-feeding their infants at six months, only 23% of African American and 48% of Mexican American mothers were breast-feeding at that point.

The findings of Ryan and Martinez (69) and Gabriel et al (21) were supported by Brodwick et al (31). The infant feeding patterns of Anglo American (n=62), African American (n=51), and Mexican American mothers (n=32) living in a city in the southwestern United States were assessed by interviewing mothers in their home. The authors found that 65% of Anglo American infants compared to only 10% of African American infants and 31% of Mexican American infants were breast fed.

A similar observation was made by Rassin et al (68) that reinforces the role of ethnicity as a major factor influencing the differences in breast-feeding patterns. In a study of Anglo American, African American, and Mexican American mothers (n=379) residing in Texas, the investigators reported that 43% of Anglo American, 9% of African American, and 23% of Mexican American mothers were breast-feeding. Based on the above findings, it appears that there is a relationship between ethnicity and breast-feeding patterns for Anglo American, Mexican American, and African American mothers. Also, the incidence of breast-feeding is higher for Anglo American mothers when compared to either Mexican American or African American mothers.

Incidence of Breast-Feeding: Southeast Asian Americans. Among southeast Asian American mothers, the incidence of breast-feeding is less common in the United States than in their native countries (76,77). Romero-Gwynn and Carias (60) documented a decline in the incidence of breast-feeding in Southeast Asian women who immigrated to the United States. The authors studied 214 infants born to IndoChinese mothers who had come from Cambodia and Laos to Northern California. Breast-feeding data were collected by questionnaires completed at individual interviews that were conducted in the home. The incidence of breast-feeding in this population was 26%, and the mean duration of breast-feeding was 8.7 months. A major limitation of this study is the fact that it was conducted with Indochinese refugees. Results may not be generalizable to the Asian Indian American population currently residing in the United States.

In a 1992 study by Ahmadi (74), breast-feeding patterns of Asian American mothers were determined using 150 Iranian, Afghan, and Southeast Asian immigrant mothers residing in the United States. A personal interview was used to obtain data for this study. The incidence of breast-feeding in this group was 32%. However, Asian Indian American mothers were not included and hence, findings of this study do not provide any specific infant feeding information for Asian Indians residing in the United States. Another study by Tuttle and Dewey (52) assessed the infant feeding practices of southeast Asian American women and found that 12% of Hmong and 8% of the Vietnamese women breast-fed. Here again, Asian Indian American mothers were not included in the study.

The grouping of many diverse southeast Asian cultural groups (67,74) obscures differences in infant feeding practices between cultural sub-groups that may affect the infant's dietary intake and subsequent development. The literature reviewed indicates that there is an ethnic trend in the incidence of breast-feeding, with the highest incidence reportedly among Anglo American mothers compared to mothers belonging to other ethnic groups residing in the United States.

Ethnic Trends in Duration Of Breast-feeding

The reported duration of breast-feeding varies among Anglo American, African American, and Mexican American mothers. Many researchers have compared the duration of breast-feeding among mothers belonging to these groups and findings from these studies are summarized herein.

Health professionals in maternal and child nutrition have attempted to increase the incidence of breast-feeding at hospital discharge (78). There has been an upward trend in the percentage of mothers who reported that they breast-fed at discharge from the hospital, ie 51.5% to 54.2% (79); however, this increase has been reported only for Anglo American mothers.

The result of a 1994 study by Novotny et al (73) supports this finding. As part of the Hawaiian infant feeding survey, a questionnaire was mailed to Anglo American, Filipino, and Hawaiian mothers receiving WIC (Women, Infants and Children) services. The authors found that 54% of Anglo American mothers were

breast-feeding at the time of discharge from the hospital compared to 45% and 17%, respectively, of Hawaiian and Filipino mothers.

Duration Of Breast-feeding: Anglo Americans vs Mexican Americans. In an analysis of infant feeding practices of Anglo American and Mexican American mothers, Wright et al (30) reported an association between ethnicity and duration of breast-feeding in these two groups. While Anglo American mothers breast-fed for a mean duration of 6.9 months, Mexican American mothers reported doing so for a mean duration of 5.7 months. While 60, 50, 37, and 22% of Anglo American mothers, respectively, were breast-feeding their infants at 4, 6, 9, and 12 months, only 33, 21, 18, and 7% of Mexican American mothers respectively were doing so at each of these ages. It thus appears that when 50% of Anglo American mothers were continuing to breast-feed their infants at six months of age, half the number of Mexican American mothers in this study breast-fed.

Kokinos and Dewey (29) studied infant feeding practices of Mexican Americans in northern California and found that the incidence of breast-feeding had declined to 38% at three months, 21% at six months, and 3% at one year of age. The mean duration of breast-feeding was reported to be 4.8 months. In contrast, O'Malley et al (32) who studied the infant feeding practices of migrant Mexican American farm laborers in Northern Colorado, reported that 27% of the mothers had stopped breast-feeding before the infant was four months old.

A cultural pattern seems to emerge about duration of breast-feeding based on findings of a survey conducted to explore the cultural differences between infant feeding practices of Anglo Americans and Mexican Americans (5). A longer duration of breast-feeding by Anglo Americans compared to that of Mexican Americans was reported. Although Anglo American mothers were breast-feeding until the infant was five months of age, Mexican American mothers ceased breast-feeding when their infant was four months old.

Kostraba et al (24) collected diet histories of infants to determine an association between early exposure to cow's milk and solid food in infancy with the risk of developing insulin dependent diabetes mellitus. In regard to duration of breast-feeding, 68% of Anglo American mothers were breast-feeding when their infant was three months old compared to only 35% of the Mexican American mothers who had similar age infants.

Duration of Breast-feeding: African Americans. Parraga et al (13) assessed the breast-feeding patterns of 116 African American infants born to low income urban mothers. Mothers were interviewed in their homes when the infants were three weeks, two, four, and six months old. At three weeks of age, 20% of infants were being exclusively breast-fed, whereas at two, four, and six months, 19%, 9%, and 7%, respectively, of the infants were being exclusively breast-fed.

Duration of Breast-Feeding: Anglo Americans vs African Americans vs Mexican Americans. In a study of infant feeding practices of triethnic groups, Ryan et al (23) found that ethnicity was associated with duration of breast-feeding. Twenty one percent of Anglo American mothers were breast-feeding their infants at six months of age, but only 6% of African Americans and 14% of Mexican Americans, respectively, were doing so. The findings of a study of infant feeding practices of Anglo American, African American, and Mexican American mothers living in Texas support this finding (31). At four months of age, 23%, 8%, and 6% of Anglo American, African American, and Mexican American mothers, respectively, were breast-feeding.

Duration of Breast-feeding: Southeast Asian Americans vs Anglo Americans vs African Americans vs Mexican Americans. The available information on Asian American mothers' infant feeding practices is very limited. The duration of breast-feeding in a racially heterogenous population was studied by Samuels et al (67). They observed that 47% of Anglo American, 33% of southeast Asian American, 21% of African American, and 15% of Mexican American mothers were breast-feeding at four months. In this study, researchers had categorized diverse groups of Asian Americans into one group; as a result, it is likely that Asian Indian Americans were under-represented. Another limitation of this study is that data were collected from pediatric and nursing records and by a follow-up mail survey when the infants

were four months of age. Hence, accuracy of the data collected is limited by accuracy of the infant feeding information provided by the mother and as interpreted and recorded by the associated medical and paramedical professionals. In a study by Ahmadi (74), it was observed that at five months, only 18% of southeast Asian mothers were breast-feeding their infants exclusively. These findings indicate that more than 50% of Anglo American mothers breast-fed their infants beyond three months of age of the infant compared with less than 25% of Mexican American and African American mothers doing so when their infants were three months old.

In summary, based on studies of individual researchers (14,15-18,20,23,24,29,30,32,60,63,64,67,69) and national surveys (23,66,69-71,138) on infant feeding practices of Anglo Americans, African Americans, and Mexican Americans, it appears that ethnicity not only influences incidence, but also the duration of breast-feeding at hospital discharge and when the infant is six months old. However, no such documentation is available on breast-feeding patterns of Asian Indian Americans, although they are the the third largest ethnic minority in the United States.

Ethnic Trends in Introduction of Formula

Similar to trends in the cultural diversity in breast-feeding patterns (incidence and duration of breast-feeding) of Anglo American, African American, and Mexican American mothers, investigators have reported cultural diversity in the timing that formula is introduced to the infant's diet. The literature describes similar

comparisons for formula among groups and within groups that were cited about incidence and duration of breast-feeding.

Introduction of Formula: Mexican Americans. The influence of ethnicity on the introduction of formula has been reported by Kokinos and Dewey (29). They observed that most Mexican American infants were receiving formula at a mean age of three months.

Introduction of Formula: African Americans. Parraga et al (13) conducted a study on infant feeding practices of African Americans. They found that 58% of African American infants in this study were receiving formula by three weeks of age.

Introduction of Formula: Anglo Americans vs Mexican Americans. Wright et al (30) found that Anglo Americans and Mexican Americans introduced formula into the infant's diet at mean ages of 3.3 months and 2.6 months, respectively. A similar cultural difference in age of infant and introduction of formula was reported by O'Malley et al (32). The results indicate that 69% of Mexican American mothers introduced formula at a much earlier age than Anglo American mothers. Zive et al (5) reported that Anglo American mothers introduced formula at a mean age of four months compared to the mean age of three months for Mexican American infants.

From these findings, conclusions can be drawn that the average Mexican American infant is younger when formula is introduced than the ages reported for Anglo American infants (29,30,32). Findings reported by various researchers confirm the cultural differences between Anglo Americans, African Americans, and Mexican Americans not only in breast-feeding patterns, but also with reference to introduction of formula. African American and Mexican American mothers reportedly introduce formula into the infant's diet at an earlier age than Anglo American mothers.

Ethnic Trends in Introduction of Solid Foods

In order to meet the challenging nutritional demands as infants grow and develop, there is an emphasis on the gradual introduction of variety into the infant's diet (58,80-85). Investigators studying infant feeding practices of Anglo American, African American, and Mexican American mothers have documented ethnic differences among these groups in regard to introduction of solid foods into the infant's diet.

Introduction of Solid Foods: African Americans. In an infant feeding study conducted exclusively with African Americans, the mothers introduced solid foods much earlier than at the recommended age of four to six months (13). Twenty percent of the mothers had introduced solid foods by four months, 48% at six months,

and 72% by nine months. By six months of age, 98% of the African American infants had received solid foods.

Introduction of Solid Foods: Mexican Americans. Findings from a study of Mexican American mothers residing in northern California (29) reinforce the idea of ethnic trends in introduction of solid foods in the first few months of an infant's life. Solid foods were introduced before two months of age for 8% of the children, with 40% receiving solid foods between two and four months, 28% between four and six, and 24% at six months or later. Overall, 50% of Mexican American mothers had introduced solid foods before the infant was four months old.

Introduction of Solid Foods: Anglo Americans vs Mexican Americans. In a study by Wright et al (30), Mexican American mothers introduced solid foods to the infant's diet at a mean age of four months compared to five months as the mean age for Anglo American infants. Mexican American mothers also introduced vegetables to the infant's diet earlier than Anglo American mothers. By the age of four months, 27% of Mexican American mothers had introduced vegetables. With reference to the introduction of solid foods, the average Mexican American infant was 6.2 months compared to 6.6 months for Anglo American infants. Likewise, Mexican American mothers in this study also were more likely to introduce meat earlier into the infant's diet compared to Anglo American mothers, eg mean of 7.8 months for Mexican American infants compared to 8.4 months for Anglo American infants.

A similar observation was made by O'Malley et al (32). They reported that 27% of Anglo American mothers and 59% of Mexican American mothers had introduced solid foods before four and six months, respectively. The mean age of Mexican American infants when solid foods were introduced was four months compared to the average age of 6.6 months for the Anglo American infants.

Findings by Zive et al (5) also seem to confirm earlier findings that Mexican American mothers are more likely to introduce solid foods into the infant's diet at an earlier age than Anglo American mothers. They reported that the mean age of introducing solids for Anglo American babies was five months compared to four months for the Mexican American babies.

Based on the findings of several studies, ethnicity does exert an impact on the introduction of solid foods to the infant's diet. Not only do African American and Mexican American mothers have a lower incidence and duration of breast-feeding and the subsequent earlier introduction of formula when compared to Anglo American mothers, but they also seem to introduce solid foods into the infant's diet at an earlier age than Anglo American mothers do. From these studies, it is clear that African American and Mexican American mothers introduce solid foods to the infant's diet at an age earlier than that recommended by the American Academy of Pediatrics (81).

Cultural Differences in Mothers' Sources of Information and Beliefs about Infant Feeding Practices

Ethnic Trends in Mothers' Sources of Information about Infant Feeding Practices

Much of the information about infant feeding that mothers receive reportedly comes from family members, relatives, available literature, media, and health professionals (18,22,75,86-101). The sources of information about infant feeding and their relative importance to primiparous mothers have been investigated by several researchers (102-104).

Sources of Information about Infant Feeding: Anglo Americans vs African Americans vs Mexican Americans. The cultural influence on mothers' sources of information for infant feeding among Anglo American, African American, and Mexican American groups has been documented by Baranowski et al (22). They evaluated the influence of social network members on breast-feeding decisions of a triethnic population of Anglo American, African American, and Mexican American mothers residing in Texas. The husband was reported as the most influential feeding advisor by 44% and 43% of Anglo American and African American mothers, respectively. For 37% of Mexican American mothers, the husband was cited as a major influence on feeding decisions made by the mother. A friend and mother were cited as the second most influential feeding advisors for 20% and 19% of Anglo American and African American mothers, respectively.

Sources of Information about Infant Feeding: African Americans. An ethnic perspective to the sources of information about feeding infants has been provided by Black et al (97). They studied 120 African American mothers enrolled in a WIC program in Georgia. Primary sources of information for mothers in this study were dietitians and other health professionals.

Parraga et al (13) interviewed mothers in their home when infants were three weeks, and two, four, and six months old. They reported that African American mothers received information about the sequence of introduction of weaning foods to the infant's diet primarily from health professionals, especially pediatricians.

In comparing the results of Baranowski et al (22) and Birenbaum (95), it appears that for Anglo American mothers, the male partner is the most influential advisor about infant feeding practices. On the other hand, among African American mothers, a friend seems to exert a major influence on the mothers' feeding decisions.

Sources of Information about Infant Feeding: Anglo Americans. Based on a study of 17 Anglo American mothers, a partitioning of use of sources of feeding information between the early and later part of infancy has been reported by Crockenberg (91). Throughout the first six months of the infant's life, the pediatrician had a major influence on the infant feeding decision of Anglo American mothers.

Sources of information used by Anglo American mothers about feeding their infants in the immediate post partum period have been surveyed by

St. Clair et al (96). They studied 185 low income, inner city women who were seen immediately after delivery. Results indicated that following birth of the baby, 28% of the mothers sought the advice about infant feeding practices from at least one social network member.

Findings by St. Clair et al (96) are further confirmed by Pridham (99,100) who reported that mothers from different ethnic groups seek different sources of information at different time periods during the infant's first year of life.

In the first three months of life of the Anglo American infants studied by Pridham, family members and friends influenced issues related to frequency of feedings.

Littman et al (101) studied the influence of information sources on breast-feeding patterns of Anglo American mothers. Although 24% of the mothers stated that books were a major source of infant feeding information, 17% reported magazines and pamphlets, and 9% reported videos as a significant source. Family and friends (22%), nurses and physicians (10%), and LaLeche League (4%) were reported as major sources of infant feeding information. Mothers in this study consulted a health care provider (55%) about the mode of infant feeding practices (breast-feeding and/or formula feeding) prior to delivery. Only 11% of the participants cited the physician as a major influence in the immediate postpartum period.

Based on the findings of these studies (91,96,99,101), in the first few months of infancy, from 25-30% of the Anglo American mothers sought information about feeding their infant from personal network including family and friends, but some

used books and magazines as sources.

Kleingbeil (86) reported that with regard to introduction of solid foods, Anglo American mothers used a greater variety of sources of information, including professional and lay sources as well as media. He found that while health care professionals were the primary source that influenced the mother's decision about introduction of solid foods, peers and husband played a secondary role in this aspect.

According to Bryant (87), professional sources of information seem to be more influential for Anglo American mothers than other sources, with particular reference to introduction of solid foods. These reports (86,87) are supported by a study by Adair (18) who found that Anglo American mothers seek a greater variety of information sources about feeding their infant in the second half of infancy, and these sources are different from those used in the early part of infancy. Adair (18) interviewed 77 primiparous, middle income, Anglo American mothers in the first year of the infant's life. Forty-four mothers were reportedly using reading materials as their primary source of information about infant feeding. Only 17 mothers cited that they consulted health care professionals as their primary source of information. In this study, 14 mothers reported that child birth classes were used as reinforcers of the feeding information that they had received from reading materials. Findings indicate that scientific literature and personal network were the most significant sources of information. However, a majority of mothers in this study consulted pediatricians with regard to information on weaning, use of whole cow's milk, and introduction of solid foods. Additionally, mothers in this study relied on the medical community for

continued information on breast-feeding.

A similar cultural dimension to sources of information about used by Anglo American mothers about feeding infants in the 6-12 month period has been provided by Ryberg and Merrifield (90). In a study of 190 Anglo American mothers and infants, they found that mothers received information about infant weaning issues first by telephone, followed by the use of newsletter, one-to-one discussions with health care personnel, toll-free informational telephone services, and through parent support groups. Campbell et al (92) found that Anglo American mothers rely on physicians for feeding sources of information in the six to 12 month period.

Results reported by Kleingbeil (86), Bryant (87), Adair (18), Ryberg and Merrifield (90), and Campbell et al (92) have been confirmed by McKim (93) and Reece (103). McKim surveyed 184 primiparous Anglo American mothers when their infants were three, six, nine, and 12 months of age. Mothers relied primarily upon professional and family networks for supplementary information on infant feeding issues, specifically with regard to introduction of solid foods, and the appropriate age and practices for weaning. Reading materials also were used as supporting sources on the same feeding issues.

McIntosh (94) studied sources of information used by primiparous Anglo American mothers that specifically focused on infant weaning practices. The pediatrician was the mother's primary source of information about the timing of cessation of breast-feeding and introduction of weaning foods. According to While (104) Anglo American mothers who breast-fed their infants beyond six months of age

sought professional sources of information.

Similarly, Satter (100) reported that during the infant's second six months of life, Anglo American mothers sought advice from reliable professional sources for choice of appropriate supplemental foods. At eight and 12 months, Anglo American mothers sought advice from professional sources. It is evident that in the 6-12 month period, Anglo American mothers primarily seek information about infant feeding from professional sources, including scientific literature, and the medical community (18,86,87,90,93,94,100).

Sources of Information about Infant Feeding: Mexican Americans. In a study of Mexican American mothers, 25% of mothers reported that their primary source of information, specifically with regard to breast-feeding, was a health care provider, (29). Fifty per cent of the mothers reported that they did not seek infant feeding information from any source. In the Kokinos and Dewey study (29), 21% of Mexican American mothers cited health care providers as their primary source of information on bottle feeding; 6% had received bottle feeding advice from their mother. The remaining 73% of the mothers did not consult anyone for bottle feeding advice.

Mother and grandmother appear to be primary feeding advisors for Mexican American mothers. Baranowski et al (22) and Birenbaum et al (95) reported that the attitude of the husband had a positive influence on infant feeding decisions, specifically with regard to breast-feeding decisions. However, in the study by

Baranowski et al (22), the direction of influence of social network members towards the feeding practice(s) of breast-feeding/formula feeding was not determined.

Mothers belonging to different ethnic groups reportedly seek different sources of information at different periods of time in the first year of the infant's life. Initial breast-feeding decisions appear to be influenced by lay sources of information (95). With reference to introduction of solid foods into the infant's diet, professional sources seem to be more influential (87).

Sources of Information About Infant Feeding: Anglo Americans vs Mexican Americans. The significance given to social network members as infant feeding advisors and the influence of social network members on infant feeding decisions differed between Anglo Americans and Mexican Americans in Bryant's study (87). Bryant examined 20 Anglo American and 28 Mexican American mother/infant pairs residing in Florida. Results indicated that for Mexican Americans, the maternal grandmother was the key infant feeding advisor. On the other hand, maternal grandmother was not reported to have a major influence on Anglo American mothers' infant feeding practices.

Sources of Information About Infant Feeding: Haitian Americans. Desantis (72) studied 30 Cuban and 30 Haitian mothers living in south Florida. The authors interviewed the mothers in their home using an open-ended questionnaire. Six mothers in this study reported that relatives and friends were their primary sources

that influenced bottle feeding decisions. Professional sources, including pediatricians, were cited as secondary sources of information about infant feeding.

