THE INFANT FEEDING STUDY

NAIROBI SITE REPORT

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CHAPTER I INTRODUCTION AND METHODOLOGY

Introduction

This report is part of a larger study that began in 1979 to explore the determinants of infant feeding practices in four developing countries. The larger study was conducted by a research consortium of The Population Council, Colombia University, and Cornell University in collaboration with investigators in each field site. The Nairobi study was jointly implemented by the Central Bureau of Statistics (CBS), the African Medical and Research Foundation (AMREF), Research Bureau (E.A.) Ltd. (RBL), and the research consortium. In addition to Nairobi, data were collected in Bangkok, Thailand; Bogota, Colombia; and Semarang, Indonesia. The institutions representing the other 3 sites are Mahidol University, Bangkok; Faculty of Interdisciplinary Studies, Javeriana University, Bogota; and Diponegora University, Semarang. The central objective of the study is to investigate the significance of a broad range of biological, social, cultural and economic factors on infant feeding practices in order to determine the nature and magnitude of their contribution to problems of infant nutrition. The variables included the role of the health professions, infant food marketing and distribution strategies, and women's labor force participation. An interdisciplinary research approach has been utilized in order to identify a variety of potential influences on infant feeding decisions and choices. The research was guided by the conceptual framework developed by staff and consultants in early 1981.[1]

This approach included, in Nairobi, a large cross sectional survey and coordinated studies on (1) ethnography (including an ethnography of the medical infrastructure) (2) marketing, and (3) government policies regarding infant feeding. The ethnographic research was done by AMREF and involved two main segments. The first was an in-depth examination of the feeding practices and environmental conditions of a small group of women in one of Nairobi's low income areas. The result of this work

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[1] The conceptual framework was endorsed by AID's Project Review Panel in April 1981 and has been distributed as a Population Council International Programs Working Paper: Laukaran, V.H., E.K. Kellner, B. Winikoff, G. Solimano, M. Latham, P. Van Esterik, and J. Post "Research on Determinants of Infant Feeding Practices: A Conceptual Framework," November 1981, Working Paper No.15.

has been reported separately.[2] Besides standing on its own as a unique view of urban poverty, the ethnography was used to construct a culturally appropriate survey instrument and to interpret survey results. The second segment, phase II, was designed to follow mothers of clinically diagnosed severely malnourished children through rehabilitation efforts in order to learn more about feeding practices and the health care system with which these mothers interact.

The medical infrastructure component, done by AMREF, examined the knowledge, attitudes and practices of health workers and workings of health facilities to see how these affect infant feeding. Interviews were conducted with a sample of health workers in Nairobi, and a larger sample was interviewed through AMREF-sponsored training seminars held for health workers in other parts of the country. In addition, institutional profiles were prepared on a number of Nairobi health care facilities by members of the ethnographic and medical infrastructure teams (Appendices 4 and 5).

The marketing component of the study, conducted by RBL, examined industry practices and the wholesale and retail distribution of breastmilk substitutes and commercially available weaning foods. The work included interviews with the manufacturers and marketers of infant feeding products and a retail audit of the availability of infant food products in a sample of commercial outlets in Nairobi (Appendix 3).

The government policy component was conducted by CBS staff to investigate relevant tariff and customs laws, legislation relating to working women and the policies of different government ministries and agencies involved with maternal and infant health and nutrition. This component was also concerned with studying the development of a Kenyan infant formula marketing code (Appendix 6).

Infant feeding survey interviews were conducted by CBS with 980 low and low-middle income women who had given birth in the preceding 18 months to determine their feeding patterns and what influenced these. An attempt is made here to integrate the data from each component with the interpretation of the survey analysis.

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[2] Norman Scotney, Kogi, W., Njogu, W., and Okello, M. "Infant Feeding Studies, Ethnographic Component, Phase I." Health Behavior and Education Department, AMREF, Nairobi, 1982.

Survey Methodology

Sampling

The survey component of the Infant Feeding Study in Nairobi was designed to investigate the role of a broad range of factors as determinants of infant feeding practices. These factors included, among others, women's employment, health service variables, and demographic variables. For each of these analyses it would be possible to design a special study to investigate their effects on infant feeding practices, and the sampling strategies, in all probability, would vary according to the purpose of the analysis. Because of the broad scope of this study, however, and the need for descriptive information to formulate policies to improve infant feeding practices, it was decided, in consultation with sampling experts from the Consortium, to use representative cluster samples of each city.

The Central Bureau of Statistics (CBS) maintains a sampling frame for the entire nation based on the 1979 national census. The city of Nairobi is a stratum of the national frame and thus could be used to obtain a representative cluster sample. Before selecting the study sample, measures of size were assigned to the Enumeration Areas (E.A.) in the sampling frame to correct for differences between the desired 100 household units and the actual number of households after enumeration. Each E.A. was assigned one measure of size (MOS) per hundred households, rounded to the nearest hundred. Thus, an E.A. of 130 households was assigned an MOS of 1, while an E.A. with 260 households would receive 3 MOS units. This procedure gave a total of 1,950 MOS clusters for the city of Nairobi from which 55 clusters were selected for the sample, an estimated 3.5% of the Nairobi population. Because of the large number of expatriates in Nairobi whose income is many times that of the indigenous population, it was decided to eliminate the upper-income areas from the sample. A Nairobi City Council list of income zones was used to identify and exclude 12 high-income clusters, estimated to include one-tenth of the population of the original clusters. The 43 remaining clusters were covered by the survey.

Interviewers began by enumerating each household in the block to determine households with eligible infants. The completed sample of interviews included only 730 babies. Because this was less than the desired sample size of 1,000, a change was made in the sampling plan, and four Enumeration Areas were selected from low-income zones. All blocks in these E.A.s were sampled. An additional 230 interviews were conducted in these E.A.s for a completed sample size of 980. Because the CBS sampling frame is not self-weighted, the final data were weighted

using the known probability of selection for each cluster, or, in the case of the augmented sample, the selection probabilities for the entire E.A. were used.

Instrument Development

The research Consortium developed a model instrument for all study sites which included information on households, index mothers, and children under 12 months. The basis for the selection of these variables is described in the working paper cited above (Laukaran, et al.,1981). Key variables for each household to be included in the instrument were: income, water supply, electricity, sanitation, refrigeration, number of persons in household, and recency of urban migration. Information for each index mother included age, number of live births, number of years of education, and employment of the male head of the household.

For each child, information was included on sex, date of birth, age, birth order, place of birth, hospitalization and morbidity in the last two weeks, as well as height and weight. The key variables included in the infant feeding data were as follows:

* ever breastfed
* currently receiving breast milk
* currently receiving nonhuman milk
* currently receiving infant formula
* currently receiving other foods
* duration of exclusive breastfeeding
* age at introduction of nonhuman milk
* age at cessation of nonhuman milk
* age at introduction of infant formula
* age at introduction of other foods
* type of other foods given

Other information included in the questionnaires consisted of consumer behavior information, prenatal care and maternity care, and detailed information on the mother's employment, on knowledge and attitudes about breastfeeding, and determinants of weaning and bottle feeding.

The resulting questionnaire format was precoded and used a closed-ended format to minimize data management problems anticipated because four languages had to be used in interviewing. Members of the ethnographic team reviewed the concepts, choices, and wording for cultural appropriateness and clarity. The instruments were revised based on their suggestions, and the questionnaires were then translated into Kiswahili and two of the most common tribal languages, Kikuyu and Jaluo. Each questionnaire was translated back into English by a

second team of translators to validate the accuracy of the translations. Copies of the translated questionnaires were then field tested by the interviewer trainees, and final modifications were made before printing.

Interviewer Training

Sixteen female interviewers who were 'A' and 'O' level former students fluent in English, Kiswahili, and either Kikuyu or Jaluo were trained using classroom sessions for one and a half weeks, followed by practical exercises in interviewing technique and anthropometric measurement, and field training. A final session was held to discuss instrument modifications after the field test.

Field Work

Data collection took place between March and June, 1982. Interviewers were sent into each cluster and assigned groups of households to survey. Two return visits were made, if needed, to interview mothers who had not been available on the first round. At least one of these visits was on a weekend or evening to increase the chance of finding working mothers. In the few instances where a household refused to be interviewed, a supervisor was sent to help convince the family to respond. This was in every case eventually successful. There were two categories of nonresponse, households where there was an eligible baby, but despite repeated home visits, the mother or baby could not be found at home; and questionnaires discarded because of loss of one or more of the sections or missing information within a section. The total number of cases from the first category, those who were not found at home, was 101. There were 39 cases discarded because of errors in the questionnaires.

The on-site field supervisor from Cornell University supervised all data collection activities. The precoded survey forms were initially edited in the field so that interviewers could correct errors while they still had access to the respondent. Final editing was done by the fieldwork supervisor at the CBS offices prior to data entry. Computer programs for data cleaning were written to look for keying errors or miscoding. Missing data, range, and internal and external consistency errors were checked for, and each was traced back to the original form and either corrected or coded as missing.

Weighting

A known probability of selection for each cluster and E.A. was obtained from the sampling division of the CBS. For the four

E.A.s selected for the augmented sample, the data from the cluster already done within each were combined with data for the rest of that E.A., and the probability for the entire E.A. was used. This was done so that the areas where entire E.A.s were surveyed would not be over-represented in the sample.

Weighting factors were calculated by multiplying the inverse of the probability of selection by the inverse of the rates of babies covered to babies eligible for each cluster or E.A.:

$$\left(\frac{1}{\text{cluster or E.A. probability}} \times \frac{\text{babies eligible}}{\text{babies covered}}\right)$$

The weighted number of babies was calculated by multiplying the babies covered by the resulting weights for a total of 28,173.58 weighted units. The number of total weighted units for each cluster was then reduced by a factor of 980/28,174 to reduce the sample back to 981 babies.

Data Analysis

The data were coded, edited, and cleaned in-country using the computing facilities of the Central Bureau of Statistics. The clean data tapes were delivered to Consortium staff at The Population Council in New York, and final data analyses were prepared on the Council's DEC-PDP-11-73 computer. For logistic regression analysis, the Princeton University Computing Center was used to enable the application of SAS programs.

Limitations of the Data

Statements based on these data apply only to low and low-middle income families from Nairobi. While repeat visits were made to improve coverage of the sample areas, mothers working outside their homes may be slightly under-represented. Because of the constant migration of some women to the rural areas and back for planting and harvesting, a higher proportion of these women may have been missed. The overall high rate of coverage should minimize these problems, as should the use made of the ethnographic data.

CHAPTER II CHARACTERISTICS OF HOUSEHOLDS AND MOTHERS

Households

The size of the index households ranged from two members to thirteen with a mean size of 5.5 persons. This is somewhat larger than the mean household size of 4.2 for all of Nairobi from the preliminary tabulation of the 1979 Census data (unpublished). The number of rooms used for sleeping ranged from one to six with 77% of the households using only one room. Ninety percent of the households rented their dwellings with rents ranging from K.Shs. 30 to K.Shs. 2,170 per month (1K.Sh.=U.S. $.08). The amount paid in rent is not always a reliable indicator of housing quality because of government and employer housing subsidies in some of the middle and low-middle income groups and because longer term residents paid lower rents. Of those renting, 73% paid K.Shs. 200 or less per month.

Thirty percent of the households had water piped into their houses and another 68% used water piped to some point outside their home. Forty percent of the households had access to a flush toilet, either private or communal, while 52% used either an open or closed pit latrine. Twenty-nine percent of the households had electricity, and seven percent had a refrigerator. Fifty-five percent used either wood or charcoal for their usual cooking fuel, 33% used the more expensive paraffin (kerosene), and only 12% used cylinder gas or electricity (Table 2-1).

Thirteen percent of the households were female headed, and 54% of all household heads had not gone beyond primary school (standard 7). Seventy-four percent of the household heads were being paid on a regular monthly basis while 8% worked as day laborers and another 10% were not working.

The typical household from our sample, then, had five people living in 1-2 rooms which they rented. They drank water piped to a point outside their home which they purchased by the debe (4-5 gallon container). The house had no electricity and most of the cooking was done on a small, portable, wood or charcoal stove. The family used a pit latrine. The typical household head was a male, educated seven years or less, and presently working.

Mothers

The age of the index mother ranged from 14 to 44 with a mean age of 24. Table 2-2 shows the age breakdown in five year intervals. Fourteen percent of the women report their marital status as single and 85% as married, with the rest separated, divorced or widowed.

Mother's tribe or ethnic group is presented in Table 2-3. The main tribes reported were the Luo (31%), Kikuyu (27%) and Luhya (22%). The distribution is different from the 1979 census population breakdown by ethnic group for all of Nairobi which lists Luo (18%), Kikuyu (33%) and Luhya (16%). This suggests that Luo and Luhya may be overrepresented in the low income population and Kikuyus somewhat underrepresented.

Mother's education ranged from no schooling through university, with 18% never having attended school and two-thirds having a primary (standard 7) education or less. Fifty-seven percent reported being able to read English and 68% said they could read Kiswahili.

Most of the mothers had lived in Nairobi for a relatively short period of time. One-third had lived here for one year or less and almost two-thirds for five years or less. Seventy-eight percent said they had spent most of their lives in rural areas rather than towns or cities. Eighty-six percent could not say how much longer they expected to stay in Nairobi.

For 26% of the women the index child was their first birth, and for another 26% it was the second. For twenty-eight percent it was the third or fourth, and for the remaining 20% the index child was their fifth or more birth (Table 2-4). Eleven percent of the mothers were working outside their homes and another 5% were working at home to earn money at the time of the interview.

The typical index mother from our sample, then, is 24 years old, married, and either Luo, Kikuyu or Luhya. She has a primary education or less and claims to read both English and Kiswahili at an unspecified level. She has spent most of her life in rural areas having moved to Nairobi only within the last five years, and is uncertain as to how long she will stay. The index child is her first or second.

Index Children

Forty-nine percent of the index children were female and 51% male. The ages ranged from a few days to 18 months with the distribution shown in Table 2-5.

Twenty-three percent of the index children were born at home, 1% at a midwife's or neighbor's home, 65% in a government hospital or clinic, and the remaining 11% in private clinics, hospitals, or maternity homes. Thirty-nine or 4% of the index children were twins and two were originally triplets. One hundred and sixty-two, 17%, of the index children had been reported as hospitalized as an in-patient since birth, the

reasons given were diarrhea (6%), vomiting (4%), measles (4%), pneumonia (2%), cough (2%), malaria (1%).[1]

When asked if the index child had been ill in the last two weeks, 44% of the mothers reported "yes" with the most common causes shown in Table 2-6. Since in many cases the causes of illness or symptoms were probably determined without the child having gone to a hospital or clinic, these figures need to be used carefully, but fever followed by diarrhea seem to be the two main reported causes of morbidity for the index children, and these illnesses seem reasonable in light of the limited access to water piped inside the home and lack of sanitary toilet facilities found both in the survey and the ethnography. The relatively high number of reported coughs and colds may be related to the rainy season which started shortly after the interviewing had begun. Ninety-seven percent of the infants had at some time been breastfed, and 77% were breastfeeding at the time of the interview.

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[1]Sums to more than 17% because some children had more than one illness.

Table 2-1 Household Amenities

	% Households
Piped Water	30
Access to flush toilet	40
Electricity	29
Refrigerator	7
Cooking Facilities:	
wood/charcoal	55
kerosene	33
gas/electricity	12

Table 2-2 Number and Percent of Index Mothers in 5-Year Age Intervals

Age	N	%
14	2	0
15-19	163	17
20-24	422	43
25-29	262	28
30-34	84	9
35-39	34	2
40-44	15	1
TOTAL	981	100%

Table 2-3 Number and Percent of Index Mothers by Tribe

Tribe	N	%
Kikuyu	269	27
Luo	300	31
Luhya	217	22
Kamba	88	9
Kisii	30	3
Meru/Embu	13	1
Mijikenda	21	2
Kalenjin	6	1
Other	37	4
TOTAL	981	100%

Table 2-4 Parity of Index Mothers

	N	%
1	255	26.0
2	254	25.9
3-4	278	28.3
5+	196	20.0
TOTAL	983	100%

Table 2-5 Age Distribution of Index Children in Months

Age	(N)	%
<1 month	69	7.2
1-2 months	70	7.1
2-3	60	6.1
3-4	41	4.2
4-5	47	4.8
5-6	61	6.3
6-7	68	7.0
7-8	57	5.8
8-9	52	5.3
9-10	63	6.5
10-11	37	3.8
11-12	48	4.9
12-13	60	6.1
13-14	43	4.4
14-15	45	4.6
15-16	44	4.5
16-17	33	3.4
17-18	26	2.6
18-19	37	3.8
TOTAL	963	100%

Table 2-6 Reported Cause of Index Child Illness in Previous Two Weeks

Reported Cause of Morbidity	(N)	% of Sample
Fever	157	16
Diarrhea	131	13
Cough	97	10
Vomiting	45	5
Malaria	35	4
Measles	23	2
Cold	17	2
Pneumonia	10	1
Other	28	3

CHAPTER III INFANT FEEDING PATTERNS

Overall Patterns

An initial analysis was done of the type of feeding pattern by current age of the index child (Table 3-1). Feeding patterns were classified as one or a combination of the following: breastmilk, supplemental foods, and breastmilk substitutes, the latter including both cow's milk and infant formula.

At less than one month of age, 70% of children received only breastmilk. This percentage rapidly drops to only 11% of those children between three and four months of age, and only 6% between five and six months. Eleven children were found to be receiving only breastmilk at ages over six months.

The distribution by age of children receiving only breastmilk and a breastmilk substitute (either cow's milk or infant formula) starts at 16% at less than one month and peaks at two to three months with 34%. The percentage drops to 5% by six to seven months and then declines. Thirteen of the index children were given only breastmilk and either cow's milk or infant formula at ages over six months. Only three children were found to be receiving cow's milk or infant formula alone. Two of these three children were over six months of age.

The number of children from these first three groups who were over six months of age and receiving only cow's milk and formula, and/or breastmilk, was 26 or 4.4% of the children over six months. Because breastmilk alone or breastmilk and breastmilk substitutes cannot supply all of a child's nutritional needs after six months of age, this 4% of the index children over six months were probably either malnourished or at nutritional risk. Prolonged breastfeeding into the ninth or tenth month of life without supplemental foods, commonly believed to be one of the causes of malnutrition in rural Africa's communities in these age groups, was little evidenced in this urban sample.

The distribution of children receiving breastmilk and food supplements rises to a plateau by three months and continues until 17 months when breastfeeding declines. A pattern very similar to this is also found in the distribution of children receiving breastmilk substitutes and food supplements.

The distribution by age of those children receiving all three types of nourishment (breastmilk, and breastmilk substitutes and food supplements) starts at 8% of children less than one month of age and then quickly increases as more breastmilk substitutes and supplemental foods are added. The percentage levels range between 35% and 60% between the ages of

three and ten months, and then decrease as breastfeeding declines.

Few children receive only food supplements. Almost all children less than six months of age receive, either in combination or singly, breastmilk, cow's milk, or infant formula. The number and percentage receiving food supplements alone rises gradually after this point as more children are taken off each of these three types of milks.

Feeding patterns can also be grouped in another way: those with any breastmilk; those with any breastmilk substitutes; and those with any food supplement regardless of what else is included in the diet. The results are presented in Figure 3-1. The use of food supplements rises sharply from less than 25% at less than one month to 60% at three months and almost 90% at six months and continues in the range of 85% to 100% thereafter. Breastmilk consumption is almost universal in the earliest months and declines irregularly to near 30% at 18 months. Use of breastmilk substitutes starts at around 25% at one month, rises to over 60% at 2 months, and generally stays in the 60-70% range, and then drops off after that. At the time of the interview, 77% of the index children were receiving breastmilk either exclusively or in combination with other foods, 34% were receiving cow's milk, and 25% were getting infant formula.

The ethnography points to differential use of cow's milk and infant formula in this population. Cow's milk is a fairly common part of the adult diet when prepared in porridge and milk teas, while infant formula is considered more as a special supplement to help the body grow. With this in mind, the "breastmilk substitute" group was broken down into use of cow's milk and use of infant formula. The results in Figure 3-2 show the differences in use of these breastmilk substitutes. Among those infants fed breastmilk substitutes, use of cow's milk is nearly constant across age groups while infant formula use is highest in the early age groups and declines steadily as children grow older.

Breastfeeding

From the data presented earlier it is clear that most Kenyan women breastfeed, with 97% initiating breastfeeding and most of these continuing at least six months. Less than one-fourth of the mothers had discontinued breastfeeding at the time of the interview. Over ninety percent of children were reported breastfeeding in all age categories through six months and over 70% of the infants were being breastfed in all but one age category (ten months) through 13 months (Table 3-2).

The duration of breastfeeding was calculated using the lifetable analysis procedures available through the SURVIVAL program in SPSS. This type of analysis is useful when examining a time interval between an initial event (in this case, the initiation of breastfeeding) and a subsequent termination event (in this case, cessation of breastfeeding).

