INFANT FEEDING PRACTICES AND NUTRIENT INTAKE: A SURVEY OF TEN- TO FOURTEEN-MONTH-OLD INFANTS IN RICHMOND, VIRGINIA

by

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INTRODUCTION

The past fifty years have witnessed considerable change in infant feeding practices. The most noted of these changes is the decline in breast-feeding. In 1920, infants were primarily breast-fed; today, studies indicate only twenty percent of infants are breast-fed at one month of age, and only ten percent are breast-fed by four months of age (1). Another change is that solid foods have been introduced at a progressively earlier age. In the early part of the century, solid foods were seldom offered to infants before their first birthday (1); by 1963, Epps and Jolley (2) found all of the infants they surveyed were receiving solid foods by three months of age.

Another change, concurrent with the introduction of solids, is the earlier transition from semi-solid to table foods. This progression from strained or chopped foods is occurring at a younger age. Beal (3) demonstrated that while this transition to table food occurred at approximately two years of age in 1946, the change to table foods occurred at thirteen months of age by 1955.

Practices vary widely concerning the time when solids and table foods are introduced into the child's diet. Nutritionists and physicians have begun to evaluate the earlier introduction of semi-solids and the transition to

table foods, as well as the decline in the practice of breast-feeding. These changes in diet and feeding practices have implications for the health and the nutritional status of the young child.

The diet and feeding practices of the very young do affect growth, development, and later eating practices. Food practices established during the early years are believed to affect food choice and, consequently, nutritional status throughout life. The importance of evaluating the diet and feeding practices has been reinforced by recent studies which show an increased incidence of obesity, dental caries, and atherosclerosis occurring in early childhood. These health problems are highly complex issues, but they strongly suggest the need to evaluate food habits in infancy. The nutritional problem is that current infant dietary regimes may not adequately include preventive goals.

The nutritional status of preschool children, one to six years old, has been analyzed in four major nutritional surveys in the past ten years: the Ten State Nutrition Survey, 1968-1970 (4); the First Health and Nutrition Examination Survey, 1971-1974 (5); the Preschool Nutrition Survey, 1968-1970 (6); and North Central Region Nutrition Survey (7). These surveys have provided a wealth of information on dietary intake, and anthropometric, clinical and biochemical measurements which together give a comprehensive picture of the nutritional status of preschool children.

Beal's studies on the very young child (3,8,9,10,11) remain the foundation for studies on feeding practices of pre-school children, but the rapid changes in feeding practices necessitate more current information.

Results from these nutritional surveys and from most other research in the 1960's and 1970's were analyzed with various socioeconomic variables or with anthropometric and clinical measurements. In short, many of these previous studies describe the nutritional dimensions of poverty. The studies confirmed that, in general, children of poverty have lower dietary evaluations than children of greater affluence. These nutritional surveys have also established a reference point of mean nutrient intake. Since the work of Beal, very limited research has been published which correlates infant feeding practices to dietary nutrient intake. More work is needed to document current feeding practices and to relate this information to nutrient intake.

In view of the changes in infant feeding practices, coupled with the importance of establishing good feeding practices at a young age, nutritionists must constantly expand the data base on current feeding practices and on the nutrient level of infant diets.

This study will contribute to that objective by surveying the dietary nutrient intake and feeding practices among infants, ten to fourteen months old, in Richmond, Virginia. The focus of this study is to investigate bottle usage and

feeding frequency, and to examine the interrelationships of these feeding practices to nutrient intake.

Data from this study will be beneficial in three general areas: (A) in planning, implementing, and evaluating education; (B) in comparing current practices with recommendations of major medical organizations on infant feeding; and (C) in gaining an overview of current infant feeding practices in Richmond, Virginia.

The primary contribution of this information will be in the first area--planning, implementing, and evaluating appropriate nutrition education for mothers of very young children. Integral to the development of sound nutrition education is a knowledge of present feeding habits. Nutritionists are aware of the fact that nutritional guidance for mothers of infants may be of value not only in improving diets of the children, but also in establishing a lifelong pattern of responsible nutrition. The testing of the hypothesis should provide nutrition educators with basic information on the relationship of bottle usage from 10 to 14 months of age and feeding frequency to nutrient intake.

This research will also provide data which can be used to compare current infant feeding practices with the 1976 recommendations on infant feeding by the Committee on Nutrition of the American Academy of Pediatrics (12,13). Essentially, the Committee recommends that iron supplementation

and the use of infant formula or other heat-treated milk products continue through the first year of life.

Gaining an overview of current infant feeding practices in Richmond, Virginia, will be an additional contribution of this research. Regional differences in food consumption and dietary adequacy have been documented. To gain this regional information on infant feeding practices and dietary intake, a local population must be investigated.

The results from this study will enable the nutritionist to better cope responsibly with the ongoing changes in infant feeding practices by planning and implementing appropriate nutrition education programs.

REVIEW OF LITERATURE

Two major changes have occurred in infant feeding practices during the past 50 years. Breast feeding was once the predominant means of feeding the newborn; today, however, only a relatively small percentage of infants are breast-fed. In the 1920's, most children were introduced to solids around their first birthday; today, many children receive solid foods within the first few weeks of life. These changes in infant feeding practices have been documented by Beal in a longitudinal study (3,8,9,10,11) and have been the subject of several reviews (1,2).

During the past 20 years, nutritional investigations have continued to report nutrient intake and feeding practices of infants. In fact, these studies have become more comprehensive over a period of a few years. In the 1960's, Filer and Martinez (14), Epps and Jolley (2), and Kerry, Crispin, Fox, and Kies (15) explored the relationship of feeding practices to socioeconomic factors. Harris and Chan (16) studied both the community feeding practices and the advice of local physicians on infant feeding. Then, in the late 1960's, Guthrie (17) postulated the early introduction of solids may be a predisposing factor to later hypertension.

Filer and Martinez (14) surveyed over 4,300 randomly selected 6-month-old infants, and showed a mean iron intake of 8.9 mg with a standard deviation of 6.7 mg. Cereal provided 50% of the mean daily iron intake. The wide range of iron intake reflected a wide variability in cereal intake. Other sources of iron included meat, vegetables, eggs, and fruit.

The mean caloric intake was 803 calories per day. A large standard deviation of caloric intake reflected individual and daily fluctuations in appetites. Seventy percent of the calories was from milk formula, 10% from fruit, and 4% from cereal. Although no significant difference in total calories ingested was seen in various demographic characteristics, infants with mothers of limited education had lower iron intake, lower cereal intake, and higher milk consumption.

Epps and Jolley (2) studied over 500 infants less than 6 months old from the Child Health Clinics of the District of Columbia Department of Public Health, and revealed a high incidence of early feeding of several solid foods, including cereal, fruits, vegetables, meat, and egg yolk. This study indicated 83% of the infants were taking solids at 1 month of age, 96% by 2 months, and virtually 100% by 3 to 5 months of age. The feeding of table foods was also found in occasional infants. Race, birth weight, sibling

order, maternal age, and maternal education were independent of the prevalence of feeding solids.

The work of Kerry, Crispin, Fox, and Kies (15) used a 3-day food record to compare nutrient intake of children 3½ to 5½ years from two socioeconomic levels. Mean dietary intake of protein, fat, calcium, vitamin A, thiamine, riboflavin, ascrobic acid, panthothenic acid, and niacin met or exceeded the recommended dietary allowances for both groups of children. Both groups were similar in that mean iron and caloric intakes were slightly lower than the recommended allowances. However, children of the lower socioeconomic status received diets providing more iron and thiamine, whereas, those of the higher socioeconomic status group had greater dietary intake of ascorbic acid and vitamin A.

To evaluate infant feeding practices, and to assess the advice of physicians on infant feeding practices, Harris and Chan (16) surveyed 373 infants, 10 to 25 years old, from the Well Child Clinic of the Mayo Clinic in Rochester, Minnesota, as well as 49 physicians from the community.

In that study, 57% of the infants were taking whole milk by 4 months of age, and 84% by 6 months of age. Seventy-nine percent of the mothers used terminal method of sterilization. Sixty-one percent of the mothers discontinued sterilization of formula, bottles, and nipples by 4 months of age, and 89% by 6 months of age. The majority of the mothers, 85%, were still warming the milk for

6-month-old infants, and 23% were warming the milk for infants 1 year of age or older.