Sources of Information about Infant Feeding: Asian Americans. Clear cultural differences in infant feeding sources of information also emerge from a study carried out by Shand and Kosaway (89). This study examined sources of infant feeding information used by primiparous, middle income mothers residing in Tokyo, Japan, and Anglo American mothers residing in the United States. Japanese mothers relied less upon professional sources, family members, lay people and also more upon formal sessions held on infant feeding. On the other hand, Anglo American mothers utilized a wide spectrum of infant feeding sources of information that included personalized as well as professional sources of information. Compared to one-third of Anglo American mothers, only one-fourth of Japanese mothers sought information from family members.

Ahmadi (74) interviewed 150 Persian and southeast Asian immigrant women in California. They reported that 48% of mothers stated that their own mothers were the primary source of information.

All the above findings demonstrate the ethnic differences in sources of infant feeding information used by Anglo American, African American, and Mexican American mothers. Research exploring this dimension of infant feeding among Asian Indian Americans is warranted.

To sum up, with regard to the sources of information about infant feeding used in the first six months of Anglo American infants' lives, mothers consulted health care professionals, primarily pediatricians, as their primary source of information (91,96,99,101). However, in the second half of infancy, Anglo American mothers primarily relied upon professional sources and also used personal network and literature as secondary sources (18,86,87,90,93,94,100).

Based on limited research about information sources used by southeast Asian American mothers, it appears that personal networks, including maternal grandmother, are the primary source of feeding information. However, there is no research done on partitioning patterns of sources of information used by south Asian American mothers in the early and later half of infancy. This dimension of infant feeding among Asian Indian Americans remains unexplored.

Ethnic Trends in Infant Feeding Beliefs

Fishbein and Azjen (105) define belief as: "The probability or improbability that a particular relationship exists between the object of belief and some other object, concept or goal". Infant feeding beliefs and associated feeding practices have been shown to be embedded in the cultural context of several ethnic groups (8,18,87,88,106-109). To analyze infant feeding practices of any particular ethnic group, the cultural belief behind such practices needs to be determined, which leads to the need for examination of infant feeding beliefs of that specific group.

Infant feeding beliefs are transmitted culturally and vary with ethnicity as shown by Bryant (87), Adair (18), Shand and Kosaway (89), and Fishman et al (109). Manstead et al (110), Dusdieker (111) and Ehling (112) found that the primary factor influencing infant feeding decisions was that of the mother's infant feeding beliefs. Infant feeding beliefs of the mother influence major infant feeding decisions such as timing and length of feedings, which Manstead (110) and Dusdeiker (111) propose as a determinant of infant feeding behavioral patterns. In a study by Fishman et al (109) about the beliefs of south Asian women, participants believed that the quality of breast milk was influenced by their diets.

Infant Feeding Beliefs: Anglo Americans. In a study by Adair (18), Anglo American mothers held "infant obesity centered beliefs". Mothers reportedly believed in diluting infant formula with equal amounts of water with the objective of reducing the number of calories in the formula. They believed that infant obesity can be avoided by not overfeeding the infant with a concentrated formula. Mothers believed that eliminating solid foods from the infant's diet, except for fruit and cereal, feeding low fat milk rather than formula, and reducing the volume of food in the infant's bottle will prevent infant obesity. Anglo American mothers in this study also believed that extra calories from dry fat milk and reconstituted dry fat milk caused infant obesity. Mothers believed in substituting the infant's whole milk diet with skim milk to prevent excess weight gain. In Adair's study (18), Anglo American mothers also believed that strained, mushy, bland, nutritious foods and those devoid of additives

were appropriate for the infant. Mothers believed that "baby food" considered appropriate for feeding is only the foods sold in jars. They believed that fish does not count as baby food and is not appropriate for the baby, since baby food manufacturers do not produce fish based baby food. With regard to beliefs about appropriate infant foods, mothers were influenced by needs of the infant, characteristics of the infant food, and perceptions of the mother about the influence of consumption of that food on the health of the infant. Strong beliefs were observed in this area, specifically focusing on physiological maturity of the infant. Mothers believed in modifying the infant's diet to facilitate easier digestion of the food and to prevent intestinal gas and diarrhea. Participants also believed in the gradual introduction of a variety of foods in synchrony with the infant's developmental milestones. Acidic foods were believed to cause diaper rash. Formula feeding was considered less healthy than breast-feeding. Thus, infant feeding beliefs of Anglo American mothers in this study were infant-nutrition, infant-development, and infant-health centered.

O'Campo et al (113) studied 198 urban Anglo American mothers and found that normative and behavioral beliefs about breast-feeding influenced the longer duration of breast-feeding observed in Anglo American mothers. Anglo American mothers reportedly believed that breast-feeding was more convenient than bottle feeding.

Infant Feeding Beliefs: Haitian Americans. Desantis (72) found that mothers held culture-based beliefs about the benefits of breast-feeding over bottle feeding,

about the nutritionally beneficial composition of breast milk and immunity benefits of breast milk and about the positive mother-infant bonding consequences of breast-feeding. Mothers also held beliefs about the pacifying effect of bottle feeding.

In a study by Nachman et al (114), Haitian mothers believed that a fat baby was a healthy baby. They believed that maternal stress during lactation caused diarrhea, if the infant was breast-fed (115).

In a study of Haitian American's infant feeding beliefs (116) mothers believed that breast milk contributed to intestinal parasites in infants. Mothers thought that they should not breast feed when they were sick and that breast-feeding caused diarrhea.

Infant Feeding Beliefs: Mexican Americans. Mexican American mothers' beliefs related to infant feeding were reported by Alvarez and Murray (117). In this study, mothers believed that a lactating mother's emotional state is linked to the quality of breast milk. If the mother is emotionally upset, the baby should be weaned immediately to prevent causing harm to the baby.

Similar to Nachman et al study (114) of Haitian mothers, Blank (118) reported that Mexican American mothers believed that a fat baby was a healthy baby and formula fed babies were fatter than breast-fed babies. This finding about mode of feeding and obesity also was reported by Ehling (112) who studied beliefs of Mexican American mothers. These studies indicate that Mexican American mothers believe in the relationship between infant feeding mode and infant obesity.

Cultural Differences in Nutrient Adequacy of the Diet and Growth of Infants from Birth to 12 months

Ethnic Trends in Nutrient Adequacy in the First Year of Life

The primary goal of infant feeding is to provide adequate amounts of energy and nutrients (38,66,120,121). Iron, zinc, and calcium are required in the infant's diet for normal growth and development (71,122-124). Infants of minority groups may be at an increased risk for certain nutrient deficiencies, ie calcium, iron and zinc, during the second half of infancy (26, 125).

Iron Intake of Anglo American, African American, and Mexican American Infants. Currently, 16% of infants six to 12 months of age do not meet the RDA for iron (38). Based on the findings of national surveys, infant cereals provide almost one half of the infant's daily iron intake during the first year of life (126,127).

The cultural profile with regard to iron intake has been reported by Martinez and Kreiger (71) for Anglo American and African American infants. They determined that the median daily iron intake for infants is 10.1 mg/day. In a nationwide food consumption survey, the iron intake of Anglo American infants was computed by Ryan and Martinez (66). Eighty-five per cent of African American infants had a median iron intake below 100% of the RDA. Another interesting observation was that African American infants between the age of birth and six months received less iron from infant cereal than Anglo American infants.

In 1987, the U.S. Centers for Disease Control reported the occurrence of iron deficiency anemia as 16% of children, ages 6-24 months. However, a major limitation of this finding is that the study was done with Anglo American infants (122).

An ethnic perspective to the iron intake of Puerto Rican infants has been provided by Sanjur et al (27). They studied 120 urban Puerto Rican children aged 5 to 37 months. Data were obtained by 24 hour recall and two day food records. They found that 48% of the infants had less than 100% of the RDA for iron.

Zinc Intakes in the Diets of Anglo American Infants. According to findings of the Nationwide Food Consumption Surveys (38) and Gerber Nutrition Survey (126), zinc intakes appear to be adequate in the diets of Anglo American infants. In a 1989 dietary survey, zinc was reportedly inadequate for 25% of infants, 6-12 months of age. Infants with inadequate dietary zinc intake had a low intake of milk based foods and beverages (38). However, the nutrient adequacy of infants' diets belonging to other ethnic groups has not been documented.

Calcium Intakes in the Diets of Anglo American Infants. Similarly, 17% of African American infants aged six to 12 months receive less than the RDA for calcium and vitamin C (128). Most of the infants in this study had exceeded the recommended intake for calcium, B₁₂, protein, riboflavin, folate, calcium, magnesium, phosphorus, thiamin, vitamin A and vitamin C.

Vitamin Intakes in the Diets of Anglo American Infants. Most

Anglo American infants exceed the RDA for vitamins (38). Based on the analysis of NHANES II data, it has been reported that the median intake of infants exceeds the RDA for vitamin A, thiamin, riboflavin, niacin, and vitamin C (129). Results from Ross Labs Infant Nutrition Survey (79) Gerber Nutrition Surveys (126) and Nationwide Food Consumption Survey (38) show these intakes. NHANES surveys show that 95% of 6-11 month old infants consumed more than two-thirds of the RDA for vitamin A.

Energy and Macronutrient Intakes in the Diets of Anglo American Infants.

The mean protein intake exceeded the RDA by about 50% at three months and by about 100% at nine months (129). The ethnic trend in nutrient intake has been investigated by Nicklas et al (130) who studied 125 mothers and infants (81 Anglo American and 44 African American). They used 24 hour recalls to determine the dietary intake of infants in each of the two ethnic groups. Results indicate that at six months of age, total energy intake of Anglo American infants was 937 Kcal/day compared to the energy intake of 969 Kcal/day in the case of African American infants. At six months, total fat intake was significantly higher in African American infants compared to that of Anglo American infants. Percentage contribution of energy from carbohydrates was higher among Anglo American infants compared to African American infants. However, the percentage of energy from dietary fat was higher for African American infants than Anglo American infants. When the diets

were evaluated for nutrient density, it was found that the intake of carbohydrate/1000 Kcal was higher among Anglo American infants; total fat intake/1000 Kcal was higher among African American infants.

The cultural trend in nutrient intake of Anglo American and African American infants has been provided by Johnson et al (131). When infants were one year of age, these researchers obtained the socio-demographic, cultural, and fat intake profile of 1392 Anglo American and African American infants. The intake of total fat was higher among African American infants compared to Anglo American infants. This finding about fat and sodium intake of Anglo American infants is supported by data reported by Fisher et al (132).

Ethnic Trends in Growth Patterns of Infants

Based on the literature, growth patterns differ for infants belonging to different ethnic groups (133-135). The ethnic trend in the growth patterns of Anglo American infants from middle income families in Knoxville was investigated by Skinner et al (25). These researchers interviewed mothers when infants were two, four, six, eight, and 10 months old. The average birth weight of these infants was 7.8 ± 1.2 lb for males and 7.6 ± 1.2 lb for females. When infants were four months old, male infants had a mean weight of 15.4 ± 1.6 lbs compared to 13.9 ± 1.7 lbs for females. By six months of age, irrespective of gender, all infants had doubled their birth weight.

Duncan et al (133) and Kautz and Harrison (134) studied growth patterns of Anglo American and Mexican American infants at one year of age. They reported that 85% of Anglo American and 93% of Mexican American infants fell between the 5th and 95th National Center for Health Statistics (NCHS) percentiles for weight. With regard to height, 95% of infants belonging to each of the two ethnic groups fell between the 5th and 95th NCHS percentiles. Compared to Anglo American infants, Mexican American infants had greater weight for length.

Duncan (133) studied Mexican American infants in Colorado. They were lighter, shorter, and had smaller head circumference compared to non-Mexican American infants. This finding has been reported by Harrison and White (135). Duncan found that Mexican American infants are shorter than Anglo American infants, and that Mexican American infants have an average weight for length that is higher than that of Anglo American infants.

Dewey et al (136) studied growth patterns of 209 Mexican American infants in northern California. At one year of age, the weight for age was at the 50th percentile; the height for age in these infants was at the 54th percentile whereas weight for height for Mexican American infants was at the 45th percentile. Other investigators have found overweight and short stature among Mexican American infants (137-139).

Jung and Czajka-Narins (140) investigated the influence of birth weight, gender, race, and type of feeding on the doubling and tripling of birthweight in the first year. They studied Anglo American and African American infants in a health

maintenance organization. These researchers found that average birth weight doubling time of African American infants was 128 days, whereas Anglo American infants doubled birth weight after 155 days. Birth weight tripling time ranged from 412 days for African American infants to 484 days for Anglo American infants.

It is apparent that African American and Mexican American infants double and triple their birth weight earlier than that of Anglo American infants. From the above findings (134,136,140), a conclusion can be drawn that African American infants gain weight faster than Anglo American infants in the first year of life.

Summary

This review includes cultural differences in infant feeding practices of Anglo American, African American, and Mexican American mothers residing in the United States. These practices included the incidence and duration of breast-feeding, introduction of formula, introduction of solid foods, sources of information, infant feeding beliefs, nutrient adequacy, and growth patterns of infants. Based on the consistency of findings, the following generalizations can be drawn with specific reference to Anglo American, African American, and Mexican American mothers.

The incidence and duration of breast-feeding continues to be the highest for Anglo American mothers. African American and Mexican American mothers introduce formula and solid food to the infant's diet earlier than Anglo American

mothers.

In regard to sources of information about infant feeding practices, among Anglo American mothers, a health professional seems to have a major influence on infant feeding decisions made by the mother, whereas among African American mothers, a friend seems to exert a major influence on infant feeding decisions. For Mexican American mothers, maternal grandmothers appear to be the primary infant feeding advisors.

The infant feeding beliefs of Anglo American mothers can be described as infant-nutrition centered and infant-health centered (18,87). On the other hand, very little is known about infant feeding beliefs of African American and Mexican American mothers (69). There is no documentation available on the influence of infant feeding practices on the growth pattern of infants belonging to different ethnic groups residing in the United States.

The literature reviewed provided limited information about feeding practices of Asian American mothers and no study was found about feeding practices of Asian Indian American mothers. The grouping of mothers in some studies who belong to diverse subgroups, based on their Asian ethnicity (60,67) and the omission of Asian Indian American mothers in other studies lead to little useful information about infant feeding practices and beliefs of Asian Indian American mothers. With a growing population of Asian Indians immigrating to the United States and with a potential for infant malnutrition, research documenting feeding practices and beliefs of Asian Indian American mothers will provide an insight into this aspect of infant nutrition.

CHAPTER III

METHODOLOGY

Overview

This study used descriptive survey research methodology to compare infant feeding practices and beliefs of Anglo American and Asian Indian American mothers residing in Knoxville, Tennessee. Using a validated Infant Feeding Practice Questionnaire (IFPQ-Appendix I) administered at individual interviews conducted in the home, data were collected at 1, 3, 6, 9, and 12 months. The mother was asked to respond to questions about her infant feeding practices and about her primary sources of information about these practices. At each interview, the infant's weight was taken, recumbent length was determined, and head circumference was measured. The mother also provided a 24-hour recall of the infant's food intake. At the end of the last interview session, the mother was asked to complete and to return by mail the self-administered Feeding Belief Questionnaire (FBQ-Appendix II) to the investigator.

Human Subjects Approval

This study was approved by the Committee on Research Participation involving Human Subjects at the University of Tennessee, Knoxville. This study involved no invasive laboratory techniques and no risk to the study subjects. A copy of the "Statement of Informed Consent" is provided in Appendix III.

Sample

This research was designed to study a total of 50 Anglo American and Asian Indian American infants with 25 in each group. The subjects were drawn from the Knoxville urban area in 1993 and 1994. The study sample was comprised of middle class, Anglo American (n=25) and Asian Indian American (n=25) mother/infant pairs. Subjects were recruited from University and community population through personal and community networks, clinics and health departments, churches, student organizations, and newspaper announcements of infant births. In addition, a Recruitment Poster (Appendix IV) with a baby picture and postage paid, self-addressed cards were posted at community centers, clinics, and local stores that served these particular ethnic groups.

Criteria for Inclusion of Anglo American and Asian Indian American Mothers and Infants

To meet the inclusion criteria, all mothers had to be primiparous, middle income, older than 19 years, and no mother could receive public assistance. Infants had to be full term, healthy, and must have had a birth weight of 2500 grams or larger. For the Asian Indian American mother/infant pairs to be included in the study, the infant's parents must have been born in India and must have resided in the United States at least for one year and for not more than eight years. Ethnicity was determined based on the mother's self report, mother's country of birth, and the national language spoken in the home.

Based on the data obtained for education and employment, socioeconomic status was determined using the Hollingshead Four Factor Index of Social Status (141). If both husband and wife were employed, then calculations included education and occupation of both individuals. This index is based on the educational level and occupational status of the primary wage earner(s) in a nuclear household. The Hollingshead Index produces scores ranging from 8 to 66, with a score of 8 being the lowest possible and 66 the highest possible score. Hollingshead Index divides the scores into five groups. Scores ranging from 8 to 19 are representative of lower socioeconomic status; scores ranging from 20 to 29 of lower middle income status; scores ranging from 30 to 39 of middle income; scores ranging from 40 to 54 of upper middle income, and scores from 55 to 66 of upper socioeconomic status.

Recruitment Procedure

Eligibility of the subjects was determined using the aforementioned inclusion criteria. Once subjects were identified, the investigator conducted telephone interviews (Appendix V) and sent cover letters (Appendix VI). A participation questionnaire was used for both telephone and letter contacts to screen eligible participants (Appendix VII). If individuals were eligible, they received an "interest in the study letter" (Appendix VIII). Prospective subjects were informed that when their babies were 1, 3, 6, 9, and 12 months of age, they would be interviewed privately in their homes to collect information about infant feeding practices and sources of feeding information used.

The mothers were informed that their babies would be weighed, recumbent length determined, and head circumference measured at each of the five interview sessions. The letter also informed the mothers that they would be required to fill out the self-administered Feeding Belief Questionnaire (FBQ, Appendix II) that would be completed at the last interview session when their babies were 12 months old. The letter indicated that participation in the study was voluntary; mothers could withdraw from the study at any time; and any information provided would be kept confidential by using code numbers for each participant. Mothers were asked to return the postage paid card (Appendix IX) to the investigator if they were interested in participating in the study.

A follow up letter (Appendix X) was sent to non-respondents 10 days following the first letter. A letter (Appendix XI) thanking the mothers and briefing them on the study was sent to those who expressed willingness to participate in the study. A letter (Appendix XII) thanking the mothers who did not meet the study criteria also was sent. Reasons for exclusion were explained in the letter. A description of the total number of mothers contacted and reasons for exclusion are provided in Appendix XIII.

Subject Consent

A "Statement of Informed Consent" (Appendix III) was signed by mothers. The consent form described responsibilities of the participants at each of the five interview sessions (1, 3, 6, 9, and 12 months). Each session was expected to last about one hour. The consent form also stated that this was a non-intervention study and no information about dietary adequacy of infant's diet would be provided by the interviewer. If questions were asked, mothers would be referred to their primary health care provider. Inappropriate feeding practices deemed hazardous to the baby's health for the purpose of this study included: feeding substitute or imitation milks, feeding non refrigerated cans of milk once they were opened and used; feeding undiluted concentrated formula; feeding practices that challenge the immune capacity of the infant, feeding alcoholic beverages to the baby, and any other feeding practice that in any way has been scientifically proven to be a potential risk to the infant or

has been shown to cause impairment of the normal functioning of the infant. The consent form indicated that there was no risk involved to the mother and/or infant from participation in the study. The method used for securing the confidentiality of the data and subjects' identities was described. Names and telephone numbers of the research staff were provided. The signed forms were stored in a locked file cabinet in Room Number 213C, Jessie Harris Building, Department of Nutrition, University of Tennessee, Knoxville. A copy of the consent form was provided to each subject.

Instrument Development

Development of Infant Feeding Practice Questionnaire (IFPQ)

A modified version of an existing screening questionnaire (142) for use in infants from birth to 12 months of age (Appendix XIV) developed in the Department of Nutrition, University of Tennessee, Knoxville, was used in this study. This existing questionnaire was further modified to include cultural information for use in this study. The major modifications on Section A of IFBQ included: addition of ethnic information regarding the parent's country of birth, number of years of residence in the United States, national language spoken at home, and modification of information on education to suit the educational system in India. In addition to the above modifications on Section A of IFPQ, questions regarding colostrum feeding and pre-lacteal feeds were added to Section B of IFPQ. Section B of IFPQ had open and

close-ended questions about breast-feeding, formula feeding, non-breast-milk liquid feeding, bottle feeding, supplemental feeding, vitamin and mineral supplementation, mothers' sources of information, 24 hour recall, and anthropometric data.

Pilot Testing. The IFPQ was administered to ten mothers in each ethnic group (Anglo American and Asian Indian American) residing in Knoxville, Tennessee. This was carried out during personal interviews conducted in the mothers' homes. Tests for reliability were conducted using Cronbach's alpha (143). For a given test, Cronbach's alpha provides an estimate of the reliability in the form of a coefficient. This coefficient is a measure of internal consistency and for this instrument, the alpha value was 0.73. The questionnaire was revised based on the mothers' responses and necessary modifications were made. Then, the revised questionnaire (Appendix I) was administered to the subjects in the actual study sample.