The advantage of lifetable analysis is that it takes into account censored cases, where the termination event has not occurred at the time of data collection. This happened when mothers were still breastfeeding at the time of the interview. We do not know how long they continued after the interview, only that they breastfed at least as long as the interval of time between their initiation of breastfeeding and the time of the interview. The SURVIVAL program in SPSS allows these censored cases to be included and calculates an expected duration for them based on the other data.

The SURVIVAL program also allows for the use of breastfeeding duration (expressed as median duration) as a dependent variable by creating separate lifetables for each value of an independent variable (mother's age or education, for example) thought to influence breastfeeding duration. The program calculates a D statistic (modified from Chi square) from which can be calculated the probability that the different subgroups or values of the independent variable represent different populations. Using lifetable analysis, the median duration of breastfeeding for all mothers initiating breastfeeding is 16.02 months.

Table 3-3 shows the time of first breastfeeding. Three-quarters of the mothers initiated breastfeeding in the first 24 hours after birth; 47% did so within the first six hours. When asked if they had been given any advice on breastfeeding, only 19% of the mothers interviewed said that they had, and even fewer (7%) said that they had been shown how to breastfeed. For most women it appears to be a simple and natural activity. When asked whether breastfeeding was pleasant, unpleasant, or neither, 95% chose "pleasant" and only 4% "unpleasant;" with 1% choosing "neither."

The same attitude is reflected in the responses to whether or not the mothers had any problems breastfeeding. Eighty-five percent (805) reported no problem, and of those reporting any problem, three-quarters reported a morbidity problem and one-quarter (n=36) reported having insufficient milk.

The main breast morbidity reported was engorged breasts by 62 (6%) of the mothers, followed by sore nipples (3%) and breast infections (mastitis or abscess, 2%). In the ethnography, some women complained of having "too much milk" or leakage. Only two mothers in the cross sectional survey mentioned either of these

when asked about breastfeeding problems. Their perception of what constitutes a "problem" is most likely at issue here.

The 36 women who reported having insufficient milk comprise a small but interesting group. Mothers' perception of insufficient breastmilk is one of the more frequently given reasons for early introduction of breastmilk substitutes and the second most common reason (after the baby refusing the breast) given for the cessation of breastfeeding.

To learn more about this issue mothers were asked how they knew their breastmilk was not sufficient. Most of the mothers reported that the baby cried soon after breastfeeding, was restless, or seemed not satisfied. The second most common reason given was that "the milk never came in."

Supplementation

One striking feature of the feeding patterns from the tables and figures is the incidence of mixed milk feeding; feeding of breastmilk substitutes in addition to breastmilk. At the time of the survey, more than one-third (37%) of the index children were receiving this combination of milks. Of those mothers feeding both breastmilk and breastmilk substitutes, more than one-fourth (28%) reported usually giving both at the same feed, while the rest usually used the different milks separately. Of the 106 mothers feeding both breastmilk and breastmilk substitutes at the same feed, 75% reported breastfeeding first followed by a "top up" bottle of either cow's milk or infant formula. When all mothers giving both breastmilk and breastmilk substitutes were asked if they thought their baby was getting more of its food from breastmilk, more from the substitute, or equal amounts from both, 59% reported more from breastmilk, 26% more from substitutes, and the remaining 15% equal from both.

The practice of "top up" feeding was noted as a problem by the breastfeeding counselors. Since the sucking action of the baby is responsible for stimulating the hormonal response in the mother necessary for milk production, bottle feeding may decrease the volume of the mother's milk, and may be a cause of insufficient milk. More than one-third (36%) of the mothers who reported feeding either infant formula or cow's milk along with breastmilk at the time of the survey reported doing so because they had "not enough breastmilk." This creates a situation where the "cure" actually worsens the problem. Instead of adding bottlefeeds when a mother perceives a decrease in her breastmilk, she should put the baby to the breast more frequently to stimulate production.

Table 3-4 shows the distribution of cow's milk, infant formula or any supplement, including solid or semi-solid

foods, among the sample children. The most striking point from this table is the early age at which foods other than breastmilk are added to the diet. In this sample, other milks are the preferred first supplement, with over half the children over two months receiving this item in the diet. One-third of the sample children under 30 days of age are receiving supplements, as are one-half of those 1 to 2 months old and two-thirds of the children 2 to 3 months of age. Since medical research shows exclusive breastfeeding to be the best feeding regimen for the first 4 to 6 months of life, the extremely early addition of other foods seen in our sample is at best wasteful and at worst dangerous, as biological contaminants not found in breastmilk are introduced to the baby.

A 24-hour food intake recall was done for each index child. The mother was asked to describe "all things to eat or drink that were given to that child during the preceding 24 hours." The results, broken down by age group, are presented in Table 3-5, and show a distribution very similar to those described earlier for the constituent foods of the seven feeding patterns. Of note are the widespread introduction of solid and semi-solid foods before four months of age and the relatively widespread and very early introduction of glucose drinks. The medical infrastructure substudy reports the common practice of giving glucose solutions to newborns in hospitals, and the ethnographers also found use of these solutions to be common in the community. Since glucose solutions (sugar water) have little nutritional value, provide an easy entry point for pathogens, and decrease the demand for breastmilk, their use should be discouraged.

Analysis was done of differences in feeding in the last 24 hours by sex of the index child. No differences were found. Analysis of the seven feeding patterns presented earlier also shows no differences by sex. Finally, analysis was done to determine breastfeeding frequency, using the 24 hour recall data. The mean frequencies for the whole sample are presented in Table 3-6. As children get older, the daily frequency declines, from 9.6 in the 0 to 4 month group to 4.9 in the 16 to 20 month old group (Table 3-7, below).

In summary, the feeding pattern most often observed in our sample was breastfeeding with the early introduction of either cow's milk/infant formula or solid and semi-solid foods. Ninety-seven percent of the mothers sampled initiated breast-feeding and 75% of those started within the first 24 hours after birth. Most mothers breastfeed for a long period of time with 85% reporting breastfeeding at least once a day at six months and almost 50% still breastfeeding at least once a day at 15 months.

Infant formula use was reported for more than half of the index children either currently or at some time in the past. The number of children fed formula seems to peak at about three

months and then decrease, in contrast to cow's milk which becomes part of the child's regular diet as it grows.

More than 70% of the four month old index children were receiving food supplements. The early introduction of food supplements and breastmilk substitutes appears to be associated with decreased weaning intervals (shorter duration of breastfeeding). Twenty-four hour recall data confirmed the information collected on feeding patterns and reflected the common use of glucose drinks also reported by the ethnographers.

Breastfeeding, Amenorrhea and Contraception

The length of postpartum amenorrhea is an important component of the birth interval, and is a major determinant of fertility in natural fertility populations. Many studies have demonstrated that the total length of breastfeeding is positively correlated with the length of postpartum amenorrhea (and hence the length of birth intervals). Since this study obtained unusually detailed information on infant feeding practices for a fairly large representative sample, it provides valuable information regarding how infant feeding practices, particularly breastfeeding, affect the length of postpartum amenorrhea.

Eighty-two cases were excluded from the examination of the relationship between breastfeeding and amenorrhea because of obvious reporting errors or potentially misleading information. There were 26 cases reporting a length of amenorrhea longer than the current age of child, and 9 cases reported a length of breastfeeding longer than current age of the child. These were obvious cases of reporting error. Twenty-four women were pregnant before their first postpartum menstruation, hence no valid length of postpartum amenorrhea could be obtained from these women. Certain kinds of hormonal contraceptives interfere with a woman's menstruation; therefore, if the use of these contraceptives was initiated before a woman's first postpartum menstruation, her reported time of first menstruation may be artificially delayed or induced by the hormone. Hence, these cases are excluded from the analyses of the relationship between breastfeeding and amenorrhea length. Women who used hormonal injection contraceptives could delay menstruation for several months; only 1 woman in the Kenya sample had initiated the use of injection contraceptives before first menstruation. On the other hand, women who used estrogen contraceptive pills would experience induced menstruation within two weeks; there were 21 women who started using pill contraceptives prior to the reported start of menstruation.

The estimated median length of breastfeeding is 16.22 months, while the estimated median length of amenorrhea is 6.87 months. Among those women who had weaned their child (currently

not breastfeeding, and with known length of breastfeeding), there was a positive relationship between the known length of breastfeeding and their median length of amenorrhea (Table 3-7).

The proportion still breastfeeding and the mean frequency of breastfeeding among currently breastfeeding women for each postpartum month is presented below. The mean frequency of breastfeeding among still breastfeeding women decreased steadily from about nine and a half times per day to about five times per day by the end of 18 months. Similarly, the proportion still breastfeeding also decreases over time (Table 3-8).

In order to assess the effect of frequency of breastfeeding amenorrhea status, the proportion amenorrheic between the "high frequency" (frequency six times or more per day) and the "low frequency" (frequency less than six times per day, currently non-breastfeeding women not included) breastfeeders are compared. The results are presented below. At most postpartum intervals, the proportion amenorrheic is higher for the "high frequency" breastfeeders. In the intervals where the proportion amenorrheic is lower for the "high frequency" breastfeeders, the actual proportions amenorrheic in the two groups are quite similar (Table 3-9).

Presumably, the more the infant's diet is dependent on the mother's breastmilk, the more the suckling stimulus necessary for the maintenance of amenorrhea. In all postpartum months, among the five feeding patterns identified, proportion amenorrheic is lowest for those women who have weaned their child (NO BF group), and the proportion amenorrheic is highest among the exclusive breastfeeders (BF Only group). Mixed feeding regimes have intermediate values (Table 3-10).

The median length of breastfeeding and median length of amenorrhea by age of the mother were calculated (Table 3-11). There seems to be no obvious trend in the median length of breastfeeding by age of the mother. The median length of amenorrhea, however, was much longer for the very oldest age group.

Median breastfeeding and amenorrhea lengths were also assessed by parity groups (Table 3-12). Women of higher parity breastfed longer and had longer durations of amenorrhea than women of lower parity.

Contraception and the birth spacing effect of breastfeeding are important issues for Kenya because of its high birth rate and the limited public acceptance of modern birth control methods. Most of the women interviewed were aware of the effect of breastfeeding on delaying postpartum ovulation and menstruation from their own experience. Data presented earlier show that 75% of the mothers believe that at six months a woman still

breastfeeding is less likely to get pregnant than one who stopped at three months. The ethnography also documented this knowledge.

Survey statistics on the use of modern contraceptive methods show 18% of the women using any birth control method since the birth of the index child. Of these, 123 or 12% of all women interviewed reported using oral contraceptive agents, 4% used IUDs, and the remaining 2% reported use of other modern methods.

Health and Feeding Patterns

The relationship between feeding patterns and whether or not the child was ever hospitalized is presented in Table 3-13. Exclusively breastmilk substitute fed children were excluded because there were too few to analyze (N=4). These data show significantly fewer children fed exclusively on breastmilk as ever having been hospitalized. A similar analysis of reported morbidity in the previous two weeks by feeding pattern, shows a similar picture (Table 3-13). Exclusively breastfed babies were reported as having a lower percent with morbidity in the previous two weeks. Because exclusively breastfed children tend to be younger, and because very young infants tend to have less morbidity than infants who are several months old, the analysis was performed a second time using only children who were older than 2 months (Table 3-14). The apparent differential in prior hospitalization increased, if anything, as a result of this restricted analysis. On the other hand, the probabilities of having been sick in the last two weeks increased overall, and the apparent protective effect of exclusive breastfeeding seems to have disappeared.

Children Who Were Never Breastfed

Although the vast majority of the children in the Nairobi sample was breastfed for at least some portion of time, there is, nonetheless, a small group (<3%) who were never breastfed. The question arises whether the group who never breastfed differs in some fundamental way from the majority of children. Examination of the survey data (Table 3-15) shows that certain characteristics of the mothers and their child care experiences predict a greater than average risk of not breastfeeding. Greater percentages of mothers for whom the index child is their first, never breastfed. Similarly, any education and ability to read English are both associated with increased--albeit very small--rates of never breastfeeding. The experience of having a previous child who was not breastfed increases the chance of never breastfeeding over seven-fold. If the mother did not feed the baby at all (whether breast or bottle) in the hospital, this also increases the chance that the child will not ever be breastfed. Interestingly, rooming arrangements of mother and

and child during the first day appear to have less relationship with probability of breastfeeding, although mothers who do not room with their babies are slightly less likely not to initiate lactation.

Table 3-1. Type of Feeding by Age of Index Child
(n = 833)

Age in Months	Breastmilk Only		Breastmilk and Breastmilk Substitutes		Breastmilk Substitutes Only		Breastmilk, Breastmilk Substitutes and Food Supplements		Breastmilk and Food Supplements		Food Supplements Only		Breastmilk Substitutes and Food Supplements	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<1	52	70	12	16	0	0	6	8	5	6	0	0	0	0
1 to 2	36	53	22	32	0	0	4	6	7	10	0	0	0	0
2 to 3	19	33	20	34	1	2	10	17	8	14	0	0	0	0
3 to 4	4	11	11	27	0	0	14	35	9	23	0	0	1	3
4 to 5	6	13	7	16	0	0	25	54	6	14	2	3	0	0
5 to 6	4	6	10	17	0	0	33	55	7	12	0	0	6	10
6 to 7	1	1	4	5	1	2	32	47	22	33	1	2	7	13
7 to 8	0	0	0	0	0	0	31	57	15	27	1	2	7	13
8 to 9	0	0	1	3	0	0	27	55	13	26	1	2	7	13
9 to 10	2	3	3	4	0	0	23	38	11	17	6	10	17	27
10 to 11	2	6	1	3	0	0	9	23	11	31	1	3	13	34
11 to 12	1	3	0	0	0	0	21	48	12	27	1	3	8	19
12 to 13	2	5	0	0	0	0	21	39	14	25	2	4	15	28
13 to 14	2	5	2	5	1	3	14	33	9	22	2	5	12	28
14 to 15	0	0	2	4	0	0	17	41	6	16	5	11	11	28
15 to 16	0	0	0	0	0	0	12	27	10	22	2	4	20	46
16 to 17	1	4	0	0	0	0	11	35	8	25	1	5	9	31
17 to 18	0	0	0	0	0	0	5	18	3	12	6	22	12	46
18 to 19	0	0	0	0	0	0	5	15	3	10	11	32	15	43

* "Breastmilk substitutes" includes both cow's milk and infant formula.

Table 3-2 Percentage of Children Currently Breastfed by Age of Child

Age (months)	N	% Yes
0	59	100
1	67	100
2	71	93.1
3	50	97.7
4	38	100
5	56	90.6
6	63	95.7
7	51	78.1
8	55	81.7
9	57	72.5
10	42	58.6
11	43	79.8
12	62	70.3
13	38	72.9
14	43	52.8
15	47	47.5
16	31	68.8
17	21	22.1
18	48	28.1

Table 3-3 Percent of Index Mothers Initiating Breastfeeding by Time of Initiation

Time of First Breastfeeding	%
Never	4
1-6 hours	47
7-12 hours	5
13-24 hours	20
25-48 hours	11
3-4 days	5
5-6 days	1
7+ days	3
Can't remember	4

Table 3-4 Consumption of Breastmilk Substitutes and Food Supplements by Age

Age (mo)	Total	Breastmilk Substitutes		Any Supplement	
	N	N	%	N	%
0	75	18	24	23	31
1	69	26	38	33	48
2	58	31	53	39	67
3	39	26	67	35	90
4	46	32	70	40	87
5	60	49	82	54	90
6	68	47	69	67	98
7	84	38	70	54	100
8	49	35	71	49	100
9	62	43	69	60	97
10	37	23	62	35	95
11	43	29	67	42	98
12	54	36	67	52	96
13	42	29	69	40	95
14	41	30	73	41	100
15	44	32	73	44	100
16	30	20	67	29	97
17	26	17	38	26	100
18	34	20	59	34	100

Table 3-5. Foods Consumed by Index Children in the Previous 24 Hours by Age of Infant

Child's age in Months	Breastmilk (%)	Cow's Milk (%)	Infant Formula (%)	Glucose Drink (%)	Tea W/Milk (%)	Uji*W/Milk (%)	Uji*W/Out Milk (%)	Pkgd Cereal (%)	Ugali** (%)	Potatoes (%)	Bananas (%)	Eggs (%)	Meat (%)	Other Vegs. (%)	Fruits (%)
<2	96	9	25	21	0	2	2	9	2	1	3	0	0	1	2
2-4	95	14	44	19	0	9	7	18	2	5	8	3	0	1	3
4-6	92	23	38	12	4	30	16	21	10	13	18	3	0	6	6
6-8	80	31	28	15	3	43	20	12	20	29	34	11	7	6	5
8-10	66	37	21	9	8	54	17	9	29	32	41	9	7	23	3
10-12	64	38	11	3	13	51	18	5	34	40	44	14	8	18	10
12-14	59	37	10	3	9	54	16	3	44	27	37	14	8	22	5
14-16	46	39	16	8	27	43	23	5	53	38	29	17	19	29	9
16-18	40	50	3	0	23	40	24	2	60	36	36	16	18	31	11

*Uji is thin maize porridge

**Ugali is thick maize porridge

Table 3-6 Mean Frequencies of Breastfeeding for Mothers Currently Breastfeeding by Time of Day Using 24-Hour Recall

	Mean Frequency of Breastfeeding	S.D.
Morning	2.3	2.0
Afternoon	1.6	1.8
Evening	1.7	1.7
Night	2.8	1.9
TOTAL	8.5	5.7

Table 3-7 Length of Breastfeeding and Length of Amenorrhea

Known length of breastfeeding	Median Length of Amenorrhea
0 < Length < 3	3.87
4 < Length < 7	4.93
8 < Length < 11	6.52
12 < Length < 15	9.30
16 < Length < 19	--

Table 3-8 Frequency of Breastfeeding By Age of Child

Months	Mean Frequency of BF	Proportion BF
0 - 4	9.60	98.0
4 - 8	8.20	90.8
8 - 12	6.70	76.2
12 - 16	6.70	63.3
16 - 20	4.90	42.5

Table 3-9 Proportion Amenorrheic by Frequency of Breastfeeding

Postpartum Months	Freq < 5 times Prop (AM)	n	Freq > 6 times Prop (AM)	n
0,1	66.7	18	91.7	109
2,3	68.2	22	78.9	95
4,5	59.1	22	52.3	65
6,7	51.9	27	50.7	71
8,9	52.9	17	46.2	39
10,11	20.0	30	54.8	31
12,13	25.0	16	18.2	22
14,15	--	10	7.7	13
16,17,18	18.2	11	42.9	7

Table 3-10 Proportion Amenorrheic by Patterns of Feeding

Feeding Patterns	Months 0-4	5-9	10-14	15-19	20-24	(n)
BF ONLY	90.5	63.7	77.8	-	-	139
BF+FOOD	63.8	51.7	40.5	12.9	-	241
BF+MILK	77.5	57.9	57.1	0.0	-	9[illegible]
BF+FD+MK	67.9	48.7	32.2	25.0	-	260
NO BF	60.0	23.8	12.3	13.9	-	191

Table 3-11 Median Length of Breastfeeding and Amenorrhea by Age of the Mother

AGE OF MOTHER	MEDIAN BF LENGTH	MEDIAN AM LENGTH
<20	16.86	7.97
20-24	15.80	6.55
25-29	14.03	7.82
30-34	18.00	9.23
35+	17.00	16.35

Table 3-12 Median Length of Breastfeeding and Amenorrhea by Parity of Mother

PARITY OF MOTHER	MEDIAN BF LENGTH	MEDIAN AM LENGTH
ONE	14.94	6.58
TWO-THREE	15.46	7.33
FOUR/FIVE	17.22	8.55
SIX/SEVEN	>18.00	9.05
EIGHT	>18.00	9.93

Table 3-13 Percent of All Index Children Ever Hospitalized and Reported Ill in the Previous Two Weeks by Feeding Pattern

Feeding Pattern	% Ever Hospitalized	% Sick in Previous 2 wks.
Breastmilk only	4.9	31.7
Breastmilk + Breastmilk Substitutes	13.2	36.6
Breastmilk, Breastmilk Substitutes + Food Supplements	14.3	43.6
Breastmilk + Food Supplements	21.3	50.3
Food Supplements only	29.8	43.3
Breastmilk Substitutes + Food Supplements	18.8	48.3
Total	16.2	43.6

Table 3-14 Percent of Children Older Than 2 Months Hospitalized and Reported Ill in Previous Two Weeks by Feeding Pattern

Feeding Pattern	% Ever Hospitalized	% Ill in Previous 2 Weeks
Breastmilk only	3.0	46.4
Breastmilk + Breastmilk Substitutes	16.0	45.5
Breastmilk, Breastmilk Substitutes + Food Supplements	15.1	45.8
Breastmilk + Food Supplements	22.6	52.0
Food Supplements Only	29.8	43.3
Breastmilk Substitutes + Food Supplements	18.8	48.3
Total Sample	18.0	47.7

Table 3-15 Characteristics of Mothers and Percent of Children Who Were Never Breastfed