The introduction of solids was also studied by Harris and Chan. At 1 month of age, 80% of the infants were receiving cereal and 52% were receiving fruit. By 2 months of age, those infants receiving fruit had increased to 83%.

Harris and Chan also found that before or around 1 year of age, 78% of those surveyed had discontinued nutrient supplements, and by 18 months of age, 96% were no longer receiving supplements.

The survey of physicians showed a wide range of infant feeding advice on the duration of sterilization and on nutrient supplementation. However, physicians agreed that the order for introduction of solids was cereal, fruit, and vegetables, but showed a great variation in the suggested age for introduction of these foods.

Guthrie (17) in a study of 89 infants, reported 35 were being fed a mixed diet by 3 weeks of age and all 89 infants received solid food by 9 weeks of age. The sodium content of the diet was elevated when the infant received solid food. In Guthrie's analyses, the earlier a child was introduced to solid food, the higher the sodium content of his diet.

It is the work from the 1960's that has laid the foundation for the more comprehensive and sophisticated nutritional research in this decade. Both the field

research and the surveys of child nutrition have expanded. In general, most nutrition researchers (18,19,20,21,22,23, 24,25) are expanding the socioeconomic variables and defining the ecologic variables which influence a child's nutritional status. (It should be noted that only two of these studies, Caliendo (24) and Sabry (25), investigated the child less than two years old.) Likewise, the study of feeding habits has expanded to provide a complete nutritional picture, i.e., the nutritional status of the child.

Both the methods and monies used to conduct nutritional surveys have expanded during the last decade. Three national studies (4,5,6) and one extensive regional survey (7) have increased our knowledge of child nutrition. With the introduction of computer science, in conjunction with these extensive surveys, came the possibility of almost unlimited data and, therefore, numerous interpretations of that information. For example, after the Ten State Nutrition Survey was reported in 1972 (4), several articles in the literature quickly followed dealing with specific data from that survey. The American Academy of Pediatrics established a special Ad Hoc Committee to review the Ten State Survey and published several articles, including "The Ten State Nutrition Survey: A Pediatric Perspective" (26); "Trends in Fatness and the Origins of Obesity" (27); "Nutrition, Growth, Development, and Maturation: Findings from the Ten State Nutrition Survey of 1968-1970" (28); and "Reflections on

Dietary Studies with Children in the Ten State Nutrition Survey of 1968-1970" (29).

Research in the 1970's has also explored the nutritional status of various minorities. For example, Yanochik-Owen (30) and Horner (31) have conducted several studies on the American-Indian preschool population. It is this minority that is perhaps receiving the least nutritionally adequate diet in the United States. Another example of a preschool nutritional status study of minorities is that of the Mexican-American child by Larson (32).

Within the state of Virginia, research in the 1970's has been limited. Two studies are available that reported aspects of nutrition of the very young child. Wentworth (33) focused on the mineral intake of nine infants in a longitudinal study over a 9-month period. Hunt, Legrand, and Hitchcock (34) studied a representative sample of 828 adults and children in Loudoun County, Virginia, and showed a correlation between nutritional and health related status.

In summary, the major trends in infant feeding practices during the past 50 years have been the decrease in the frequency of breast feeding and the progressively earlier introduction of solids into the infant's diet. Both of these changes may have an affect on the child's health and eating habits in later life. Because the change

is progressive, the knowledge of current trends in infant feeding practices must be continuously revised.

A review of infant and preschool nutrition research during the past 20 years also shows a progression. Extensive nutrition surveys by government agencies and comprehensive research projects by large institutions provide virtually unlimited information and data for evaluation. However, with the regional differences in food habits, grassroots nutritionists must examine and evaluate community practices in each locale and integrate this knowledge with the wealth of information available from the more comprehensive investigations. This unique data from each locale can be used to design and modify infant nutrition education programs appropriate for the young children in that area.

PROCEDURES

During March, 1978, data on infant feeding practices and nutrient intake was collected on 34 infants 10 to 14 months of age in Richmond, Virginia. Information was collected by reviewing the medical record, and from an interview schedule, a self-administered questionnaire, and two 24-hour dietary records. An explanation of each step in the flow of the procedure is described in this section.

Sample selection

A non-probability purposive sample of 46 infants, between 10 and 14 months old, was chosen from among the office patients of one private pediatrician. Of these 46 infants, investigator arranged interviews with mothers of 34 infants. Of these 34 mothers, all completed the entire study. Because of the pediatrician's association with a large urban medical center, his infant population is drawn from families in the Central Virginia area with a wide range of educational, economic, and regional backgrounds, and includes many families affiliated with the medical complex.

A sample of 30 or more was needed to use two categories in establishing chi-square correlation. Thus, 46 mothers, rather than 30, were contacted, as attrition was anticipated. Of the 46 infants that were selected to

participate in the study, the investigator was unable to arrange an interview with 12 of the mothers. Six of these 12 mothers could not be located by telephone or at the address given in the medical record. One infant was hospitalized; one on an extended out-of-state trip; and one mother was unwilling to participate during the data collecting period. Two infants passed the upper end of the age range criteria, and one was moving out of the country before an interview could be arranged.

Of the 34 mothers interviewed, 100 percent provided sufficiently complete data to calculate the nutrient intake. The investigator achieved this unusual high return by offering hours of encouragement, assistance, and motivation.

Three infants that completed the study were being breast-fed. These 3 infants will be reviewed in a later paper using a protocol more appropriate to approximate and evaluate nutrient contribution of breast milk to the total diet. The data from these 3 infants will not be included in the results of this study.

The sample was selected by an alphabetical hand search of the pediatrician's medical records. All children that met the following criteria for admission to the study were included:

a) children born between January 8, 1977 and May 17, 1977;

b) children living in the Richmond metropolitan area;
c) no diagnosed abnormal metabolic or physical condition which would have interfered with normal feeding;
d) currently under the care of the pediatrician to meet their health care needs; and
e) non-institutionalized.

In addition to these criteria, the infant must have been between 10 to 14 months of age, inclusive. The infant's age was calculated from the date of the investigator's interview with the mother. It is this age that was used throughout the data collection and interpretation.

Review of the medical record

The pediatrician's medical records of these 46 infants were reviewed to obtain address, telephone number, parent's name, demographic data, weight and nutritional history.

For the purpose of this study, medical record will refer to the pediatrician's record of office visits including well baby checks as well as sick visits. These records include the pediatrician's written comments and often other notes from the pediatric nurse practitioner student and health professional students. The Investigator's Worksheet, page 1 (Appendix A), was used to record information from the medical record.

Although the nutritional history from the medical record was not used as data in this study, the investigator felt a working knowledge of each infant's nutritional history would enhance the rapport with the mother.

The weights of the infants were obtained from the medical record if recorded within the 30-day period prior to the interview date. Weights in the pediatrician's office are recorded by trained personnel on a beam scale that is maintained on a regular schedule. Infants were nude except for a dry diaper when weighed. Weights for those infants that were not weighed in the pediatrician's office within the 30 days prior to the interview date were extrapolated from three or more points as plotted on a National Center for Health Statistics weight chart. Weights determined from both methods were then rounded to the nearest whole kilogram. Since the weights were only used to calculate calories per kilogram body weight, and protein grams per kilogram body weight, the investigator felt these methods of weight determination were adequate.

Disadvantages of the investigator obtaining a weight at the site of the interview were two-fold. First, the motion of transporting and moving a beam scale would no doubt have resulted in inaccurate weights. Second, the rapport with the mothers and their cooperation to obtain two 24-hour FOOD AND BEVERAGE RECORDS may have been jeop-

ardized if the mother would have been asked to undress the child, change the diaper if wet, take off the infant's shoes, wake the child if sleeping and then hand the infant to the investigator for weighing.

Introduction of the study to the mother

Mothers of these 46 infants were contacted by letter from the pediatrician and encouraged to participate in the study. The content of the letter is given in Appendix B.

Within three weeks after the arrival of the letter, the investigator telephoned the mother and again explained the study. If the mother agreed to participate, she was scheduled for an interview. All interviews were scheduled for a time and place convenient for the mother.