Development of Feeding Belief Questionnaire (FBQ)

FBQ was part of a required paper for a doctoral level course on "Cross-Cultural Counseling" in Spring of 1993 and continued as an independent study in Summer of 1993. A 19 item, Likert scale format (144), feeding belief questionnaire was developed. Statements were generated using literature sources and

informal interviews with Anglo American and Asian Indian American mothers. The FBQ was formatted similar to "Beliefs of Pregnant Mothers" Questionnaire developed by Carruth and Skinner (145). The instrument contained infant feeding belief statements about colostrum, pre-lacteal feeds, breast-feeding, introduction of formula, non-breast-milk liquids, solid foods, other foods (processing and preparation), and foods given during and following illness.

Pilot Testing. Mailing addresses of middle income Anglo American and Asian Indian American mothers with one child younger than ten years of age residing in Knoxville, Tennessee, were obtained from the community, University student organizations, church organizations, and child care centers. A letter (Appendix XIV) explaining the nature and purpose of the study, the Demographic Questionnaire, and the FBQ (Section A and B, respectively) were mailed to 530 mothers (Anglo American = 190; Asian Indian American = 190; Asian Indian = 150) in Knoxville, Tennessee and in Coimbatore, India.

On the Demographic Questionnaire, the mothers provided information about: marital status, age, number and age of children, country of birth of the children, number of years of residence in the United States, national language spoken, mother's education, father's education, mother's occupation, father's occupation, and annual household income.

In regard to the FBQ, mothers indicated their beliefs on a five point scale of "Strongly Disagree" to "Strongly Agree" (Appendix XIV). Mothers returned the

completed Demographic Questionnaire and the FBQ in a self-addressed, postage-paid envelope provided by the investigator. No personal interviews were conducted for the demographic and FBQ data. However, the mothers could provide additional comments at the end of the questionnaires about wording used, sequence of items, and the perceived difficulty of answering the questions.

Out of the 530 mothers who received the FBQ, 466 responses were returned to the investigator. Factor analysis of these responses was carried out (146). The principal component method was used in obtaining the initial factors. This initial factor matrix was subjected to varimax rotation. This procedure simplified the factors for emerging themes; orthogonality among the factors also was retained during this process. Factor loadings of ≥ 0.50 and eigen values greater than unity gave rise to the themes.

Five factors met these criteria and the themes were named by the investigator. The themes that emerged were beliefs based on pre-lacteal feeding, breast-feeding, bottle feeding, non-breast-milk liquid feeding, and solid foods. These terms are defined on page 4 of this document. The themes were used in revising the pilot tested FBQ (Appendix XV) for use in the actual study sample (Appendix II).

Data Collection

Data Collected Prior to First Interview

Subsequent to recruitment and consent of subjects to participate, Section A of IFPQ (Appendix III) was mailed to the participant. Section A includes demographic data that were used to determine the participant's eligibility to be in this study. No further demographic information was requested at the initial interview.

First Interview

As shown on Table I, data on breast-feeding practices were obtained from mothers at the first interview session, using Section B of the IFPQ (Appendix I). Responses to questions about initiation and duration of breast-feeding and reasons, if any, for not initiating breast-feeding immediately after birth were recorded. The mother provided information about the number of times she breast-fed her baby during the day and at night, and the length of time for each feeding. The mother also provided information about pre-lacteal feeds, if any, that were given to the baby. The mother was asked to respond to questions directed toward her period of decision making with regard to feeding her baby. Information about type of formula (ready to eat or concentrated liquid), brand name of formula, method of preparing formula, and the amount of formula used everyday was collected.

Bottle-feeding practices were assessed using Section B of the IFPQ. The mother was asked whether or not her baby takes a bottle to bed; if "yes", she described the amount of liquid in each bottle and the number of bottles taken to bed over a 24 hour period. Addition of foods and/or other beverages to the bottle was determined. For those mothers who added cereal to the baby's bottle, reasons for doing so and the amount of cereal added to each bottle were recorded.

In Section C of the IFPQ, the consumption of beverages other than formula or milk, such as Kool-ade, juices, soda, water, and others was recorded. This included the number of times/day and the amount and kind of beverage consumed by the infant.

Introduction of supplemental foods to the infants' diets appeared as three separate categories on Section D of the IFPQ: Commercial Baby Foods, Homemade Foods, and Table Food (Appendix I). The following data were recorded: age of the infant when food from each group was added, reasons for adding and frequency and amount of cereals, fruits, vegetables, and meat consumed from each of the three "Supplemental Food" categories. Any modification of table food consumed by the baby was explored. If the food was modified, food processing techniques used for this purpose were determined and recorded.

Table 1
Time sequence and description of data collected* from Anglo American and Asian Indian American Mothers

Interview session	Data collected
First	Pre-lacteal feeds ^b , breast-feeding ^b , formula feeding ^b , non-breast-milk
One month	liquids ^b , beverages ^b , bottle feeding ^b , supplemental foods ^b , vitamin and/or mineral supplements ^b , feeding sources of information ^b , 24 hour recall ^b , and anthropometric data ^b
Second	Breast-feeding, formula feeding, non-breast-milk liquids
Three months	beverages, bottle feeding, supplemental foods, vitamin and/or mineral supplements, feeding sources of information, 24 hour recall, anthropometric data
Third	Breast-feeding, formula feeding, non-breast-milk liquids,
Six months	beverages, bottle feeding, supplemental foods, vitamin and/or mineral supplements, feeding sources of information, 24 hour recall, anthropometric data

Table 1 (continued)

Interview session	Data collected
Fourth	Breast-feeding, formula feeding, non-breast-milk liquids, beverages,
Nine months	bottle feeding, supplemental foods, special diets, vitamin and/or mineral supplementation, feeding sources of information, 24 hour recall, and anthropometric data
Fifth	Breast-feeding, formula feeding, non-breast-milk liquids, beverages,
Twelve months	bottle feeding, supplemental foods, special diets, vitamin and/or mineral supplementation, feeding sources of information, 24 hour recall, anthropometric data, and infant feeding beliefs ^b

^a=Using a validated IFPQ (Appendix I), data were collected by interviewing mothers in their home.
^b=Data collected from the mothers for the first time.

Information about vitamin and/or mineral supplementation was recorded on Section E of the IFPQ, e.g. amounts consumed/day and brand name of supplement. In addition, the mother indicated whether her baby was on any special diet, such as for allergy or other special health conditions.

Using Section F of the IFPQ, data on sources of information about feeding the infant were collected. The mother indicated the person who was her primary source of information about feeding her baby, as well as other sources of information about infant feeding practices, including family, friend(s), and/or media. Whether she followed feeding recommendations provided by any of the above sources was determined. If she had complied with the recommendation(s), she was asked to list the specific recommendation(s).

If the mother provided foods other than breast milk and formula, that dietary information was recorded using a 24 hour recall (Appendix I). In order to standardize quantities of food reportedly consumed by the baby, the investigator used some utensils, such as different sizes of common household bowls, containers, cups, baby food jars, infant formula cups, and measuring spoons to improve the accuracy of the food recalls.

Anthropometric Data of Anglo American and Asian Indian American Infants.

At each interview, three measurements each of weight, height, and head circumference were taken (Appendix I). The infant was weighed nude on a

balance beam scale with non detachable weights, using Detecto Doctors' Infant Scale Model 250. Three weights to the nearest 0.25 ounce were obtained when the infant was not moving and were recorded on the Infant Anthropometry Form (Appendix I) Consistency in weights over time was assured by measuring a two pound standard weight before each measurement and by obtaining scale error and recording. This standard weight was developed by weighing two pounds of water on a calibrated laboratory scale (Appendix III).

Recumbent length was measured utilizing a standard infant board that is a prototype of that used in the clinics/ pediatrician's office. The wooden board is 40.75 inches long with an inflexible head piece, sliding wood piece, and a 26 inch guide rule for obtaining the measurements in inches. The infant's head was held in alignment with the body, with the line of vision straight up. Gentle traction was applied to bring the top of the infant's head in contact with the fixed headboard. The infant's right foot was held with toes straight up and was pushed down at the knee with the leg fully extended. While holding the leg with one hand, the other hand was used to bring the moveable foot board against the sole of the foot (147,148). Three measurements were taken to the nearest 1/8 inch and recorded on the Infant Anthropometry Form (Appendix I).

Head circumference was measured utilizing a narrow, 1 cm, flexible, non-stretch tape. The tape was passed around the head with the infant in the supine position, and was held in place just above the bony ridges of the eyebrows and was passed around the back of the head covering the bony protrusion. Three

measurements were taken to the nearest 1 cm (147,148). Measurements were recorded on the Infant Anthropometry Form (Appendix I).

Second, Third, and Fourth Interview

As shown on Table I, data on breast-feeding, formula feeding, non-breast-milk liquid feeding, supplementary feeding, vitamin and/or mineral supplementation, feeding sources of information, and anthropometric measures were collected as in the initial interview.

Fifth Interview

At the fifth interview session, the same information was obtained as in the prior four interviews. In addition to that information, the mother filled out the self-administered FBQ (Appendix II) and mailed the questionnaire to the investigator.

Data Analysis

Data Verification

IFPQ data were verified according to a mechanism proposed by Dr. Carruth. A random number table was used in selecting one questionnaire out of 250

questionnaires. For the questionnaire that was selected, data on one section of the questionnaire were verified against the coding scheme as a reference (Appendix XVI). Similarly, another questionnaire was selected using the same procedure, and a different section of the questionnaire was verified against the reference coding scheme. This procedure allowed the investigator to be sure that all 250 questionnaires were selected and verified for at least one section of the questionnaire. Data on 24 hour recall were verified for all 250 questionnaires.

Quantitative Data Analysis

Data were analyzed using SAS PROC MEANS and SAS PROC FREQ procedures (149). Arithmetic means and frequency counts (149) were calculated for all of the variables listed in Table 2.

Data were tested for normality status using SAS PROC NORMAL (149) for each of the variables shown in Table 2. If data were normally distributed, Chi-square test or TTest (150) were used to test for statistical significance ($P \leq 0.05$). If data were not normally distributed, Wilcoxon Signed Rank Test (151) was used in testing for statistical significance ($P \leq 0.05$). PROC GLM (150) was used to test for significant differences in the means for responses of Anglo American and Asian Indian American mothers and data for the infants (Table 2).

Table 2

Testing for significant ($P \leq .05$) differences between the two groups^a for the study variables

Mean number of mothers breast-feeding at birth, following hospital discharge, and at 1, 3, 6, 9, and 12 months

Mean duration of breast-feeding (in months)

Mean age of the infant when formula is introduced

Mean age of the infant when solid food is introduced

Mean number of mothers using health professionals/personal network/media/other sources of information about infant feeding at 1, 3, 6, 9, and 12 months

Mean scores of mothers on the feeding belief statements

Mean nutrient intake of the infants at 1, 3, 6, 9, and 12 months

Mean weight, height, and head circumference of infants at birth and at 1, 3, 6, 9, and 12 months

Mean weight, height, and head circumference gain of infants between birth and one month, one and three months, three and six months, six and nine months, and nine and 12 months

Mean body mass index of infants at birth and at 1, 3, 6, 9, and 12 months

^a=Number of mothers and infants (Anglo American=25; Asian Indian American=25).

Qualitative Data Analysis

Responses to open ended questions involving breast-feeding, pre-lacteal feeds, formula feeding, introduction of supplemental foods, bottle feeding, non-breast-milk liquid feeding, vitamin and/or mineral supplementation, and sources of information about infant feeding were analyzed using content analysis (152).

Analysis of Feeding Belief Questionnaire

For the responses of Anglo American and Asian Indian American mothers to each belief statement, SAS PROC FREQ and PROC MEANS (150) were used to compute the frequencies and arithmetic averages of the scores. Following this, PROC TTEST was used to test for statistically significant ($P \leq 0.05$) difference in the mean belief scores between the two groups of mothers.

Responses of Anglo American ($n = 190$), Asian Indian American ($n = 190$), and Asian Indian mothers ($n = 150$) living in Knoxville, Tennessee and Coimbatore, India were analyzed similar to 50 mothers in this study. Results are given in Appendix XVII.

Dietary Data

The 24 hour recalls were coded and analyzed using Nutritionist IV (version 3.5.2, 153). This was used to compute the nutrient intake of Anglo American and Asian Indian American infants at one, three, six, nine, and 12 months. In addition to using Nutritionist IV (153), suitable ethnic substitutions from a ethnic food data base were made for Asian Indian American infants. If a particular food was not listed on the ethnic food data base, then an updated version of the Nutritive Value of Indian Foods published by National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India (154) was used as the source. Indian cookbooks were used as additional sources of reference for Asian Indian American infants' food intake. These foods were then added to the existing Nutritionist IV ethnic food data base.

Nutrient intakes were calculated from 24 hour recall data collected at 1, 3, 6, 9, and 12 months. Mean nutrient intakes for infants in both groups were calculated for each time period. These mean amounts for the age of infants (birth to 0.5 months and 0.5 to 12 months) were compared to the Recommended Dietary Allowances for that age.

Anthropometric Data

At each interview, three measurements for weight, height and head circumference were averaged to give a single number for each data point. Group means were calculated from individual data points. Mean growth curves for infants' ages (months) were developed. In addition, absolute increments in weight, height, and head circumference were calculated from birth to one year of age for both groups of infants (155). The rate of gain was considered as important as absolute gains. Body mass index was calculated using $\text{wt/kg/ht}^2/\text{cm}$ (38).

CHAPTER IV

RESULTS AND DISCUSSION

Sociodemographic and Ethnic Profile of Anglo American and Asian Indian American Parents

Demographic and socioeconomic status of Anglo Americans and Asian Indian Americans are presented in Table 3. Ages of Anglo American mothers ranged from 24 to 33 years; ages of Asian Indian American mothers ranged from 24 to 32 years. The mean age of Anglo American mothers was 28.3 ± 2.5 years and 28.5 ± 2.3 years for Asian Indian American mothers ($P \leq .05$, NS). Fourteen Anglo American mothers compared to eight Asian Indian American mothers held a baccalaureate degree. In addition, more Anglo American mothers compared to Asian Indian American mothers had advanced degrees.

Over 50% of fathers in both the groups had baccalaureate degrees (Table 3). About 40% of Anglo American fathers compared to 24% of Asian Indian American fathers had advanced degrees. In terms of socioeconomic status indicators, most of the fathers in both groups held professional and/or technical positions. Five Asian Indian American mothers were employed full-time and nine mothers were working part-time; eight and 12 Anglo American mothers were employed full-time and part-time, respectively.

Table 3

Demographic and socioeconomic status of Anglo Americans (AA)^a and Asian Indian Americans (AIA)^a

Characteristics	AA	AIA
Mother's Age (in years)		
24	3	1
25	3	2
26	4	3
27	2	4
28	2	1
29	2	3
30	3	6
31	2	3
32	2	2
33	2	0
Mother's Education		
Some college	4	10
Bachelor's degree	14	8
Master's degree	6	4
Doctorate degree	1	3
Father's Education		
Some college	---	3
Bachelor's degree	14	16
Master's degree	9	4
Doctorate degree	2	2
Socioeconomic status^b		
Major business, professional	14	11
Professional, technical	10	12
Skilled craftsmen, clerical, sales	1	2

^a=Number of mothers (AA=25; AIA=25).

^b=Socioeconomic status was determined using Hollingshead Four Factor Index of Social Status (1976).

The length of residence of Asian Indian American mothers in the United States ranged from two to seven years, with a mean duration of 4.7 ± 2.2 years. In the first six months of the infant's life, 14 out of 25 Asian Indian American infants' maternal grandmother was living with the infants' parents. In contrast, only four Anglo American infants' grandmother lived with the infants' parents. The predominant language spoken at home by nine Asian Indian Americans was the national language of their country of origin, ie. Hindi. Five out of 25 Asian Indian Americans spoke Gujarati. An equal number ($n=5$) spoke English at home. Other commonly spoken languages included: Tamil, Telugu, Marathi and Malayalam.

Cultural Differences In Infant Feeding Practices of Anglo Americans and Asian Indian Americans

Ethnic Trend in Incidence of Breast-feeding

All Anglo American mothers were breast-feeding immediately after the baby was born (Table 4). In contrast, 19 Asian Indian American mothers breast-fed immediately after the baby was born.

No Anglo American mother gave pre-lacteal feeds to her baby. Asian Indian American mothers who did not feed colostrum ($n=6$) gave pre-lacteal feeds to their baby. Reasons reported by Asian Indian American mothers for offering pre-lacteal feeds included "prevents colds in the infant" ($n=4$), "makes the infant healthy" ($n=5$), "helps in the flow of urine" ($n=6$), "makes the infant strong" ($n=6$), "is a

Table 4

Ethnic trend in incidence of breast-feeding: Anglo American (AA)^a vs Asian Indian American (AIA)^a mothers

Age of the infant (in months)	AA mothers ^b	AIA mothers ^b
At birth [*]	25	19 ^c
One	25	25
Three	25	22
Six [*]	21	10
Nine [*]	12	4
Twelve [*]	7	0

^a=Number of mothers (AA=25; AIA=25).

^b=Number of AA and AIA mothers breast-feeding at birth and by infant age.

^c=Six mothers did not breast-feed immediately after birth of the infant and fed pre-lacteal feeds before initiating breast-feeding.

^{*}=Significant difference ($P \leq .05$) in the number of Anglo American and Asian Indian American mothers breast-feeding.

substitute for breast-milk" (n=4), "mother/mother-in-law/sister-in-law's advice" (n=6), and "friends and family members living in India do the same" (n=6).

WHO/UNICEF (156) sponsored "Baby Friendly Hospital Initiative" recommends that newborn infants not be given any food or drink other than breast-milk unless medically indicated. However, pre-lacteal feeding practices are reported by mothers in the Indian subcontinent. According to Wijga et al (157), colostrum substitutes, like oil and butter that have a purgative action, have been fed to infants. Other investigators have reported that plain water, diluted animal milk or water sweetened with sugar, honey, glucose or jaggery, a herbal concoction "Janam Ghutti", and "gripe water" were fed to Asian Indian infants by mothers in India. (158-168).

A similar ethnic influence on pre-lacteal feeding practices has been reported in Mexican American mothers by Kokinos and Dewey (29). They found that Mexican American mothers in their study were feeding herbal tea, formula or glucose water to their infant following birth and before initiating breast-feeding. Similar findings have been reported in studies of breast-feeding practices of Asian Indian mothers living in India (158,167).

International and national organizations recommend that mothers initiate breast-feeding within a half hour of birth (156,169). This recommendation is based on the nutrient and immunological properties of colostrum. Colostrum is a source of digestive nutrients and anti-infective factors that contribute to the development of the neonate's immune system (170-172). However, Asian Indian mothers living in India

reportedly do not feed colostrum to their infants (165-168,173-181). Asian Indian American mothers in this study who did not feed colostrum gave the following reasons: "not good for the infant's health" (n=3), "causes diarrhea" (n=4), "is traditional to do so" (n=8), "not suitable for the infant's stomach" (n=2), "causes indigestion" (n=3), and "friends in India do the same" (n=5).

Ethnic Trend in Incidence of Breast-feeding at One, Three, Six, Nine and 12 Months

As shown in Table 4, there was a significant difference ($P \leq 0.05$) between groups at birth, six, nine, and 12 months in the incidence of breast-feeding. However, at one to three months of age, there was no significant ($P \leq 0.05$) difference in the incidence of breast-feeding between Anglo American and Asian Indian American mothers. When the babies were 12 months of age, no Asian Indian American mother was breast-feeding; about 28% of the Anglo American sample was still breast-feeding when the infants were one year old. Among Anglo American mothers, the maximum decrease in the incidence of breast-feeding occurred between six and nine months compared to the decrease in the incidence of breast-feeding among Asian Indian American mothers that occurred between three and six months.

The findings in this study that Anglo American mothers have a higher incidence of breast-feeding compared to mothers in other ethnic groups in the United States is consistent with the literature (5,15,16,21,23,29,31,32,61,68). Southeast Asian American mothers reportedly have a lower incidence of breast-feeding

compared to that of Anglo American mothers (52,60,67,74).

Ethnic Trend in Duration of Breast-feeding

Anglo American mothers in this study breast-fed their babies for a mean duration of 7.6 ± 2.2 months compared to a mean duration of 4.3 ± 1.7 months for Asian Indian American mothers. Duration of breast-feeding was significantly ($P \leq 0.05$) greater among Anglo American mothers compared to Asian Indian American mothers.

Reasons given by the Anglo American mothers for ceasing to breast-feed included infant-centered-reasons: "baby is growing", "baby is not gaining weight", "baby seems to feel hungry", "baby accepts bottle", "baby needs variety in the diet", and "weight loss in the baby". Other mother-centered-reasons include: "have to return to job", "time management", "convenience", and "pain in breast".