	N	% Never Breastfed
Parity		
One	255	3.7
Other	726	2.2
Mother's Education		
None	175	1.0
Any	806	2.7
Mother Reads English		
Yes	557	3.6
No	424	1.6
Who Fed Baby in Hospital		
Mother	473	2.6
Mother and Staff	28	4.1
Staff Only	116	7.7
Baby and Mother in Same Room 1st Day		
Yes	595	2.9
No	155	3.4
Mother Breastfed Previous Child		
No	30	13.7
Yes	679	1.9

Figure 3-1

Percent current use of breastmilk, breastmilk substitutes and food supplements alone or in combination by age of index child

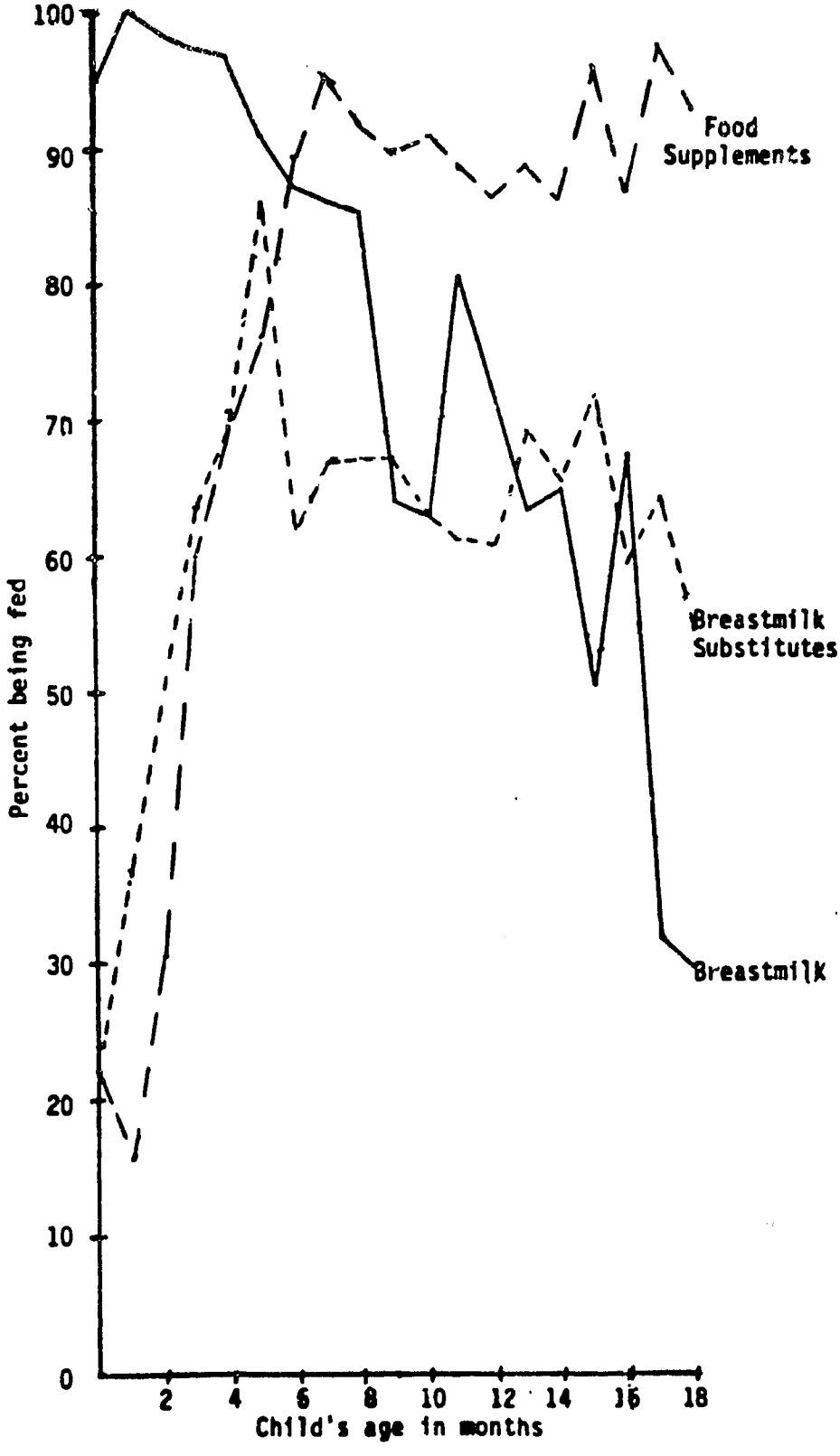
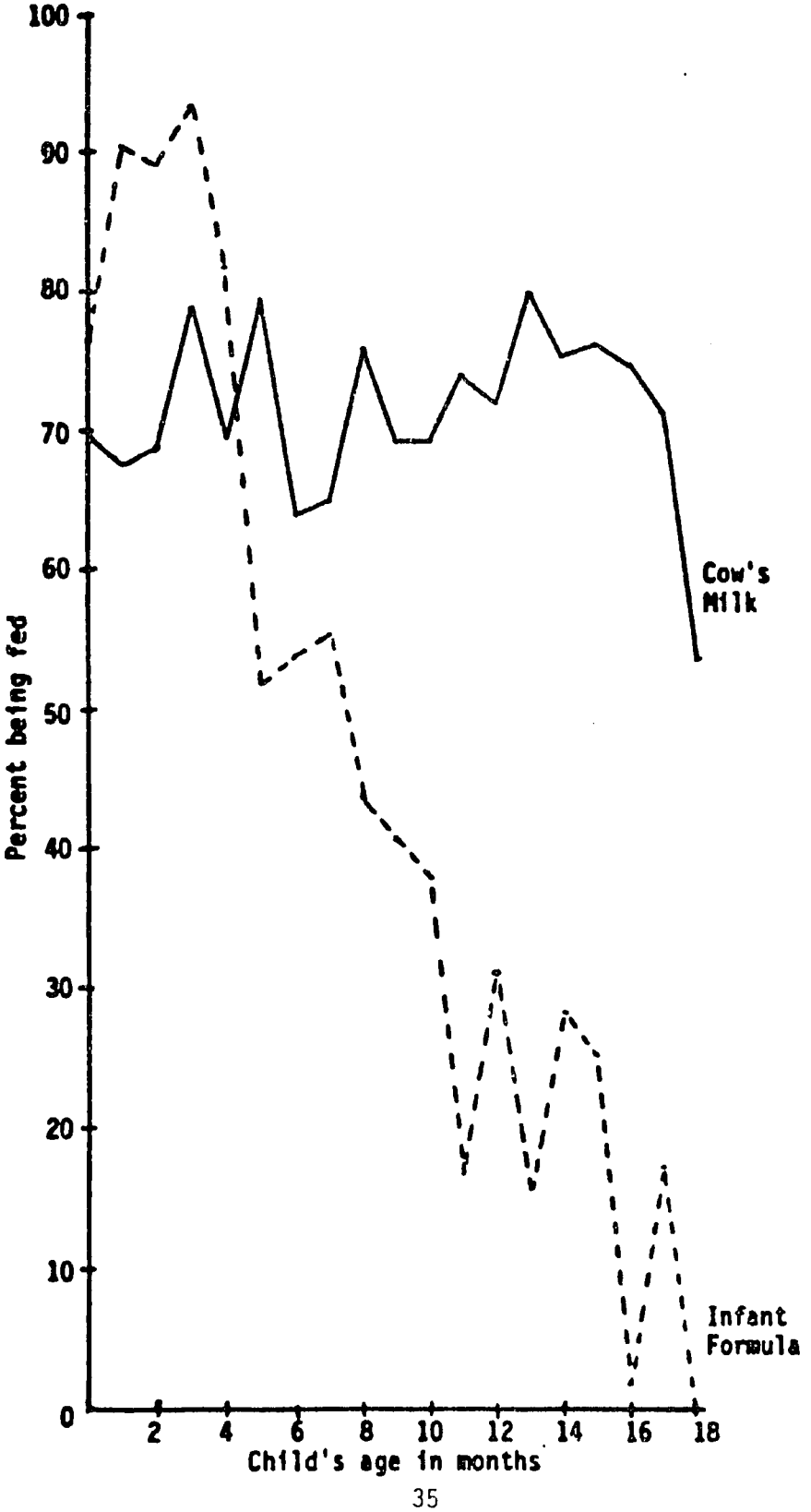


Figure 3-2

Current use of infant formula and cow's milk of those children ever fed breastmilk substitutes by age of index child



CHAPTER IV DETERMINANTS OF INFANT FEEDING PRACTICES: BACKGROUND VARIABLES

Maternal Background Characteristics

Although any of the major characteristics mentioned in section II could be used to look at differences in feeding patterns, four characteristics found to be of particular interest either from the ethnography or through analysis of the survey data itself are age, education, parity, and breastfeeding of a previous child. The relationship between these maternal characteristics and different feeding behaviors are presented in Table 4-1.

The age distribution of the index mothers is presented graphically in Figure 4-1. The mean age was 24 years and distribution shows the expected peaks at 20, 30, 35 and 40 years, responses mothers are more likely to choose if they are not sure of their exact age. Arbitrary age groupings of 19 years and under, 20 through 29 years, and 30 years or more were found to provide adequate numbers in each group for analysis.

Mother's education, presented as number of years of schooling in Figure 4-2 shows three distinct peaks: those never having attended school, those finishing primary school (standard 7), and those finishing secondary school (form 4). This variable was arbitrarily grouped as those not attending school, those starting but not finishing primary school (standard 1 through standard 6), those finishing primary but not secondary school (standard 7 through form 3), and those finishing secondary or continuing further.

Parity was divided into three groups: those women for whom the index child was their first (primiparous), those having previously borne 1 through 4 children, and those with 5 or more previous births. Twenty-six percent were primiparous; 63% had borne 1 through 4 children, and 11% had 5 or more. Finally, women were asked if they had breastfed their previous child. Ninety-six percent, or 679, mothers reported that they had breastfed their previous child and 4%, or 30, mothers reported that they had not.

Examining these maternal characteristics as independent variables influencing feeding behavior produces data presented in Table 4-1. Virtually all women, regardless of age, education or parity do initiate breastfeeding. Fewer mothers who did not breastfeed their previous baby initiated breastfeeding with the index child, and this difference is significant at the .01 level in spite of the small total number of women who did not breastfeed their previous child.

Median duration of breastfeeding in months was computed using lifetable analysis with the SPSS SURVIVAL subprogram. The median duration of breastfeeding for all mothers was calculated at 16.02 months (Fig.4-3). When broken down by maternal characteristics, the only statistically significant relationships were with mother's age and education. The two youngest groups of mothers breastfed for significantly shorter periods of time (medians = 16.55 and 15.24 months) than did the older mothers (median = 18.00+ months). Mothers in the highest education group breastfed for a significantly shorter period of time (median = 12.00 months) than did mothers in any of the other three education groups. Parity was not significantly related to duration of breastfeeding, and the sample sizes for whether or not the previous baby was breastfed were too small to analyze.

The percent of children weaned in the whole sample is 23%. When examined by maternal characteristics, significant relationships are seen with both mother's age and mother's education. A greater percentage of mothers in the middle age category (26% of the 20-29 year olds) had weaned their children than older or younger mothers (15% and 16%, respectively). With mother's education, 25% and 32% of the mothers in the two highest education groups had weaned their babies while only 16% of the mothers in each of the two lowest education groups had. Because of the small number of women who had weaned their baby at the time of the interview, statistically significant differences are hard to find.

The same problem arises with mean "weaning interval" for which statistically significant effects can only be found for some categories of age and education. The concept of "weaning interval" was developed to describe the relationship between initiation of supplementation and cessation of breastfeeding. It is calculated as the difference between the child's age (in months) at the last breastfeeding and the age (in months) at the first addition of another food or bottle milk on a regular basis. The mean weaning interval is significantly shorter for the oldest group of mothers than for the middle group (3.5 vs. 5.5 months) and is significantly shorter for mothers who never attended school than for those having finished a primary education (3.6 vs. 5.8 months).

Mother's education seems to have the greatest effect on feeding behavior with the higher educated women breastfeeding for a shorter period of time, being more likely to introduce breast-milk substitutes, and more likely to have weaned their baby at the time of the interview than their less well-educated peers. The relationship of mother's education to feeding behavior may be due in part to different employment patterns and income levels among these groups.

Maternal Knowledge and Attitudes

Table 4-2 shows the distribution of responses to a series of statements read to the mothers. From this table it can be seen that mothers feel strongly that they should not breastfeed while pregnant and that an overwhelming majority wrongly believe that infant formula added to breastmilk in the first three months of life will make their baby healthier. The last two statements, separated in the questionnaire, show some uncertainty on the part of mothers as to the appropriateness of breastfeeding in public. These data are supported by the ethnography.

Other knowledge and attitude questions presented in a different format found that 60% of the mothers thought that breastfeeding takes more of a mother's time than does bottle feeding. The idea that the bottle fed baby "feeds itself" is supported by one woman's statement in the ethnography report:

> "It is very easy to feed a baby with a bottle. You do not have to feed the baby yourself. You can just prop the bottle with a pillow and the baby will feed itself. The bottle is better for me because I am always very busy. It would take a long time to feed a baby with a cup and spoon. I would not, for example, expect my friend Gathoni to feed my baby with the cup and spoon when I leave the baby with her. It would be unfair for her as she would waste a lot of her time with the baby."

The cup and spoon method of feeding breastmilk substitutes was seldom used by mothers in the sample even though it is widely recognized by health experts and formula manufacturers as the cleanest and safest method. Ninety-two percent of the mothers feeding formula usually used a bottle and teat as did 74% of the mothers feeding cow's milk.

When asked if they would breastfeed a friend's baby if that friend were in the hospital, 89% of the mothers said they would not, and when asked what causes a woman's breasts to sag, 90% gave breastfeeding as the response. The ethnography suggests however that sagging breasts may not be important to many of the women interviewed.

The knowledge question (Table 4-2) on whether or not a mother should breastfeed when she has a fever shows that 50% of the mothers thought she should not. In a companion question asking if a mother should continue breastfeeding if her baby has diarrhea, only 58% thought that the mother should continue.

Table 4-3 shows a breakdown of knowledge and attitude responses by mother's age, education, years in Nairobi, and tribe. Of these, mother's education is the only variable showing

any marked effect, and then with only some of the statements. Interestingly, although educated mothers express perhaps more knowledge about breastfeeding and more positive attitudes, in practice, they weaned earlier and introduce substitutes earlier and more frequently (Table 4-1).

Finally, mothers were asked three attitude questions on how long a child should be exclusively breastfed, how old a child should be when it is completely weaned, and how long a mother should abstain from sexual intercourse after birth. When asked how long mother's breastmilk without other foods is enough for a baby, 22% said two months or less, 53% said three months or less, and 85% said six months or less. The remaining 15% or 141 mothers said more than six months. The age at which mothers thought babies should stop breastfeeding completely ranged from 1 to 36 months, with only 9% of the mothers saying less than a year. The mean age given by the women for completely weaning a child was 17.5 months, fairly close to the actual median duration of breastfeeding calculated from the sample (16.02 months).

When asked how long a woman should abstain from intercourse after birth, the responses ranged from one week to two years, with three months as the most frequently given response.

Socioeconomic Status

a. Measurement Problem

Socioeconomic status is usually considered to be a critical independent variable in the analysis of health and nutrition outcomes. Figure 4-4, from a recent monograph on child feeding practices[1], is an example of how socioeconomic status is modelled as a central influence on mortality through its impact on nutritional status, sanitation, and access to health care.

The problems with modelling socioeconomic status or, more specifically, income as a socioeconomic status proxy, fall into two categories: conceptual and methodological. Conceptual problems include how widely or narrowly income is defined and the recipient unit for which it is measured. When, income is measured at the household level, differences in household composition and the intrafamily distribution of resources often are not accounted for.

The methodological problems involved are also complex. Some of these include difficulties in the measurement of non-cash income, irregular income, and illegal or otherwise unreported income. There is also the problem of the household dependent or the income changing in composition over time, or being hard to characterize. Income is often measured indirectly through information on expenditure, and sometimes through the use of proxy indicators such as the ownership of specific possessions, housing materials, or amenities. The measurement of each of these variables present additional problems.

Beyond the conceptual and methodological concerns surrounding the sociologists' or economists' use of incomes or socioeconomic status are some broader issues, spilling over from social psychology and anthropology. These concern, for example, how the impact of differential income is modified by psychological, social and cultural factors.

Furthermore, social anthropologists have written of how the ill effects of limited resources can be somewhat offset by access to human resources and the use of social networks. The importance of this idea can be seen in the contrast between two hypothetical women in the Nairobi study one of whom is born in an urban low income area and the other, a recent arrival from a rural district. If the long time resident has become part of a network of neighbors and friends where she can trade child care,

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[1]R.Martorell, et al., "Child Feeding Practices: Knowledge, Research Needs and Policy Implication." Cornell Nutritional Surveillance Program Working Paper Series, No.28, March 1984.

borrow and lend food or money to cover emergencies or smooth out an irregular income, or get tips on day labor openings, etc., she may be in a much better position than a newcomer with a higher cash income.

These social science frameworks are not without difficulties. One conceptual problem is whether or not social networks or psychological factors operate at income extremes. That is, at low enough income levels does even the most effective network or best psychological outlook become overwhelmed? Can the very wealthy live long and healthy lives at very low levels of social involvement? There remains a problem of integrating all the other health related factors into a conceptual scheme, representing interaction with attitudes or networks. Methodological issues include difficulties in collecting data on esteem or involvement and in quantifying them or otherwise rendering them useful for comparison.

b. Using Socioeconomic Status Data From This Survey To Create New Variables

The obvious choice for constructing a socioeconomic status variable for study would be income or an income proxy. There were many problems, however, with collecting such data. Many of the married women claimed not to know how much their husbands made, and many more showed a general unwillingness to reveal the amount if they did. Most of the households had irregular sources of income including day labor, occasional neighborhood resale of vegetables bought at trips to the city market, and sometimes cash from the sale of crops planted and harvested in trips to visit extended families back in the rural areas. There were also many illegal sources of income in the study area including brewing illegal alcoholic beverages, prostitution, and vending without licenses. The ethnographers concluded that when incomes were revealed--enabling the collection of this information required several extended visits--they were usually underestimated.

When the direct measurement of income is impossible, expenditures or possessions are sometimes used as a proxy. Food expenditures, for example, have often been used by economists to construct poverty lines. While the women surveyed seemed pleased to state their expenses, the accurate collection of such data is very time consuming. Some food purchases are used over a long period of time (such as infant formula or tea) while others, because of the lack of refrigeration or the constraints of daily wages, are purchased one or more times a day (milk or vegetables for example). Possessions are another income proxy used in surveys. The use of these data rely on assessments of which material goods are desirable and at what level of income they can be afforded.

In the end, variables were selected for the measurement of socioeconomic statues using all of these approaches and fall into four main categories:

Income/Expenditure
Demographics
Amenities

Social Involvement

(1.) Income/Expenditures

(a) Monthly rent seemed like a good expenditure measure because most of the women interviewed (a) rented, (b) knew the rent that they paid, and (c) were not as reluctant to discuss this expenditure as they were to discuss income. 88% of the mothers responded to the question, and the responses were distributed fairly evenly with the expected peaks at 100, 500, and 200 Kenya shillings. As the study progressed,

however, it was discovered that in some survey areas rents were subsidized for employees of either the city or national government. This happened in the upper income range of the sample. Also households renting the same dwelling for a long period of time would often be spared rent increases. Thus neighbors with identical units might be paying substantially different rents based on tenure.

(b) Ownership of housing is not very useful because of the categories offered for response (own, rent, squatter/allowed, other) and the fact that nearly 90% of the respondents reported renting.

(c) How often the household head is paid was explored to try to determine regularity of employment. In Kenya, government and full time private sector employees are usually paid on a monthly basis. Seventy-four percent of the respondents reported monthly pay, 16% reported daily, weekly or bi-monthly pay, only 6% reported not working, and the rest responded with "other." Compared to all other available statistics in employment, these figures would appear grossly to overestimate regular employment and underestimate unemployment. The sample is probably large enough to do some analyses using the monthly paid vs. all others.

(d) Whether food or money received from outside Nairobi was examined to explore exchanges with the surrounding rural areas and to see if significant non-monetary income flowed into the sampled households as was suggested in the ethnography. Ninety-three percent of the households reported that they received neither. In the ethnography mothers reported returning to their rural plots twice a year (for planting and harvest), and some reported sending school age children back to their home areas to live with their parents and attend school during part of the year. These non-monetary sources of income were not captured by the survey.

(2.) Demographics

(a) The total number of household members is based on the following definition used for all Kenya Central Bureau of Statistics Surveys:

"a person or group of persons generally bound by ties of kinship, who normally reside together under a single roof or several roofs within a single compound and who share a community of life in that they are answerable to the same kind and have a common source of food or income."
The responses ranged from 2 to 13 members with a mean household size of 5.5. This figure is comparable to others generated among similar populations surveyed in Nairobi.

(b) The highest education level of each mother is available for both the mothers and the household head and both are distributed evenly enough to allow for analysis based on education.