For the purpose of this study, the term "mother" was used to denote parent responsible for feeding the infant.

A record of this telephone contact was recorded on the Investigator's Worksheet, page 2.

Personal contact with the mother

At the prescheduled time and site, the investigator met with each mother. All contact with the mothers was made by the investigator, a registered dietitian familiar with infant feeding practices. The following steps outline the flow of the contact with the mother:

A. Introduction and explanation

B. Completing the INTERVIEW schedule (Appendix C)

C. Explaining the two-day FOOD AND BEVERAGE RECORDS (Appendix D)

D. Explaining the QUESTIONNAIRE (Appendix E)

E. Explaining the return of the later two instruments

F. Thanking the mother for her cooperation

After a short introduction, the investigator proceeded to conduct the INTERVIEW schedule. After completing the Interview schedule (step B above), instructions--both verbal and written--asked the mother to itemize all foods and beverages consumed by the infant from two typical days. These two days were not necessarily consecutive. Specific description of amounts, preparation method, brand names of commercial products, and approximate time of intake, was solicited. Since infants of this age are often messy with their eating, mothers were asked to appraise actual intake as opposed to amount served. After explaining the need for two 24-hour FOOD AND BEVERAGE RECORDS, the investigator showed the mother several glasses, measuring cups and spoons, and food models to emphasize "amounts" of intake. The investigator then worked with the mother to record the infant's intake on the day of the interview up to the time of the interview.

Next the interviewer explained the three-page QUESTIONNAIRE (Appendix E). The mothers were asked to complete the

QUESTIONNAIRE and two 24-hour FOOD AND BEVERAGE RECORDS within a week of the interview. A stampled self-addressed envelope was supplied by the investigator. Those mothers failing to return the envelope were reminded by telephone. As necessary, additional visits, calls, forms, and encouragement were used to motivate mothers to return the two instruments.

All three instruments used to collect recorded data--the INTERVIEW, the FOOD AND BEVERAGE RECORD, and the QUESTIONNAIRE--were designed for this study by the investigator. Several models or concepts used in infant nutrition surveys (36,37) served as references for the investigator. Most questions were multiple choice; however, a few open-ended questions were included. Responses to the open-ended questions were tabulated on a rough matrix in order to cluster responses into categories. Each category was assigned a code. Warwick and Lininger (38) in their text The Sample Survey: Theory and Practice emphasize advantages of open-ended questions. "The chance of the respondent to have his own say-so with ideas which chosed-ended questions would not permit offers incentives for continued interest in the interview." Indeed, incentives for continued interest were needed in this study if the mother was to successfully maintain two 24-hour records.

All three instruments were critiqued by local dietitians and were pre-tested with several mothers. Content and clarity were improved with revisions after the pre-testing process.

After leaving the interview site, the investigator evaluated the interview setting by completing the appropriate form (Appendix F). It was on this form that observed data was recorded.

Coding and Keypunching

Data from all three instruments and the Investigator's Worksheet were coded according to a predetermined coding procedure. The investigator converted the estimated quantities of food ingested to gram weight. Food items eaten were coded according to Home and Garden Bulletin No. 72, revised (39) and Recall Food Selection Guide (40). This was then keypunched according to the standard procedure for computer processing.

Computer processing

All computer processing was carried out at the VPI-SU Computer Center, using the Richmond terminal. Both the Diet Analysis Program (41) and the Statistical Analysis System (42) were used. The Diet Analysis Program provided an estimate on the protein, carbohydrate, fat, calcium, riboflavin, thiamine, niacin, vitamin A, and ascorbic acid

content in the diets of the subjects. In addition to the daily average nutrient intake for each infant, the Diet Program provided other descriptive data.

The Statistical Analysis System was used to utilize data from the Diet Analysis Program. Using the Statistical Analysis System (42) provided descriptive and statistical results.

RESULTS and DISCUSSION

This study produced a substantial amount of data and provided numerous possibilities for analysis and description. The investigator chose to focus this report on selected characteristics that present an overview of the infant feeding practices and nutrieint intake of the sample.

Table I summarizes demographic characteristics of the 31 subjects of this study, alongside of corresponding demographic characteristics derived from the 1970 census of the Richmond, Virginia, Standard Metropolitan Statistical Area (43). The infants providing data are not intended to represent a random or representative sample of all 10- to 14-month-old infants in the Richmond area. The purpose of Table I is to give the reader a convenient guide for comparing those infants who participated in the study with the infant population of the metropolitan Richmond area. The weight, age, and sex of the infants are given in Table II.

The mean daily nutrient intake calculated from the two 24-hour FOOD AND BEVERAGE RECORDS are given for each of the 31 infants in Table III. These intakes include both food and beverage sources as well as vitamin and mineral supplements. Great individual variation is seen in caloric and most nutrient intakes. Other studies have also reported a wide range in individual nutrient intake (4,5,6,7). The investigator avoided drawing inferences or conclusions on the

Table I

Selected Demographic Characteristics of 31 Infants in the Study and of Richmond, Virginia Standard Metropolitan Statistical Area (43)

Characteristic	Infant Feeding Practices and Nutrient Intake Study N=31	Richmond, Virginia Standard Metropolitan Statistical Area
Sex		
Male	61% (19)	51%[a]
Female	39% (12)	49%[a]
Race		
White	77% (24)	75%
Non-White	23% (7)	25%
Median School Years Completed	15.5 years[b]	11.7 years[c]
Persons per Household	3.90	3.08

Numbers in parentheses are numbers of infants.

[a]Children under 3 years

[b]Mean of parents

[c]Persons 25 years old or over

Table II

Sex, Age, and Weight of Infants Participating in the Study

Code	Sex	Age (months)	Weight (kilograms)
01	F	11.2	10
02	M	12.9	10
03	F	13.2	11
04	M	13.0	9
05	M	11.4	10
06	M	14.0	9
07	M	13.9	12
08	F	13.0	9
09	F	10.1	9
10	F	13.0	12
11	M	10.3	10
12	M	12.3	10
13	M	13.9	10
14	M	13.5	11
15	M	10.0	8
16	M	11.2	10
17	F	11.8	10
18	F	11.3	10
19	M	11.0	8
20	F	10.7	14
21	M	13.6	10
22	M	13.4	10
23	F	13.1	11
24	F	11.5	11
25	M	12.0	10
26	M	13.6	11
27	F	14.0	8
28	M	10.3	11
29	M	13.2	10
30	F	12.9	11
31	M	10.3	9

Table III

Mean Nutrient Intake of Infants

Calculated from Two Twenty-hour Records

Infants	Calories (c/kg)	Protein (g/kg)	Calcium (mg)	Iron (mg)	Vitamin A (IU)	Thiamine (mg)	Ribo-flavin (mg)	Niacin (mg)	Ascorbic Acid (mg)
01	1219	61	949	7	15043	1.14	2.29	7.7	107
02	1217	34	843	11	3946	0.90	1.14	7.1	69
03 S	834	23	848	16	7074	0.76	1.13	4.4	335
04	957	46	923	5	2215	0.60	1.45	7.0	12
05	687	28	353	7	14435	0.70	1.33	11.2	93
06 S	1104	42	743	6	5670	0.83	1.21	5.3	220
07	1702	82	1152	10	2936	1.00	2.39	8.9	56
08 S	1181	50	1005	6	3880	0.86	1.02	7.7	47
09	1003	50	761	5	6158	0.60	1.22	8.7	64
10 S	1021	42	785	6	2210	0.60	1.51	5.1	34
11	752	31	430	16	6354	0.95	1.38	6.1	68
12	1462	56	1273	6	2869	0.71	1.84	6.3	99
13 S	1016	47	646	7	1535	0.96	1.49	5.2	50
14	840	48	1033	6	1303	0.62	1.62	3.9	14
15	641	39	489	7	989	0.39	0.92	5.0	14
16 S	1061	28	407	7	8463	0.66	1.40	5.3	299
17 S	840	49	916	5	3692	0.64	1.48	7.4	28
18	1083	29	651	14	6209	0.69	0.74	10.3	58
19	1231	58	1039	6	2937	0.76	1.74	8.1	58
20 S	578	30	513	3	1058	0.52	1.06	6.0	67
21	843	19	157	6	6794	0.30	0.72	3.8	48
22	666	22	547	2	1122	0.23	0.81	4.6	7
23	622	13	447	16	2723	0.80	0.92	4.2	119
24	651	19	185	5	1387	0.29	0.35	4.7	51
25	1141	46	872	5	3254	0.92	1.28	5.7	89
26	1096	39	319	8	4574	0.78	0.74	9.1	259
27 S	1051	36	578	6	5630	0.69	0.86	6.3	212
28	1016	43	447	17	1035	0.58	0.84	11.5	44
29 S	760	16	539	19	2023	0.91	1.09	4.4	57
30	884	42	748	6	753	0.64	1.23	7.5	55
31 S	939	23	708	40	1624	1.27	1.28	11.4	49

S = Infants receiving vitamin and mineral supplements

nutrient intake of individual infants since it cannot necessarily be assumed that the two 24-hour dietary records are a true representation of the infant's diet. In fact, this data was only used to analyze nutrient intake of the group.