With regard to the duration of breast-feeding among Anglo American mothers, 21 mothers in this study were meeting the recommendations of the American Academy of Pediatrics (1980) to breast feed for the first four to six months of life. On the other hand, only 10 Asian Indian American mothers met these recommendations.

These results are in agreement with the findings of other investigators who have found that Anglo American mothers breast-fed their babies for a longer duration compared to mothers in other ethnic groups (5,13,23,24,29,30,32,73).

Ethnic Trend in Introduction of Formula in the Infants' Diets

When formula was introduced, the mean age of Anglo American infants was 3.2 ± 1.3 months compared with the mean age of 2.8 ± 1.5 months for Asian Indian American infants. Asian Indian American infants were significantly ($P \leq 0.05$) younger when formula was introduced compared to the age of Anglo American infants. By three months of age, approximately 21 of the Asian Indian American infants were already receiving formula compared to 11 Anglo American infants receiving formula at the same age (Table 5).

By the age of four months, one-fifth of the sample of Anglo American mothers had introduced formula to the infants' diets; all Asian Indian American mothers had introduced formula by four months. This ethnic trend in the introduction of formula by Mexican American mothers has been documented by Kokinos and Dewey (29). In a study by Wright et al (30), Mexican American mothers introduced formula at an earlier age (2.6 months) than Anglo American mothers (3.3 months). Parraga et al (13) also reported that by three weeks of age, 58% of African American mothers had introduced formula to the infant's diet. Other researchers have reported findings that Anglo American mothers tend to delay the introduction of formula compared to mothers in other ethnic groups (5,13,23-24,29,32,73).)

Table 5

Ethnic trend in introduction of formula: Anglo American^a (AA) vs
Asian Indian American^a (AIA) mothers

Age of the infant (in months)	AA ^b mothers	AIA ^b mothers
1.0	1	3
1.5	2	5
2.0*	3	8
2.5	3	3
3.0	2	2
3.5*	9	4
4.0*	5	0

^a=Number of mothers (AA=25; AIA=25).

^b=Number of AA and AIA mothers introducing formula by infant age.

*=Significant difference in the number of AA and AIA mothers introducing formula.

The types of formula commonly used by Anglo American and Asian Indian American mothers in this study were ready to feed and/or concentrated liquid. There was no difference ($P \leq .05$) between Anglo American and Asian Indian American mothers in the type/brand name of formula used. Similac with iron and Enfamil with iron were the most common types of formula used by mothers in both groups.

At six and nine months, there was a difference ($P \leq .05$) between Anglo American and Asian Indian American mothers in the amount of formula fed to their infants. The average amount of formula reportedly fed per day by Asian Indian American mothers (40 ounces) was higher than the average amount of formula provided to the Anglo American infant (32 ounces). According to health professionals and pediatric experts, 32 ounces of formula exceeds 100 per cent of the Recommended Dietary Allowances (38). At 12 months of age, there was no difference ($P \leq .05$) in the amount of formula fed by mothers in each of these two ethnic groups.

Ethnic Trend in Introduction of Solid Foods in the Infants' Diets

When solid foods were introduced in the diets, a significant ($P \leq .05$) difference was found in the mean age of the Anglo American (4.2 ± 1.5 months) and Asian Indian American infants (3.1 ± 1.3 months). At three and four months, there was a significant difference in the number of Anglo American mothers and Asian Indian American mothers who introduced solid foods (Table 6). Between the ages

Table 6

Ethnic trend in introduction of solid foods: Anglo American^a (AA) vs Asian Indian American^a mothers (AIA)

Age of the infant (in months)	AA ^b mothers	AIA ^b mothers
One	0	1
Two	1	3
Three [*]	3	15
Four [*]	16	4
Five	3	3
Six	2	0

^a=Number of mothers (AA=25; AIA=25).

^b=Number of AA and AIA mothers introducing solid foods by infant age.

^{*}=Significant difference ($P \leq .05$) in the number of Anglo American and Asian Indian American mothers introducing solid foods.

of one and three months, 19 Asian Indian American mothers compared to four Anglo American mothers had introduced solid foods to the infants' diets.

The American Academy of Pediatrics (81) and WHO (172) recommend that solid foods be introduced to the diet between the ages of four and six months. These findings that Asian Indian American mothers introduced solid foods before four months are similar to reports for mothers in other ethnic groups. According to several researchers, African American and Mexican American mothers were less likely to comply with American Academy of Pediatrics recommendations for introduction of solid foods (5,13,29,30,32).

Cereal. There was a significant difference ($P \leq .05$) in the mean ages of Anglo American (4.2 ± 1.2 months) and Asian Indian American (3.1 ± 1.0 months) infants when cereal was introduced. Asian Indian American mothers introduced cereal in the infant's diet at an earlier age than Anglo American mothers. In the first six months, rice cereal followed by oatmeal and mixed cereal were most commonly used by Anglo American mothers. Although Asian Indian American mothers used rice cereal followed by mixed cereal in the first six months, they did not use oatmeal. The remaining number ($n=9$) of Asian Indian American mothers introduced rice and lentil-based-food as the first solid food in the infant's diet.

Juice. There was a significant ($P < 0.05$) difference between the two groups of infants in the mean age when juice was introduced, ie. a mean age of 2.3 ± 1.1 months for Asian Indian American infants compared to 3.6 ± 1.4 months for Anglo American infants. Apple juice was the most popular kind of juice given to Anglo American and Asian Indian American infants. A greater number of Asian Indian American mothers versus Anglo American mothers put their babies to bed with juice in the bottle. A similar observation among Mexican American mothers has been reported by O'Malley et al (32). A great majority of mothers in their study put their infants to bed with a bottle containing fruit juice and non-fruit juice beverages. Soda, cola, and a traditional drink "Atole" also were given in a bottle at bedtime.

Vegetables. There was a significant difference ($P \leq .05$) in the mean age of infants when Anglo American and Asian Indian American mothers first added vegetables to the diet. The average Asian Indian American infant was 3.6 ± 1.5 months old compared to 5.3 ± 1.7 months for Anglo American infants when vegetables were introduced in the diet. By the age of six months, all Asian Indian American infants were receiving vegetables, whereas only 20 Anglo American infants were fed vegetables by that age. The remaining ($n=5$) Anglo American mothers tended to delay the introduction of vegetables until seven months. A similar ethnic trend in the introduction of vegetables in the infant's diet has been reported in Mexican American (5,32) and African American mothers (13).

Fruits. Fruits were introduced in the Anglo American and Asian Indian American infants' diets at the mean ages of 4.6 ± 2.0 months and 3.1 ± 1.4 months, respectively. There was a significant ($P < 0.05$) difference in the mean ages when fruit was introduced to the infants' diets. By the age of 5.5 months, all Asian Indian American infants were receiving fruits. At the same age, 20 Anglo American mothers had introduced fruits. The remaining ($n=5$) Anglo American mothers delayed the introduction of fruits until six months. Similar findings have been reported for African American and Mexican American mothers (13,29,32).

Meat. In this study, the average age of Anglo American infants was 7.2 ± 1.7 months compared to 6.3 ± 2.2 months for Asian Indian American infants ($P \leq .05$). According to Parraga et al (13), African American mothers were adding meat to the infants' diets at three months of age.

Cultural Differences in Mothers' Sources of Information and Beliefs about Infant Feeding

Ethnic Trend in Sources of Information about Infant Feeding

For Anglo American mothers, pediatricians were the primary sources of information about infant feeding, when their infants were 1-6 months old (Figure 2). The maternal/paternal grandmother was the major source of information

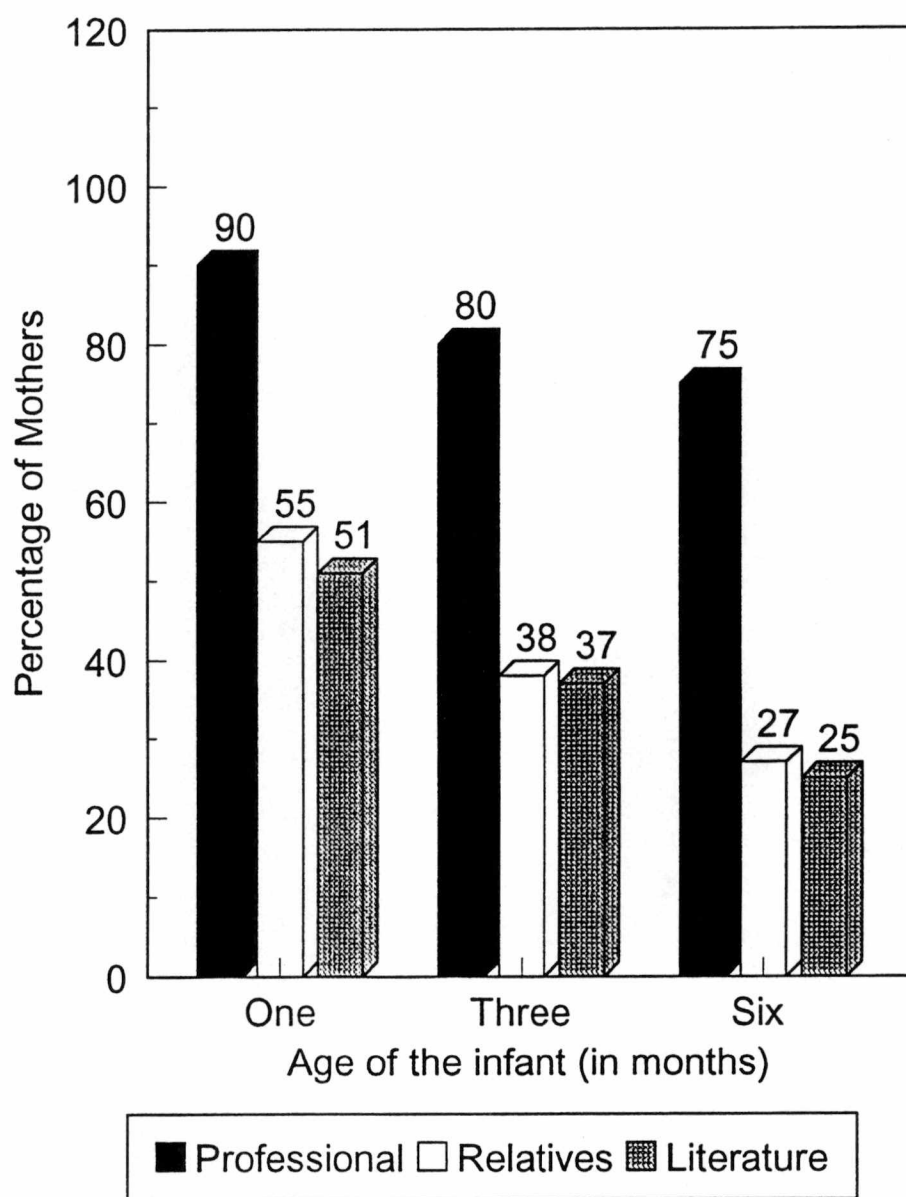


FIG 2. Sources of Information used by Anglo American Mothers

about infant feeding for Asian Indian American mothers when their infants were one and three months old (Figure 3). When Asian Indian American infants were six months old, reading materials and physicians were reported by mothers (40%) as secondary sources of information. Television, media, and relatives were cited as secondary sources of information by 20% of Asian Indian American mothers.

During the first six months, family members were secondary sources of information for Anglo American mothers. Among family members, the infant's father was the primary feeding advisor followed by the maternal/paternal grandmother of the infant. In contrast, for Asian Indian American mothers, the maternal or paternal grandmother of the infant was the primary infant feeding advisor. Sister/sister-in-law was the second most important source of information for Asian Indian American mothers. In summary in the first six months, Anglo American mothers relied primarily on health professionals for information about feeding their infants. Asian Indian American mothers sought information primarily from family network and secondarily from health professionals and literature.

In the second six months, Anglo American mothers continued to seek information about infant feeding practices primarily from health professionals. These mothers used reading materials and information from family members and peers as supplementary sources. In the second six months, Asian Indian American mothers sought information primarily from health care professionals and used information from personal network (relatives and/or friends) as secondary sources. During the same period, reading materials were used by a few Asian Indian American mothers

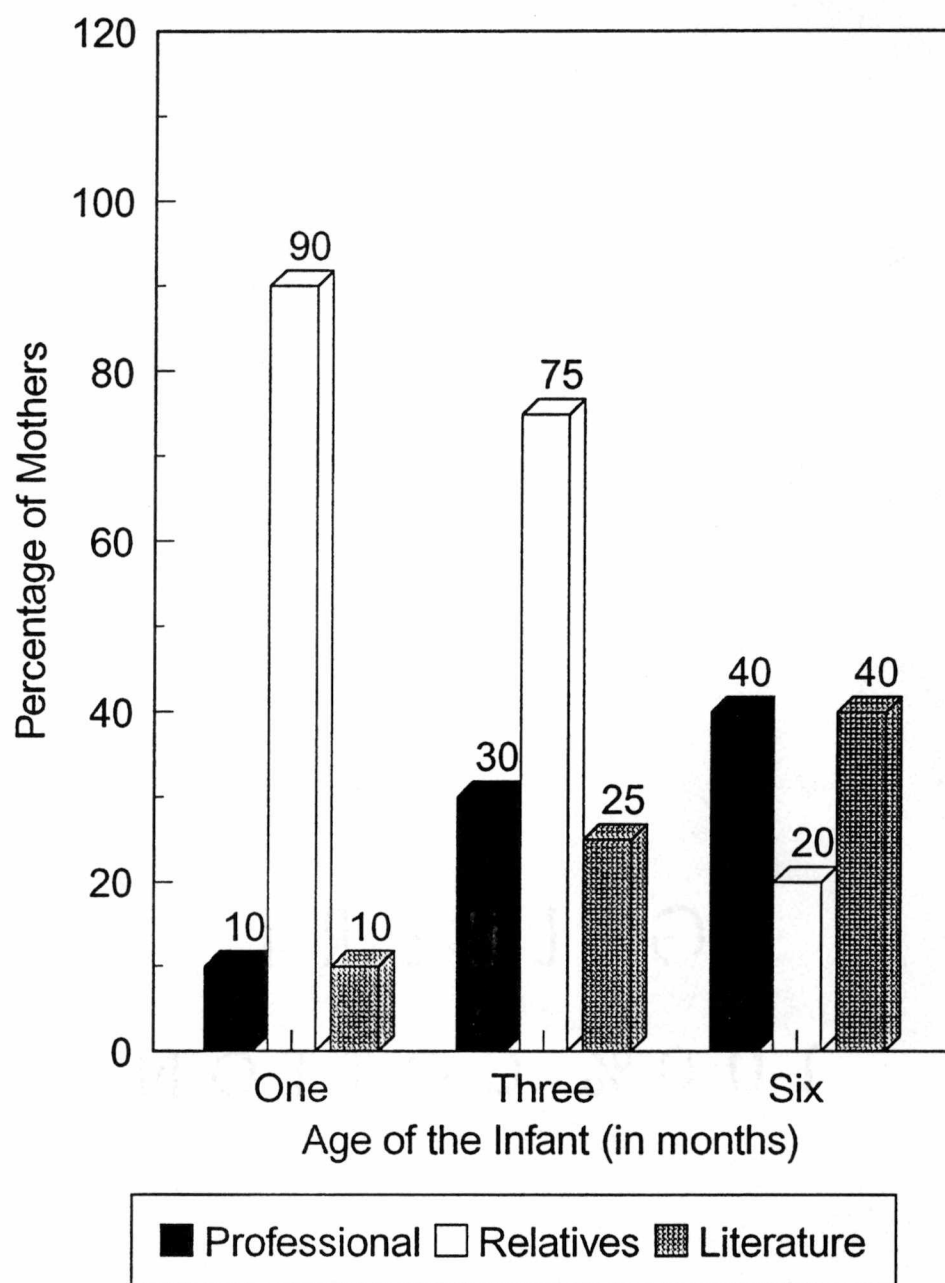


FIG 3. Sources of Information Used by Asian Indian American Mothers

(n=10). These results for Asian Indian American mothers may reflect the maternal grandmother's visiting period. That is, based on immigration rules, the time period of the grandmother's visit is usually limited to six months. Thus, whether the grandmother visits the first or second six months of the infant's life may determine the primary source of information reported by Asian Indian American mothers in this study.

Anglo American and Asian Indian American mothers reportedly sought information about the following topics from health professionals: positioning the baby during breast-feeding, frequency of feeds per day, preparation of formula, sequence in which solid foods are introduced, and use of special diets and vitamin and/or mineral supplementation. These results are consistent with the findings of Kleingbeil (86) and McKim (93), respectively. Anglo American mothers in their studies sought information from health professionals about the kinds of solid food and age of infant when solid foods were added to the diet. Mothers reported supplementing this information with advice from friends. A similar ethnic trend in the kinds of information sought by Mexican American mothers has been reported by Kokinos and Dewey (29) who found that mothers sought advice on bottle-feeding from a health professional. Similarly, African American mothers received information about the sequence of introduction of weaning foods from a health care professional (13). In this study, Asian Indian American mothers sought information from the maternal grandmother about colostrum and pre-lacteal feeding, feeding cow's milk and preparation of homemade baby foods.

A few (n=5) Anglo American mothers used toll-free numbers as additional information sources in the second six months. Toll-free numbers of commercial baby food manufacturers were used by these mothers for information about the sequence of introducing supplemental foods.

Ethnic Trend in Infant Feeding Beliefs

Of the nineteen belief statements on the FBQ (Appendix II), there was a significant difference ($P \leq .05$) in the mean scores of Anglo American and Asian Indian American mothers for 14 belief statements (Table 7). There was a significant difference ($P \leq .05$) in cultural beliefs involving: pre-lacteal feeds, feeding the infant during illness and convalescence, association of infant feeding and physiological maturity, and relationship between infant feeding and sleep patterns. Pre-lacteal feeding beliefs of Asian Indian American mothers do not reflect current recommendations that newborn infants not be given any food or drink other than breast-milk unless medically indicated (156). A similar belief in pre-lacteal feeds has been reported in Mexican American mothers (52). Asian Indian American mothers in this study believed that mothers should not breast-feed when the baby has diarrhea. A similar belief has been reported by Haitian mothers (116). Asian Indian American mothers also believed in the pacifying effects of bottle feeding. Desantis (72) reported that Haitian American mothers held the same belief. Sugar containing foods including human milk, infant formula, and beverages that remain in contact with the

Table 7

Ethnic trend in feeding beliefs: Anglo American (AA)^a vs Asian Indian American^a mothers (AIA)

Statement	Mean Score ^b		
	AA	AIA	P
Giving sugar water within the first 24 hours makes the baby healthy ^c	4.0	1.8	*
Giving glucose water within the first 24 hours helps in the flow of urine ^c	4.0	2.0	*
The baby must be breast-fed on demand ^d	3.8	3.0	
Solid foods, if introduced before six months causes liver disease ^c	4.0	1.2	*
Feeding lentils before four months results in diarrhea ^c	2.2	2.9	
Feeding fruit juices before four months causes cold ^c	3.0	1.6	*
Giving non-breast-milk-liquids within the first 24 hours helps in teething ^c	3.8	1.4	*
Feeding diluted milk prevents gastrointestinal disturbance ^c	3.6	1.2	*
Feeding whole milk before one year causes indigestion ^c	3.5	3.0	
When the baby is sick, foods must be cooked specially ^c	2.9	2.0	*
Breast-milk should be offered when the baby has diarrhea ^d	3.7	2.2	*
Breast-milk should be offered when the baby is sick ^d	3.5	2.6	
Foods given to the baby before six months need to be strained ^c	3.7	2.0	*

Table 7 (continued)

Statement	Mean Score ^b		
	AA	AIA	P
Baby should not take bottle to bed ^d	3.6	1.5	*
Adding cereal to bottle helps the baby sleep through the night ^e	3.2	1.9	*
When recovering from illness, the baby needs twice as much the usual amount of food ^c	3.0	2.3	*
Adding sugar to the baby's bottle makes the baby sleep better ^e	3.6	2.4	*
Adding sugar to water prevents colic ^c	3.8	2.4	*
Diluting soda or cola before feeding removes gas ^c	3.1	2.7	

^a=Number of mothers (AA=25; AIA=25).

^b=Mean $\pm$ standard deviation; scores ranged from 0-4.

^c=15 statements were coded 4 for strongly disagree.

^d=Four statements were coded 4 for strongly agree.

*=Significant difference ($P \leq .05$) in the mean scores between AA and AIA mothers.

baby's teeth promotes tooth decay (182).

Anglo American mothers strongly believed that foods given to the baby before six months needed to be strained. Anglo American mothers in another study believed in the modification of food texture for babies in the first six months of life (18). Fewer Asian Indian American mothers compared to Anglo American mothers believed in the modification of food textures when feeding an infant less than six months of age.