(c) Data on the occupation of each member are hard to analyze because the questionnaire was precoded and necessarily limited the number of response categories severely. Analysis might be possible by separating out the technical/professional and clerical/administrative groups at the upper end (total 32%) and the unemployed at the low end (10%) for household heads. Analysis by occupation of mothers who were not household heads is not possible because so few (1%) were working outside the home at the time of the interview.

(d) Age of each household member is available.

(e) Sex of each household member is available. Analysis by sex of household head would be interesting, although the ethnography indicates that in many more cases than the survey statistics suggest the listed male household head is largely absentee and the woman interviewed makes many of the decisions related to use of resources. Further analysis is necessary, but it appears that only approximately 10% of the sample households reported females as household heads.

(f) Marital Status was reported by all mothers. Eighty-five percent of the mothers reported being married, with another 14% listed as single. The remaining mothers reported being separated, divorced, widowed. Again, the ethnography suggests that many of the women listing themselves as "married" would be more accurately defined as either "single" or "separated."

(3.) Amenities

(a) The question on the "number of rooms used for sleeping" was so phrased because many of the households studied did not have the luxury of bedrooms or rooms used exclusively or primarily for sleeping. Even as worded, 77% of the sample reported one room and another 9% two rooms. This variable is only useful if considered in terms of number of household members as is described later in the discussion of the "density" variable.

(b) Water source was asked separately for cooking, drinking, bathing and dish washing. While source is probably more use-dependent during the dry season, it is less so during the rainy season when these data were collected, and there is almost no variation reported by use. For drinking water, 30% reported water piped into the house, 68% water piped outside the house, and the remaining 2% reported vendor purchase. Distinguishing between those who have water piped into their home vs. those who do not is logical as well as convenient. Research has shown that water piped to a point outside the home, even if purified at its source, is usually badly contaminated by unsanitary transport and household storage.

(c) A question asking specifically what type of toilet the family used and whether there were shared toilet facilities, common in many of the squatter areas and many of the low rent housing areas. Forty percent reported using a flush toilet, 52% reported using a pit toilet, and the rest reported having no toilet. These figures seem somewhat suspect since only 30% reported piped water in their houses. Some of these households might have had use of communal flush toilets at piped water source points outside of their homes. The ethnography and informal observation also support lower flush toilet figures. In any event, since piped water and flush toilets are highly related, proxy variables created from amenities should include only one or the other.

(d) There was a simple yes/no question on electricity in the home to which 29% of the households answered, " yes." These households probably consist of two subgroups: the sample's economic elite and some lower income individuals living in relatively new government subsidized housing.

(e) Only 7% of the sample reported having a refrigerator. These are certainly among the relatively very well off households because of the expense of appliances and the fact that they are not included in rental housing. The lack of discrimination between low and middle groups made the use of this variable problematic.

(f) A question on the fuel usually used for cooking elicited information on the distribution of use of wood, charcoal, paraffin (kerosene), bottled gas and electricity (ranked here from least to most expensive). Two percent reported using wood (scarce in urban areas), 53% charcoal, 33% paraffin, 10% gas, and 2% electricity. By combining wood and charcoal as one group and paraffin, gas and electricity together as another, the resulting recoded variable is logical as well as useful. The second group requires a manufactured stove, burner or cooker of some sort, the purchase of which might indicate a higher income level. Data are available from all households.

(4.) Social Involvement

(a) The length of time mother has lived in Nairobi was selected to give an indication of how "urbanized" a mother was. It might also be used as an imperfect measure of a woman's "connectedness" in her current locale. Forty-five percent reported living in Nairobi two years or less; another 31%, two years through nine years; and the remaining 24% ten years or more.

(b) A question on the length of time mother expects to remain in Nairobi turned out to be culturally inappropriate, and many of the [illegible] had difficulty responding. Eighty-six percent of the sample could give no estimate. Eleven percent said "less than two years."

(5.) Data Manipulation

After a careful examination of the relative strengths of the available variables, the following nine were chosen to be used in factor analysis:

* mother's education
* household head's education
* household head's occupation
* water source
* fuel for cooking
* rent
* mother's length of residence in Nairobi
* electricity
* density

(The "density" variable was created by dividing the total number of household members by the number of rooms used for sleeping.)

The purpose of factor analysis in this case was to see which of the socioeconomic status proxies seemed to fall out together as representatives of a single larger force or "Factor." The SPSS

program's factor routine with varimax rotation identified three "Factors", as shown in Table 4-4. The higher the value of a variable in a factor, the better its fit with that factor. Looking at Factor 1, water source, rent, and electricity stand out as primary variables in this factor, which was renamed "improved housing" to reflect the importance of these variables. Within Factor 2, mother's education, household head's education, and household head's occupation stand out as primary variables. This factor seems to represent traditional socioeconomic status variables and was renamed "SES." Factor 3, the weakest of the three created factors, seems marginally represented by the newly formed density variable.

To use these newly created factors in data analysis, variables representing each factor were selected. For the improved housing factor, a combination variable was created from the water source and electricity variables. The resulting variable "POWPIPE" contained three values:

1. households with neither water piped into the house nor electricity
2. households with either water piped into the house or electricity, and
3. households with both water piped into the house and electricity.

For the socioeconomic status factor, a single variable, mother's education, was chosen to represent the group. This was done because of difficulty encountered in separating male and female households heads in the data set. Analysis was also done based on a grouping of household head's occupations. For the third factor, the density variable was used as a separate independent variable for analysis.

Two types of analyses were then carried out using the "factor" variables: one used feeding practices as dependent variables, and a second used health outcomes as dependent variables. The feeling practices examined were 1) whether the child had ever been fed either infant formula or packaged cereals and, 2) The length of breastfeeding (examined using lifetable analyses generated by the SPSS SURVIVAL routine). These two practices were chosen because of their retrospective nature and the fact that both infant formula and packaged cereals were likely to be used within the first 3-4 months of life if used at all, a fact which allows for a potentially large sample size.

The analyses of "ever use" of infant formula or packaged cereals were done using cross tabulation because the dichotomous dependent variables do not lend themselves to regression analysis. The results, presented in Table 4-5, show statistically significant (at the .01 level using the chi square test) differences in both infant formula and packaged cereal use for

different categories of the independent variables. The percentage of children ever having been fed infant formula and packaged cereal increases with household head's employment status and mother's education. The water/electricity variable POWPIPE shows relatively little difference in "ever use" between those households with neither electricity nor inside piped water and those with one or the other. There is, however, a large increase in the percentage of households where either infant formula or packaged cereal has been fed in those households having both electricity and inside piped water. Percent "ever use" of either infant formula or packaged cereal increased with decreased housing density (fewer household members per room used for sleeping).

Lifetable analysis was done to determine the duration of breastfeeding. The median durations of breasfeeding were compared for different categories: household head's occupation, mother's education, POWPIPE, and household density. From this analysis, the probability that the different subgroups within each of the independent variables represent different populations is then calculated. The results, presented in Table 4-6, show highly significant differences in duration of breastfeeding when analyzed by mother's education and POWPIPE and no significant differences when analyzed by household head's occupation or household density. With mother's education, the median duration of breastfeeding for the most highly educated mothers (those with form 4 education or better) was 12.00 months against a median of 18.00+ months for the two groups with the fewest years of schooling. With POWPIPE, the median duration of breastfeeding for mothers living in households with both piped water and electricity was 12.64 months against median durations of 16.61 and 17.25 months for the rest of the sample.(Figure 4-5).

The health outcome analysis carried out with the "factor" variables used: 1) reported illness in the last two weeks and, 2) percent weight for age, as dependent variables. Reported illness in the last two weeks was analyzed using crosstabulations. The results are presented in Table 4-7. There were no significant differences in reported illness by category or household head's education or household density. Mother's education showed a significant, but non-linear, relationship with the lowest percentage of mothers reporting illness in the least and most schooled groups. This similarity between the non-schooled and most schooled mothers resembles that seen in the analysis of some of the knowledge and attitude data, above. The water/electricity variable, POWPIPE, shows a highly statistically significant linear relationship, where the addition of either electricity or water piped inside the house results in a decrease in reported illness.

The second outcome variable, weight for age, was analyzed using multiple regression with household head's occupation,

mother's education, POWPIPE and household density as independent variables. The adjusted R square value was 0.026, and only the POWPIPE variable was significant (F = 13.800) Since there is likely to be a non-linear relationship between weight for age at mothers education, further analysis using other techniques might demonstrate a significant effect which is missed in this analysis.

6. Summary

The variables available from the study were scrutinized to select possible socioeconomic status indicators. Those examined fell into four main categories: income/expenditures, demographics, amenities, and social involvement. Nine variables from these four groups were chosen for factor analysis based on their reliability, discrimination, and cultural appropriateness. Factor analysis produced three factors under which the nine variables seemed naturally to group. The factors appear to reflect 1) improved housing (represented by a composite variable created from water source and electricity variables); 2) traditional socioeconomic status (education and occupation levels); and 3) best represented by housing density. Relationships of these factors and a) infant feeding practices (ever use of infant formula or packaged cereal and duration of breastfeeding) and b) health outcome (percent weight for age and morbidity in the previous two weeks) were then explored.

Use of infant formula or packaged cereal shows statistically significantly greater use with increased housing quality; occupational status of household head, mother's educational level, and decreased household density. Duration of breastfeeding was only related to housing quality and mother's education, with significantly shorter durations for the best educated mothers and those living in the most improved housing. Lower morbidity was significantly related to housing quality and mother's education. Mothers with the least and most education and from the most improved housing reported the least morbidity. Only improved housing, of the four variables analyzed, had a significant relationship with percent weight for age, with those infants from families with better housing having higher percent weight for age.

Bivariate Relationships of Background Variables and Infant Feeding Practices

The cross tabulation of various socioeconomic variables with infant feeding practices outcomes reveals a number of different trends for the Nairobi sample (Table 4-8). One point that is immediately clear is that there is almost no variability in the levels of breastfeeding initiation and the numbers of children breastfed for at least three months. Almost all children in the

Nairobi sample both initiate breastfeeding and go on to breastfeed for at least three months. These high levels do not fluctuate very much even when these variables are broken down according to the different categories of socioeconomic variables shown in Table 4-8.

Breastfeeding initiation and duration shows no apparent trend by mother's age or parity. On the other hand, both the oldest and most highly parous mothers are most likely to breastfeed and tend to breastfeed longer durations. Interestingly, these groups are slightly more likely than the other age/parity groups to introduce early breastfeeding. In the case of mother's education, initiation and duration are lower for the most highly educated group. This difference is small at 3 months of breastfeeding; but becomes substantial at 6 months' duration. This highly educated group also has the lowest likelihood of breastfeeding for nine and twelve months, suggest that the most highly educated mothers may be less inclined to breastfeed for longer durations than those with lower levels of education. Interestingly, the group of women with no education is also less likely to breastfeed for nine or twelve months than the women with 1-7 years of education. While the probability of longer breastfeed is quite substantially lower among the women with no education it is not quite as low as among those with more than eight years of schooling.

Economic status is represented here by the created POWPIPE variable based on household possession of piped water and/or electricity. Both for it and "urban mother" (coded according to where the mother has resided during most of her life), the associations with the infant feeding outcomes are quite consistent. Generally, there is a decline in the duration of breastfeeding as household economic status rises, i.e. in Nairobi higher family economic status is associated with a pattern of earlier weaning. Higher family economic status is also asscciated with more early bottle feeding. Consistently fewer urban mothers breastfeed for the different durations under consideration, and they have a greater propensity to introduce early bottle feeding (37.7% versus 27.7%).

Thus, for the infant feeding outcomes of interest, this study has documented important differences in various segments of the Nairobi population. These apparent associations will be examined in more detail through the use of multivariate analysis. Such analysis provides an opportunity to evaluate the strength of association between particular variables while simultaneously controlling for the confounding effects of others. It, therefore, will be possible to identify which of the socioeconomic variables described above that may be functioning as determinants of infant feeding behavior in Nairobi.

Logistic Regression Using Background Variables

Although the preceding sections have suggested which variables may be important determinants of infant feeding behavior, a multivariate approach is necessary in order to evaluate the effects of individual predictor variables on infant feeding outcomes while simultaneously controlling for the effects of other predictors. At the same time, the use of logistic regression is necessary in order to build and evaluate an overall predictive model of the determinants of infant feeding behavior in Nairobi.[2] Logistic regression functions to assess the impact of sets of independent variables on the probability of outcome of a dichotomous dependent variable.

In the present analysis, two types of dependent variables, representing different infant feeding outcomes, are of interest. Breastfeeding duration is represented by three dichotomous variables, BF6MO, BF9MO, and BF12MO, which are coded to indicate whether or not the index child breastfed at least as long as six months, nine months or twelve months for children as old or older than the stated ages, respectively. The variable BF3MO, used in some of the other companion studies, is not included in this analysis because the probability of breastfeeding for 3 months in this sample is so high (96%) that the variable does not contain enough dispersion to function meaningfully. Similarly, breastfeeding initiation, is also excluded because it is virtually universal in Nairobi, (97%). Also included in this analysis is a variable (BOTLBY2M) coded to indicate whether a child did or did not initiate bottle feeding by the second month of age. The interest in this infant feeding outcome relates to the possible associations between early bottle feeding and truncated breastfeeding, and the possible effects on the health of the child and fertility of the mother.

The background variables that were evaluated as determinants of infant feeding behavior were chosen both because of theoretical considerations and/or because of their apparent influence on infant feeding outcomes as presented in the earlier cross tabulations and life tables. The initial set of variables that were evaluated included mother's educational level, mother's age, family socioeconomic status (POWPIPE), parity, and urban mother (a dichotomous variable coded according to whether a mother has spent a majority of her life in Nairobi).

Table 4-9 presents the result of a series of logistic regression models for different breastfeeding duration outcomes and early bottlefeeding. For each of the predictor variables,

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[2]These analyses are based on unweighted samples, since, for technical reasons, the computer packages do not allow regressions to run on weighted samples.

the beta coefficient (a rough index of magnitude and direction of influence on the dependent variable) is presented. A chi square statistic is also presented indicating whether the magnitude of the effect on the dependent variable is significantly different from zero. Finally, for each model, an overall chi square and correlation coefficient is presented to indicate how well the full set of independent variables, taken together, function as a predictive model for the outcome variable of interest.

For breastfeeding duration of at least six months, only the mother's education and urban mother are found to be significantly associated with the outcome. The direction of the betas suggest that higher education and urban residence reduce the probability that a mother will breastfeed for as long as six months. Interestingly, household economic status is not significantly related to the outcome variable, although in the earlier cross tabulations and life tables there was a suggestion of a significant effect. The logistic regression procedure indicates that when controls are applied for such factors as higher maternal education and urban residence--both of which are likely in high income families--it is the latter two variables, and not just economic status, that are most likely to influence this measure of breastfeeding duration.

For the other two measures of breastfeeding duration, (nine months and twelve months), the variable urban mother continues to exert a highly significant negative effect on the probability of longer breastfeeding. In the longer duration models(9 and 12 months), the independent effect of maternal education disappears entirely and is replaced by a stronger association with household socioeconomic status. Although the variables parity and mother's age have been linked to breastfeeding duration in other studies, they do not appear to exert a significant effect on breastfeeding duration in the current study.

The only significant predictor of early bottlefeeding are household economic status and urban residence of mother. The beta coefficients suggest a positive relationship with both, and the association with household socioeconomic status is very highly significant ($P < .001$)

For all these models, the chi squares and correlation coefficients indicate that the full set of variables does significantly affect the outcome variables in question. The magnitude of the correlation coefficients, however, suggests only modest ability of the full set of independent variables to explain the variability in the outcome of interest. The risk ratios (Table 4-10) suggest that having an urban mother decreases the probability of breastfeeding for longer durations to one-third of that of non-urban mothers. This effect is twice as great as that of socioeconomic status on the same duration parameters.

A model which considers early bottlefeeding as merely a feeding outcome neglects to account for the fact that this behavior may, in itself, exert an independent influence on breastfeeding duration. Bottle feeding has been thought to disrupt the biological process of lactation and hasten the complete cessation of breastfeeding altogether. At issue, then, is whether the introduction of early bottle feeding, in this instance by the second month, exerts a truly significant and independent effect, reducing the likelihood that a child will continue to breastfeed for longer durations and is not merely a proxy for the decision to wean. Since, in this sample, the introduction of bottlefeeding occurs rather early and the median duration of breastfeeding is over 16 months, it is likely that the two events are not consciously linked by mothers. The effect of introduction of bottlefeeding on the probability of breastfeeding several months later was, therefore, examined. Any effect of bottle feeding at two months on weaning by three months might be heavily contaminated by mothers who intentionally substituted bottle for breast within the first three months. It was thought that effects on longer durations of breastfeeding (4 to 8 months after the latest introduction of bottles) would be less likely to be weighted by such cases. To test this reasoning, a calculation was made of the proportion of all babies who did not breastfeed 6 months and nine months who also did not breastfeed for at least 3 months. These proportions were low enough (36% and 23%) to give confidence in the logic of the assumptions outlined above. In effect, a great majority of the mothers who stopped breastfeeding by 6 or 9 months had completed 3 months of breastfeeding, and, for them, the introduction of the bottle was probably not an indication of mother's intention to cease breastfeeding.

Table 4-11 presents the result of logistic regression models for the three breastfeeding duration outcomes (6, 9 and 12 months) using early bottle feeding as a predictor variable. A strong, negative correlation of this variable with 6 and 9 months of breast feeding is apparent. This suggests that even when controlling for the effects of other socioeconomic variables, the introduction of early bottle feeding reduces the likelihood that a child will breastfeed for as long as six months or nine months. In the case of the longest duration, 12 months, early bottle feeding no longer exerts any significant impact. To be sure that these results do not reflect introduction of the bottle for the purpose of weaning immediately, the regression was fitted for six and nine months duration, deleting mothers who did not breastfeed for three months. The effect of early bottle feeding remains significant in both models ($p < .01$ for 6 months and $p < .05$ for nine months). This suggests that the association is due to real effects of early bottlefeeding on discontinuation of breastfeeding. It is thus necessary to look at overall models which include early bottlefeeding as an independent variable as well as ones which do not.

When the RORs are examined for the models in Table 4-11,(Table 4-12), the degree of impact of early bottlefeeding on breastfeeding duration is readily apparent. These results show that if bottlefeeding is begun by 2 months, the odds are less than half that the child will breastfeed for six or nine months. This is a strong effect, comparable only to the influence of having an urban mother. The possibility of decreasing early bottlefeeding may have considerable policy relevance because it is a variable that is amenable to change, unlike parity or age, and is not in conflict with other humanitarian or development goals, such as raising educational levels or socioeconomic status.

Table 4-1. Selected Mother Characteristics by Feeding Behavior

Mother Characteristics		% Initiating Breast-feeding (N=953)	Median Duration of Breastfeeding in Months (N=211)	% Introducing Breastmilk Substitutes (N=753)	Mean Age of Introduction of Substitutes (N=753)	% Weaned (N=211)	Mean Weaning Interval in Months (N=211)
AGE							
19 and under	(N=167)	97	16.55	72	3.1	16.2	6.4
20 thru 29	(N=677)	97	† 15.24	78	2.3	26.3	5.5
30+	(N=137)	99	18.00+	77	2.1	15.0	3.5
EDUCATION							
None	(N=175)	99	18.00+	66	2.3	16.4	3.6
Std 1 thru 6	(N=207)	97	† 18.00+	74	2.3	16.3	6.4
Std 7-Form 3	(N=428)	97	14.87	78	2.5	25.4	5.8
Form 4-College	(N=172)	96	13.00	90	2.0	32.4	4.1
PARITY							
Primiparous	(N=254)	96	14.90	76	2.4	23.0	6.3
1-4	(N=619)	97	16.15	78	2.3	24.7	5.2
5+	(N=108)	99	18.00+	75	1.9	13.9	5.5
BREASTFED LAST CHILD							
Yes	(N=679)	98	*	77	2.3	*	*
No	(N= 30)	80	*	77	1.5	*	*

* Indicates numbers too small to analyze.
† Differences in groups significant at .01 level using the SPSS SURVIVAL D-statistic.