Both the 1974 Recommended Dietary Allowances (RDA) of the National Research Council (44) and the First Health and Nutrition Examination Survey (HANES) standards were used to evaluate the nutrient intake data from this study. The mean intake and standard deviation for calories and the eight nutrients of the infants studied are presented alongside the percentage of intake to the RDA and the HANES standard in Table IV. (The contribution of the vitamin and mineral supplements were also included in the group's mean.) Caloric and protein intake were determined for kilogram body weight.

Following the practice established by Owens (6) in the Preschool Nutrition Survey, two-thirds of the RDA was used as the arbitrary standard for nutritional adequacy. Nutrient intake of iron, calcium, and the five vitamins studied were considered "adequate" if two-thirds of the RDA was met. Thus, for the purpose of this report, two-thirds of the RDA will be used to evaluate the intake of these seven nutrients.

Analyses of this nutrient intake data revealed that the infants exceeded or were compatible with the recommended allowance for all nutrients except iron. However, for all nutrients studied, some of the infants fell below the RDA and

Table IV

Mean Nutrient Intake, Standard Deviation, and Percentage of Standards of RDA and HANES

	Calories (c/kg)	Protein (g/kg)	Calcium (mg)	Iron (mg)	Vitamin A (IU)	Thiamine (mg)	Ribo-flavin (mg)	Niacin (mg)	Ascorbic Acid (mg)
Mean	94	3.9	687	11	4,771	0.88	1.4	9.4	103
Standard Deviation [a]			280	7.6	3,659	0.37	0.6	4.3	94
1974 RDA(42) (0.5-1.0 yr.) (1-3 yrs.)	108	2.0	540	15	2,000	0.5 / 0.7	0.6 / 0.8	8 / 9	35
% RDA (0.5-1.0 yr.) (1-3 yrs.)	87	1.95	127	73	239	176 / 126	233 / 175	118 / 104	292
HANES standard (12-23 months)	90	1.9	450	15	2,000				40
% HANES standard (12-23 months)	104	205	153	73	239				258

[a] Standard deviations are recorded as ±

the HANES standard even though the mean intake was adequate. More infants fell below the standards for calories and iron than for any of the other nutrients.

Mean caloric intake was 971 calories with a standard deviation of 254. The range of caloric intake was from 578 to 1,702 calories per day. This wide range in caloric intake of individual infants was due to day-to-day variations in individual infant's eating habits as well as differences in appetite, body size, activity and rate of growth.

Mean calories per kilogram body weight was 98 with subjects ranging from 41/kilogram to 154/kilogram. Approximately one-half of the infants had energy intake in excess of the RDA, and one-half fell below the RDA. The HANES standard for 12- to 23-month-old infants is 90/kilogram. Thirty-nine percent of the 31 infants fell below this standard. For the two-day period studied, 10% of the infants had less than 50 calories/kilogram.

Mean caloric intake per kilogram body weight of this group was slightly lower than but compatible with both the RDA and the HANES standard. Mean caloric intake per kilogram body weight was 90% of the RDA for infants 0.5 to 1.0 year of age and 108% of the HANES standard for infants 12 to 23 months old. However, a substantial proportion of the infants had a low caloric intake.

Owen (6) and Eppright (7) have both documented a wide range in caloric intake and a similar mean daily caloric

intake. Owen reported a mean daily intake of 1,051 calories for infants 12 to 23 months. Eppright reported a mean daily intake of 1,199 calories for infants 9 to 18 months.

Thirty-three percent of the calories was contributed by fat. Mean fat intake was 36 grams with a standard deviation of 15.1. Lowest fat intake was 11 grams and highest fat intake was 182 grams. Again, great individual variations were seen by this wide range in daily intake of fat. This fat intake is compatible with Bowering (45) findings for 56 infants 11 to 13 months of age. Bowering found the daily fat intake remained in the range of 30-40 grams between 1 and 15 months of age. The daily fat intake was slightly lower than that reported in the major surveys (4,5,6,7).

Mean protein grams per kilogram was 3.9 and ranged from 1.2 grams per kilogram to 7.3 per kilogram body weight. Ten percent of the 31 infants were below the HANES standard for protein of 1.9 grams per kilogram. (All infants that fell below the standard also had a c loric intake below the standard.) The mean daily protein intake was 38 grams; standard deviation was 15. This daily protein intake mean was also slightly lower than that reported in the major survey (4,5,6,7). Protein provided 16% of the calories. Eppright (7) found protein contributed 18% of the calories. In the Ten State Nutrition Survey (4) and the Preschool Nutrition Survey (6), protein contributed 17% of the calories of infants less than 18 and 24 months respectively.

The mean daily calcium intake was 687 milligrams ranging from 157 to 1273 milligrams. Sixteen percent of the infants fell below the Recommended Dietary Allowances for calcium; and, 29% of the infants fell below the HANES standard. Other nutritional surveys (4,5,7) have found slightly higher calcium intakes than that found for this study. However, the 687 milligrams mean calcium intake was almost identical to the calcium intake found by Owen in the Preschool Nutrition Survey in children 12 to 23 months of age.

Iron was the nutrient found to be low in the diet most often. Fifty-five percent of the 31 infants were found to be below two-thirds of the RDA and 10% of the infants fell below one-third of the allowance. The mean daily iron intake of these three infants was 4.2 milligrams. Table V summarizes the distribution of the mean iron intake of the infants in regard to the Recommended Dietary Allowances. Using the standard from the First Health and Nutrition Examination Survey, 42% of the infants had adequate intake and 58% had inadequate intake.

Mean daily iron intake was 11.2 milligrams ranging from a high of 40 milligrams to a low of 2 milligrams. Of the nutrients studied, iron was the only nutrient for which the mean daily intake fell below both the HANES standard of 15 milligrams and two-thirds of the RDA of 10 milligrams iron.

The low iron intake of this group of infants may be a result of the transition from infant feeding regimes dis-

Table V

Distribution of the Percent of Recommended Dietary Allowance Met for Iron by Infants Participating in the Study

Percent RDA	Number of Infants	Percent of Infants
100 Percent and Above	12	39
67 to 99 Percent	2	6
50 to 66 Percent	1	3
Below 50 Percent	16	53

cussed later in this report. Approximately 60% of the infants were no longer receiving iron-fortified formula and three-fourths of the infants were no longer receiving iron-fortified infant cereal. Over the past ten years, iron has repeatedly been the nutrient found to be low in the diets of infants in the United States (4,5,6,7,44). The results from this study also indicate iron is a problem nutrient.

The mean daily intake of vitamin A (4,770 IU) was more than double the Recommended Dietary Allowance. The vitamin A intake ranged from 15043 IU to 753 IU. Ten percent of the infants had over 10,000 IU daily, yet 16% of the 31 infants fell below two-thirds of the RDA. Nineteen percent fell below the HANES standard. Other surveys have also identified very high vitamin A intakes (4,5,6,7). The 1- to 5-year-old population studied in the First Health and Nutrition Examination Survey (5) had a vitamin A intake of 163% of the standard. The vitamin A intake was 239% of the same standard for the 31 infants of this study. Although the mean intake of vitamin A exceeded both standards, approximately one-fifth of the infants may need to increase their intake of vitamin A sources.