Thus, it is evident that Anglo American and Asian Indian American mothers differed significantly in their cultural beliefs involving infant feeding and infant health/wellness. This is further supported by results of pilot testing the FBQ (Appendix XV). In comparing infant feeding beliefs of Anglo American ($n=190$), Asian Indian American ($n=190$) mothers living in Knoxville, Tennessee with the beliefs of Asian Indian mothers ($n=150$) living in India, it was found that mothers' responses to feeding belief statements related to the length of residence in the United States ($P \leq .05$). The longer Asian Indian American mothers lived in the United States, the more similar their responses were to that of Anglo American mothers and less similar to Asian Indian mothers living in India. Because of small sample size, these analyses were not done for the 50 mothers in this study. If Asian Indian American mothers living in the United States translate their cultural beliefs into practice, it could have a deleterious impact on the infant's health (156,169,182).

Cultural Differences in Nutrient Intake and Growth Patterns of Anglo American and Asian Indian American Infants

Ethnic Trend in Nutrient Intake of Infants at Six and from 6-12 Months

Ethnic Trend in Nutrient Intake of Infants at Six Months: Anglo American vs Asian Indian American Infants. Table 8 describes the RDA for infants in the United States and in the Indian sub-continent. At six months, the nutrient intakes of Anglo American and Asian Indian American infants exceeded 100% of the RDA (Table 9). For both groups, intakes exceeded 200% of the RDA for iron, vitamin A, and vitamin C.

When infants were six months old, the average calorie and fat intake of Asian Indian American infants was significantly ($P \leq .05$) higher than the average intake of these nutrients for Anglo American infants. Examples of foods fed to Asian Indian American infants that were a major source of fat included cooked rice and lentils mixed with clarified butter. In interpreting this difference in energy and fat intake between these two groups of infants, it is significant to note that this dietary data were obtained using 24 hour recall method. Researchers have shown that this process of obtaining nutrient intake information is likely to be influenced by individual day-to-day variation (183). This difference in energy and fat intake is subject to variability due to individual variations in appetite, physical activity, and growth rate.

Table 8**Recommended Dietary Allowances^a (RDA) for infants in the United States and for infants in the Indian subcontinent^b**

Energy/Nutrient	RDA for US Infants		RDA for Infants in India	
	0-0.5 years	0.5 years - one year	0 - 0.5 years	0.5 years - one year
Energy (Kcal)	650	800	637	929
Fat (gm) ^c	—	—	—	—
Protein (gm)	13	14	11.1	14.2
Carbohydrate (gm) ^c	—	—	—	—
Calcium (mg)	400	600	500	500
Iron(mg)	6	10	— ^d	— ^d
Vitamin A (IU) ^e	1238	1238	— ^d	— ^d
Vitamin C (mg)	30	35	25	25

^a=Food and Nutrition Board. Recommended Dietary Allowances (10th ed.). Washington DC: National Academy of Sciences. 1989.

^b=Recommended Dietary Allowances for Asian Indians; Nutrition Advisory Committee, Indian Council of Medical Research Expert Committee, 1988, Hyderabad, India.

^c=Recommended Dietary Allowances for these nutrients have not been established.

^d=Recommended dietary intakes for these nutrients have not been established for infants in India.

^e=To convert International Units to Retinol Equivalent, divide by 3.3

Table 9

Ethnic trend in nutrient intakes and adequacy of infants' diets at six months: Anglo American (AA)^a vs Asian Indian American (AIA)^a infants

Energy/Nutrient	AA infants		AIA infants	
	Mean $\pm$ SD ^b	% RDA ^c	Mean $\pm$ SD ^b	%RDA ^c
Energy (Kcal) [*]	889 $\pm$ 203	111	1001 $\pm$ 30	124
Protein (gm)	19.5 $\pm$ 8.2	150	14 $\pm$ 6.5	110
Carbohydrate (gm) ^d	127 $\pm$ 48	—	130 $\pm$ 54	—
Fat (gm) ^{d,*}	34.5 $\pm$ 11.0	—	43 $\pm$ 7	—
Calcium (mg) [*]	581 $\pm$ 186	145	524 $\pm$ 7	131
Iron (mg)	19 $\pm$ 9	316	17 $\pm$ 13	283
Vitamin A(IU) ^e	3885 $\pm$ 2167	313	4014 $\pm$ 2050	324
Vitamin C(mg) [*]	137 $\pm$ 95	457	190 $\pm$ 108	633

^a=Number of infants (AA=25; AIA=25).

^b=Standard deviation.

^c=Recommended Dietary Allowances (NRC,1989).

^d=Recommended dietary intakes for these nutrients have not been established.

^e=To convert International Units to Retinol Equivalent, divide by 3.3.

^{*}=Significant difference ($P \leq .05$) in the nutrient intake between the two groups of infants.

At six months, there was no significant ($P \leq .05$) difference in the average protein and carbohydrate intake between the two groups of infants. Major sources of protein in the diets of Anglo American infants were formula and other baby foods. In the diets of Asian Indian American infants, the contributors of dietary protein were traditional foods like "lentil-based-homemade infant weaning foods".

The average intake of calcium in Anglo American infants was significantly different ($P \leq .05$) from the intake of Asian Indian American infants. In the first six months, dry cereals supplemented with calcium contributed to increased adequacy of this nutrient in the diets. Based on the Gerber Infant Nutrition Survey, Purvis and Bartholmey (183) reported similar findings.

Anglo American and Asian Indian American infants' average iron intakes did not differ significantly. Infants in both the groups were receiving iron-fortified infant cereals and iron-fortified formulas. This may explain the amount of intake of this nutrient in both groups of infants (exceeded 300% and 200% of the RDA for Anglo American and Asian Indian American infants, respectively).

The diets of Anglo American and Asian Indian American infants were abundant in vitamin A and were not significantly ($P \leq .05$) different. In the first six months of life, consumption of breast milk and infant formula have been reported to meet 100% of the RDA for this vitamin (183). Additionally, mothers in this study had introduced vegetables before the age of six months. This could have provided vitamin A intakes that exceeded 100% of the RDA at six months. -

The intake of vitamin C was significantly ($P \leq .05$) higher in Asian Indian American infants compared to the intakes of Anglo American infants. Throughout the first six months, breast milk, infant formula, and vitamin C fortified fruit juices contributed to the dietary adequacy of this vitamin. Asian Indian American infants consumed greater quantities of fruit juice than Anglo American infants. This probably led to the significant ($P \leq .05$) difference in the vitamin C intake between the two groups of infants. Before the age of four months, fruit juice was introduced in the diets of both Anglo American and Asian Indian American infants.

Ethnic Trend in Nutrient Intake of Infants from 6-12 Months: Anglo American vs Asian Indian American Infants. From 6-12 months, the dietary intake of energy, protein, carbohydrate, fat, calcium, iron, vitamin A, and vitamin C of both groups of infants exceeded 100% of the RDA (Table 10). The diets of infants in both these groups exceeded 200% of the RDA for both vitamin A and vitamin C.

Asian Indian American infants' dietary intakes of calorie and fat were significantly ($P \leq .05$) higher than the intakes of energy and fat of Anglo American infants. The traditional methods of preparing infant foods, eg, fried vegetable based curries and baked potato with clarified butter, probably contributed to the higher fat intake in Asian Indian American infants compared to Anglo American infants.

The intake of dietary protein in Anglo American and Asian Indian American infants exceeded 300% of the RDA (Table 10). The 1985 Gerber Infant

Table 10

Ethnic trend in nutrient intakes and adequacy of infants' diets from 6-12 months:
Anglo American (AA)^a vs Asian Indian American (AIA)^a infants

Energy/Nutrient	AA infants		AIA infants	
	Mean±SD ^b	% RDA ^c	Mean±SD ^b	% RDA ^c
Energy (Kcal) [*]	1104±221	117	1200±266	127
Protein (gm)	46±13	350	40±17	302
Carbohydrate (gm) ^d	190±55	—	160±49	—
Fat (gm) ^{d*}	50±19	—	67±25	—
Calcium (mg)	798±23	159	803±138	160
Iron (mg) [*]	16±8	152	12±7	120
Vitamin A(IU) ^e	3900±2735	314	4050±3005	327
Vitamin C(mg)	100±66	285	104±78	297

^a=Number of infants (AA=25; AIA=25)

^b=Standard deviation

^c=Recommended Dietary Allowances (NRC, 1989)

^d=Recommended dietary intakes for these nutrients have not been established

^e=To convert International Units to Retinol Equivalent, multiply by 3.3

^{*}=Significant difference ($P \leq .05$) in the nutrient intake between the two groups of infants

Nutrition Survey data support this finding (183). At 12 months, consumption of cow's milk and increased consumption of table food by infants provided more than 200% of the RDA for protein. "Idli", a traditional fermented food product that is prepared with rice and lentils, was a major source of protein in the diets of Asian Indian American infants. Other sources of protein in the diets of Asian Indian American infants included: cooked lentil, red gram dhal, and green peas.

Dietary calcium intake was equally adequate in the diets of Anglo American and Asian Indian American infants (Table 10). Consumption of dairy products and calcium enriched infant cereals provided adequate amounts of this mineral in the diets of infants at 12 months.

The dietary iron intake was significantly ($P \leq .05$) higher for Anglo American infants compared to Asian Indian American infants. At 12 months of age, Anglo American mothers in this study continued to feed formula and cereal; fewer Asian Indian American mothers were feeding formula and cereals when their infants were one year old. This could have contributed to the difference in the dietary iron intake between the two groups of infants. The substitution of infant formula and infant cereal with cow's milk led to the lower iron intake in Asian Indian American infants. In addition, the feeding of traditional homemade infant foods that are poor dietary sources of iron, eg, rice, may have led to this difference in the dietary intake between the two groups of infants.

There was no significant ($P \leq .05$) difference in the vitamin A intake of Anglo American and Asian Indian American infants. Throughout the second six

months, consumption of table foods, including vegetables and fruits, was instrumental in meeting more than adequate amounts of this vitamin (Table 10).

There was no significant ($P \leq .05$) difference in the dietary intake of vitamin C in Anglo American and Asian Indian American infants. Anglo American and Asian Indian American infants' intake of vitamin C exceeded 300% of the RDA. Findings from the Gerber Infant Nutrition Survey (126) indicate that throughout the second six months of life, baby foods and table foods provided abundant amounts of vitamin C. Only 8% of Anglo American infants in this nationwide infant nutrition survey were receiving less than the RDA for vitamin C. Findings of this study are consistent with findings of Gerber Infant Nutrition Survey (126) that the diets of infants 12 months of age are abundant in vitamin C.

These results indicate that in the first and second six months, the diets of Anglo American and Asian Indian American infants in this study exceeded 100% of the RDA. Throughout the first 12 months, Asian Indian American infants had a significantly higher intake of calories and fat ($P \leq .05$) than Anglo American infants. Both groups exceeded 35% of their calories from fat, eg, 46% of Asian Indian Americans and 39% of Anglo American infants. In addition, Asian Indian American mothers breast-fed for 4.3 ± 1.5 months and solid foods were introduced at 3.1 ± 1.3 months. These findings have implications for growth and development, eg, obesity.

Ethnic Trend in Growth Patterns of Infants

Ethnic Trend in Weight of Infants at Birth and at One, Three, Six, Nine, and 12 Months. Table 11 compares the mean weights of Anglo American and Asian Indian American infants in the first year of life. Throughout the first 12 months, the mean weights of infants in both the groups were well above the 25th NCHS percentile (155). There was no significant difference at birth, one, three, and six months.

However, at nine and 12 months, there was a significant ($P \leq .05$) difference in the mean weights of Anglo American and Asian Indian American infants, respectively. At nine months, the mean weight of Anglo American infants was at the 50th percentile; the mean weight of Asian Indian American infants was at the 67th percentile. When the infants were one year of age, the mean weight of Anglo American infants was at the 50th percentile; Asian Indian American infants' mean weight was at the 65th percentile.

In summary, differences in weights between the two groups of infants were more pronounced at nine and 12 months than at any other period in the first year of life. At the above ages, Asian Indian American infants were heavier than Anglo American infants. This difference in weights between the two groups infants probably reflects the significantly ($P \leq .05$) higher energy and fat intake of Asian Indian American infants.

Table 11

Ethnic trend in mean weight of infants at birth, and at one, three, six, nine, and 12 months: Anglo Americans (AA)^a vs Asian Indian Americans^a

Age of the infant (in months)	AA infants	AIA infants
	Weight (lbs) Mean $\pm$ SD ^b	Mean $\pm$ SD ^b
Birth	7.78 $\pm$ 0.70	7.78 $\pm$ 0.42
One	8.80 $\pm$ 0.62	8.86 $\pm$ 0.73
Three	13.20 $\pm$ 0.85	13.47 $\pm$ 0.91
Six	17.3 $\pm$ 0.91	17.6 $\pm$ 0.88
Nine [*]	20.12 $\pm$ 0.77	21.74 $\pm$ 0.83
Twelve [*]	22.20 $\pm$ 0.65	23.40 $\pm$ 0.54

a=Number of infants (AA=25; AIA=25)

b=Standard deviation

c=AA infants included 10 males and 15 females

d=AIA infants included 8 males and 17 females

^{*}=Significant difference ($P \leq .05$) in weight between the two groups of infants

Ethnic Trend in Lengths of Infants at Birth and at One, Three, Six, Nine, and 12 Months: Anglo Americans vs Asian Indian Americans. Table 12 depicts the mean lengths of Anglo American and Asian Indian American infants at birth and at one, three, six, nine, and 12 months. Throughout the first year of life, the average lengths of the infants in both groups were above the 25th NCHS percentile (155).

There was no significant difference ($P \leq .05$) between groups at birth, 1, 3, 6, and 12 months. However, at nine months, there was a significant difference ($P \leq .05$) in the mean lengths of Anglo American and Asian Indian American infants; Anglo American infants were longer than AIA infants. However, at nine months, AA infants weighed less than AIA infants. In summary, the period of significant difference in the mean lengths between the two groups of infants, ie. at nine months, coincides with the age of the infants when a significant ($P \leq .05$) difference in the mean weights occurred (Table 11).

Ethnic Trend in Head Circumference of Infants at Birth, and at One, Three, Six, Nine, and 12 Months: Anglo American vs Asian Indian American Infants. Table 13 compares the average head circumference of Anglo American and Asian Indian American infants at birth, and at one, three, six, nine, and 12 months. Throughout the first 12 months of life, the average head circumferences of these two groups of infants were above the 25th NCHS percentile (155). Throughout the first year of life, there was no significant ($P \leq .05$) difference in the mean head circumferences of these two groups of infants.

Table 12

Ethnic trend in mean length of infants at birth and at one, three, six, nine, and 12 months: Anglo Americans (AA)^a vs Asian Indian Americans (AIA)^a

Age of the infant (in months)	AA infants	AIA infants
	Height (inches)	
	Mean±SD ^b	Mean±SD ^b
Birth	19.60±1.3	19.63±1.1
One	21.52±1.0	21.54±1.2
Three	24.05±1.0	23.6±1.2
Six	26.58±1.1	27.5±0.9
Nine ^c	29.46±1.0	27.3±0.9
Twelve	30.03±1.2	29.13±0.8

^a=Number of infants (AA=25; AIA=25).

^b=Standard deviation.

^c=AA infants included 10 males and 15 females.

^d=AIA infants included 8 males and 17 females.

^{*}=Significant difference ($P \leq .05$) in length between the two groups of infants.

Table 13

Ethnic trend in mean head circumference of infants at birth and at one, three, six, nine, and 12 months: Anglo Americans (AA)^a vs Asian Indian Americans (AIA)^a

Age of the infant (in months)	AA infants	AIA infants
	Head Circumference (inches)	
	Mean±SD ^b	Mean±SD ^b
Birth	14.2±0.7	14.4±0.5
One	15.5±0.9	15.7±1.5
Three	16.5±1.2	16.6±1.0
Six	17.6±1.4	17.5±1.2
Nine	18.2±1.2	18.3±0.8
Twelve	18.8±1.3	18.9±1.1

^a=Number of infants (AA=25; AIA=25).

^b=Standard deviation.

c=AA infants included 10 males and 15 females.

d=AA infants included 8 males and 17 females.

Ethnic Trend in Mean Weight, Length and Head Circumference Gains in the First Year of Life. As shown in Table 14, between nine and 12 months, there was a significant ($P \leq .05$) difference between Anglo American and Asian Indian American infants in the mean weight gain (0.5 ± 0.05 lbs vs 1.2 ± 0.1 lbs). Throughout the first year, there was no significant ($P \leq .05$) difference between these two groups of infants in the average length gain or in the head circumference gain. During the first 12 months of life, cumulative weight gain differed significantly ($P \leq .05$) between Anglo American and Asian Indian American infants (12.9 ± 1.7 vs 15.5 ± 1.4 lbs). Cumulative length gain and cumulative head circumference gain did not differ significantly ($P \leq .05$) between the two groups of infants. Throughout the first 12 months, there was no significant difference in the body mass index between the two groups of infants. If a significance level of $P \leq .10$ was used to test mean differences, body mass index was significantly different between the two groups.

Table 14

Ethnic differences in mean weight, length, and head circumference gain from birth to one month^a, one to three months^b, three to six months^c, six to nine months^c, and nine to 12 months: Anglo Americans (AA)^d vs Asian Indian Americans (AIA)^d

Age interval	Weight (lbs) ^e		Length (inches) ^e		Head Circumference (cms) ^e	
	AA	AIA	AA	AIA	AA	AIA
Birth-One	1.0±0.1	1.0±0.3	1.9±0.3	1.9±0.1	0.4±0.1	0.3±0.1
One-Three	1.7±0.3	1.7±0.2	1.3±0.3	1.0±0.3	0.5±0.1	0.5±0.1
Three-Six	1.3±0.3	1.5±0.2	0.9±0.1	0.8±0.1	0.4±0.1	0.3±0.1
Six-Nine	1.0±0.1	1.2±0.2	0.7±0.1	0.5±0.1	0.2±0.1	0.3±0.1
Nine-12	0.5±0.05*	1.2±0.1*	0.3±0.04	0.4±0.02	0.2±0.05	0.2±0.04

^a=Gain for one month interval.

^b=Gain for two month intervals.

^c=Gain for three month intervals.

^d=Number of infants (AA=25; AIA=25).

^e=Mean±standard deviation.

*=Significant difference ($P \leq .05$).

CHAPTER V

SUMMARY AND CONCLUSION

The objective of this study was to compare the infant feeding practices of primiparous, middle income, Anglo American and Asian Indian American mothers residing in Knoxville, Tennessee. This study also compared mothers' sources of information and beliefs about feeding practices as well as the nutrient adequacy of the diets and growth patterns of infants in the two ethnic groups. If differences pertaining to these objectives occurred, the nature and direction of the differences were evaluated.

It was hypothesized that the incidence of breast-feeding following birth and at one, three, six, nine, and 12 months would be higher in Anglo American mothers compared to Asian Indian American mothers; in addition, Anglo American mothers would breast-feed for a longer duration compared to Asian Indian American mothers. Data from this study partially supported these hypotheses. All Anglo American mothers compared to 19 Asian Indian American mothers initiated breast-feeding immediately after the infants were born. At six, nine, and 12 months, there was a significant difference ($P \leq .05$) in the incidence of breast-feeding between the two groups of mothers. Twenty-one and 12 Anglo American mothers compared to 10 and four Asian Indian American mothers, respectively, breast-fed their infants at six and nine months. When the infants were one year old, seven Anglo American mothers

breast-fed their infants; no Asian Indian American mother was breast-feeding at that age. As hypothesized, Anglo American mothers breast-fed for a longer duration (7.6 ± 2.2 months) than Asian Indian American mothers (4.3 ± 1.7 months).

It was hypothesized that Anglo American mothers would introduce formula to the infant's diet at a later age than Asian Indian American mothers did. This led to another hypothesis that Anglo American mothers would introduce solid foods at a later age compared to Asian Indian American mothers. The hypothesis involving formula feeding was supported by the findings of this study. That is, when formula was added to the diet, Anglo American infants were older (3.2 ± 1.3 months) than Asian Indian American infants (2.8 ± 1.5 months).

Data from this study supported the hypothesis involving age of infant when solid foods were introduced. Anglo American infants were older (4.2 ± 1.5 months) compared to Asian Indian American infants (3.1 ± 1.3 months). Asian Indian American mothers introduced cereal, juice, fruits, vegetables, and meat to the infants' diets earlier than the Anglo American mothers.

It was hypothesized that a greater number of Anglo American mothers would use health professionals as their primary source of information about infant feeding compared to Asian Indian American mothers and that Asian Indian American mothers would rely on family network for infant feeding information. The findings both support and negate this hypothesis. Throughout the first year of life of Anglo American infants, mothers relied primarily on health professionals for information about feeding. In contrast, Asian Indian American mothers sought information

primarily from the family network in the first six months and relied more on health professionals in the second six months of the infant's life.