Table 4-2 Percent of Mothers Agreeing, Disagreeing, and Having No Opinion

Knowledge and Attitude Statements	% Agree	% Disagree	% No Opinion
A woman should not breastfeed when she is pregnant	86	13	1
When a mother has a fever, she should not breastfeed	50	48	2
It is better for a child to be weaned abruptly than to let it nurse occasionally after it stops nursing every day	73	24	2
At 6 months mothers still breastfeeding are less likely to become pregnant than women who stopped breastfeeding at 3 months	75	17	8
A child will be healthier if it receives infant formula in addition to breastmilk in the first 3 months of life	85	10	5
Bottle feeding rather than breastfeeding will encourage the father to take an interest in a new baby	55	34	11
Most wealthy people in Kenya bottle feed their babies	77	19	4
Mothers should breastfeed their babies whenever they are hungry no matter where the mother and baby are	79	21	0
It is better to bottle feed a baby if you are out with the baby in a public place (like a clinic or church)	77	21	2

Table 4-3. Percentage of Mothers Agreeing to Knowledge and Attitude Statements By Mother's Age, Education, Number of Years in Nairobi and Tribe

	A woman should not breast-feed when she is pregnant	When a mother has a fever she should not breastfeed	It is better for a child to be weaned abruptly	Mothers still breastfeeding at 6 mos. less likely to become pregnant than those who stopped at 3 months	A child will be healthier if it receives formula in addition to breastmilk in the first 3 months	Bottle feeding rather than breastfeeding encourages the father to take an interest in the baby	Most wealthy people in Kenya bottle feed their babies	Mothers should breastfeed their babies anywhere when the baby is hungry.	It is better to bottle feed if you are out in public (like clinic or church)
TOTAL (N = 980)									
Agree	86	50	73	75	85	55	77	79	77
% Disagree	13	48	24	17	10	34	19	21	21
No opinion	1	2	2	8	5	11	4	0	2
MOTHER'S AGE									
19 & under (N=164)	87	54	80	74	89	53	72	80	80
20 thru 29 (N=683)	86	50	72	76	85	55	78	77	76
30 and older (N=133)	88	46	77	72	85	57	74	84	78
MOTHER'S EDUCATION									
No schooling (N=175)	87	53	77	77	89	55	73	78	85
Std 1 thru std 6 (N=207)	87	53	78	78	87	57	73	75	75
Std 7 thru form 3 (N=426)	84	51	74	75	86	56	82	82	80
Form 4 thru college (N=172)	91	42	66	72	78	48	72	75	68
YEARS IN NAIROBI									
1 - 2 (N=441)	87	52	73	75	86	54	75	80	78
3 - 10 (N=373)	85	47	71	75	86	56	80	77	77
10+ (N=162)	87	50	82	76	84	54	74	79	75
MOTHER'S TRIBE									
Luo (N=299)	90	53	74	77	90	56	76	72	81
Kikuyu (N=269)	89	51	76	72	87	48	76	88	75
Luhya (N=217)	79	46	76	75	78	60	80	77	76
Kamba (N= 88)	89	47	68	80	82	56	73	75	80

Table 4-4 Factor Analysis Values for Selected SES Proxy Variables

	FACTOR 1	FACTOR 2	FACTOR 3
Mother's Education	0.24783	0.30705	0.56874
Household Head's Education	0.15312	0.85085	0.17150
Household Head's Occupation	0.26622	0.47675	0.01606
Water Source	0.75887	-0.21205	-0.12085
Fuel for Cooking	0.27648	0.31811	0.24567
Rent	0.53485	0.45334	0.02885
Mother's Length of Residence in Nairobi	0.32756	0.10538	0.12886
Electricity	0.81662	-0.31077	-0.23153
Density	-0.00314	0.11081	0.50745

Table 4-5 "Ever Use" of Infant Formula and Packaged Cereal by SES Proxy Variables
(Within each variable differences statistically significant at the .01 level using a chi square test)

	Ever Fed Infant Formula		Ever Fed Packaged Cereal	
	% yes	% no	% yes	% no
HOUSEHOLD HEAD'S OCCUPATION				
1 unemployed/day labor	46	54	50	50
2 semi/unskilled	48	52	40	60
3 technical/professional	67	33	58	42
MOTHER'S EDUCATION				
1 none	42	58	26	73
2 std. 1 - std. 6	44	56	37	63
3 std. 7 - form 3	52	48	51	49
4 form 4 or higher	80	20	68	32
POWPIPE				
1 no electricity, no inside piped water	47	53	41	59
2 either electricity or inside piped water	47	53	46	54
3 both electricity and inside piped water	74	26	64	36
DENSITY				
1 high density	47	53	41	59
2 medium density	54	46	55	
3 low density	59	41	55	45

Table 4-6 Median Duration of Breastfeeding by SES and Proxy Variables

	Median Duration of Breastfeeding (months)	Level of Significance
HOUSEHOLD HEAD'S OCCUPATION		
1 unemployed/day labor	13.23	
2 semi/unskilled	16.76	NS
3 technical/professional	15.69	
MOTHER'S EDUCATION		
1 none	18.00+	
2 std. 1 - std. 6	18.00+	.01
3 std. 7 - form 3	14.87	
4 form 4 or higher	12.00	
POWPIPE		
1 no electricity, no inside piped water	16.42	
2 either electricity or inside piped water	17.25	.01
3 both electricity and inside piped water	12.69	
DENSITY		
1 high density	16.76	
2 medium density	16.48	NS
3 low density	14.37	

Table 4-7 Percent Reporting Illness of Child in the Previous Two Weeks b SES Proxy Variables

	Reported Illness in the in the previous 2 weeks	
	% yes	% no
HOUSEHOLD HEAD'S OCCUPATION		
1 unemployed/day labor	47	53
2 semi/unskilled	45	55
3 technical/professional	41	59
MOTHER'S EDUCATION*		
1 none	38	62
2 std. 1 - std. 6	48	52
3 std. 7 - form 3	47	53
4 form 4 or higher	35	65
POWPIPE*		
1 no electricity, no inside piped water	47	53
2 either electricity or inside piped water	41	59
3 both electricity and inside piped water	36	64
DENSITY		
1 high density	47	53
2 medium density	44	56
3 low density	39	61

* Differences sig ificant at the .01 level using a chi square statistic.

Table 4-8 Association of Socioeconomic Variables with Infant Feeding Outcomes

	EVER BREASTFED		BREASTFED 3 MONTHS		BREASTFED 6 MONTHS		BREASTFED 9 MONTHS		BREASTFED 12 MONTHS		BOTTLE BY 2 MONTHS	
Mother's Age	N	%	N	%	N	%	N	%	N	%	N	%
< 20	164	97.5	128	99.2	99	93.9	71	85.9	49	75.5	137	31.4
20-29	684	97.2	503	94.6	411	83.9	296	73.3	202	69.3	583	30.0
30-39	118	99.2	96	95.8	80	87.5	55	80.0	32	81.3	104	32.7
≥ 40	15	100.0	9	100.0	5	100.0	5	100.0	5	100.0	11	38.8
Mother's Education	N	%	N	%	N	%	N	%	N	%	N	%
None	175	99.0	130	96.0	104	91.8	79	75.9	46	65.3	147	25.2
1-4 yrs.	84	97.6	63	96.2	52	91.3	36	92.6	22	93.5	71	30.4
5-7 yrs.	394	97.6	301	96.0	244	87.9	171	78.9	117	80.6	342	26.9
≥ 8 yrs.	328	96.6	242	94.2	192	79.2	145	71.0	102	59.8	276	38.0
Parity	N	%	N	%	N	%	N	%	N	%	N	%
1	255	96.3	197	96.4	163	88.4	113	76.2	80	68.8	221	35.3
2-3	414	97.6	302	94.9	248	84.7	174	74.7	118	68.3	342	26.1
4-5	205	87.1	156	94.2	129	84.4	99	74.8	64	79.9	183	29.8
6-12	107	100.0	81	98.8	54	90.1	40	90.0	25	76.0	91	38.5
Economic Status	N	%	N	%	N	%	N	%	N	%	N	%
1	634	97.4	483	95.5	390	88.6	274	81.3	180	77.1	544	25.3
2	119	99.0	91	100.0	77	94.6	52	79.0	32	75.8	101	30.9
3	229	96.8	162	93.0	128	73.6	100	62.4	75	57.4	190	45.7
Urban Mother	N	%	N	%	N	%	N	%	N	%	N	%
No	765	97.5	575	95.7	463	88.9	331	81.4	221	78.2	645	28.5
Yes	216	97.5	161	94.9	132	76.5	95	59.8	66	50.7	190	37.8
Total	981	97.4	736	95.5	594	86.2	426	76.6	287	71.9	836	30.6

Table 4-9 Logistic Regression Models for Different Infant Feedin Outcomes:
Beta Coefficients for Background Variables

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS	BOTTLE BY 2 MONTHS
Mother's Education	-0.255 (5.02)*[1]	-0.069 (0.43)	-0.085 (0.45)	0.004 (0.00)
Socioeconomic Status	-0.227 (1.64)	-0.451 (6.99)**	-0.429 (4.85)*	0.438 (15.47)***
Parity	0.098 (0.31)	0.251 (2.03)	0.290 (1.99)	0.063 (0.39)
Mother's Age	-0.211 (1.81)	-0.091 (0.36)	-0.087 (0.25)	-0.088 (0.94)
Urban Mother	-0.799 (8.27)**	-1.137 (17.15)***	-1.145 (12.99)***	0.380 (4.23)*
Model X^2	(29.09)***	(35.64)***	(27.84)***	(26.45)***
R	0.20	0.23	0.23	0.12

[1]Numbers in parentheses are MLE chi-squares (Wald Statistics)

*P < .05, **P < .01, ***P < .001

Table 4-10 Adjusted Risk Odds Ratios and 95% Confidence Intervals for Background Variables

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS	BOTTLE BY 2 MONTHS
Mother's Education	.78 (.62, .97)	NS	NS	NS
Socioeconomic Status	NS	.64 (.46, .89)	.65 (.44, .95)	1.55 (1.24, 1.92)
Parity	NS	NS	NS	NS
Mother's Age	NS	NS	NS	NS
Urban Mother	.45 (.26, .78)	.32 (.19, .55)	.32 (.17, .59)	1.46 (1.02, 2.1)

Table 4-11 Logistic Regression Models for Different Infant Feedin Outcomes:
Beta Coefficients for Background and Early Bottle Feeding Predictor Variables

	BREASTFED 6 MONTHS	BRFASTFED 9 MONTHS	BREASTFED 12 MONTHS
Mother's Education	-0.272 (5.46)*[1]	-0.069 (0.41)	-0.074 (0.33)
Socioeconomic Status	-0.162 (0.81)	-0.427 (6.20)*	-0.422 (4.66)*
Parity	0.116 (0.42)	0.272 (2.36)	0.295 (2.06)
Mother's Age	-0.226 (2.01)	-0.088 (0.33)	-0.086 (0.25)
Bottle by 2 Months	-0.925 (12.14)***	-0.741 (7.92)**	-0.331 (1.10)
Urban Mother	-0.755 (7.18)**	-1.083 (15.19)***	-1.22 (12.39)***
Model X^2	(41.14)***	(42.86)***	(28.58)***
R	.24	.26	.22

[1]Numbers in parentheses are MLE chi-squares (Wald Statistics)

*P < .05, **P < .01, ***P < .001

Table 4-12 Adjusted Risk Odds Ratios and 95% Confidence Intervals for Background and Early Bottle Feeding Variables

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS
Mother's Education	.76 (.61, .96)	NS	NS
Socioeconomic Status	NS	.65 (.47, .91)	.66 (.45, 96)
Parity	NS	NS	NS
Mother's Age	NS	NS	NS
Bottle by 2 Months	.40 (.24, .68)	.48 (.28, .80)	NS
Urban Mother	.47 (.27, .82)	.34 (.20, .58)	.33 (.17, .61)

Figure 4-1
Mother's Age (N=981)

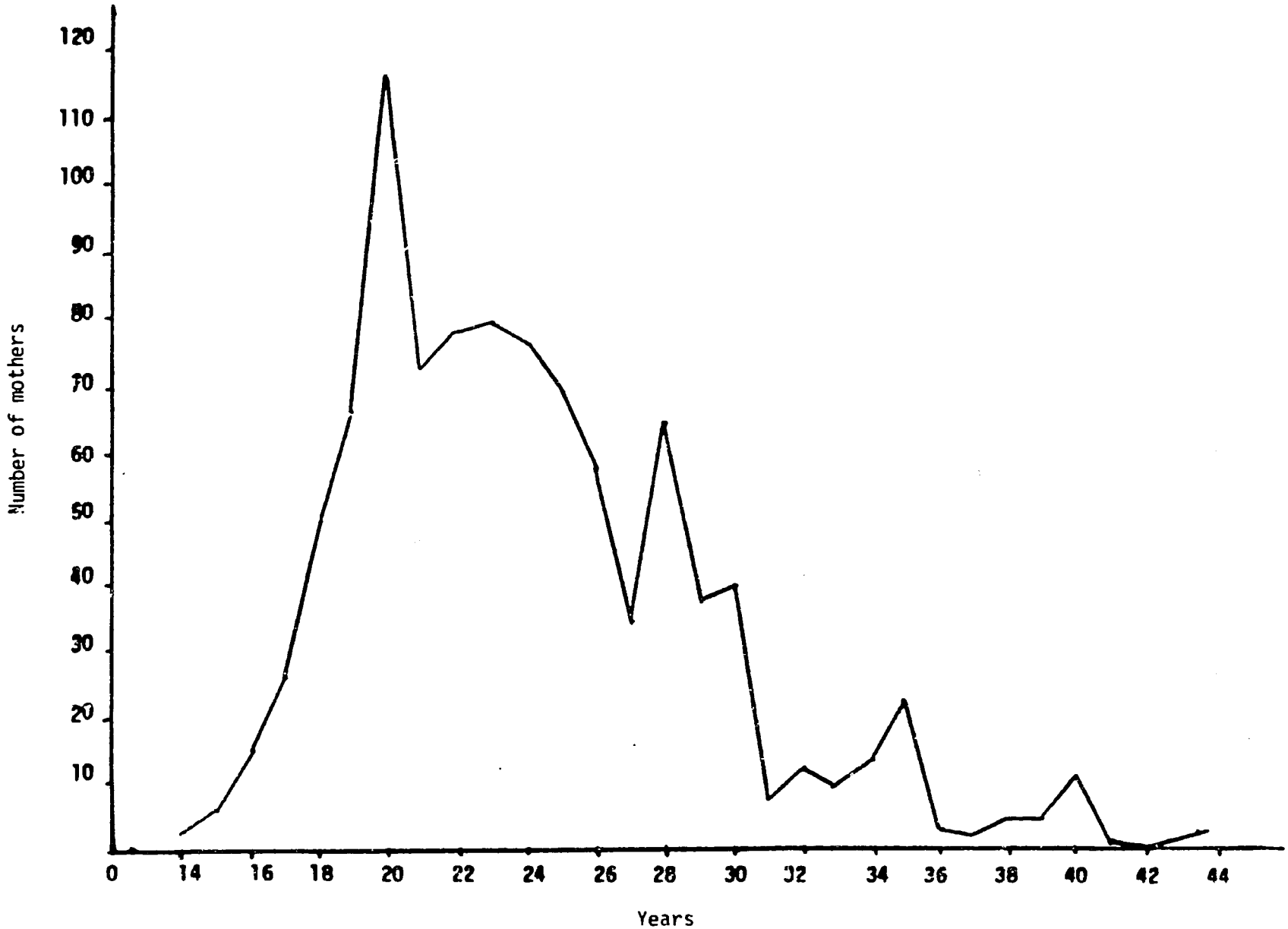


Figure 4-2

Years of Education of Mother

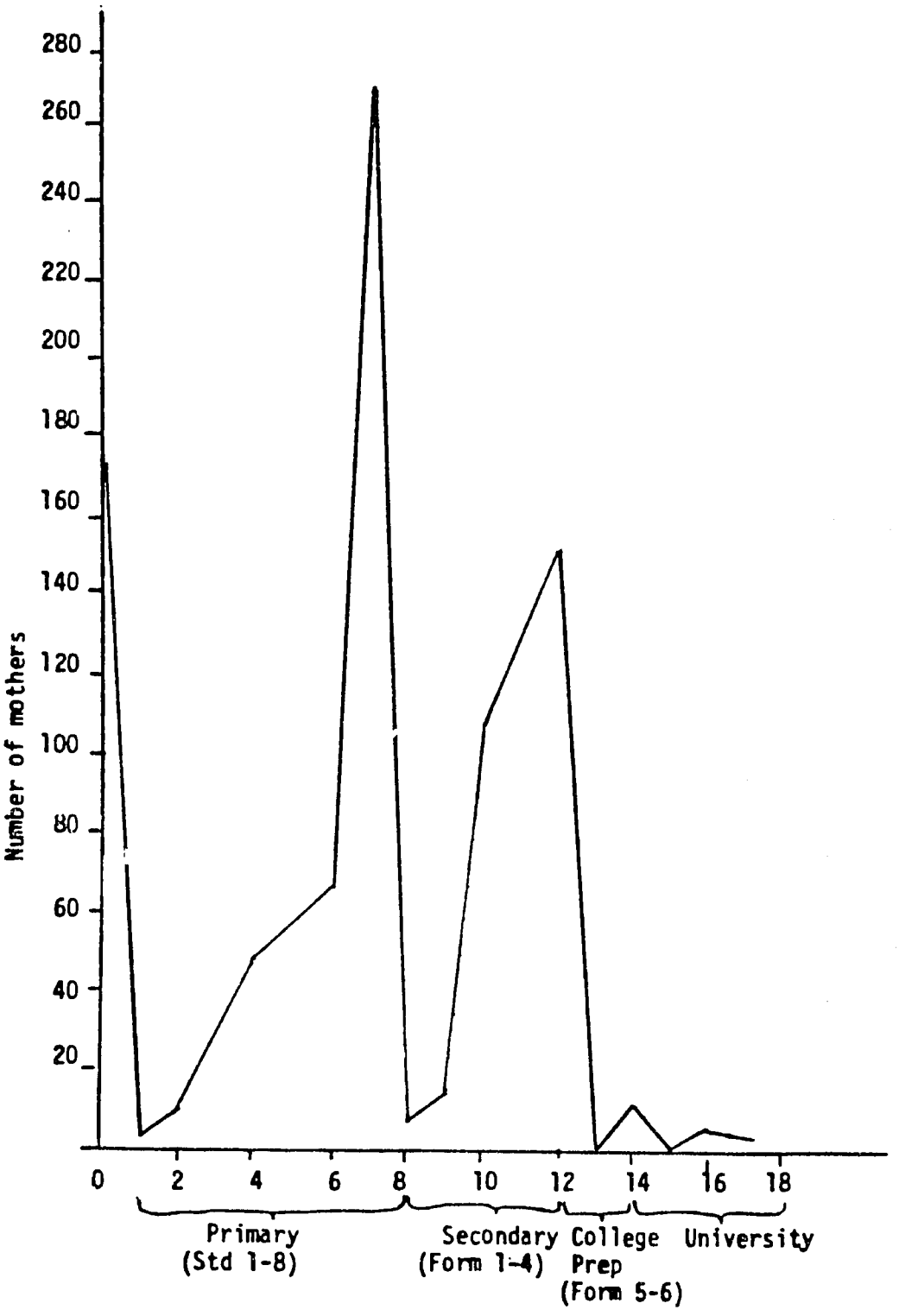
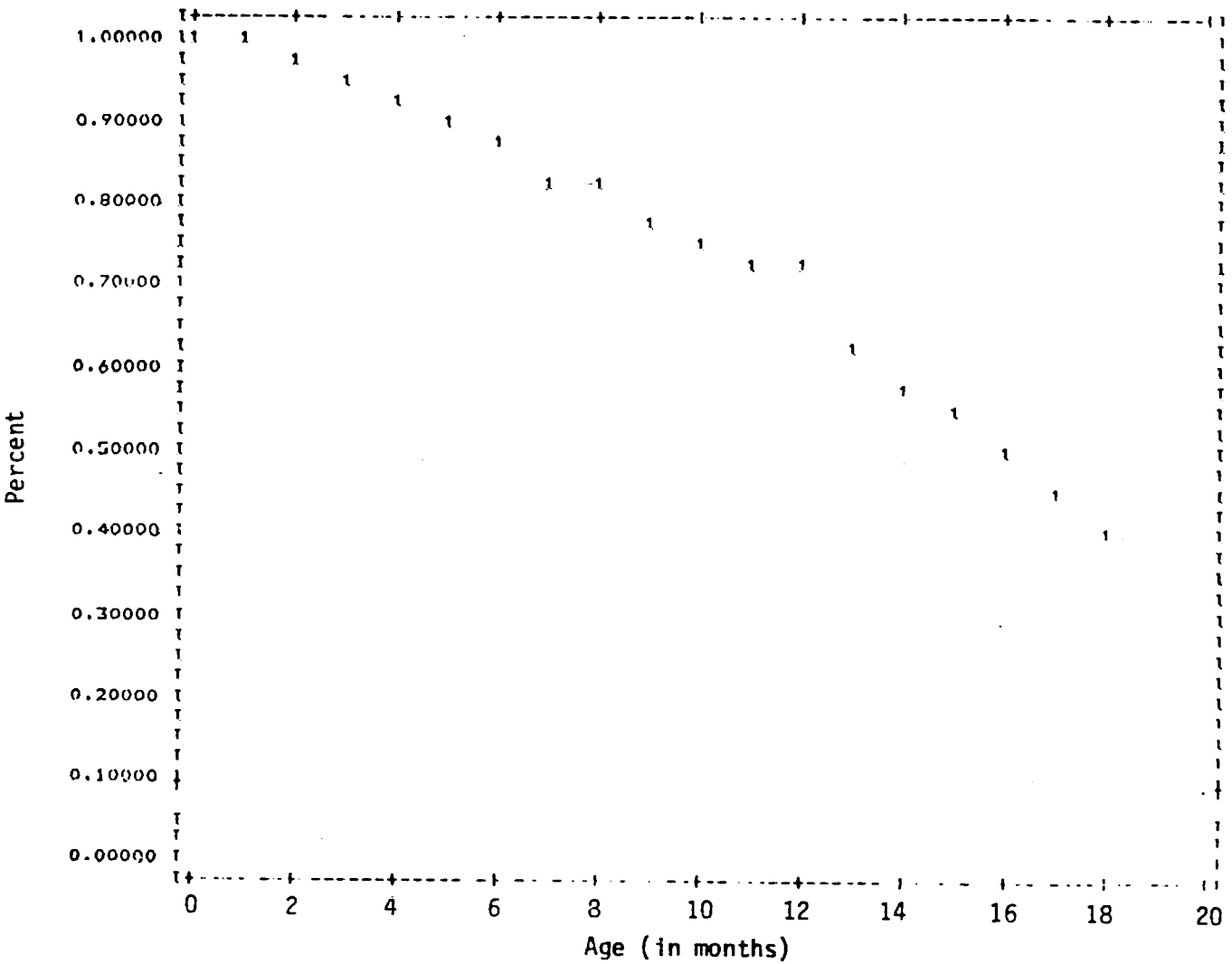