The intake of three of the B-complex vitamins was calculated--thiamine, riboflavin, and niacin. A two-third's intake of the Recommended Dietary Allowance, or greater, was achieved for thiamine, riboflavin, and niacin by 94%, 97% and 81% of the infants, respectively. Mean daily intake of

thiamine was 0.88 milligrams; of riboflavin, 1.43 milligrams and of niacin, 9.35 milligrams. Nutrient intake data for these three B-complex vitamins from both the Ten State Nutrition Survey and the HANES are quite similar to that found in this study.

Ascorbic acid intake was above two-thirds of the Recommended Dietary Allowances for 87% of the infants studied. The mean daily intake was 103 milligrams per day, with a standard deviation of 94. Although the vitamin C intakes tended to be high, the range of ascorbic acid was from 7 milligrams to 370 milligrams daily. Only 10% of the infants received less than two-thirds of the RDA.

The mean daily ascorbic acid intake was 292% of the Recommended Dietary Allowance and 258% of the standard used in the First Health and Nutrition Examination Survey.

In summary, mean daily nutrient intake for calcium, vitamin A, thiamine, riboflavin, niacin, and vitamin C were above the Recommended Dietary Allowance and the First Health and Nutrition Examination Survey standard. Iron was the only nutrient that mean daily intake fell below both standards. On the whole, daily nutrient intake means were slightly below the corresponding means from the major nutrition surveys of this decade.

Data on infant feeding practices was obtained from the mothers of all 31 infants. This data included feeding fre-

quency and bottle usage, as well as the use of formula and milk, vitamin and mineral supplements, and commercial infant foods.

When mothers were asked, "How many times in a 24-hour period does your child have regular scheduled feedings," 29 out of 31 mothers reported 3 meals. One child ate 2 meals each day and one ate 4 meals each day.

Feeding frequency was determined by counting the number of times in a 24-hour period the infant received food and/or beverage, including both meals and between-meal feedings. The mean daily feeding frequency was 6.7, with the number of feedings ranging from 3 to 12. Thirty-eight percent of the infants received food or beverages during the night. (Night feedings were included in calculating total frequency of feedings.) Sixty-five percent of the infants received a bedtime snack. Ten percent of the mothers reported their infants ate only three meals each day with no in-between foods or beverages.

Of the 31 infants studied, only 6% were weaned from the bottle completely. Several mothers reported they were in the process of weaning by slowly decreasing the number of bottles offered in a 24-hour period. This transition was also reflected by the fact that all but 16% of the infants drank out of a cup one or more times daily. Slightly more than half of the mothers reported the infant could "hold

their own cup." The mean total bottles each 24 hours was 4.4 (and of these, 1.5 were given in the crib).

The use of milk in the diet was also explored. Mothers were asked about type, amount, and frequency of milk their infants received. Approximately one-half of the infants were on cow's milk and the other half were on commercial infant formula. Table VI shows the various milk types used by the infants. Of the infants less than 12 months old, 54% were receiving an iron-fortified infant formula. Of those infants over 12 months old, 28% were receiving an iron-fortified formula. Because of the limited sample size, this was not a significant statistical relationship, but the trend in decreased use of iron-fortified formula after the first birthday was evident.

Commercial infant foods (including infant cereals but excluding formula) were used by 74% of the infants at least one time weekly. When mothers were asked about the various food groups within the commercial infant foods, 20 to 45% reported using items from each food group at least one time each week. Table VII shows the frequency of usage of commercial infant foods. Infant cereal, meats, vegetables, and fruits were the four groups used more frequently. One hundred percent of the infants were receiving at least some table foods daily. By far, the most common practice was the combination of mainly table food with a limited amount of commercial infant foods.

Table VI

Frequency and Percentage of Infants

Currently Using Various Milk Types

Types	Frequency	Percentage
Cow's Milk		
Whole	10	32
2%	5	16
Skim	1	3
Subtotal	16	51
Formula		
With Iron	12	39
Without Iron	3	10
Subtotal	15	49

Table VII

Percentage of Infants Using

Commercial Infant Foods

One or More Times Weekly

Food Group	Percentage
Infant Cereal	39
Juice	29
Meat	39
Vegetables	39
Fruits	45
Desserts	23
Combination Dinners	23

Next to milk, juice was the beverage most often given in the bottle and cup. However, a substantial number of infants were receiving Tang, Kool-aid, and tea. In addition, many infants were receiving "sips" of various beverages from their mother's glass.

Approximately one-third of the infants received no water each day, one-third received less than 4 ounces, and one-third received 4 to 32 ounces. Sugar was added to the water of 13% of the infants.

Thirty-nine percent of the infants were receiving various types of infant vitamin and mineral supplements. A variety of eight types of supplements were used; three of these contained iron. All eight types were infant supplements as opposed to children or adult supplements, and all supplements were given in the recommended quantity. However, one child received one dose each of two types of supplements daily and one child received only one dose per week.

In one-half of the infants using supplements, the supplement improved an otherwise inadequate nutrient intake. In one infant, vitamin A was brought above standards and in five infants, iron was brought above standards by the contribution of the supplement.

Figure 1 portrays the differences of the mean daily nutrient intake of the 31 infants with and without the vitamin and mineral supplements. Mean nutrient intake expressed

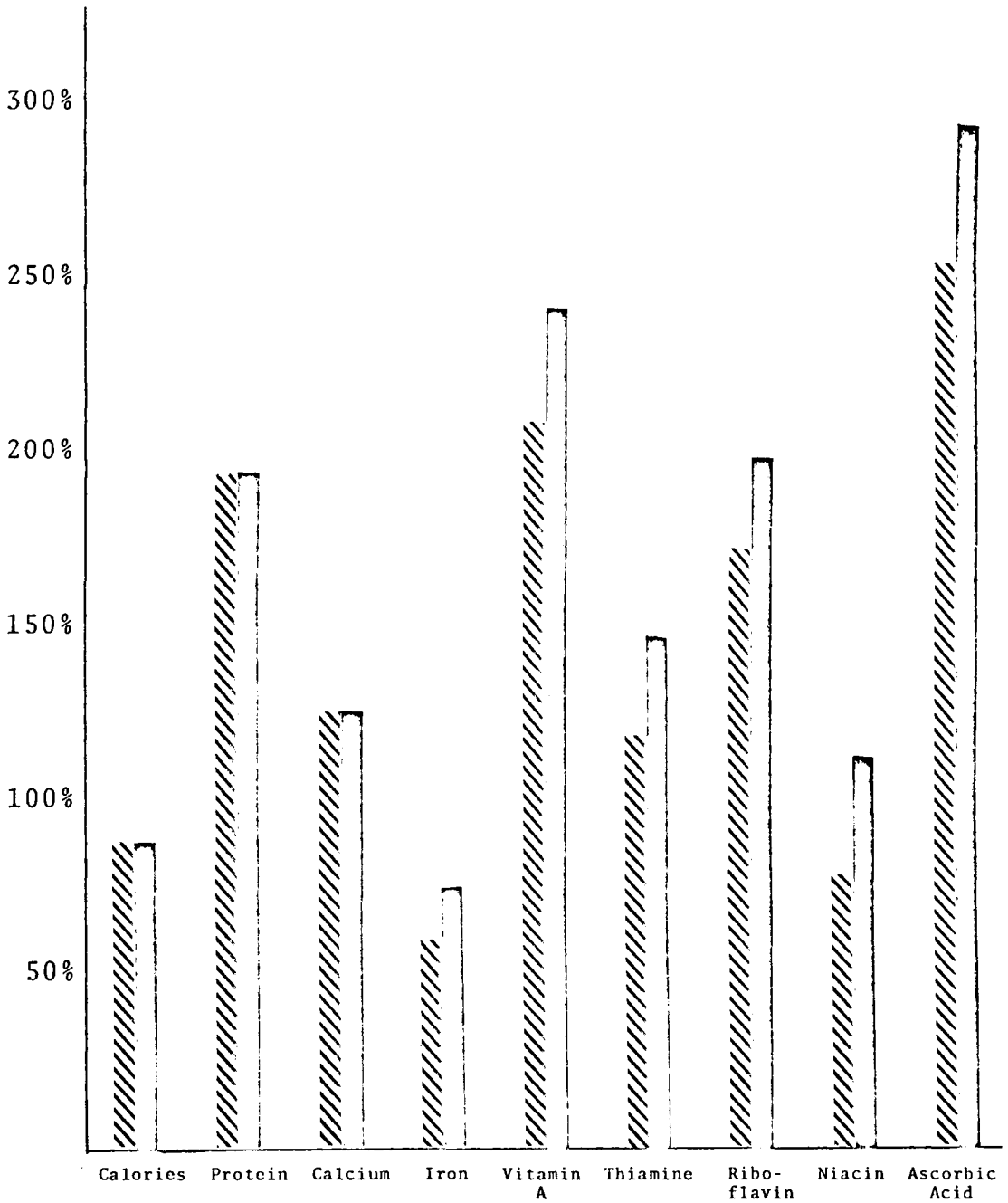

FIG. 1. Percentage of Recommended Dietary Allowances (42) fulfilled by mean daily nutrient intake. //// = Mean from food intake. ▭ = Mean from food and supplement intake.