Additionally, it was hypothesized that Anglo American mothers' beliefs with regard to feeding their infants would be different from those of Asian Indian American mothers. There was a significant difference ($P \leq .05$) in the mean scores of Anglo American and Asian Indian American mothers for 14 out of 19 belief statements. The two groups of mothers differed significantly ($P \leq .05$) in cultural beliefs involving: pre-lacteal feeds, infant feeding and health, association of infant feeding and physiological maturity, and relationship between infant feeding and sleep patterns.

It was further hypothesized that the nutrient intake of Anglo American infants in the first year of life would be more adequate, based on meeting the RDA for age and gender, than that of Asian Indian American infants. Results partially supported this hypothesis. Throughout the first 12 months, the nutrient intakes of infants in both the ethnic groups exceeded 100% of the RDA. The fat intake of Asian Indian American infants was significantly higher ($P \leq .05$) than the intakes of Anglo American infants. At six months, Anglo American infants' dietary calcium intake was higher ($P \leq .05$) than Asian Indian American infants' dietary adequacy for this nutrient. In the second six months, Anglo American infants' diets were higher in iron compared to the diets of Asian Indian American infants.

It was hypothesized that in the first year of life, the growth rate of Anglo American infants would be greater than that of Asian Indian American infants.

Growth rate refers to cumulative gains over the 12 months in weight, length, and head circumference. Based on anthropometric means, infants in the two ethnic groups were growing and developing normally. However, at nine and 12 months, Asian Indian American infants were heavier than Anglo American infants ($P \leq .05$). At nine months, Anglo American infants' mean length was greater than that of Asian Indian American infants ($P \leq .05$). Throughout the first 12 months, the mean head circumferences of Anglo American and Asian Indian American infants were similar. Cumulative weight gain in the first year of life differed significantly ($P \leq .05$) between Anglo American and Asian Indian American infants. Thus, the hypothesis that Anglo American infants would have a greater growth rate was not true throughout the 12 months for length and head circumference; however, Asian Indian American infants had a larger cumulative weight gain.

Implications for Nutrition Educators and Health Care Professionals

In this study, eight Asian Indian American mothers were not feeding colostrum and were feeding pre-lacteal feeds to their newborn infants. This practice is not in compliance with the recommendations and advocacy of the World Health Organization/United Nations Children's Emergency Fund (156) and the American Dietetic Association (169), respectively. With regard to the duration of breast-feeding, less than half Asian Indian American mothers met the recommendations of the American Academy of Pediatrics, eg continue breast-feeding into the second six

months of life of the infant (80). The American Academy of Pediatrics (80) and the World Health Organization (156) also recommend that solid foods not be added to the infant's diet before the ages of four to six months. However, Asian Indian American mothers did not comply with recommendations to breast-feed and to defer introduction of solid foods. In addition, they did not introduce any of the solid foods at the recommended age of infant. Results also indicate that with specific reference to the incidence and duration of breast-feeding, and age of infant at introduction of solid foods, Anglo American mothers complied (based on mean age of infants) with current recommendations of the American Academy of Pediatrics (80).

There appears to be a cultural influence on the infant-feeding-decision making process of the mothers. Results of our study indicated that during the first six months, the primary source of information for Asian Indian American mothers was the maternal/paternal grandmother of the infant. Additionally, Asian Indian American mothers strongly believed in the harmful effects of colostrum, in the beneficial effects of pre-lacteal, and in the pacifying effects of bottle feeding. These beliefs, if translated into practice could have harmful consequences on the infant's health.

Results of this study suggest different nutrition education strategies for these two groups of mothers. For Asian Indian American mothers, nutrition education sessions involving current recommended infant feeding practices need to be scheduled in the immediate post-partum period (185). Maternal/paternal grandmother of the infant should be included in these sessions.

Traditional home-made "cooked rice and lentil-based infant foods" mixed with clarified butter were significant sources of fat in for the Asian Indian American infants. Lentil is a significant source of protein and iron in the diets of these infants. Nutrition intervention messages should be directed toward modifying the traditional food component and in modifying the food preparation practices of these mothers. This also could be included in the nutrition education sessions targeted at Asian Indian American mothers in the immediate post-partum period.

For both groups of mothers, the infants' diets exceeded the RDA by 200-300% for protein and Vitamin A. Two questions follow these findings. First, what foods are contributing to this excess protein which is not needed at 200% level. Some forms of protein foods carry significant amounts of fat, which may contribute to fat intakes greater than 35% of calories.

Secondly, the mean weight of the infants meet or exceed the 50th percentile of the NCHS growth chart. With energy intakes of 117% to 127% of the standard, mothers may promote unneeded weight gain in the first year of the infant's life. Nutrition educators should be cognizant of the health/wellness concerns of these mothers and teach toward lifelong health and emphasize quantity and quality of food in the first year of life.

Nutrition education messages addressing infant feeding practices of Asian Indian American mothers should be developed. The following topics should be addressed: pre-lacteal feeding and formula feeding practices, current recommendations for age of the infant at introduction of solid foods, and recommended dietary

allowances for nutrient intakes in the first 12 months of life.

Nutrition education for Anglo American mothers should be targeted at age of infants for adding fruit, juice, and vegetables to the diet. Anglo American mothers should continue to seek professional advice about infant feeding practices and receive encouragement for their efforts.

Future Research Needs

Infant feeding practices of middle income, primiparous Anglo American and Asian Indian American mothers living in another geographical area within the United States need to be investigated. It also would be interesting to assess the infant feeding practices of middle income, Asian Indian mothers living in India. This would aid in determining the influence of immigration on the infant feeding practices of mothers who have moved from a developing country to a developed country.

It is beyond the scope of this study to determine the impact of acculturation on the feeding practices of Asian Indian American mothers. Further research identifying the association between the length of residence in the United States and feeding practices and beliefs of mothers needs to be conducted.

Sample size ($n=25$ in each ethnic group) prevents the exploration of the relationship between infant feeding practices of mothers and growth patterns of infants in each of the two ethnic groups. Further research in this area is warranted.

Dietary data in this study were obtained from one 24 hour recall collected at one, three, six, nine, and 12 months. The validity of this kind of data can be increased by getting three day food records from the mothers and by collecting three 24 hour recalls. This approach would include at least one weekend and two week days and would minimize the effects of individual variability in infants.

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APPENDICES

APPENDIX I

REVISED INFANT FEEDING PRACTICE QUESTIONNAIRE

Mother's Age _____ years

Mother's Date of birth _____

Mother's Country of Birth _____

Number of Years lived in the United States _____

Language spoken at home _____

Living Arrangements (Check one)

- ☐ Live with husband and children (Ages) _____
☐ Live alone with children (Ages) _____
☐ Live with other relative (specify) _____
☐ Live with parents and husband _____
☐ Live with both parents _____
☐ Live with one parent _____

Mother's Education

- | | |
|--|--|
| ☐ Primary school | ☐ Some college |
| ☐ Intermediate school | ☐ Bachelor's Degree |
| ☐ Middle school | ☐ Master's Degree |
| ☐ High school | ☐ Doctorate Degree |

Father's Education (Check one)

- | | |
|--|--|
| ☐ Primary school | ☐ Some college |
| ☐ Intermediate school | ☐ Bachelor's Degree |
| ☐ Middle school | ☐ Master's Degree |
| ☐ High school | ☐ Doctorate Degree |

Do you (mother) have any paid employment? (Check one)

☐ yes ☐ no

If yes, how many hours per week do you work?

- ☐ Full-time (>35 hours)
☐ Part-time (<35 hours)

If you are currently employed, what is your occupation? _____

In which of these categories does your present household income fit best?

- ☐ Below \$10,000
☐ Between \$10,000 and \$15,000
☐ Between \$15,001 and \$20,000
☐ Between \$20,001 and \$25,000
☐ Between \$25,001 and \$30,000
☐ Between \$30,001 and \$35,000
☐ Between \$35,001 and \$40,000
☐ Between \$40,001 and \$45,000
☐ Between \$45,001 and \$50,000
☐ Between \$50,001 and \$60,000
☐ Between \$60,001 and \$80,000
☐ Over \$80,001

ID Number _____
Date _____

SECTION B: BREAST FEEDING/FORMULA FEEDING

13. Did you put your baby to breast immediately after birth?

_____/_____
Yes no

ANSWER THE FOLLOWING QUESTIONS IF THE BABY WAS NOT PUT TO BREAST IMMEDIATELY AFTER BIRTH

14. Why was your baby not put to breast immediately after birth?

15. How many hours after the baby was born did you breast feed your baby?

16. Did you give any other liquid to your baby before giving her breast milk?

Yes ____ No ____

17. If yes, did you give any of the following to your baby before giving her breast milk?

Plain water ____

Sugar water ____

Glucose water ____

Tea ____

Honey ____

Cow's milk ____

18. Are you breast feeding or formula feeding or doing a combination of both (Check one)

____ Breast feed only

____ Breast feed and formula feed

____ Formula feed only

19. When did you decide to breast feed or formula feed? (Circle answer)

____ Before Pregnancy

____ During Pregnancy

____ After birth of the baby

IF FORMULA FEED ONLY, GO TO QUESTION 31

ANSWER THE FOLLOWING QUESTIONS IF CURRENTLY BREAST FEEDING

20. How many times a day do you breast feed? (6.00am - 9.00pm)

21. How many times a night do you breast feed? (9.00pm - 6.00am)

22. How long does your baby nurse at each breast? (in minutes)

**ANSWER THE FOLLOWING QUESTIONS IF CURRENTLY BREAST FEEDING AND
FORMULA FEEDING**

23. If you are breast feeding, do you also give formula? (Check one)

_____/_____
yes no

24. If yes, what formula do you give (Check one)

_____ Ready-to-Feed

_____ Concentrated liquid

_____ Other

25. What is the brand name of the formula that you give?

26. List other brands of formula you have used in the past

27. How do you prepare the formula? (Dilution)

28. What are the reasons for preparing formula the way you do?

29. What is the amount of formula you give per feeding ?

30. How long does one can of formula last?

ID Number _____
Date _____

ANSWER FOLLOWING QUESTIONS IF CURRENTLY FORMULA FEEDING ONLY

31. What kind of formula do you use? (Check one)

_____ Ready-to-feed

_____ Concentrated liquid

_____ Powder _____ Other

32. What is the brand name of formula that you give?

33. How long does one can of formula last?

34. How do you prepare the formula?

35. What is the amount of formula that you give every day? (ounces)

ANSWER THE FOLLOWING QUESTIONS IF NO LONGER BREAST FEEDING

36. How long did you breast feed? (Specify age of the baby in days /months)

37. For what reason(s) did you stop breast feeding?

ASK ALL MOTHERS ABOUT BABY TAKING BOTTLE TO BED

38. Does your baby take a bottle to bed? (Check one)

_____ / _____
yes no

39. If yes, what is in the bottle?

40. What is the amount per bottle?

_____ (Ounces)

41. What is the number of bottles that your baby takes to bed everyday?

ID Number _____
Date _____

ADDITION OF FOOD AND BEVERAGES TO THE BOTTLE

42. Do you add any food/beverages to the bottle?

_____/_____
yes no

43. If yes, what do you add?

IF ADDED CEREAL TO BOTTLE, ANSWER QUESTION 44-47.

IF NOT , GO TO QUESTION 48

44. What are the reasons for adding cereal to your baby's bottle?

45. How much cereal did you add to each bottle?

46. Do you change the nipple of the bottle (make it larger or smaller?) when you add cereal to the bottle?

_____/_____
yes no

47. Do you use a different nipple for cereals and for formula?

_____/_____
yes no

ID Number _____

Date _____

SECTION C

OTHER BEVERAGES OFFERED

48. Does your baby drink milk? (Check one)

_____/_____
yes no

49. If yes, check one

_____ 2% milk

_____ whole milk

_____ skim milk

_____ other

Amount of milk/day

(Ounces) _____

50. Number of bottles of milk/day

51. How many times a day does your baby drink the following beverages?

Beverage	Times/day	Amount	Kinds/Brand
Kool-ade	_____	_____	_____
Juices	_____	_____	_____
Soda pop	_____	_____	_____
Water	_____	_____	_____
Other	_____	_____	_____

ID Number _____
Date _____

SECTION D

SUPPLEMENTAL FOODS

52. Why did you add supplemental foods to your baby's diet?

53. What did the baby do that told you to add supplemental diets?

54. What position do you hold your baby when you add supplemental foods?

55. If your baby is not held, how do you position your baby during feeding?

ID Number _____
Date _____

SUPPLEMENTAL FOODS: COMMERCIAL BABY FOOD

If your infant eats these foods every day or nearly everyday, which are **consumed** most often?

<u>Type of food</u>	<u>Amount of Food/Size of Jar</u>
---------------------	-----------------------------------

Cereal (dry or jar)

_____	_____
_____	_____
_____	_____

Fruits

_____	_____
_____	_____
_____	_____

Vegetables

_____	_____
_____	_____
_____	_____

Meat:

_____	_____
_____	_____
_____	_____

ID Number_____

Date_____

SUPPLEMENTAL FOODS: HOMEMADE BABY FOOD

If your infant eats these foods every day or nearly everyday, which are consumed most often?

<u>Type of food</u>	<u>Amount of Food/Size of Jar</u>
---------------------	-----------------------------------

Cereal (dry or jar)

_____	_____
_____	_____
_____	_____

Fruits

_____	_____
_____	_____
_____	_____

Vegetables

_____	_____
_____	_____
_____	_____

Meat:

_____	_____
_____	_____
_____	_____

ID Number _____
Date _____

SUPPLEMENTAL FOODS: TABLE FOOD

If your infant eats these foods every day or nearly everyday, which are **consumed** most often?

<u>Type of food</u>	<u>Amount of Food/Size of Jar</u>
---------------------	-----------------------------------

Cereal (dry or jar)

_____	_____
_____	_____
_____	_____

Fruits

_____	_____
_____	_____
_____	_____

Vegetables

_____	_____
_____	_____
_____	_____

Meat:

_____	_____
_____	_____
_____	_____

ID Number _____
Date _____

SECTION E

SPECIAL DIETS AND VITAMIN AND MINERAL SUPPLEMENTATION

56. Do you give your baby vitamin/iron drops? _____/_____

yes no

57. If yes, what kind? _____

If yes, how often? _____

58. Is your baby on a special diet now? If yes, check one

_____ Allergy

_____ Other

59. In summary, how do you judge that your baby is rejecting formula,
breast, or Food?

60. What do you do when your baby rejects formula, breast or other foods?

ID Number _____
Date _____

SOURCES OF INFORMATION

Sources of Information used for feeding your baby

61. Who has been the most important source in talking to you about feeding your baby?

62. When? _____

63. Have any of the following persons talked to you about feeding your baby? (check choices) If yes, specify person's title and advice given.

_____/____ family (relationship) _____
yes no

_____/____ friends _____
yes no

_____/____ health professional. Who specifically? (We do not need names)
yes no

64. Have you used any of the following sources of information about feeding your baby?
(Check all applicable)

_____/____ television (what programs?) _____
yes no

_____/____ newspaper (what columns or writers?) _____
yes no

_____/____ magazines (specify) _____
yes no

_____/____ others _____

65. Did you follow the recommendations given? ____/____
yes no

66. What were these specific recommendations that you followed?

ID Number _____

Date _____

FOOD RECALL

WHAT DID YOU FEED YOUR BABY YESTERDAY?

TIME/PLACE	FOOD AND DESCRIPTION	AMOUNT

ID Number _____

Date _____

INFANT ANTHROPOMETRY FORM

WEIGHT

1. _____ ounces

2. _____ ounces

3. _____ ounces

RECUMBENT LENGTH

1. _____ inches

2. _____ inches

3. _____ inches

HEAD CIRCUMFERENCE

1. _____ centimeters

2. _____ centimeters

3. _____ centimeters

DATE	1 POUND MEASUREMENT	2 POUND MEASUREMENT

APPENDIX II

REVISED FEEDING BELIEF QUESTIONNAIRE

1. What is your age? _____ years
2. How many children do you have? (Check one)
One _____
Two _____
Three/More _____
3. Where were your children born? (List country and state of birth)
First child _____
Second child _____
Third child _____
4. How long have you lived in the United States? _____ Months _____ Years
5. What is the language spoken at home? _____
6. Your education (Check one)

_____ Primary school	_____ Some college
_____ Intermediate school	_____ Bachelor's Degree
_____ Middle school	_____ Master's Degree
_____ High school	_____ Doctorate Degree
7. Husband's education (Check one)

_____ Primary school	_____ Some college
_____ Intermediate school	_____ Bachelor's Degree
_____ Middle school	_____ Master's Degree
_____ High school	_____ Doctorate Degree
8. Your occupation: _____
9. Husband's occupation: _____
10. In which of the categories does your annual household income fit best? (Check one)

_____ Below \$10,000
_____ Between \$10,000 and \$15,000
_____ Between \$15,001 and \$20,000
_____ Between \$20,001 and \$30,000
_____ Between \$30,001 and \$40,000
_____ Between \$40,001 and \$45,000
_____ Between \$45,001 and \$50,000
_____ Between \$50,001 and \$60,000
_____ Between \$60,001 and \$80,000
_____ Over \$80,001

The following statements have to do with beliefs about feeding your baby. Please indicate your belief by circling the answer that best expresses your disagreement or agreement or no opinion with each statement. There are no right or wrong answers.

The following abbreviations are used to indicate your disagreement (or agreement or no opinion) with each statement. SD = Strongly disagree, D = Disagree, NO = No opinion, A = Agree AS = Strongly Agree.

To help you, an example is shown in which a response shows "agreement" with the statement.

Statement	Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree
Colostrum protects against disease.	SD	D	NO	A	AS

	Statement	Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree
1	Giving sugar water within the first 24 hours makes the baby healthy.	SD	D	NO	A	AS
2	Giving glucose water within the first 24 hours helps in the flow of urine.	SD	D	NO	A	AS
3	The baby must be breastfed on demand.	SD	D	NO	A	AS
4	Solid foods, if introduced before six months causes liver disease.	SD	D	NO	A	AS
5	Feeding lentils before 4 months results in diarrhea.	SD	D	NO	A	AS
6	Feeding fruit juices before 4 months causes cold.	SD	D	NO	A	AS
7	Giving non breast milk liquids within the first 24 hours helps in teething.	SD	D	NO	A	AS
8	Feeding diluted milk prevents gastrointestinal disturbances.	SD	D	NO	A	AS

	STATEMENT	Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree
9	Feeding whole milk before one year causes indigestion.	SD	D	NO	A	AS
10	When the baby is sick, foods need not be cooked specially.	SD	D	NO	A	AS
11	Breast milk should be offered when the baby has diarrhea.	SD	D	NO	A	AS
12	Breast milk should be offered when the baby is sick.	SD	D	NO	A	AS
13	Foods given to the baby before 6 months needs to be strained.	SD	D	NO	A	AS
14	Baby should not take bottle to bed.	SD	D	NO	A	AS
15	Adding cereal to bottle helps the baby sleep through the night.	SD	D	NO	A	AS
16	When recovering from illness, the baby needs twice as much the usual amount of food.	SD	D	NO	A	AS
17	Adding sugar in the baby's bottle makes the baby sleep better.	SD	D	NO	A	AS
18	Adding sugar to water prevents colic.	SD	D	NO	A	AS
19	Diluting soda or cola before feeding removes gas.	SD	D	NO	A	AS

ADDITIONAL COMMENTS (IF ANY)

APPENDIX III

STATEMENT OF INFORMED CONSENT

The purpose of this study is to determine whether the infant feeding practices and beliefs from birth to one year of age of Anglo Americans residing in Knoxville, Tennessee are different from those of Asian Indian Americans residing in Knoxville, Tennessee.

You will be personally interviewed at home when your baby is 1, 3, 6, 9 and 12 months of age. At each of these interview sessions, you will be asked to respond to a questionnaire about infant feeding practices, and sources of information about your feeding practices. You will be asked to recall your baby's food intake in the previous 24 hours for each interview session and your baby will be weighed and measured. Each interview session will last an hour. At the last interview session, you will be asked to fill out a self-administered "Infant Feeding Belief Questionnaire" and mail it back to us.

There is no anticipated risk to you or to your baby from participating in this study. Your identity and any information that you provide will be kept confidential by the use of ID numbers. Only the research staff will have access to any information that you provide which will be stored in a locked filing cabinet in Room Number 213C, Jessie Harris Building.

Information that you provide will be useful for various health professionals. It is your choice to participate in the study and you can quit whenever you want to. If you do not participate or decide to quit, there will not be any penalty. If you have any questions about the study either now or in future, please contact Srimathi Kannan, M.S., or Dr Betty Ruth Carruth, Room Number 213C, Jessie Harris Building, Department of Nutrition, University of Tennessee, Knoxville, Tennessee, 37996-1900 or call 974-0824 or 523-4510.

I have read and understood the explanation of this study and agree to participate.