Figure 4-3

Duration of Breastfeeding by Last Breastfeed

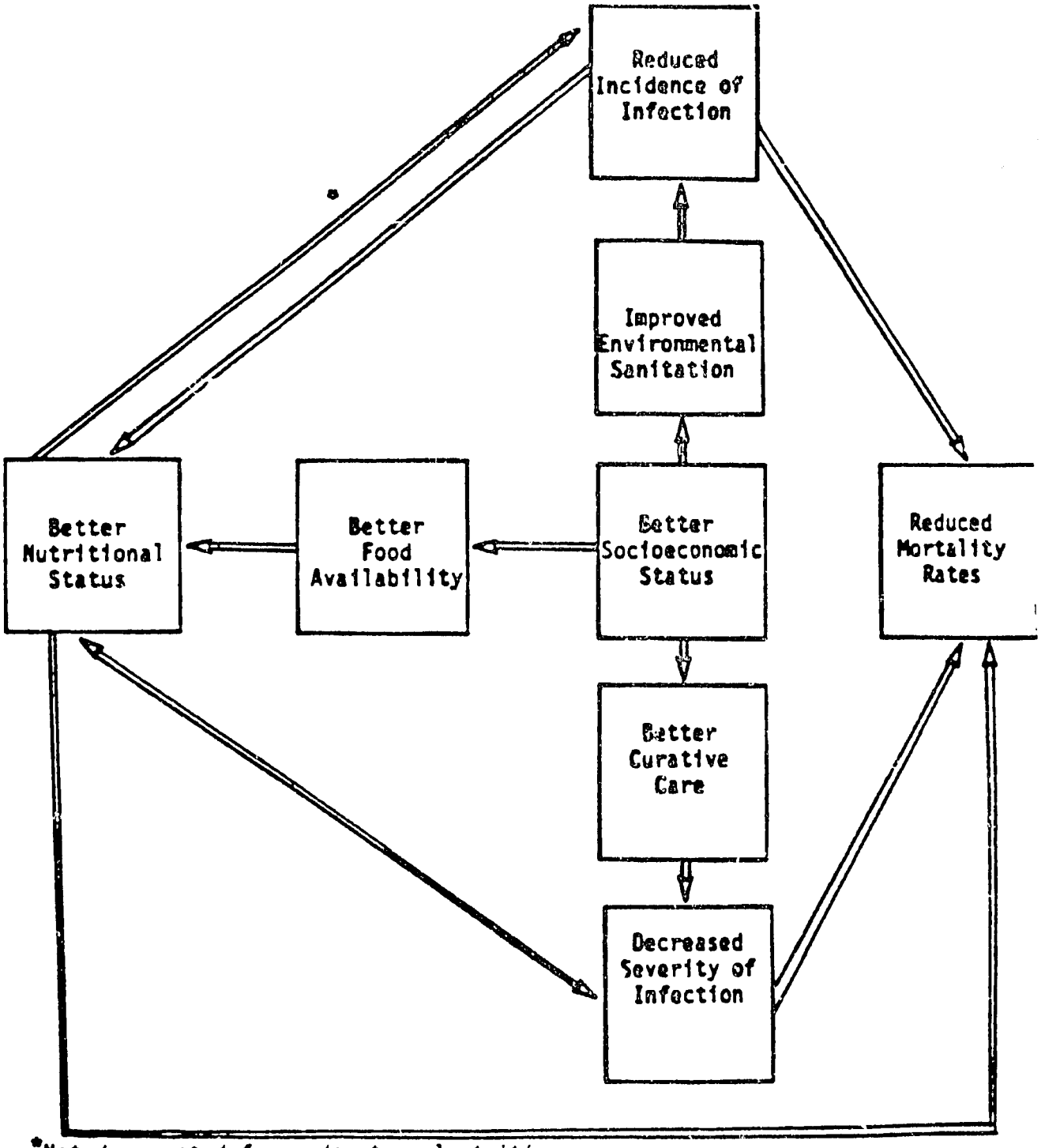


Key:

N	Median Survival
959	16.2

Figure 4-4

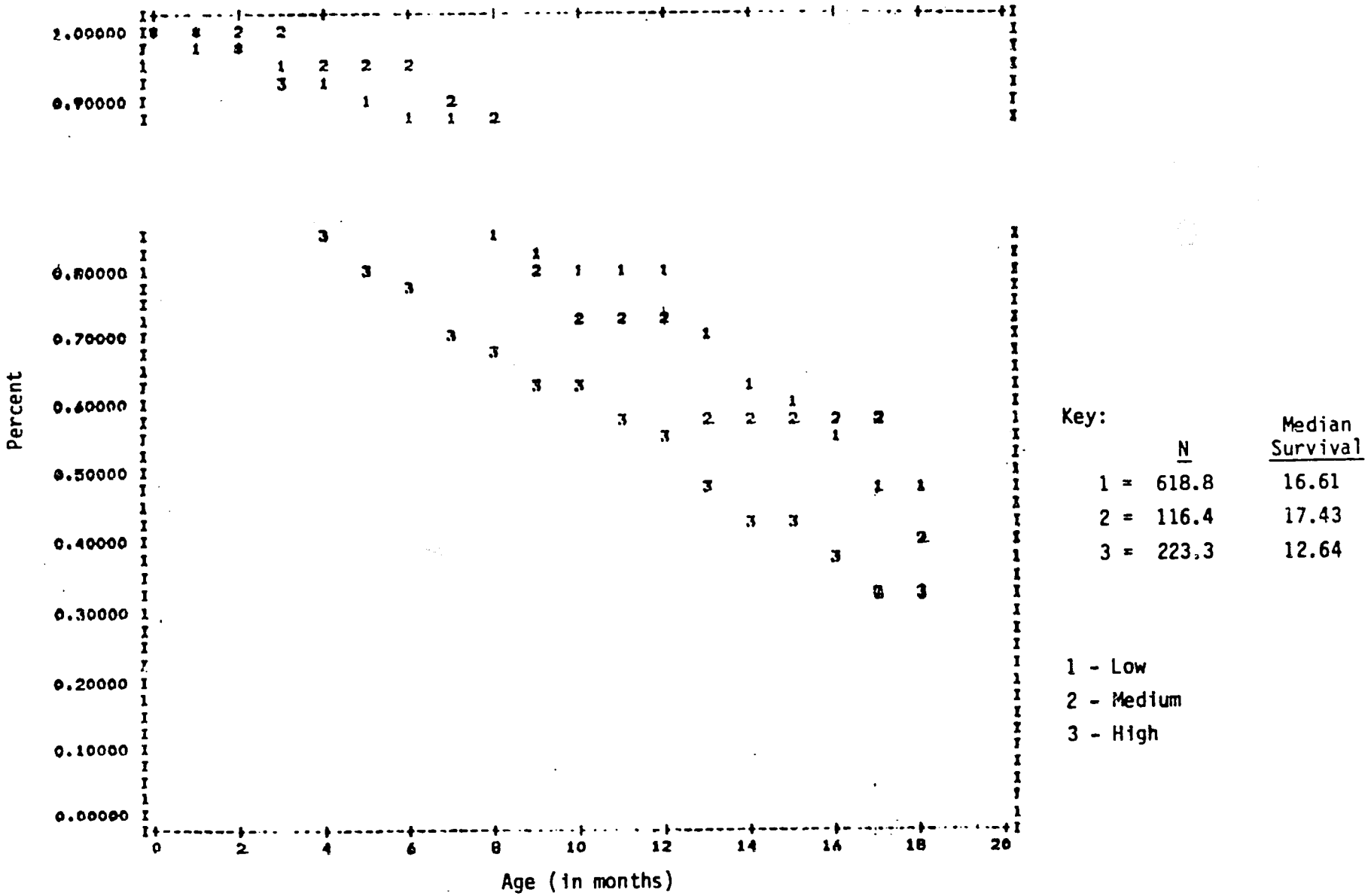
A Model for the Effects of Nutritional Status, Infection, Mortality and SES



From: "Child Feeding Practices: Knowledge, Research Needs and Policy Implications," by R. Martorell et all., Cornell Nutritional Surveiilance Program Working Paper Series No. 28, March 1984.

Figure 4-5

Duration of Breastfeeding by Socioeconomic Status



CHAPTER V DETERMINANTS OF INFANT FEEDING PRACTICES: MARKETING OF INFANT FOODS

Methodology

The general objective of the marketing studies was to examine the role of infant food marketing and distribution strategies on infant feeding behavior. Because commercial marketing strategies and practices are developed or refined, on a country-by-country basis, and because no prior marketing research studies of infant food marketing had been undertaken in the participating countries, much of the marketing research was descriptive and exploratory in nature. Five research questions guided the researchers:

1. What current practices and strategies characterize the infant food marketing in each nation?
2. What factors account, in whole or in part, for the current marketing environment?
3. What is the intensity of current promotional activity by infant food sellers to mothers, health care workers, and others who influence infant feeding choices?
4. What effects, if any, do the marketing practices and policies of infant food sellers have on infant feeding behavior of mothers?
5. What effects, if any, do the marketing practices and strategies of the infant food sellers have on the behavior of health care providers?

Three specific approaches were used to answer these questions: a retail market study; a study of the state of the industry; and a consumer behavior study.

The retail market substudy explored the distribution of breast milk substitutes by examining the number, variety, and prices of products in a sample of sales outlets (food stores, shops and pharmacies). Preliminary market investigations and ethnographic field research on the commercial products actually used to feed infants were employed to develop a list of products in common use.

The state of the industry substudy provided information about the production, distribution, and advertising policies and practices of infant food wholesalers and retailers. Trade policies and regulations of national governments were analyzed to determine their influence on the production, distribution, and advertising practices of producers and sellers. Information was collected through secondary data analysis and interviews with appropriate industry, government, and health personnel. Specific practices, such as the distribution of free samples and promotion

to the medical profession were also examined as part of other substudies.

The consumer behavior substudy, administered as a segment of the cross sectional survey on infant feeding practices, provided data on the demand for breast milk substitutes. The decisions to buy and use breastmilk substitutes are manifested in two distinct types of behavior, namely, purchase of a commercial breastmilk substitute and the actual feeding of such a product to the baby. Purchasing behavior was elicited through survey questions on commercial products fed to infants as well as through observation of retail practices. Feeding behavior was explored in the cross sectional survey.

Research questions 1, 2, and 3 were studied through the retail audit and state of the industry analyses. This research provided a baseline of information about commercial infant foods marketing which is currently unavailable in each site. The retail audit analysis consisted of collection and analysis of price, product, and promotional data from retail shops and outlets. These data were collected by local subcontractors on site. All subcontractors were trained or certified as to professional qualifications by Trost Associates Incorporated of Norwalk, Connecticut, the Consortium's marketing subcontractor. Retail audit reports were tabulated and analyzed by Trost Associates prior to submission to the Consortium. The state of the industry analyses consisted of secondary research about the development and size of the infant foods industry; direct observations of industry activity by Consortium staff, consultants, or subcontractors; and interviews of infant food company executives and employees, other businessmen directly involved with the industry, and health providers possessing first-hand information about industry actions.

Research question 4 addresses the "consumer behavior" of mothers. To examine maternal decisionmaking, questions on such topics as product awareness, brand awareness, past feeding behavior, and hospital practices (e.g., receipt of samples) were included in the cross sectional survey instrument.

Research question 5 was addressed through interviews with health care personnel, infant food company representatives, and through direct observation by Consortium staff, consultants, or subcontractors.

In Nairobi, the retail market and state of the industry substudies were carried out by RBL, Ltd., a major commercial market research firm. RBL staff conducted interviews with personnel of the largest infant food firms located in Nairobi according to an interview protocol developed by the Consortium's marketing subcontractor, Trost Associates, Inc. Transcripts of these interviews were forwarded by RBL to Trost Associates. The

state of the industry study was supplemented by secondary research, direct observations by other Consortium staff and consultants, and examination of promotional materials, labels, and other marketing materials.

The retail audit of Nairobi's establishments was conducted by RBL staff according to a protocol and a representative sample design developed by the company and approved by Trost Associates. RBL first conducted a census of all retail outlets in Nairobi to determine which actually carried infant foods. According to the RBL census, 894 outlets reported carrying products relevant to the infant feeding study. The Nairobi sampling frame consists of six categories of outlets (small shops; medium shops; large shops; self-service; chemists; market stalls). To sample a projected 100 outlets in proportion to their incidence in the universe of 894x, as specified by the Consortium, would leave too few chemists, self-service, and large shops for reliable conclusions to be drawn. Therefore, the sampling frame was adjusted to include a greater number of these outlets and a reduced number of small shops and market stalls. Such adjustments, which conform to normal marketing survey practices, were approved by Trost Associates, and implemented by RBL in its actual auditing of outlets. A total of 107 outlets was audited in February, 1982.

Each of the audited outlets was visited by an RBL representative who recorded information about the available products, sizes, prices, point-of-sale promotional materials, and other relevant observations. Interviews were conducted with store personnel at this time. All retail data were tabulated by RBL and forwarded to Trost Associates for analysis. Trost Associates prepared a report that summarized these data and integrated various aspects of the retail and state of the industry substudies.

Four categories of data were collected for the state of the industry substudy: general information (name of companies, past history, local versus multinational firms): competitive environment (market share, pricing patterns, promotional activities, medical relationships); channels of retail distribution and health care system contact; and government regulatory activities. Data were collected from multiple primary and secondary research sources for each category.

Data for the consumer behavior substudy were drawn from the cross sectional survey of mothers in Nairobi. Questions were developed in such areas as products used, awareness of past and present advertising, product and brand awareness, and advice received from various sources, including health care providers, friends, and relatives. The consumer behavior analysis has utilized these data, and data from other sections of the survey,

to assess the influence of marketing on maternal decisions to use breastmilk substitutes and to purchase particular products.

Overview

Nairobi, Kenya has long been an important marketing and manufacturing center for the East African infant foods industry. Population size, growth rates, and cash incomes have attracted commercial interests, including multinational food companies. The historic involvement of British firms reflects Kenya's colonial heritage, and Nestle's prominent market position is also longstanding. In more recent times, international pharmaceutical companies have brought their infant foods to Kenya as well.

The modern infant foods market in Kenya consists of two basic products, infant formula and baby cereal. In Nairobi, Nestle is the unquestioned leader in both categories, accounting for more than 60 percent of infant formula sales and 80 percent of baby cereal sales. In such a market, there is relatively little competition. Thus, some of the competitive practices evident in other countries are less evident in Kenya. Marketing promotion does occur in the health care system, however, with companies making regular and frequent contact with nurses, administrators, and pediatricians. There is modest product sampling to mothers and significant provision of free supplies to hospitals and clinics by companies.

The entire industry faces problems of occasional milk shortages and state regulated price controls. These problems are influential in shaping the behavior of all manufacturers and sellers.

Mothers demonstrate a high awareness of past media advertising and current brands. While the provision of free samples to new mothers does not appear to be a widespread practice, among those who do receive discharge packets, there is an association with early introduction of bottlefeeding.

Retail Availability

a. Infant Formula

Infant formula products are widely available in Nairobi. The audit of retail outlets determined that infant formula products were available in more than 90 percent of the shops that were surveyed (Table 5-1). The audit of retail outlets identified eight brands of infant formula. The brands, and the companies that manufacture them are:

Brand		Manufacturer
1.	Nan	Food Specialties, Kenya, Ltd. (a Nestle subsidiary)
2.	Lactogen	" " "
3.	Ostermilk	Glaxo
4.	Cow and Gate (Baby Milk Plus)	Cow and Gate
5-6.	SMA/S-26	Wyeth
7-8.	Similac/Isomil	Abbott Laboratories

Mead-Johnson was not operating in the Kenyan market at the time of the study, although some old product literature (date and origin unknown) was located during the period of data collection.

Of the 107 retail outlets that were audited, Nestle had by far the highest market penetration. Its two products, Nan and Lactogen, were located in 86 percent of all outlets. Cow and Gate, Wyeth, and Glaxo (36%, 34%, and 24% respectively) had comparatively less representation, and Abbott had the smallest market presence with only seven percent of those outlets audited carrying its products.

All brands except Abbott's were found in at least 5 of the 6 categories of market outlets in Nairobi. Chemists/pharmacies did not carry either Nestle or Cow and Gate products, and for these outlets Wyeth products appear to have the dominant representation. Among all brands, Nestle's Lactogen formula is by far the most widely available brand in Nairobi, appearing in at least 80 percent of every category of shop or outlet except chemist/pharmacy shops (Table 5-1).

Nestle has the largest share of the market as measured by the volume of infant formula products available for sale. Based on shelf formula products, Nestle has approximately 60 percent of volume, followed by Cow and Gate (17 percent), Wyeth (16 percent), Glaxo (6 percent), and Abbott (1 percent). Nestle also has the largest share of the market as measured by the retail value of products found on-shelf, with 56 percent. Wyeth's relative value was 21 percent, followed by Cow and Gate (17 percent), Glaxo (5 percent), and Abbott (1 percent).

The price structure of infant formula is both important and complex in Nairobi. Government price controls existed throughout the period studied, thereby limiting the ability of manufacturers to change retail prices. According to retailers and industry

interviews, price controls also contribute to occasional product shortages. Once approved by government officials upon application by a particular company, price changes require several months to implement. During this time, old inventories decline as the product is sold off under the previous control price. Allowing companies to increase prices immediately on existing inventory would create an unearned surplus, or "windfall" profit. Shortages reportedly occur at the time where pre-existing inventories near zero, but new supplies (for sale at the newly authorized price) are not yet available for retail sale. Under such conditions, mothers who are using one product may be forced to switch to a different, available brand of formula.

Price data illustrate the existence of distinct market segments. As shown in Table 5-2, published prices for leading infant formula indicate product availability in a range of prices. Nestle's Lactogen is the most widely available in Nairobi, and also the least expensive. Given these two characteristics, it is evident why this product dominates consumer use. Ostermilk, while relatively close in price to Lactogen, is much less widely available in the marketplace. Abbott and Wyeth have evidently chosen a high price/limited volume approach to their marketing. As shown in Table 2, Wyeth's formulas (SMA and S-26) are among the highest priced formulas in Nairobi. Abbott's Isomil (soy-based) was priced at approximately 55 KShs, nearly 2.5 times the price of Lactogen. Together, pricing and distribution practices reflect different marketing strategies for commercial infant foods in Nairobi.

b. Other Foods

"Cow's milk," refers to either fresh liquid milk, tinned liquid milk or powdered milk products. Two main kinds of fresh liquid cow's milk are available to the index households, KCC and fresh cow's milk. KCC or Kenya Cooperative Creameries milk is produced in Nairobi and is widely distributed in half-litre paper tetra packs at government regulated price (currently K.Shs. 1.95 or US $.16). The retail audit of the marketing survey puts KCC's market penetration (percent of shops in an area carrying the product) in the small and medium shops at 50% and 65% respectively. These percentages are at least three times higher than any of the other cow's milks.

Availability is fairly stable throughout the year except for occasional shortages at the end of the dry season (March and September). Fresh cow's milk (non-processed) was not included in the retail audit but was included in the survey. Its availability is certainly more restricted than KCC milk because of the lack of space for most low income urban dwellers to keep any livestock, but some use is reported. The tinned liquid milks and powdered milks are available, according to the retail audit, in the larger shops and self service stores in Nairobi. Index

mothers were asked what kinds of milks they had heard about which could be used to feed babies. KCC and unprocessed fresh cow's milk were by far the most commonly mentioned (92% and 94%). There was very little unaided recall of the tinned liquid or powdered products (2% and 8%). None of these products is being advertised.

The use of commercial cereals in the Nairobi sample is not extensive. The 24-hour recall data show a peak of use for children at about four months of age, when about 20% of the infants were reported to have received commercial cereal on the previous day. From about six months onwards, use declines, reaching 2% at 18 months. The retail audit found the market dominated, again, by the Nestles product. The two Glaxo products, Farex and Farleys, were also widely available, with the Cow and Gate product less so, and the Robinsons' products not found in the sample at all.