as percent of RDA is only slightly greater when the contribution of the supplement is included. However, when mean nutrient intake of the infants not receiving supplements is compared to mean nutrient intake of infants receiving supplements, a substantial increase in iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid is found. This difference is shown in Figure 2.

Chi-square analysis was used to determine the nature of the relationships between feeding frequency and selected nutrient adequacy, and between bottle usage and selected nutrient adequacy. These relationships are summarized in Table VIII. No statistically significant relationship was revealed.

The investigator had chosen this 10- to 14-month-old age group anticipating approximately 50% of the infants would have completed the weaning process. However, the study revealed only 6% of the infants were weaned from the bottle. Thus, due to the small number of infants weaned from the bottle, it was impossible to establish significant chi-square relationships using this variable.

The method used to determine feeding frequency may have produced accurate data if total feedings were seven or less, but other methods should be explored to determine number of feedings in future studies. Since the feeding frequency of so many infants clustered between five and eight, it was

difficult to separate infants into two equal groups for the chi-square test. If the sample had been larger, the infants could have been divided into high, medium, and low levels for feeding frequency for the chi-square test and may have produced as significant relationship.

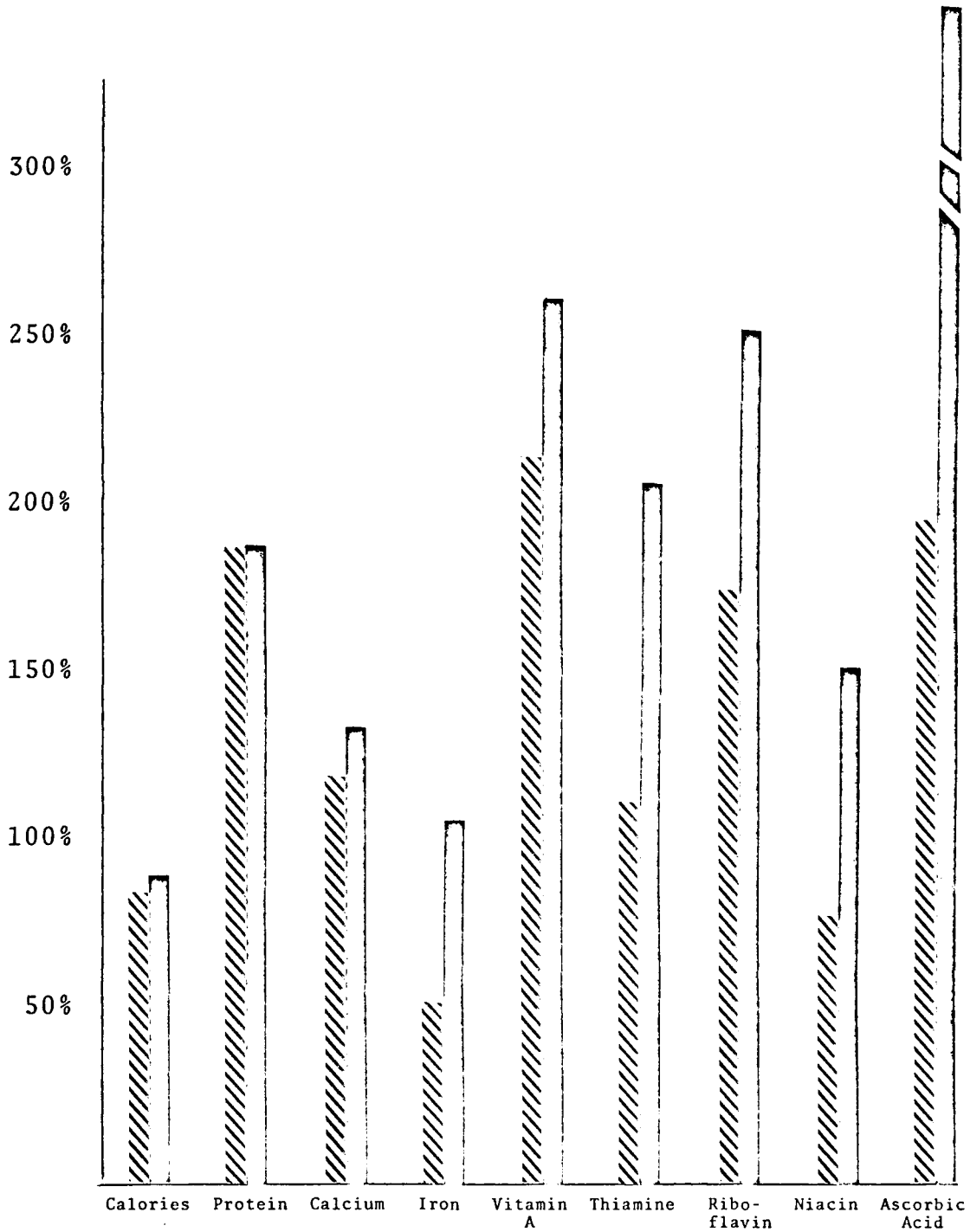

FIG. 2. Percentage of Recommended Dietary Allowances (42) fulfilled by mean daily nutrient intake. //// = Mean from food intake of 19 infants not using supplements. ▭ = Mean from food and supplement intake of 12 infants using supplements.

Table VIII

Chi-square Correlations Between

Feeding Practice and Nutrient Adequacy

	Chi-square Probability
Feeding Frequency with Adequate Vitamin A	0.9237
Bottle Usage with Adequate Protein	0.7895
Bottle Usage with Adequate Calcium	0.5214

SUMMARY and CONCLUSIONS

A study of infant feeding practices and nutrient intake was conducted among 31 infants 10 to 14 months of age in Richmond, Virginia. Data was collected by reviewing the medical record, and from an interview schedule, a self-administered questionnaire, and two 24-hour dietary records.

Two types of results were obtained through this research. The first, descriptive, included characteristics of the population, mean, and standard deviation of the nutrient content of the diet, and frequency of various feeding practices. The second involved a statistical chi-square analysis to evaluate the degree of relationship between feeding practices and nutrient content.

The intake of calories and eight nutrients--protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid--was calculated and compared with the Recommended Dietary Allowances and the First Health and Nutrient Examination Survey standards. Intake means were sufficient to meet both standards for all nutrients except iron. Calories and most nutrients revealed a wide range of individual nutrient intake with some infants consuming lower intakes than required by the standards. On the whole, nutrient in-

take data was slightly lower than but compatible with findings from recent major nutritional surveys.

Another contribution of this research was documenting local infant feeding practices. The majority of infants were eating between 5 and 8 feedings in a 24-hour period with a mean frequency of feedings of 6.8. The mean daily total number of bottles was 4.4, of which 1.5 were given in the crib. Only 6% of the infants were weaned from the bottle. Approximately one-half were using cow's milk, and the other one-half were using a commercial infant formula. A wide variety of commercial infant foods were used by three-fourths of the infants at least one time weekly. Infant cereal, meats, vegetables and fruits were the four groups within the commercial infant foods used more frequently and by more infants.