Name

Date

----- Signature

APPENDIX IV
RECRUITMENT POSTER

ATTENTION MOMS

BABY PICTURE

IF YOU HAVE A NEWBORN BABY, WE NEED YOU FOR A STUDY
ON INFANT FEEDING PRACTICES
INTERVIEWS WILL BE CONDUCTED AT YOUR CONVENIENCE
IN YOUR HOME

If you are interested in the Infant Feeding study, please answer the following questions and mail this card. We will contact you soon.

Baby's Birthdate: _____
Father's Education: ☐ High School ☐ Some College
 ☐ College Graduate or Higher

Father's Occupation: _____
Mother's Education: ☐ High School ☐ Some College

Mother's Occupation: _____
Your Name: _____

Mailing Address _____

Telephone Number: _____

APPENDIX V

TELEPHONE INTERVIEW

Hi _____,

I am Srimathi Kannan and I am a Doctoral student in the Department of Nutrition at the University of Tennessee, Knoxville. We are interested in collecting information about Anglo American mothers and babies.

We are identifying mothers and babies for this study. We would appreciate it if you would take a couple of minutes to tell us the following about you and your baby.

1. What is your name? _____
2. What is your age?
3. Is this your first baby? _____
4. What is your country of birth? _____
5. What is your language that you speak at home? _____
6. What is your mailing address?

Thank you.

We will contact you within the next few days.



APPENDIX VI
CONTACT LETTER

Department of Nutrition
1215 West Cumberland Avenue, Room 229
Knoxville, TN 37996-1900
(615) 974-5445
FAX = (615) 974-3491

Dear _____,

Hi! Hope you and your baby are doing fine. At the University of Tennessee, we are interested in collecting information about Anglo American/Asian Indian American mothers and their babies.

If you agree to participate in the study, you will be personally interviewed in your home when your baby is one month old and again approximately 3, 6, 9 and 12 months old. At each of these interview sessions, you will be asked to respond to a questionnaire about infant feeding practices and sources of information about your feeding practices. You will be asked to recall your baby's food intake in the previous 24 hours for each interview session and your baby will be weighed and measured. At the last interview session, you will be asked to fill out a self-administered "Infant Feeding Belief Questionnaire" and mail it back to us. Each interview session will last approximately an hour.

We would appreciate you taking a few minutes to complete the enclosed "Participation Questionnaire" which will help us identify babies and mothers for our study. After you have furnished the information, please fold the paper on the dotted line so that your answers appear only on the inside. Seal the paper by wetting the glue on the free edge of the paper and mail it to us. No postage is necessary. Thank you for providing this information.

Sincerely,

Srimathi Kannan, M.S.

Doctoral Student

Betty Ruth Carruth, Ph.D., RD.

Professor of Nutrition





APPENDIX VII

Department of Nutrition
1215 West Cumberland Avenue, Room 229
Knoxville, TN 37996-1900
(615) 974-5445
FAX = (615) 974-3491

PARTICIPATION QUESTIONNAIRE

In order to identify mothers and infants who meet the criteria for study participation, we request you to complete the following information.

1. What is your current name and mailing address

2. What is your husband's country of birth? -----
3. What is your current phone number? -----
4. What is your age? ----- years
5. What was your baby's weight at birth? ----- Pounds ----- Ounces
6. What was your baby's length at birth? ----- Inches
7. What was your baby's head circumference at birth? ----- Inches
8. How long have you lived in the United States? ----- months ---- years





APPENDIX VIII

Department of Nutrition
1215 West Cumberland Avenue, Room 229
Knoxville, TN 37996-1900
(615) 974-5445
FAX = (615) 974-3491

INTEREST IN THE STUDY LETTER

Dear mother,

At the University of Tennessee, we are studying how Anglo American/Asian Indian American mothers in Knoxville feed their babies. Information that you provide about how you feed your baby will be highly valuable for various health professionals. If you agree to participate in the study, you will be personally interviewed in your home when your baby is 1 month old and again approximately at 1, 3, 6, 9 and 12 months. At each of these interview sessions, you will be asked to respond to a questionnaire about infant feeding practices and sources of information about your feeding practices. You will be asked to recall your baby's food intake in the previous 24 hours for each interview session and your baby will be weighed and measured. At the last interview session, you will be asked to fill out a self-administered "Infant feeding belief" questionnaire and mail it back to us. Each interview session will last approximately an hour.

There is no anticipated risk to you or to your baby from participating in this study. Information you provide will be kept confidential by means of code numbers. No invasive procedures will be used in the interviews. This study has been approved by the Committee on Research Participation involving Human Subjects, University of Tennessee. It is your choice to participate in the study and you can quit whenever you want to do so. If you do not participate or decide to quit, there will not be any penalty. We would appreciate your returning the post card to show you are interested in participating in the study. Thank you for your help.

Sincerely,

Srimathi Kannan

Doctoral Student

Betty Ruth Carruth, Ph.D., RD.

Professor of Nutrition



APPENDIX IX
POSTCARD RETURNED BY MOTHERS

I am interested in participating in the infant feeding practices study

Please contact me at this address

My phone number is: _____



APPENDIX X

Department of Nutrition
1215 West Cumberland Avenue, Room 229
Knoxville, TN 37996-1900
(615) 974-5445
FAX = (615) 974-3491

FOLLOW UP LETTER

Dear mother,

As you may recall from a previous letter mailed from the University of Tennessee, we are studying how Anglo American/Asian Indian American mothers residing in Knoxville, feed their babies. Information you provide about how you feed your baby will be valuable for health professionals.

If you agree to participate in the study, you will be personally interviewed at your home when your baby is one month old, and again approximately at 3, 6, 9 and 12 months. At each of these interview sessions, you will be asked to respond to a questionnaire about infant feeding practices, and sources of information about your feeding practices. You will be asked to recall your baby's food intake in the previous 24 hours for each interview session and your baby will be weighed and measured. At the last interview session, you will be asked to fill out a self-administered "Infant Feeding Belief Questionnaire" and mail it back to us. Each interview session will last about one hour. There is no anticipated risk to you or to your baby from participating in this study. Any information that you provide will be kept confidentially coding. No invasive procedures will be used in any of the interviews. This study has been approved by the Committee on Research Participation involving Human Subjects, University of Tennessee, Knoxville.

We need your help in learning more about how mothers in Knoxville feed their babies. Please treat this letter as a reminder and we would appreciate you returning the enclosed post card to show you are interested in participating in the study. Thank you for your help.

Sincerely,

Srimathi Kannan, M.S.
Doctoral Student

Betty Ruth Carruth, Ph.D., RD.
Professor of Nutrition





Department of Nutrition
1215 West Cumberland Avenue, Room 229
Knoxville, TN 37996-1900
(615) 974-5445
FAX = (615) 974-3491

APPENDIX XI

LETTER THANKING MOTHERS

Dear mother,

We appreciate your willingness and consent to participate in this study that focuses on infant feeding practices. This is to brief you, once again, on what you would be required to do once the study begins. You will be interviewed privately in your home by a Doctoral student when your baby is one month old, and again at 3, 6, 9 and 12 months. In each of the five interview sessions, you will respond to a questionnaire about infant feeding practices, and sources of information about your feeding practices. You will be asked to recall the foods that you fed your baby within the 24 hours preceding each interview session. Your baby will be weighed, recumbent length determined and head circumference measured. At the last interview session, you will be asked to fill out a self-administered "Infant Feeding Belief" questionnaire and mail it back to us.

We would like to thank you once again for agreeing to participate in this study. We will be contacting you by letter within the next few days to schedule an appointment for the first interview session. We look forward to meeting with you and your baby. If you have any questions, please call (615) 523-4510 or (615) 974-5445.

Thank you.

Sincerely,

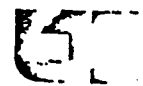
Srimathi Kannan, M.S.

Doctoral Student

Betty Ruth Carruth, Ph.D., R.D.

Professor of Nutrition





Department of Nutrition
1215 West Cumberland Avenue, Room 229
Knoxville, TN 37996-1900
(615) 974-5445
FAX = (615) 974-3491

APPENDIX XII

LETTER THANKING MOTHERS WITH REASONS FOR EXCLUSION

Dear mother,

Thank you for your interest in participating in our infant feeding study. The selection criteria for participating in this study is based on infant birth order, infant birth weight, length of residence in the United States and socioeconomic status. We are sorry to let you know that the information that you provided is not compatible with selection criteria that we have established for participating in our study. We appreciate your interest in the study.

Thank you.

Sincerely,

Srimathi Kannan, MS

Doctoral Student

Betty Ruth Carruth, Ph.D., R.D.

Professor



APPENDIX XIII

MOTHERS CONTACTED AND REASON(S) FOR EXCLUSION

Anglo American Mothers and Infants	<u>Reasons for Exclusion</u>
Total number contacted = 68	Not primiparous
	Low birth weight infant
	Lower socioeconomic status
	Not full-term infant
	Moving out of Knoxville during the study period
	Mother younger than 19 years of age
	Not living within the study circumference area
Asian Indian American Mothers and Infants	<u>Reasons for Exclusion</u>
Total number contacted = 47	Lived in the U.S for less than one year
	Lived in the U.S for more than eight years
	Returning to India during the study period
	Not primiparous
	Not full-term infant
	Not living within the study circumference area

APPENDIX XIV

ORIGINAL INFANT FEEDING PRACTICE QUESTIONNAIRE

Father's Age _____ Mother's Date of Birth _____

0. **Living Arrangements** (Check one)

- ☐ Live with spouse and children
(ages) _____
- ☐ Live alone with children
(ages) _____
- ☐ Live with other relative,
specify: _____
- ☐ live with parents and spouse
- ☐ Live with both parents
- ☐ Live with one parent

1. **Mother's Education** (Check one)

- ☐ < 7th grade
- ☐ junior high school
- ☐ some high school
- ☐ high school graduate
- ☐ some college or specialized training
- ☐ college graduate
- ☐ graduate school or professional training

2. **Spouse's Education** (Check one)

- ☐ < 7th grade
- ☐ junior high school
- ☐ some high school
- ☐ high school graduate
- ☐ some college or
specialized training
- ☐ college graduate
- ☐ graduate school or professional training
- ☐ not applicable

Spouse/Mother's Occupation

13. Spouse's Occupation _____
14. Do you (mother) have any paid employment? (Check one) ____/____.
yes no
15. If yes, how many hours per week do you work?
_____ full-time (> 35 hours)
_____ part-time (< 35 hours)

16. If currently employed, Mother's Occupation _____

Household Income

In which of these category does your present household income fit best?

- ____ Below \$10,000
- ____ Between \$10,000 and \$15,000
- ____ Between \$15,001 and \$20,000
- ____ Between \$20,001 and \$25,000
- ____ Between \$25,001 and \$30,000
- ____ Between \$30,001 and \$35,000
- ____ Between \$35,001 and \$40,000
- ____ Between \$40,001 and \$45,000
- ____ Between \$45,001 and \$50,000
- ____ Between \$50,001 and \$55,000
- ____ Between \$55,001 and \$60,000
- ____ Between \$60,001 and \$80,000
- ____ Over \$80,001

Financial Assistance

18. Do you currently receive financial assistance? ____/____.
yes no
19. If yes, what is this assistance? (check all that apply).
- ____ Medicaid
- ____ Medicare
- ____ Family Financial Support
- ____ Food Stamps
- ____ Aid to Mothers of Dependent Children
- ____ W.I.C. ____ During Pregnancy ____ For Infant

20. Have you received financial assistance previously.

 / .
yes no

21. If yes, when did you receive it? _____

22. What was the assistance? _____

Breast/Formula Feedings: (ask all mothers)

23. Are you breast-feeding or formula feeding or doing a combination of both? (circle answer)

_____ breast feed

_____ breast feed and formula feed

_____ formula feed

24. When did you decide to breast-feed or formula feed? (circle answer) Before, After or During Pregnancy. If formula fed only, go to item 32.

ANSWER THESE QUESTIONS IF MOTHER IS CURRENTLY BREAST-FEEDING

25. How many times a day do you breast-feed? (6:00 am - 9:00 pm)

26. How many times a-night do you breast feed? (9:00 pm - 6:00 am)

27. Length of time for each breast-feeding (number of minutes each breast) _____

ANSWER THESE QUESTIONS IF MOTHER CURRENTLY BREAST AND FORMULA FEEDS

28. If breast-feeding, is formula also given? (check one) ____ / ____
yes no

29. If yes, what formula is given (check one)

_____ ready-to-feed

_____ concentrated liquid

_____ other

30. Brand name of formula? _____

31. List other brands of formula used in past. _____

32. How is formula prepared (dilution)? _____

33. Amount/day _____

34. How long does 1 can of formula last? _____

ASK THESE QUESTIONS IF CURRENTLY FORMULA FEEDING ONLY

35. What kind of formula is used? (check one)
_____ ready-to-feed
_____ concentrated liquid
_____ other
36. Brand name of formula? _____
37. How long does 1 can of formula last? _____
38. How is formula prepared (dilution)? _____
39. Amount/day (ounces) _____

ASK THESE QUESTIONS IF MOTHER IS NO LONGER BREAST-FEEDING

40. How long did you breast-feed? _____
41. Why did you stop breast-feeding? _____
- _____
- _____

ASK ALL MOTHERS ABOUT BOTTLES TO BED

42. Does your baby take a bottle to bed? (check one) _____ / _____
yes no
43. If yes, what is in the bottle? _____
44. Amount/bottle (ounces) _____

FOOD AND BEVERAGES ADDED TO BOTTLE

45. Do you every add any food/beverages to the bottle? _____ / _____
yes no
46. If yes, what do you add? _____
- _____

IF CEREAL WAS ADDED TO THE BOTTLE OR INFANT FEEDER, ASK THESE QUESTIONS

47. What are the reasons you added cereal to your baby's bottle?

48. How much cereal was added to each bottle? _____

How many times a day does your baby drink the following beverages?

<u>Beverage</u>	<u>Times/Day</u>	<u>Amount</u>	<u>Kinds/Brand</u>
-----------------	------------------	---------------	--------------------

Kool-ade			
----------	--	--	--

Juices			
--------	--	--	--

Soda Pop			
----------	--	--	--

Water			
-------	--	--	--

Other			
-------	--	--	--

SUPPLEMENTAL FOODS: COMMERCIAL BABY FOOD

If your infant eats these foods every day or nearly every day, which are consumed most often?

Type of Food	Amount of Food/Size of Jar
--------------	----------------------------

Cereal (Dry or Jar)	
---------------------	--

Fruits

Vegetables

Meat:

SUPPLEMENTAL FOODS: HOMEMADE BABY FOOD

If your infant eats these foods every day or nearly every day, which are consumed most often?

Type of Food	Amount of Food/Size of Jar
--------------	----------------------------

Cereal

Fruits

Vegetables

Meat:

SUPPLEMENTAL FOODS: TABLE FOOD

If your infant eats these foods every day or nearly every day, which are consumed most often?

Type of Food	Amount of Food/Size of Jar
--------------	----------------------------

Cereal

Fruits

Vegetables

Meat:

Do you change the texture of table food consumed by your baby?
If so, what methods are used?

_____ food processor

_____ food mill

_____ blender

_____ other

IF SUPPLEMENTAL FOODS WERE FED, ASK THESE QUESTIONS

55. Why did you add supplemental foods to your baby's diet?

56. What did the baby do that told you to add supplemental foods?

57. What position do you hold your baby when you feed supplemental foods?

58. If baby is not held, how does mother position the baby for feeding?

ASK THE FOLLOWING QUESTIONS OF ALL MOTHERS

59. Do you give your baby vitamin or iron drops? ____ / ____
yes no

If yes, how often _____

What kind? _____

60. Is your baby on a special diet now? If yes, check one:

_____ allergy

_____ weight reduction

_____ other

61. IN SUMMARY, HOW DO YOU JUDGE THAT YOUR BABY IS REJECTING
FORMULA, BREAST, OR FOOD?

ASK ALL MOTHERS

PART VI SOURCES OF INFORMATION

Information Sources for Feeding Baby

69. Who has been the most important source in talking to you about how to feed your baby?

70. When? _____

71. Have any of the following persons talked to you about how to feed your baby? (check choices) If yes, specify person's title and advice given.

____ / ____ family (relationship) _____ yes no

____ / ____ friends _____ yes no

____ / ____ health professional. Who specifically? _____
yes no

____ / ____ others (specify) _____
yes no

72. Have you used any of the following sources for information about feeding your baby?
(Check all applicable)

____ / ____ television (what programs?) _____
yes

____ / ____ newspaper (what columns or writers? _____
yes no

____ / ____ magazines (specify) _____
yes no

____ / ____ others _____
yes no

73. Did you follow the recommendations given? ____ / ____
yes no

74. What were these recommendations specifically?

Use of Pacifier

75. Do you use a pacifier? ____ 122. What type? ____

76. Why do you use a specific pacifier? ____

77. When do you use a pacifier? ____

78. Does a pacifier help? ____ / ____ How? ____
yes no

ASK ALL MOTHERS

PART VII HEALTH STATUS AND HEALTH CARE PRACTICES

79. At what hospital was your infant born? _____
80. When the infant was born, were you covered by insurance to pay the doctor and hospital?
_____/_____
yes no
81. Where do you currently take your baby for medical care?

- _____
- _____
82. Do you have insurance coverage? ____/____
yes no

83. If yes, name of carrier. _____

84. If no, how was the bill paid? _____

85. How many times have you taken the baby to the Doctor since
birth? _____

86. Has the infant experienced any of the following conditions at or since birth? (check one or
several)

_____ Prolonged illness*

_____ Hospitalization _____ # of days

_____ Harelip

_____ Deficient palate

_____ Excessive gag reflex

_____ Jaw hangs

87. Has your baby been ill since birth (check one) ____/____
yes no

88. If yes, what were these illnesses and what medications were given?

Illness	Medication	Length of time
_____	_____	_____
_____	_____	_____

ASK ALL MOTHERS

If your baby was hospitalized for any of these illness; describe that hospitalization.

Code Number _____

Date _____

PART VIII: INFANT ANTHROPOMETRY FORM

Weight

Standard 2# weight = _____ ounces

1. _____ ounces

2. _____ ounces

3. _____ ounces

Recumbent Length

1. _____ inches

2. _____ inches

3. _____ inches

Head circumference

1. _____ centimeters

2. _____ centimeters

3. _____ centimeters

SCALE ERROR

[illegible]

APPENDIX XV

ORIGINAL FEEDING BELIEF QUESTIONNAIRE

What is your age? _____ years

How many children do you have? (Check one)

One _____

Two _____

Three/More _____

Where were your children born? (List country and state of birth)

First child _____

Second child _____

Third child _____

How long have you lived in the United States? _____ Months _____ Years

What is the language spoken at home? _____

Your education (Check one)

_____ Primary school

_____ Intermediate school

_____ Middle school

_____ High school

_____ Some college

_____ Bachelor's Degree

_____ Master's Degree

_____ Doctorate Degree

Husband's education (Check one)

_____ Primary school

_____ Intermediate school

_____ Middle school

_____ High school

_____ Some college

_____ Bachelor's Degree

_____ Master's Degree

_____ Doctorate Degree

Your occupation: _____

Husband's occupation: _____

In which of the categories does your annual household income fit best? (Check one)

- _____ Below \$10,000
- _____ Between \$10,000 and \$15,000
- _____ Between \$15,001 and \$20,000
- _____ Between \$20,001 and \$30,000
- _____ Between \$30,001 and \$40,000
- _____ Between \$40,001 and \$45,000
- _____ Between \$45,001 and \$50,000
- _____ Between \$50,001 and \$60,000
- _____ Between \$60,001 and \$80,000
- _____ Over \$80,001

The following statements have to do with beliefs about feeding your baby. Please indicate your belief by circling the answer that best expresses your disagreement or agreement or no opinion with each statement. There are no right or wrong answers.

The following abbreviations are used to indicate your disagreement (or agreement or no opinion) with each statement. SD = Strongly disagree, D = Disagree, NO = No opinion, A = Agree, AS = Strongly Agree.

To help you, an example is shown in which a response shows "agreement" with the statement.