When index mothers were asked which brand of cereal they first gave their child, only two brands were mentioned. Ninety-six percent reported Cerelac (Nestle), and 3% reported Farex as the first brand used. When the 164 index mothers currently feeding commercial cereals were asked what brand their child was currently consuming, the response was almost identical, with 95% reporting Cerelac and 4% reporting Farex.

Competitive Structure

The infant foods industry in Nairobi (and Kenya as a whole) is dominated by Nestle. Through its local subsidiary, Food Specialties Korporation (FSK), which is 82 percent owned by Nestle and 18 percent by local interests, Nestle accounts for upward of 60 percent of all infant formula sales and nearly 80 percent of cereal sales. According to industry interviews, Nestle's infant formula share may well be 80-85 percent in all of Kenya.

Nestle's principal competitor has been Cow and Gate. Retail audit figures indicate that Cow and Gate had approximately 17 percent of the market share in Nairobi, although interviews with industry participants suggest a much smaller share. Subsequent to the retail audit, Cow and Gate withdrew from Kenya. Presumably, the share of market held by Nestle formulas has further increased, and a conversation with a recent visitor suggests that the trend is in this direction. Wyeth International (an American Home Products subsidiary) appeared to have slightly more than 20 percent of the market in Nairobi based on retail audit data, and industry interviews suggested that this was considerably greater than Wyeth's previous market share. Since Cow and Gate's departure, Wyeth's visibility has reportedly increased.

Glaxo (E. A.) Ltd. was found to have about 6 percent of the market in Nairobi from data in the retail audit. This conforms to statements from the company's executives, who estimate that Glaxo has held a 6 percent share for a number of years. It was anticipated that Glaxo would not enlarge its share of the infant formula market, even after Cow and Gate's withdrawal. Glaxo also sells cereals used for infant feeding, but its products account for only a small share (less than 5 percent) of the total cereal market. The only other company doing infant formula business in Nairobi was Abbott Laboratories, which sold small volumes of Similac and its soy based formula, Isomil. According to both the retail audit and interview data, Abbott has less than one percent of the market.

Most of the infant formula sold in Kenya is produced locally. Imported formulas are closely controlled by the Government of Kenya which is highly concerned about foreign exchange and the flow of capital from the country. Nestle manufactures all of its best selling formula (Lactogen) in Nairobi, based on locally available milk, while it locally produces its other major formula (Nan) from imported raw materials. Wyeth has imported its formulas, SMA/S26, as has Abbott (Isomil). Glaxo manufactures all formula locally, as did Cow and Gate. Prior to a 1980 ban on exports, Cow and Gate tended to export much of the product it manufactured in Kenya. The company's relatively high market share, demonstrated in the

Nairobi retail audit, and its announced plan to withdraw from Kenya, may be explained by a decision to phase out its Kenyan operations by selling off all available stock and selling locally until its resource contracts expired.

The distribution system in Kenya consists of several types of channels. Nestle (FSK) and Glaxo utilize the following arrangements:

Manufacturer --> Distributor/Agent --> Wholesaler --> Retailer

For large retail customers, the manufacturer may distribute directly, from plant to retail outlet. Cow and Gate also used this basic marketing distribution system.

Wyeth and Abbott supply their products directly to importers who, in turn, distribute them to wholesalers and thence to retailers. As discussed above, Wyeth and Abbott are available in chemist/pharmacy shops were other infant formulas are not available. This penetration into the chemist/pharmacist segment of the retail market can be attributed to the combined efforts of the Wyeth personnel and the local distributors to market through the health care system.

Industry representatives we interviewed reported that credit terms are infrequently extended in these market channels and that cash transactions had become increasingly necessary. This appears to be a consequence of economic problems rather than commercial tradition.

Advertising and Promotion

Given the concentrated market structure, it was not surprising to find relatively limited advertising and promotional activity. That which was discovered tended to be focussed on health workers rather than directly on mothers. All manufacturers proclaimed their adherence to either ICIFI's or their own company's code of conduct. All were aware of the World Health Organization Code but pointed out that the Kenya Ministry of Health had not issued formal regulations based on the W.H.O. Code. Several industry representatives we interviewed described the efforts of their companies to communicate to the Ministry their own company's willingness and intention to meet voluntary marketing standards.

Mass media advertising to the general public appears to have been discontinued as a competitive approach in the mid-1970's. (This would conform to the development of the first industry codes of conduct.) No mass media promotions, via television or radio, were discovered during the study period. In a few

instances, printed point-of-sale material was discovered, but it was uncertain when that material was given to retailers, and from whom. As for mass media promotion in Nairobi, we can conclude that the industry has conformed to their own policy statements and Kenyan law.

By the account of industry executives, retailers, and health workers, promotion does occur in the health care setting. Educational materials were frequently mentioned as a useful item provided by the industry for the benefit of health workers and, ultimately, mothers. These included pamphlets, brochures, and several baby books. These items were not in conformity with the strict language of the W.H.O. Code, although some doubt exists as to the precise position of the Ministry of Health at the time this field research was completed (early 1982).

An important and widely acknowledged practice has been the provision of free supplies of infant formula by the manufacturers to the hospitals and clinics making such requests. The major manufacturers acknowledged that such requests are made and met as deemed necessary by the companies. "Necessary" is clearly meant to recognize the role of health institutions in recommending feeding alternatives, legitimizing a company's products, and providing advice to mothers.

Free samples were reportedly received by only 4 percent of the mothers in the cross-sectional survey. It is unclear what proportion of these samples were directly provided by the companies for the purpose of sampling and what proportion were drawn from the free supplies provided to the hospital for in-house feeding. This issue remains an important one in 1985, as recognized by both W.H.O. and UNICEF.

Government Policies

The Government of Kenya has long demonstrated a direct interest in the marketing and health issues surrounding infant feeding. Previous actions include restrictions on mass media advertising, support for the W.H.O. Code, and encouragement of industry efforts to develop appropriate marketing policies. In general, these policies have encouraged manufacturers to shift advertising and promotional activity from the general public to health workers, and to decrease overall levels of promotion.

In addition to the policies of the Ministry of Health and Bureau of Standards that pertain directly to marketing activities, the Government of Kenya's general economic policies have also influenced infant feeding patterns. For example, the decision to restrict companies operating in Kenya from exporting infant formula products to other nations was made for the purpose of meeting a growing local demand for milk products. Because

such local products are under price controls, however, manufacturers have been under what they consider to be severe economic pressure. This has contributed to Cow and Gate's withdrawal from Kenya and has clearly led companies such as Wyeth and Abbott to operate on an "imports-only" basis. With Cow and Gate's departure, only Nestle (FSK) and Glaxo continue as local producers of infant formula products.

The government decision to channel all marketing and distribution of raw milk through Kenya Cooperative Creameries (KCC) has meant that both Nestle and Glaxo are restricted in terms of local suppliers. Because KCC's milk does, in fact, compete in the market against infant formula products, the formula companies are being supplied by one of their competitors. In addition, price controls on formula products limit the manufacturer's ability to raise prices as product manufacturing costs (including milk from KCC) increase. This places further pressure on the price-cost margins of the companies. The net effect of this interaction of import restrictions, domestic price controls, and milk production/distribution policies is an industry facing continuous economic pressure.

Commercial Influences and Consumer Behavior

A marketing analysis of infant feeding patterns should focus on factors that affect the supply and demand for commercial infant foods, here specifically formula and non-formula milks. Factors that affect the supply have already been discussed, i.e. the availability of formula and non-formula milks in retail outlets, the number and diversity of products, and the relationship between producers and the State. Factors relevant to the demand for commercial infant foods include those experiences and circumstances that have direct bearing on the mother and her child, i.e., the receipt of a promotional sample of infant formula, problems with breastfeeding or labor force participation. Less direct influences are those that result from previous experience, or encounters, such as recommendations about infant feeding from relatives, neighbors, or health care workers.

In this discussion we will focus on the following consumer-variables: receipt of an infant formula sample, recall of mass market advertising, brand awareness, and attitudes towards commercial infant foods. Unless otherwise noted, these analyses are of women with infants less than 12.5 months of age at the time of the interview.

Samples

The data do not indicate that the provision of free samples of infant formula directly to mothers is a significant marketing practice in Nairobi (Table 5-3). Overall, only four percent of the mothers in this study reported receiving a free sample of infant formula. Ninety percent of these women reporting receiving the sample at a hospital or clinic. While the distribution of free samples does not appear to be widespread, there do appear to be significant differences between those who did and did not receive a free sample of infant formula. Specifically, higher education, higher age, previous work, multiparity ($p<.07$), and not reporting rooming-in are all significantly associated with reporting the receipt of a free sample. Women who delivered in a clinic or hospital were also more likely to report receiving a free sample ($p=.07$) than those who delivered outside that setting.

Further, according to the reports of the women in this study, some hospitals were more likely to provide free samples than others. Of the 335 women who reported giving birth at Pumwani hospital, a large municipally controlled maternity hospital, only 6 women reported receiving a free sample. Likewise, among the comparatively fewer number of women reporting delivery at Kenyatta hospital ($n=40$), which is a teaching hospital with an affiliated medical school, approximately the same percentage (3%) reported receiving a free sample. However, among the 39 mothers in the sample who delivered in either Mater hospital or Aga Khan hospital, 36 percent reported receiving a free sample. Further, even though women who delivered at these two private hospitals account for only 5 percent of the total sample, among those who reported, 47 percent of those who received free infant formula had their maternity care at these private facilities. These two hospitals are also the least likely to provide rooming-in of any kind.

Closer examination of these findings revealed the following. Among women with more than 10 years of schooling, those who reported delivery in Mater Hospital or Aga Kahn Hospital were significantly more likely to report receiving a sample ($p<.001$) than those women who reported delivery in a public hospital. However, women who reported delivering their babies at Mater Hospital or Aga Khan Hospital also had significantly more years of schooling and were more likely to have been working prior to having the baby at home or in the public hospitals ($p<.001$). For the most part, the fact that the majority of the women who reported maternity care in the two private hospitals had more than ten years of education (89%) explains the relationship between education and receiving a free sample. The relatively smaller number of women who received samples in the public facilities, and the even smaller number of

women with ten or fewer years of schooling who delivered in the private hospitals, means that the association between schooling and receipt of a sample is inconclusive. Rather, the more appropriate conclusion we can draw from these results is that women who deliver in private hospitals are more likely to receive a sample than women who deliver in a public hospital.

We also examined the effect of health care worker advice to bottlefeed and endorsement of specific brands of infant formula. Health care worker advice to bottlefeed exclusively (5 percent), or supplement breastfeeding with bottlefeeding (19 percent), was not significantly associated with any infant feeding outcomes. As for advice to use a specific brand of infant formula, only 23 women reported this kind of endorsement. There was no significant difference in the kind of general advice given to mothers in public and private hospitals, i.e., approximately 75 percent in both public and private facilities were advised to breastfeed. However, the likelihood of receiving advice to use a specific brand of infant formula did differ for public and private hospitals. A significantly greater percentage of those who had their babies in a private facility recalled health workers' endorsement of a specific formula brand (15% vs. 5%). These women were also more likely to receive product literature (59% vs. 5%), and a significantly greater percentage reported that their baby's first food in the hospital was infant formula (44% vs. 9%).

The effect of promotional samples to mothers on infant feeding patterns has been an important policy question in recent years. In the case of Nairobi, however, the proportion of women in the survey that reported receiving a free sample is so small that direct "sampling" can not be viewed as among the primary marketing influences that affect the overall pattern of infant feeding. Because the overall number of women who received samples is small, and because other factors influence early bottle introduction, it is difficult to draw conclusions about the influence of samples on early bottlefeeding.

Although women who delivered in private hospitals were more likely to receive a free sample than women who delivered in public hospitals, receipt of a sample in that setting was not associated with bottle introduction by the end of the first month. Women who received a sample in a public hospital were, however, significantly more likely to introduce the bottle by the end of the first month (2-sided fisher's exact test, p=.003) than those who did not receive a sample. Because the number of women who delivered in public hospitals and reported receiving samples is so small however, we can only speculate on this particular association.

Overall, these results are somewhat difficult to interpret. First, although the number of women who reported receiving a

sample is quite small, it appears that there is a much higher rate of sampling in two private hospitals than in the public hospitals. Since the sampling frame designed by the Kenyan investigators underrepresented higher income groups, it may be that the overall rate of sampling is somewhat higher than we are able to determine. It does appear that infant formula companies have targeted private hospitals for more intensive promotion, and that the private hospitals, in turn, are distributing these products to their clients.

These data do support the conclusion that public hospitals have more closely complied with the W.H.O. Code's provision regarding free samples than have private hospitals. There is less distribution of free samples from public hospitals, and this may indicate that stricter controls have limited the amount of free supplies to that necessary for in-house infant feeding requirements. Second, while we do observe that women who receive a sample in a public hospital are more likely to bottlefeed at the end of the first month than women who did not receive a sample, the overall rate of sampling appears to be so low (because of selective distribution) that this result perhaps is of little significance for overall infant feeding patterns in Nairobi.

Advertising Recall

Sixty-eight percent of the sample recalled infant formula advertising on radio or television (Table 5-4). Although the W.H.O. Code and earlier voluntary restraints led to the virtual end of this kind of promotion, a majority of women still recall those promotional messages. In addition, there were demographic differences in advertising recall. Women with higher education were significantly more likely to recall this form of promotion than women with fewer years of education, and women who were in the labor force prior to having their baby were also more likely to recall advertising. It is also interesting to see that there is a nonlinear relationship with respect to age. Younger women and older women are less likely to recall these messages than women in their 20's.

Brand Awareness

There are eight brands of infant formula available to women in Nairobi, and, on average, women could name at least two brands without prompting from the interviewer. When questioned about their recognition of each of the available brands, the average woman in the survey indicated recognition of four brands, or roughly 58 percent of the available brands in the Nairobi market (Table 5-5). Since there were no more than five major brands in Nairobi at the time of the survey, however (SMA, Similac, and

Isomil have considerably less availability), the true consumer awareness is closer to 70 percent of the generally available product set. Furthermore, since 1982, Cow and Gate formula has been withdrawn from the market, leaving only four major brands. Overall, then, it is clear that Nairobi mothers had a high degree of awareness of the available commercial formula milks, and in all probability that awareness is higher today.

Education was positively associated with brand awareness, as was parity, previous labor force participation, and receipt of a free sample of infant formula. Further, the same association between the respondent's age and recall of advertising exists for brand awareness. Women in their twenties are able to recognize more brands than younger or older women.

Consumer Attitudes

One indication of consumer orientation to the use of specific products is the expression of values, attitudes and knowledge about these products. Respondents in Nairobi were asked to indicate their agreement or disagreement with a number of statements about infant feeding in general, and bottlefeeding in particular. Overall, Nairobi women appear to have a strong investment in the belief that infant formula is a necessary supplement to breastfeeding during the earliest months of a child's life. When asked to indicate their agreement or disagreement with the statement, "A child will be healthier if it receives infant formula in addition to breastmilk in the first three months of life," 86 percent of those surveyed indicated that they agreed (Table 5-6). This attitude appears to be held uniformly, with no significant differences among women on the basis of age, previous labor force participation, place of delivery or parity. Women with more than 10 years of education are less likely to agree with the statement than women with fewer years of education, but it is not clear that this represents a stronger commitment to breastfeeding. Because of the way the statement is worded, the greater disagreement may indicate the belief that infant formula alone would be sufficient or it may indicate that more educated women, in fact, have more information on infant nutrition and health.

The stated belief in the nutritional importance of infant formula, however, probably represents a conviction that formula is a necessary supplement to breastfeeding. When asked how many months breastfeeding alone is adequate to feed an infant, the median age reported was three months. When asked at what age it is appropriate to wean an infant, however, the median age reported was 18 months. There are other indications that women in Nairobi have a strong commitment to bottlefeeding. When asked if infants should be breastfed when they are hungry regardless of where the mother and baby are, 79 percent of the mothers

responded affirmatively, but 77 percent also indicated that bottlefeeding was more appropriate. Finally, when asked, "If you had more money, would you prefer to bottlefeed instead of breastfeed your baby?," 32 percent indicated that they would.

The fact that one-third of those interviewed admit that financial constraints influence their feeding decisions raises interesting questions for a population that has a strong propensity to use formula supplementation. Table 5-7 shows a significantly greater percentage of those not feeding any commercial milks, or only using cow's milk, than of those currently using formula would prefer to bottlefeed exclusively if money were no object. These findings indicate that a significant number of women were actively price conscious regarding their infant feeding regimens.

Further evidence for this combination of price and value awareness was seen in the response to questions regarding the reasons for feeding particular brands of cow's milk or infant formula. Among those currently feeding cow's milk, the dominant reasons given was price (35%), followed by availability. For infant formula, the primary reasons were the mother's preference for that particular brand (29%), followed by the baby's preference (25%).

Summary

The modern infant foods market in Nairobi is highly concentrated, represented by a few manufacturers and dominated by one. Government policies have exerted a strong influence in virtually every dimension of marketing activity, from controls on production and prices, to early bans on advertising. The Government of Kenya has also endorsed the W.H.O. Code of Marketing. Mothers of infants in Nairobi represent a large and stable clientele for infant foods suppliers. Our survey revealed a group of consumers (and non-consumers) with a strong commitment and orientation to formula feeding as a supplement, and a significant percentage who say they would abandon breastfeeding altogether if they had the financial means. Consumer attitudes towards bottlefeeding were uniformly positive.

Overall, our analysis of consumer behavior in Nairobi reveals little variation in orientation towards commercial infant foods. The lack of competitive pressures, coupled by government restrictions and W.H.O. Code compliance have muted the competitive aggressiveness this industry displays in other settings. We observed very little sampling, but that which we did observe was disproportionately in the private hospitals. This suggests that suppliers are taking advantage of Code ambiguities, although being selective in their targets. The fact that women who delivered in private hospitals are more likely to

report brand endorsement from health care workers and receipt of literature suggests that the industry in Nairobi is concentrating its promotional activities on private institutions.

Table 5-1. Formula Availability

Base: 107 retail audits

	Total	Shops					
		Small	Medium	Large	Self Service	Chemists/ Pharmacies	Market Stalls
	107	30	20	15	10	7	25
Product							
Any Formula	92%	90%	90%	100%	100%	100%	100%
Nan	42%	33%	45%	67%	90%	—	28%
Lactogen	81%	80%	90%	87%	90%	—	96%
Ostermilk	24%	20%	20%	27%	90%	14%	12%
Cow and Gate	36%	23%	40%	47%	100%	—	24%
SMA	24%	17%	25%	40%	50%	57%	8%
S26	32%	17%	30%	60%	70%	71%	16%
Similac/Isomil	7%	—	—	—	30%	71%	—

Nairobi, 1981

Table 5-2 Average Formula Price Per 500 Gram

Company	KSHS	US $
Glaxo	22.85	2.86
Nestle	26.75	3.34
Cow and Gate	29.60	3.70
Wyeth	38.05	4.76
Abbott	55.70	6.96

8 KSHS = $ 1 (US)

Table 5-3 Respondent Characteristics and Receipt of Infant Formula Sample, Nairobi 1981 (N=748)

	Percent Receiving Sample	Significance
TOTAL	4.1	
Education*		
0-4 yrs.	<1.0	.001
5-7 yrs.	2.3	
8-10 yrs.	3.0	
>10 yrs.	13.2	
Age		
<19	<1.0	.02
20-24	3.6	
25-29	6.8	
30-34	8.2	
35+		
Working Prior to Delivery		
No	1.8	.001
Yes	16.1	
Place of Delivery		
Home	1.3	.07
Hospital	4.9	
Parity		
Primiparous	1.6	.07
Multiparous	4.9	
Rooming In (Hospital births only)		
No	18.2	.001
Yes	1.6	

*Due to small cell sizes, which could make x^2 on an uncollapsed table unreliable, the table was collapsed for statistical testing across uniform categories.