Thirty-nine percent of the infants were receiving vitamin and mineral supplements. The contribution of the supplements to the overall mean nutrient intake was minimal. However, when the mean nutrient intake of infants receiving supplements was compared to intake of infants not receiving supplements, the differences for iron, vitamin A, riboflavin, niacin, and ascorbic acid were substantial.

Chi-square analysis revealed no statistically significant relationships between feeding frequency and selected nutrient adequacy or between bottle usage and related adequacy.

This research has provided valuable information to expand the data base on both current feeding practices and nutrient intake of 10- to 14-month-old infants in Richmond, Virginia. A great deal more research is needed to provide a comprehensive picture of infant feeding practices. In addition, longitudinal studies are needed to document the effect of infant feeding practices on lifelong health and nutritional status, since obesity and dental caries may have their origins in early feeding practices. Nutritionists must incorporate preventive goals in infant nutrition education until more data is available on these complex health issues.

Data from this research verifies that current infant dietary regimes do not adequately include preventive measures in regard to dental caries. Excessive feeding frequency in early childhood may be related to establishing eating habits in later life that would lead to obesity. In line with preventive health goals, the following suggestions should be incorporated in the nutrition education of mothers of infants in this age range:

a) encouraging the use of iron-fortified formula and infant and adult iron-fortified cereals;
b) limiting feedings to six or less in a 24-hour period, thus limiting the contact of food and beverage on the teeth;

c) using water to satisfy thirst in place of beverages containing refined sugar;

d) setting a realistic timetable for weaning the infant from the bottle, and

e) avoiding the use of the bottle in the crib.

Following these suggestions may indeed affect the infant's nutritional status throughout life.

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APPENDIX A

Infant Code _____

INVESTIGATOR'S WORKSHEET

Information from chart	*Coding*
Date of chart review _____ Birthdate ___/___/___ yr mth dy	___
Child's full name _____ *male/female*	_____
Child is called _____ *white/non-white*	_____
Mother's name _____	
Address _____	
_____ zip _____	____
Telephone: Home _____ Other _____	

Growth record from four most recently recorded visits:

AGE	DATE yr mo day	WEIGHT lbs-oz	WEIGHT kg	HEIGHT in	HEIGHT cm
___.	___	___ - ___	___	___	___
___.	___	___ - ___	___	___	___
___.	___	___ - ___	___	___	___
___.	___	___ - ___	___	___	___

Plotted on growth chart? *Yes No* Percentile ___ _____

Chart history of infant feeding practices: _____

_____

_____

Breast-fed? *Yes No* Duration _____ _____

Formula _____

Date letter mailed to explain study _____

Additional information _____

_____

Infant Code _____

Telephone contact

Coding

Date Time Comments

__/__/__ _____ _____

__/__/__ _____ _____

__/__/__ _____ _____

Mother received letter? *Yes No* If no, explain _____

_____

Mother agrees to participate in study? *Yes No* _____

Does your child have any problems that have changed his food habits in past week? *Yes No*
Explain _____ ____ ____

Interview set for date __/__/__ Time _____ __/__/__

Site of interview _____

Directions _____

Other information _____

Follow-up after interview

Evaluation of interview completed? *Yes No* _____

Reminder to return questionnaire & food record: *Yes No* _____

Date _____ postcard/telephone comment _____ _____

	Questionnaire	Interview	__/__/__
Return date	_____	_____	__/__/__
Completeness	_____	_____	____ ____
Quality	_____	_____	____ ____
Follow-up needed	_____	_____	____ ____

Thank-you note mailed: date _____

Materials sent to mother _____ ____ ____ ____

Summary of information charted _____

_____

APPENDIX B

(Date)

Dear Mrs.

I would greatly appreciate it if you would consider assisting Mrs. Virginia Henrichs when she telephones you sometime within the next few days.

Mrs. Henrichs, a registered dietitian, is studying food habits of children. The purpose of the study is to examine trends in the feeding practices of young children. As food habits change from region to region and year to year, dietitians and physicians must survey current feeding practices so that our knowledge and materials can be updated. Several children in the Richmond area have been selected to participate in this important study. We hope you will also participate. The information you give her will naturally remain confidential.

When Mrs. Henrichs telephones, she will want to set up a 20-minute interview with you at your convenience. At the time of this interview, you will be given a questionnaire and a two-day food record to complete after the interview. You then return both forms to her by mail in an envelope which she will provide.

My sincere thanks for any time and assistance you might give Mrs. Henrichs. Your help is important if we are to successfully study the feeding practices of young children.

Sincerely,

(typed name)

P.S. For your information, Mrs. Henrichs can be reached at most any day or evening.

APPENDIX C

Code VLH _____
11

INTERVIEW

Mother's Name _____ Date _____

Child's Name _____ Age on this date _____

Explanation to mother: We're interested in how infants are eating these days--their food and beverage habits. Your child has been selected by chance so that we can get a good overall picture of infant feeding practices and nutrient intake.

1) Does your child have any problems or conditions that are presently altering his/her appetite or food habits? YES NO N.A.

If yes, explain _____

If yes, ask mother to wait until the child is back to normal eating habits before recording the two-day intake.

2) How many times in a 24-hour period does your child have regular scheduled feedings? _____

3) What do you call these feedings?

#1_____ #4_____

#2_____ #5_____

#3_____ #6_____

4) Does your child take milk with any of these feedings? YES NO

If yes, which feedings? _____

Code, does child take milk with meals? _____

Code_____

Explanation to mother: Now I need to determine how many times between regular feedings the child might eat or drink. From the record you keep, I will receive information of specific foods and amounts. In these next questions, I need the number of times food or beverage is taken between the regular feedings.

Interviewer should substitute mother's terminology in questions 5-7.

5) Does your child usually have anything to eat or drink after he wakes up in the morning, but before "feeding #1?" YES NO

If yes, how many times?_____

Interviewer should explore all possibilities with mother to get at number of contacts with food or beverage that are not scheduled feedings. (For example, between "feeding #1" and "feeding #2," how many different times would your child eat or drink?_____)

6) Does your child have anything to eat or drink after "last feeding" but before bedtime? YES NO

If yes, how many times?_____

7) Does your child usually have any food or beverages during the night? YES NO

If yes, how many times?_____

Code number of feedings per 24 hours _____.

Explanation to mother: That completes the questions on feeding frequency; the next series of questions are to study the use of the bottle and/or cup at this age.

Code_____

8) How many times each 24 hours does your child usually receive the bottle? _____

If answer is 0, go to question 13.

9) Does your child hold his/her own bottle?

YES NO N.A.

If yes, when _____

10) Approximately how long does it take to finish the bottle?

A. less than 5 minutes

B. 5-20 minutes

C. 21-30 minutes

D. 31-60 minutes

E. greater than one hour

F. N.A.

11) How many times each 24 hours does your child usually receive the bottle in his/her crib or bed? _____

If answer is 0, go to question 12.

Explanation to mother: You can use the yellow card to answer the next questions.

Code_____

A.	MILK OR FORMULA	G.	JUICE
B.	TANG	H.	SOFT DRINKS (SODA)
C.	ICED TEA	I.	WATER
D.	LEMONADE	J.	BEER
E.	COFFEE	K.	OTHER, EXPLAIN _____
F.	KOOLADE	L.	SOLIDS

12) Which of these beverages were given in the bottle during the past week when the child was in the crib? _____, _____, _____, _____, _____

13) Which of these beverages were given in the bottle one or more times during this past week? _____, _____, _____, _____, _____, _____

14) Does your child drink from a cup one or more times daily? YES NO

If yes, does your child hold his own cup? YES NO

15) Which of these beverages were given in a cup one or more times during this past week? _____, _____, _____, _____, _____, _____

Explanation to mother: I have three more questions.

Code_____

16) Does your child take any vitamin or mineral drops or pills? YES NO

If yes, Name _____

Brand _____

Amount _____ Frequency _____

Interviewer, ask mother to see supplement container or dropper, if need be, to complete above information.

17) Approximately how much water does your child take in a 24-hour period?

A. less than 4 ounces (½ cup)

B. between 4 ounces (½ cup) and 24 ounces (3 cups)

C. more than 24 ounces (3 cups)

D. no water

Is this water sweetened? YES NO

If yes, describe _____

_____

Interviewer, ask mother to record all sweetened water on the FOOD AND BEVERAGE RECORDS.