Statement	Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree
Colostrum protects against disease.	SD	D	NO	A	AS

	Statement	Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree
1	Giving sugar water within the first 24 hours makes the baby healthy.	SD	D	NO	A	AS
2	Giving glucose water within the first 24 hours helps in the flow of urine.	SD	D	NO	A	AS
3	The baby must be breastfed on demand.	SD	D	NO	A	AS
4	Solid foods, if introduced before six months causes liver disease.	SD	D	NO	A	AS
5	Feeding lentils before 4 months results in diarrhea.	SD	D	NO	A	AS
6	Feeding fruit juices before 4 months causes cold.	SD	D	NO	A	AS
7	Giving non breast milk liquids within the first 24 hours helps in teething.	SD	D	NO	A	AS
8	Feeding diluted milk prevents gastrointestinal disturbances.	SD	D	NO	A	AS

	STATEMENT	Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree
9	Feeding whole milk before one year causes indigestion.	SD	D	NO	A	AS
10	When the baby is sick, foods need not be cooked specially.	SD	D	NO	A	AS
11	Breast milk should be offered when the baby has diarrhea.	SD	D	NO	A	AS
12	Breast milk should be offered when the baby is sick.	SD	D	NO	A	AS
13	Foods given to the baby before 6 months needs to be strained.	SD	D	NO	A	AS
14	Baby should not take bottle to bed.	SD	D	NO	A	AS
15	Adding cereal to bottle helps the baby sleep through the night.	SD	D	NO	A	AS
16	When recovering from illness, the baby needs twice as much the usual amount of food.	SD	D	NO	A	AS
17	Adding sugar in the baby's bottle makes the baby sleep better.	SD	D	NO	A	AS
18	Adding sugar to water prevents colic.	SD	D	NO	A	AS
19	Diluting soda or cola before feeding removes gas.	SD	D	NO	A	AS

ADDITIONAL COMMENTS (IF ANY)

APPENDIX XVI

INFANT FEEDING PRACTICE QUESTIONNAIRE CODING SCHEME

1. Mother's age: Numerical (in years) 23-34.

2. Mother's Date of Birth:

3. Mother's country of birth: US = 1
India = 2

4. Number of years lived in the U.S.
Numerical (in years)

5. Language spoken at home:

English = 1
Hindi = 2
Tamil = 3
Malayalam = 4
Telugu = 5
Kannada = 6
Marathi = 7
Gujarati = 8
Bengali = 9
Other = 10

6. Living Arrangements

Live with one parent = 1
Live with both parents = 2
Live with husband = 3
Live with husband and with parents = 4

7. Mother's Education:

Primary school = 1
Intermediate school = 2
Middle school = 3
High school = 4
Some college = 5
Bachelor's Degree = 6
Master's Degree = 7

Doctorate Degree = 8

8. Father's Education:
Primary School = 1
Intermediate school = 2
Middle school = 3
High school = 4
Some college = 5
Bachelor's degree = 6
Master's degree = 7
Doctorate Degree = 8
9. Do you have any paid employment?
yes = 1; no = 0
10. If yes, how many hours per week do you work?
Full time = 1; part-time = 2
11. If you are currently employed, what is your occupation?
4 = skilled manual workers, craftsmen
5 = clerical and sales workers
6 = technicians and semi professionals
7 = managers, minor professionals
8 = administrators, minor professionals
9 = high level executives
12. In which of these categories does your present household income fit best?
1 = below \$10,000
2 = between \$10,000 and \$15,000
3 = between \$15,001 and \$20,000
4 = between \$20,001 and \$25,000
5 = between \$25,001 and \$30,000
6 = between \$30,001 and \$35,000
7 = between \$35,001 and \$40,000
8 = between \$40,001 and \$45,000
9 = between \$45,001 and \$50,000
10 = between \$50,001 and \$60,000
11 = between \$60,001 and \$80,000
12 = Over \$80,001

SECTION B: Infant Feeding Information

13. Did you put your baby to breast immediately after birth?
yes = 1; no = 0
14. Why was your baby not put to breast immediately after birth?
Mom advised not to = 1
Friend advised not to = 2
Top milk is bad for the baby = 3
15. How many hours after the baby was born did you breast-feed your baby?

6-12 hours = 1
13-19 hours = 2
20-24 hours = 3
> 24 hours = 4
16. Did you give any other liquid to your baby before giving her breast milk?
yes = 1; no = 0
17. If yes, did you give any of the following to your baby before giving her breast milk?
Plain water = 1
Sugar water = 2
Glucose water = 3
Tea = 4
Honey = 5
Cow's milk = 6
18. Are you breast-feeding or formula feeding or doing a combination of both?
Breast feed only = 1
Breast feed and formula feed = 2
Formula feed only = 3
19. When did you decide to breast feed or formula feed?
Before Pregnancy = 1
During Pregnancy = 2
After birth of the baby = 3
20. How many times a day do you breast feed?
Numerical: 0-10
21. How many times a night do you breast-feed?
Numerical 0-3

22. How long does your baby nurse at each breast?
Numerical: (in minutes): 0-30
23. If you are breast-feeding, do you also give formula?
yes = 1; no = 0
24. If yes, what formula do you give?
Ready to feed = 1
Concentrated liquid = 2
Powder = 3
A mix/combination of both = 4
Other = 5
25. What is the brand name of the formula that you give?
Gerber with Iron = 1
Gerber low iron = 2
Gerber (Soy) = 3
Carnation Good Start = 4
Enfamil with Iron = 5
Isomil with Iron = 6
SMA = 7
Similac with Iron = 8
Nutramigen = 9
Prosobee with Iron = 10
Prosobee without Iron = 11
Alimentum = 12
Nursoy = 13
Other = 14
26. List other Brands of formula you have used in the past:
Gerber with Iron = 1
Gerber low iron = 2
Gerber (Soy) = 3
Carnation Good Start = 4
Enfamil with Iron = 5
Isomil with Iron = 6
SMA = 7
Similac with Iron = 8
Nutramigen = 9
Prosobee with Iron = 10
Prosobee without Iron = 11
Alimentum = 12
Nursoy = 13
Other = 14

27. How do you prepare the formula? (Dilution)
0 = no dilution
1 = 1 scoop + 2 oz of water
2 = dilute in the ratio of 1:1; 3 = other
28. What are the reasons for preparing formula the way you do?
Instructions on label = 1
Pediatrician's advice = 2
Mother told so = 3
Friend told so = 4
Sister told so = 5
Highly concentrated bad for baby = 6
Too dilute bad for baby = 7
29. What is the amount of formula you give per day?
Numerical (in oz) 0 - 32
30. How long does one can of formula last?
Numerical (in days) 0 - 4
31. What kind of formula do you use?
Ready to feed = 1
Concentrated liquid = 2
Powder = 3
A mix/combination of both = 4
Other = 5
32. What is the brand name of formula that you give?
Gerber with Iron = 1
Gerber low iron = 2
Gerber (Soy) = 3
Carnation Good Start = 4
Enfamil with Iron = 5
Isomil with Iron = 6
SMA = 7
Similac with Iron = 8
Nutramigen = 9
Prosobee with Iron = 10
Prosobee without Iron = 11
Alimentum = 12
Nursoy = 13
Other = 14
33. How long does one can of formula last?

Numerical (in days) 0 - 4

34. How do you prepare the formula?
0 = no dilution
1 = 1 scoop + 2 oz of water
2 = dilute in the ratio of 1:1
3 = other
35. What is the amount of formula that you give every day?
Numerical (in oz) 0 - 32
36. How long did you breast feed?
Numerical (in weeks)
1 = 1 week
2 =
3 =
4 =
5 =
6 =
7 =
8 =
9 =
10 =
11 =
12 =
37. For what reasons(s) did you stop breast-feeding?
Baby is growing = 1
Have to get back to job = 2
Mom advised to = 3
Friend advised to = 4
Pediatrician advised to = 5
Baby not gaining weight = 6
Baby needs variety in diet = 7
Time management = 8
Convenience = 9
Weight loss = 10
Pain in breast = 11
Baby seems to feel hungry = 12
Baby accepts bottle = 13
Other = 14
38. Does your baby take a bottle to bed?
yes = 1; no = 0

39. If yes, what is in the bottle?
Fruit juices = 1
Cereals = 2
Fruits = 3
Vegetables = 4
Non fruit juice beverages = 5
Non fruit juice liquids = 6
Milk=7
Infant formula=8
40. What is the amount per bottle?
Numerical (in ounces)
41. What is the number of bottles that your baby takes to bed everyday?
Numerical 1-4
42. Do you add any food/beverages to the bottle?
Yes = 1; no = 0
43. If yes, what do you add?
Fruit juices = 1
Cereals = 2
Fruits = 3
Vegetables = 4
Non fruit juice beverages = 5
Non fruit juice liquids = 6
Milk=7
Infant formula=8
44. What are the reasons for adding cereal to bottle?
Helps baby sleep better = 1
Baby will not feel hungry = 2
Mom advised to do so = 3
Baby will stop crying = 4
Sister does the same = 5
Baby too young for spoon feeding = 6
Helps baby eat more cereal = 7
45. How much cereal did you add to each bottle?
Numerical (in tbsp) 1 - 6
46. Do you change the nipple of the bottle (make it larger or smaller when you add cereal to the bottle)?

yes = 1; no = 0

47. Do you use a different nipple for cereals and for formula?
yes = 1; no = 0

SECTION C: OTHER BEVERAGES OFFERED

48. Does your baby drink milk?
yes = 1; no = 0

49. If yes, check one:
2% milk = 1
whole milk = 2
skim milk = 3
other = 4

Amount of milk per day: Numerical in oz. 0 - 32

50. Number of bottles of milk per day: 0 - 4

51. How many times a day does your baby drink the following beverages?

KDtime 0 - 6
JCTime 0 - 6
SDtime 0 - 6
HOfTime 0 - 6
ORtime 0 - 6

KDamt 0 - 32
JCamt 0 - 32
SDamt 0 - 32
HOamt 0 - 32
ORamt 0 - 32

SECTION D: SUPPLEMENTAL FOODS

52. Why did you add supplemental foods to your baby's diet?
Baby appears to be ready = 1
Baby drinks more than 32 oz of formula per day = 2

Doctor recommended = 3
Baby does not have nay problem = 4
Baby gets hungry soon = 5
Baby does not like formula = 6
Had to get back to job = 7
Baby sleeps better = 8
Belief about quantity = 9
Mom advised to = 10
Other = 11

53. What did the baby do that told you to add supplemental foods?

Baby was hungry immediately after feeding = 1
Baby was not gaining weight = 2
Baby accepted bottle-feeding = 3
Baby was crawling = 4
Baby had doubled birth weight = 5
Baby was not sleeping long enough = 6; Other = 7

54. What position do you hold your baby when you add supplemental foods?

Sitting position, ie within 30 degrees of upright = 1
Held in unusual position = 2
Baby was on mother's lap = 3
Baby was sitting with help; in position, outside mother's arms = 4
Baby was held in an unusual position = 5
Other = 6

55. If your baby is not held, how do you position your baby during feeding?

Put in baby carrie,r = 1
Booster seat = 2
Car seat = 3
Chair swing = 4
Infant seat = 5
Other = 6

SECTION E: SPECIAL DIETS AND VITAMIN AND MINERAL
SUPPLEMENTATION

56. Do you give your baby vitamin/iron drops?
yes = 1; no = 0

57. If yes, what kind?
 Fluoride drops = 1
 Multivitamin = 2
 Tri-vi-sol with Iron = 3
 Vdaylin = 5
 Pediaflor = 6
 Poly-vi-flor = 7
 Vi-daylin = 8
 Vi-daylin with Fluoride = 8
 Vdaylin plus iron = 9
 Poly vi sol with iron = 10
 Poly vi sol Infant = 11
- Daily = 1
 > 3 days and < 7 days/week = 2
 < 3 days/week = 3
 > 1 day = 4
58. Is your baby on a special diet now? If yes, check one
 yes = 1; no = 0
- allergy = 1
 weight reduction = 2
 specific formula from seeming intolerance = 3
 other = 4
59. In summary, how do you judge that your baby is rejecting formula, breast, or food?
- Spits out bottle = 1
 Closes mouth = 2
 Spits out formula = 3
 Stops sucking = 4
 Stops swallowing, just sucks = 5
 Head movement = 6
 Does not latch on = 7
 Expression changes; happy = 8
 Cries, screams, gets fussy = 9
 Hits breast = 10
 Makes certain noise; squeaking = 11
 Wiggles, fidgets, plays = 12
 Pauses, drinks slower = 13
 Loses interest = 14
 Goes to sleep = 15

Throws up = 16
Chokes = 17
Burps or hiccups = 18

60. What do you do when your baby rejects formula, breast or other foods?

Continue feeding = 1
Discontinue feeding = 2
Distract baby with toys and continue with feeding = 3
Other = 4

SECTION F: SOURCES OF INFORMATION

61. Who has been the most important source in talking to you about feeding your baby?

Mother = 1
Mother in law = 2
sister = 3
sister in law = 4
grandmother = 5
friend = 6
physician = 7
nurse = 8
birth classes = 9
observation = 10
LaLecheLeague = 11
Nutritionist = 12
Nurse = 13
Magazines = 14
Maternity Center = 15
Television = 16
Newspaper = 17
1-800-numbers = 18
other = 19

62. When?

During baby check up = 1
Before pregnancy = 2
During pregnancy = 3
After baby was born = 4

When mother was visiting = 5
When mother in law was visiting = 6
When sister in law was visiting = 7
When call Doctor's office = 8
During baby shower = 9
other = 10

63. Have any of the following persons talked to you about feeding your baby?

Family; yes = 1; no = 0
Friends; yes = 1; no = 0
Health professional(s); yes = 1; no = 0

64. Have you used any of the following sources of information about feeding your baby?

Television; yes = 1; no = 0

News or Newsweekly = 1
American Baby Show = 2
You and Your Baby = 3
Commercials = 4

Newspaper; yes = 1; no = 0

Wall Street Journal = 1
Articles on Breast-feeding = 2
Tennessean = 3
Family Section = 4
Articles on Nutrition = 5
Articles on Infant Feeding = 6
Other = 7

Magazines; yes = 1; no = 0

New Parent Advisor = 1
Healthy Kids = 2
Baby and you = 3
Parenting = 4
New Mothers = 5
Working Woman = 6
Glamour = 7
Good Housekeeping = 8

Child = 9
 Homes and Gardens = 10
 Self = 11
 What to expect when you are expecting = 12
 Sear's Baby Magazine = 13
 Working Mother = 14
 Redbook = 15
 Glamour = 16
 Lamez Magazine = 17
 McCalls = 18
 Parents = 20
 Femina = 21
 Eve's Weekly = 22
 American Baby = 23
 Lamez Baby Magazine = 24
 Mothering = 25
 Womans's Era = 26
 Femina = 27
 Eve's Weekly = 28

Books:

The Complete Pregnancy and Baby Book = 1
 Healthy Baby = 2
 What to expect when you are expecting = 3
 What to expect in Toddler years = 4
 Baby's Breast-feeding and Bonding = 5
 What to expect in the First Year = 6
 Books by Penelope Leach = 7
 Books by Dr. Spock = 8

65. Did you follow the recommendations given?
Yes = 1; no = 0
66. Recommendations of family, friends, health professional, television, newspaper, magazines and others

Put baby to breast immediately after baby is born = 1
 Do not put baby to breast immediately after baby is born = 2
 Give pre-lacteal feeds = 3
 Stop breast-feeding when baby gains weight rapidly = 4
 Feeding fruit juice to baby relieves constipation = 5
 Baby should not be given whole milk before one year = 6

Advice on how to breast feed = 7
 Do not feed the baby yellow vegetables = 8
 Advice on how to burp = 9
 Baby needs variety in the diet = 10
 Solid foods should be introduced when baby is 3 months old = 11
 Adding cereal to baby's bottle will help baby sleep through the night = 12
 Baby should not take bottle to bed = 13
 Should not add salt to baby's food = 14
 Do not give fruit juice when baby has cold = 15
 Cereal should be the first baby food = 16
 Fruits should be introduced into the baby's diet before introducing vegetables = 17
 Should introduce new foods into the baby's diet gradually = 18
 Should introduce new foods, only one at a time = 19
 Should give the baby more homemade foods and less commercial food = 20
 Should give vitamin supplements when baby is 6 months old = 21
 Feed Gripe water if baby has indigestion = 22
 If baby does not gain weight, start formula early = 23
 If baby cries at night, breast feed the baby = 24
 Start baby on a single grain cereal = 25
 If baby rejects a new food, do not continue feeding the baby with that food = 26
 Dilute baby's fruit juice with equal amounts of water = 27
 Give water before baby goes to bed at night = 28
 Give more water when start baby on formula = 29
 Give more water when start baby on solid foods = 30
 Refrigerate unused portion of baby food immediately = 31
 Do not put food back into the food jar once the jar has been opened = 32
 Read baby jar/food label to check ingredient list and storage instructions = 33
 Do not add cereal to baby's bottle = 34
 Test temperature of baby's food before feeding = 35
 Breast milk is the best for baby = 36
 Do not breast-feed on one breast for a long time = 37
 Start vegetables/solids when baby is 4-5 months old = 38
 Baby needs water to grow healthy = 39
 Feeding over concentrated formula to the baby causes dehydration = 40
 Mix baby cereal with fruit juice = 41
 Dilute juice with water in the ratio of 1:2 = 42
 Do not put the baby to bed with bottle = 43
 Feed the baby pureed foods = 44
 Introduce new foods during afternoon feeding = 45
 Do not feed the baby canned foods = 46

SECTION H : INFANT HEALTH AND ILLNESS STATUS

67. How many times have you taken the baby to the Doctor since he was born?
Numerical

68. Has the infant experienced any of the following conditions at or since birth?

Prolonged illness; yes = 1; no = 0

Hospitalization; yes = 1; no = 0

Harelip; yes = 1; no = 0

Deficient palate; yes = 1; no = 0

Excessive gag reflex; yes = 1; no = 0

Jaw hangs; yes = 1; no = 0

69. Has your baby been ill since birth?
yes = 1; no = 0

70. If yes, what were these illnesses?

Cold = 1

Ear infection = 2

Pneumonia = 3

APPENDIX XVI

RESPONSES FROM PILOT TESTING OF FEEDING BELIEF QUESTIONNAIRE

Response rate was 88% Seventy four per cent of Anglo American, 70 per cent of Asian Indian American and 67 percent of Asian Indian mothers living in India held baccalaureate degrees. Asian Indian American mothers had lived in the United States for an average of 6.3 years. Asian Indian American mothers' responses related to length of residence in the United States. Anglo American mothers strongly agreed with beliefs: The baby must be breast-fed on demand; Breast-milk should be offered when the baby is sick. Asian Indian American mothers strongly agreed with beliefs: Adding cereal to bottle helps the baby sleep through the night; Adding sugar to water prevents colic. Asian Indian mothers strongly agreed with beliefs: giving pre-lacteal feeds helps in the flow of urine; feeding fruit juices before four months causes cold; feeding lentils before four months results in diarrhea. Anglo American and Asian Indian American mothers did not differ significantly on two beliefs about: bottle to bed; breast-feeding during convalescence. Asian Indian American and Asian Indian mothers had significantly different mean scores on seven belief statements, three involving introduction of solid foods and four involving bottle feeding. Culture based differences in mothers' infant feeding beliefs existed among Anglo American, Asian Indian American mothers. Anglo American mothers' infant feeding beliefs reflect current recommended practices. The longer Asian Indian American mothers in Knoxville resided in the United States, the more similar their responses were to that of Anglo American mothers. Feeding beliefs of Asian Indian mothers living in India do not reflect current recommended feeding practices.

APPENDIX XVIII

World Health Organization^a reference values for weight for age and height for age for infants from birth to 12 months

Age of the infant (in months)	Weight (in lbs)			Height (in inches)		
	Centile			Centile		
	3rd	50th	97th	3rd	50th	97th
Birth	5.4	7.43	9.23	18.11	19.8	21.02
One	6.75	9.45	11.93	19.53	21.3	23.07
Three	9.23	13.3	16.43	21.85	23.74	25.7
Six	13.05	16.9	20.93	24.37	25.6	28.3
Nine	16.3	20.03	24.3	25.8	28.1	30.1
Twelve	17.8	22.3	26.8	27.6	29.6	31.7

^a=WHO (1983) Measuring Change in Nutritional Status. WHO, Geneva.

VITA

Srimathi Kannan was born in Coimbatore, Tamil Nadu, India on September 12, 1966. She attended Jawahar Higher Secondary School in Neyveli, Tamil Nadu, India and in May 1983, she completed the All India Senior School Certificate Exam obtaining the first rank among girls. In May 1986, she graduated with a Bachelor of Science Degree in Nutrition and Dietetics with Honors in Food Chemistry from Bharatidasan University, Tiruchi. In May 1988, she completed her Master of Science Degree in Nutrition majoring in Environmental and Industrial Health and was ranked second from Bharathiar University, Coimbatore. From January 1989 to July 1991, she worked as a Research Scientist in Avinashilingam University, Coimbatore, India with the U.S.D.A Foreign Agricultural Service Research, US-India Project PL 480.

In August 1991, she entered Graduate School at the University of Tennessee, Knoxville as a doctoral student and graduate research assistant in the Department of Nutrition. From August 1992 to July 1995, she was a graduate teaching assistant. She is a member of the Kappa Omicron Nu Honor Society. She has co-authored and presented 10 research papers at professional conferences. She received the Outstanding Teaching and Outstanding Research Awards from the Department of Nutrition (1994, 1995) and an Award for Outstanding Achievement in Student Research and the Young Professional Travel Award from the Society for Nutrition Education, USA (1995). She plans to continue her research and teaching interests in maternal and child nutrition.