Interviewer, calculate child's age as of interview date.

APPENDIX D

DIRECTIONS AND HELPFUL HINTS
for
FOOD AND BEVERAGE RECORD

1. Keep the record current...as the child eats or drinks take a minute at that time to write it down.

2. Give the child the same foods and beverages, in the same amounts, as you would on any other day.

3. The amount actually eaten by the child should be recorded. Quite often the amount served is different from the amount eaten. Record amounts in weights or as portion of measuring cup or measuring spoon. You may also find a small ruler helpful.

4. Record any sugar, butter, jelly, etc., that might be added to the food. For example, record the amount of dry infant cereal, then the amount of any milk, water, juice, etc., added to the dry infant cereal.

5. Record any foods or beverages given the child by other adults or children. Even small bits or sips that the child takes from your food should be included in the record.

6. Include all "finger foods"...or foods the child could get to and eat on his own.

7. Please record the amount of fluid in ounces. (1 cup = 8 ounces; ½ cup = 4 ounces) Note how juice was diluted. If commercial infant juice, please indicate brand name. For all juice, indicate sweetened or unsweetened. Include all fluids given in the bottle, training cup, or glass.

8. Please indicate brand name and exact title of all commercial infant foods.

9. Did you include any solids or liquids that the child had during the night?

10. Please don't hesitate to call me day or night if you have questions completing this important form. If you have unique foods or questions on specific items, save the label from the container until we discuss your questions.

Virginia Lee Henrichs

E X A M P L E S for FOOD AND BEVERAGE RECORD

BREAD-Include what you put on the bread, kind of bread; note if crust is not eaten.

Time or Meal	Food or Beverage Item	Amount	Description
B'fast	Bread	3/4 slice	Whole wheat
	+ margarine	1 teaspoon	
	+ jelly	1 teaspoon	Grape

BABY FOOD-Include the item's complete name, brand, size of jar and amount eaten.

Time or Meal	Food or Beverage Item	Amount	Description
Lunch	Junior Chicken	1/2 jar	Heinz 3 1/2 oz jar
Lunch	Junior Peaches	3/4 jar	Beech-Nut 7 3/4 oz jar
4 pm	Junior Chicken and Noodles	1 jar	Gerber 7 1/4 oz jar
Supper	Junior Beef with Vegetables	1 jar	Gerber High Meat Dinner 4 1/2 oz jar

TABLE FOOD-If appropriate, include cooking method and ingredients.

Time or Meal	Food or Beverage Item	Amount	Description
B'fast	Scrambled egg	1	1 medium egg, 1 tablespoon milk, in Bacon drippings
10 AM.	Banana	1/2	large
Supper	Pear	1 half	canned in heavy syrup drained
Supper	green beans	1/3 cup	drained seasoned with Wesson oil
7 pm	cracker	1	saltine

Code_____

FOOD AND BEVERAGE RECORD

Do not write in this column.

Circle the day of the record:

Day 1 Day 2

Circle the day of the week:

Mon Tues Wed Thur Fri Sat Sun

INSTRUCTIONS: Please record all food and beverages your child eats or drinks. Begin with the first food or beverage taken in the morning and continue recording every item during the next 24 hours.

Time or Meal	Food or Beverage Item	Amount	Description	
				_ _ _,_ _ _,
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				_ _ _,_ _ _,
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				_ _ _,_ _ _,

Code_____

FOOD AND BEVERAGE RECORD continued

Time or Meal	Food or Beverage Item	Amount	Description	Do not write in this column.
				___,___,
				___,___,
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APPENDIX E

VLH
Code_____
Q1

Questionnaire

INSTRUCTIONS: Circle the answer that best describes your child's current food habits.

---

1. Which of the following type of milk does your child usually take? Circle one.

   A. cow's milk - whole (regular)

   B. cow's milk - 2% fat

   C. cow's milk - skim

   D. formula with iron

   E. formula without iron

   F. other; explain _____

   G. usually does not receive any of the above;

      explain _____

2. In the following list of commercial infant foods,

   put a 0 by those foods your child never or rarely receives;
   put a 1 by those foods your child eats one to four times each week; and
   put a 2 by those foods your child eats five or more times each week:

   _____ Infant cereal

   _____ Baby juice

   _____ Strained or junior meat or meat sticks

   _____ Strained or junior vegetables

   _____ Strained or junior fruits

   _____ Baby or junior desserts

   _____ Combination dinners

   _____ High meat dinners

Code_____

3. How many persons (children and adults) are presently living in the household? _____

4. How many years of education has the mother completed? _____

5. How many years of education has the father completed? _____

6. Some people say we are the best judge of ourselves, and others think we are too hard or too easy on ourselves. But we know it is important to get the mother's viewpoint.

   How would you judge your child's food habits?

   Very Good Good Fair Poor Very Poor

7. Do you think you ought to be doing anything different in regards to feeding your child? YES NO

   If yes, explain _____

   _____

8. Name two or three points you feel you are doing correctly regarding the child's food habits or nutrition.

   _____

   _____

   _____

9. What type of information would you find most useful in feeding your child? Check as many as you would find useful.

   _____ Discussion with pediatrician

   _____ Printed literature

   _____ Paperback books

   _____ Lectures or group meetings

   _____ Other _____

Code_____

10. Currently, who do you rely on for nutrition information regarding your child? Check as many as appropriate to your current situation.

_____ Doctor

_____ Nurse

_____ Other professionals

_____ Friends or neighbors

_____ Mother or mother-in-law

_____ Other

_____ TV or radio

_____ Past educational experiences

_____ Library materials

_____ Printed information

_____ Paperback books

11) Place a check by those persons who assisted in recording the two-day FOOD AND BEVERAGE RECORD.

_____ Mother

_____ Father

_____ Grandparents

_____ Siblings

_____ Friends or neighbors

_____ Babysitters

_____ Others; describe _____

APPENDIX F

EVALUATION OF INTERVIEW SETTING

Interview _____ Site of Interview _____

1. Cooperativeness of respondent:

   _____ not cooperative
   _____ somewhat cooperative
   _____ very cooperative

2. Interest of respondent in nutrition and child care:

   _____ uninterested
   _____ somewhat interested
   _____ very interested

3. Respondent's general knowledge of infant feeding practices:

   _____ not knowledgeable
   _____ somewhat knowledgeable
   _____ very knowledgeable

4. Frankness of responses:

   _____ not frank
   _____ somewhat frank
   _____ very frank

5. Infant:

   _____ present and disruptive
   _____ present and cooperative
   _____ not present

6. Other observations about the interview:

   _____

   _____

   _____

(adapted from "Handout #5, Sociology 5612, VPI-SU)

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INFANT FEEDING PRACTICES AND NUTRIENT INTAKE: A SURVEY OF TEN- TO FOURTEEN-MONTH-OLD INFANTS IN RICHMOND, VIRGINIA

by

Virginia Lee Clemmer Henrichs

(ABSTRACT)

A study of infant feeding practices and nutrient intake was conducted among 31 infants 10 to 14 months of age in Richmond, Virginia. Data was collected by reviewing the infants' medical records and from an interview schedule, a self-administered questionnaire, and two 24-hour dietary records.

The intake of calories and eight nutrients--protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid--was calculated. Intake means were sufficient to meet both the Recommended Dietary Allowances and the First Health and Nutrition Examination Survey standards for all nutrients except iron. The majority of the infants had a mean iron intake below the standard. Calories and most nutrients revealed a wide range of intake with some infants consuming a less than adequate intake.

Another contribution of this research was documenting current infant feeding practices. The mean daily total number of feedings was 6.8. The mean daily total number of bottles was 4.4, of which 1.5 were given in the crib. Only six percent of the infants were weaned from the bottle. Approximately one-half of the infants were using cow's milk, and the other one-half were using a commercial infant formula. A variety of commercial infant foods were used by three-fourths of the infants, with infant cereal, vegetables, and fruits being used most frequently. Thirty-nine percent of the infants were receiving vitamin and mineral supplements, but the contribution of the supplements to the group's mean nutrient intake was minimal.

Chi-square analysis revealed no significant relationships between feeding frequency and selected nutrient adequacy and between bottle usage and related adequacy.