Table 5-4 Respondent Characteristics and Recall of Commercial Advertising of Infant Formula, Nairobi 1981 (N=748)

	PERCENT RECALLING ADVERTISING	SIGNIFICANCE (p<1)
TOTAL	68.0	
Education		
0-4 yrs.	53.9	.001
5-7 yrs.	62.8	
8-10 yrs.	70.4	
>10 yrs.	79.7	
Age		
<19	59.0	.01
20-24	65.4	
25-29	73.4	
30-34	54.2	
35+	50.0	
Working Prior to Delivery		
No	62.7	.05
Yes	75.2	

Table 5-5 Respondent Characteristics and Awareness of Commercial Infant Formula Brands, 1981 (N=748)

	$\bar{X}$ BRANDS RECALLED	PROPORTION OF ALL BRANDS RECALLED	SIGNIFICANCE ($p<$)
TOTAL	4.07	58.31	
Education			
0-4 yrs.	2.88	41.94	
5-7 yrs.	3.93	56.16	.001
8-10 yrs.	5.02	71.45	
>10 yrs.	5.37	76.39	
Age			
<19	3.73	53.24	
20-24	4.10	58.65	
25-29	4.43	63.62	.02
30-34	3.72	53.38	
35+	3.78	54.76	
Working Prior to Delivery			
No	3.91	55.80	.001
Yes	5.10	72.79	
Parity			
Primiparous	3.76	53.8	.01
Multiparous	4.17	59.8	
Receipt of Infant Formula Sample			
No	3.99	57.2	.001
Yes	6.02	85.5	

Table 5-6 Respondent Characteristics and Response to the Statement: "A child will be healthier if it receives infant formula in addition to breastmilk in the first three months of life," Nairobi 1981 (N=748).*

	% AGREE	% DISAGREE	SIGNIFICANCE (p<)
TOTAL	86.0	10.2	
Education			
0-4 yrs.	85.8	8.2	
5-7 yrs.	88.1	8.3	.01
8-10 yrs.	88.3	8.2	
>10 yrs.	80.6	18.3	
Age			
<19	89.4	8.9	ns
20-24	85.1	9.5	
25-29	86.6	11.2	
30-34	82.3	15.8	
35+	87.4	6.7	
Working Prior to Delivery			
No	87.4	8.9	ns
Yes	77.7	17.2	
Place of Delivery			
Home	85.8	10.9	ns
Hospital	86.5	8.3	
Parity			
Primiparous	87.2	9.0	ns
Multiparous	85.7	10.6	

*Respondents with "no opinion" excluded from the table for clarity. "No opinion" responses range from 3-6 percent for each sub-table. Significance tests based on agree/disagree distribution.

Table 5-7 Percent Answering Yes to the Question "If you had more money would you prefer to bottlefeed instead of breastfeed your baby?" (i.e., bottlefeed exclusively) by current use of commercial milks*

	% answering yes
Commercial Milk Use	
None	.39
Cow's Milk	.38
Infant Formula	.21
X2 =17.99, p<.001	

*Respondents were grouped by single commercial milk use. Women feeding both cow's milk and infant formula at the time of the interview (N=25) were excluded from this table.

CHAPTER VI DETERMINANTS OF INFANT FEEDING PRACTICES: MATERNAL EMPLOYMENT

This section of the analysis will focus on the effect of maternal employment on infant feeding choices. The data will be examined to test the hypothesis that:

> Paid labor force participation outside the home increases the probability of early use of breastmilk substitutes, early supplementary foods and substitution of convenient but nutritionally inappropriate foods.
>
> Among women who do work for pay outside the home, specific attributes of labor force participation are thought to be important determinants of infant feeding practices. Where possible, such specific attributes and their effects will be identified.

Only 156, or 16% of the sample, reported working outside of their homes before the index child was born. Of these women, 62% worked in professional/technical or administrative/clerical positions with the rest divided among sales, service and general labor. Seventy-seven percent of the women who worked outside their homes received some sort of maternity leave for the birth of the index child, and 35 mothers were on maternity leave at the time of the interview. For 82% of the women, maternity leave was fully paid; for 3% partially paid; and for the remaining 15%, unpaid. The length of leave varied from 1 to 30 weeks with most women receiving two months. This is the official length of maternity leave for government employees and is a standard followed by many private concerns.

Only 108 women, or 11% of the sample, were working outside their homes at the time of the interview. The breakdown by occupation was very similar to that reported for employment prior to the birth of the index child. The mean number of hours worked per week was 45.9. Almost half of the mothers working away from home traveled 20 minutes or less to get to work and 80% traveled one-half hour or less. Just less than half (49%) of the mothers working away from home reported that they usually saw the baby during the working day. This is not surprising because most government and private employers close down for one and one-half hours at midday for employees to return home for lunch. When asked who took care of the baby while the mother was at work, 11% reported taking the baby with them; 39% reported leaving the baby with a family member; 43% left the baby with a day care worker or maid; 3% with a friend or neighbor; and 4% left the baby unattended.

When asked if they did any work in their homes to earn money, only 4.8% of the women reported that they did. From the ethnography, this figure seems low, probably because the mothers either did not consider jobs like buying and reselling vegetables from their front steps employment, or because they were fearful of drawing attention to unlicensed or untaxed transactions. This type of informal work was common in the ethnographic survey.

To understand possible relationships between working outside the home and infant feeding patterns, it is necessary to know something about the women who are likely to be working away from their homes during the early infancy of their children. In fact, they are rather atypical of the sample universe of Nairobi mothers. They are much more likely to be urban born, more highly educated, and of higher socioeconomic status than non-working women and women who earn income at home (Table 6-1). Whereas over 95% of all women with less than seven years of education were not employed outside the home, about one-third of these mothers with more than 10 years of education were so employed.

Because of the small number of women working outside their homes for wages and the even smaller number reporting earnings from work done in their homes, it is almost impossible to analyze working away from home vs. working in the home as determinants of infant feeding patterns. In most cases, analysis is only possible by combining women not employed with those working for income in their homes and comparing this group with women employed outside of their homes.

To examine whether paid labor force participation of the mother outside the home increases the probability of early use of supplementary foods and the substitution of convenient but inappropriate foods, it is necessary to compare children of similar age whose mothers do and do not work away from home. Table 6-2, shows the distribution of ages of children for mothers working away from home at the time of the survey and for those who were not. Women tend to work outside the home in greater numbers when children are older than one year and, therefore, working out mothers have relatively older children than those who stay home. For this reason, it is necessary to control for age when comparing the diets of children of women working away from home and those who are not.

Since the age mix of children between the ages of 3 and 12 months is quite similar among women who work away from home and women who stay home (Table 6-2) diets were analyzed for just this group of children, using food items mentioned in the 24 hour recall. These data show striking differences in the diets of children whose mothers work outside of the home and those whose mothers do not (Table 6-3). A significantly larger percentage of those children whose mothers work outside the home receive infant formula, uji with milk, commercial cereals, protein rich foods(a

combination variable including meat, fish, eggs and legumes), other vegetables (excluding legumes and potatoes) and fruits. A significantly larger percentage of children whose mothers do not work outside the home were reported as receiving breastmilk.

The data on use of uji, a widely used maize porridge, are of particular interest. While there is no statistically significant difference in the reported use of uji by mothers working outside of the home and those not, there is a significant difference in the percentage of children receiving uji prepared with milk. Children of mothers working outside of the home are more likely to get this more nutritious and expensive blend. This recalls a statement from the ethnography: "I know what foods a baby should be given and even what I should prepare for a new arrival. My major problem is that I do not have money."

Breastfeeding initiation is almost universal in both working out and non-working out mothers, but it is slightly less prevalent among the former (Table 6-4). There is also slightly less breastfeeding to three months of age among mothers who work away from home, but a substantially lower likelihood of breastfeeding to 6, 9 or 12 months. Early bottlefeeding is also slightly more common among the women who were working outside their homes at the time of the survey. As would be expected from the significantly higher prevalence of breastfeeding among mothers who do not work away from home, lifetable analysis shows a significant difference (at the .01 level) in median duration of breastfeeding (median 12.04 months for those who work out and 16.23 months for those who do not (Fig. 6-1). Analysis of weaning interval also shows a statistically significant difference (at the .05 level) between those mothers working outside the home and those not. The mean weaning interval for mothers working outside of the home was 4.8 months as compared to 5.8 months for mothers working at home or unemployed.

When a variable representing work outside the home is added to the set of background socioeconomic variables, no significant, independent effect is seen on the probability of outcome for the breastfeeding duration variables or for early bottles (Tables 6-5 and 6-6). In the model for breastfeeding 12 months there is more association in the expected direction, but even this is not quite significant at the .05 level. It is noteworthy that, in this population working outside the home is closely associated with higher socioeconomic status and being an "urban" mother, both of which exert significant independent effects in the above models. Thus, while working outside the home appears to be associated with several of the infant feeding outcome variables when analyzed in a series of simple bivariate cross tabulations, once other background factors are controlled, the apparent association is no longer evident.

One interesting finding is the correlation between the age of the child when working mothers return to work and the age at which that child first receives a breastmi k substitute (cow's milk or infant formula). As might be expected, mothers returning to work when their child is younger start substitutes earlier. Sixty-seven percent of those mothers returning to work when their child was one month or younger started breastmilk substitutes before the child was two weeks old, while only 47% of the mothers returning when their child was 1-2 months and only 21% of the mothers returning when their child was 2-3 months old, started substitutes as early. This finding may indicate that, at least in the earliest weeks of life, delay in return to work outside the home may be likely to prolong the period of exclusive breastfeeding. Reconsideration of maternity leave policies may be indicated to improve infant feeding patterns.

When working women who were given maternity leave are compared to those who were not (Table 6-7), certain differences in infant feeding patterns emerge. Those women who had no leave were less likely to initiate breastfeeding but more likely to continue it if they began. The reasons for this may be found in the characteristics of working women who receive leave as opposed to those who do not. Working women who have no leave may have to return early to informal market jobs such as peddling, house service, or construction. They may not see any way to breastfeed while doing such work, and their early return to work may mean they never begin. On the other hand, women who receive maternity leave are more likely to be in clerical civil service and semi-professional jobs. All these occupations are associated with more education, higher economic status and more urban characteristics -- all of which are associated with the shorter breastfeeding durations evidenced among these women. Supplementation with milk bottles does not appear different between these two groups of women, probably because even women who had leave were likely to have returned to work by the time the baby was two months of age.

Since only a small number (11%) of the mothers in our sample were working outside of the home at the time of the interview, the implications of the shifts in feeding practices documented for these women are not of major importance for the entire population. Certain effects on feeding patterns do, however, seem likely for the small group of women with young infants who work outside the home. Differences were observed in the types of foods reported consumed in the previous 24 hours between babies of women working outside the home and those not. Babies whose mothers worked outside the home were more often reported as having consumed infant formula, uji with milk, commercial cereals, protein rich foods, vegetables and fruits. More babies whose mothers did not work outside of the home reported giving breastmilk in the previous 24 hours. The increased diversity in the diets of babies of mothers who worked outside the home was

found even when the child's age was controlled and may be a result of mother's additional income as well as the need to supplement breastmilk while the mother is out of the home.

Working outside of the home does appear to affect weaning interval, with mothers working outside of the home weaning their infants over a shorter period of time. The median duration of breastfeeding is shorter for mothers who work outside the home, but, when tested in a logistic regression, working away from nome is not significantly, independently related to measures of breastfeeding duration. The age of the child when the mother returned to work and, by implication, the length of maternity leave correlated well with the age of introduction of breastmilk substitutes. Those with longer leaves breastfed exclusively for a longer time.

One reason for the relatively minor effects of working outside the home or breastfeeding in this sample may be that half the mothers who work outside the home report that they were usually able to see the baby during the working day. This, combined with the relatively low frequency of working outside the home among the women with young children, means that for women in this sample, paid labor force participation outside of the home was not an important constraint to breastfeeding.

Table 6-1 Association of Working Outside the Home and Background Characteristics of Mothers

	Workout		Do Not Workout	
	N	%	N	%
Family SES				
no water or electricity	103	24.6	846	70.5
both water and electricity	103	55.5	846	18.1
Urban Mother	103	32.9	846	20.1
Mother's Education				
none	103	4.7	846	19.9
$\geq$10 yrs.	103	14.4	846	55.5

Table 6-2 Age Distribution of Babies by Work Status of Mother

A. Entire Sample

Age	Workout	No Workout
0	1.4	6.5
1-2	12.3	13.7
3-4	7.5	9.2
5-6	9.6	13.1
7-8	10.0	12.1
9-11	11.1	16.1
12-14	24.3	14.7
15-18	23.6	14.7

B. Babies 3-11 Months

3-4	19.6	18.2
5-6	25.1	25.9
7-8	26.2	23.9
9-11	29.1	31.9
	100.0	99.9

Table 6-3 Percent of Children 3-12 Months Consuming Selected Foods in Previous 24 Hours

Foods	Mother not employed or working at home (% consuming)	Mother employed outside the home (% consuming)
Breastmilk*	77.0	61.4
Cow's milk	30.5	30.9
Infant formula*	23.8	40.7
Uji (w/ or w/out milk)	57.7	64.3
Uji w/ milk*	41.2	57.7
Commercial cereal*	11.5	21.3
Protein foods*	15.1	27.8
Other vegetables*	12.3	24.2
Fruits*	3.9	16.5

P = .05

Table 6-4 Association of Working Outside the Home with Different Infant Feeding Outcomes

	EVER BREASTFED		BREASTFED 3 MONTHS		BREASTFED 6 MONTHS		BREASTFED 9 MONTHS		BREASTFED 12 MONTHS		BOTTLE BY 2 MONTHS	
Workout	N	%	N	%	N	%	N	%	N	%	N	%
No	846	97.7	639	96.1	529	88.6	362	79.4	234	76.7	723	29.0
Yes	103	96.0	86	92.1	65	66.9	58	61.3	48	51.1	94	37.1

Table 6-5 Logistic Regression Models for Different Infant Feeding Outcomes: Beta Coefficients for Background and Maternal Employment Predictor Variables

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS	BOTTLEBY 2 MONTHS
Mother's Education	-0.247	-0.043	-0.027	-0.012
	(4.41)*[1]	(0.16)	(0.04)	(0.03)
Socioeconomic Status	-0.229	-0.412	-0.340	0.420
	(1.58)	(5.49)*	(2.78)	(13.35)***
Parity	0.079	0.235	0.305	0.069
	(0.20)	(1.75)	(2.07)	(0.44)
Mother's Age-	0.201	-0.063	-0.041	-0.091
	(1.59)	(0.17)	(0.06)	(0.97)
Workout	-0.127	-0.334	-0.811	0.058
	(0.10)	(0.75)	(3.66)	(0.04)
Urban Mother	-0.736	-1.083	-1.045	0.367
	(6.85)**	(15.10)***	(10.34)**	(3.78)
Model X^2	(28.42)***	(33.84)***	(29.35)***	(22.87)***
R	.18	.21	.22	.10

[1]Numbers in parentheses are MLE chi-squares (Wald Statistics)

*P < .05, **P < .01, ***P < .001

Table 6-6 Adjusted Risk Odds Ratios and 95% Confidence Intervals for Background Socioeconomic Variables and Maternal Employment Variables

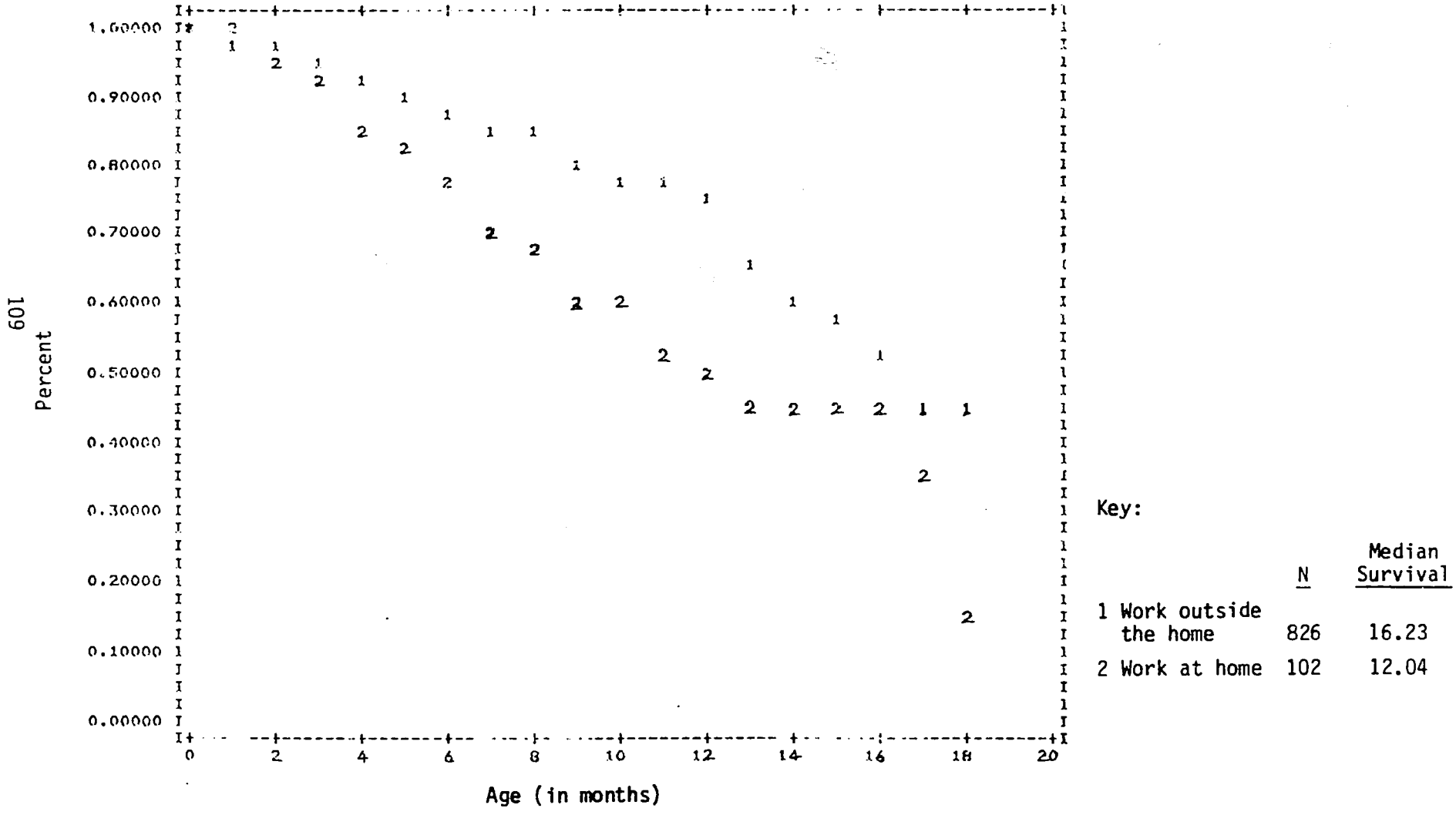
	Breastfed 6 Months	Breastfed 9 Months	Breastfed 12 Months	Bottle by 2 Months
Mother's Education:				
5-7 vs none	.61 (.48, .77)	NS	NS	NS
8-10 vs 5-7	.78 (.62, .98)	NS	NS	NS
Socioeconomic Status:				
Med. vs Low	NS	.66 (.47, .94)	NS	1.52 (1.21, 1.91)
Hi vs Low	NS	.44 (.31, .62)	NS	2.32 (1.85, 2.90)
Birthorder	NS	NS	NS	NS
Mother's Age	NS	NS	NS	NS
Workout	NS	NS	NS	NS
Urban Mother	.48 (.28, .83)	.34 (.20, .58)	.35 (.19, .66)	NS

Table 6-7 Feeding Patterns of Mothers Currently Working Away from Home by Maternity Leave Benefits

	Had No Leave (n=26)	Had Leave (n=78)
Ever Breastfed	89.7	98.1
BF3MO	100.0	90.0
BF6MO	92.8	68.2
BF9MO	68.3	59.0
BF12MO	70.0	46.0
Early Bottles	38.2	36.7

Figure 6-1

Duration of Breastfeeding by Maternal Employment



Key:

	N	Median Survival
1 Work outside the home	826	16.23
2 Work at home	102	12.04

CHAPTER VII DETERMINANTS OF INFANT FEEDING PRACTICES: HEALTH SERVICES

The health care system in Nairobi consists of both government and private facilities. The government maternity facilities are of two types: National and City Council. Of the former, Kenyatta National Hospital is the main facility and, as a teaching center, is restricted to medically complicated deliveries. The Nairobi City Council operates maternal and child health centers, maternity units and one large maternity hospital. Maternal and child health centers offer antenatal and postnatal care but do not handle deliveries. Most of these are done in the system's maternity units or in Pumwani Hospital. Maternity units are small centers often attached physically to City Council Housing Complexes. Pumwani Hospital is a large maternity hospital with between 100 and 150 births per day. Mothers are referred to Pumwani from the maternity units for their first birth, all births after the fifth, and when there have been previous difficult deliveries. Mothers with more severe medical complications such as heart conditions or diabetes are referred to Kenyatta National Hospital.

Private maternity centers in Nairobi run the range from very small maternity homes to large and well equipped private hospitals such as Nairobi Hospital, Aga Khan Hospital and M.P. Shah Hospital. These centers all charge fees from two to more than ten times the K.Shs. 120 - (just under US $10) charged at Pumwani, and as a consequence, are of less interest in terms of this low and middle income sample.

Of our sample, 770 or 79% of the index children were born in Nairobi. Of these, 14% were born at home, 9% in City Council Maternity Units, 57% at Pumwani Hospital, 7% at Kenyatta National Hospital and the remaining 15% in one of the private hospitals or maternity homes. Of the 211 babies born outside of Nairobi, 54% were born at home, 31% in a government clinic or hospital, and the remaining 15% in private facilities. Seventy-six percent of all index child births were attended by a health worker (doctor, clinical officer, trained midwife or nurse); only 2% were attended by traditional midwives: thirteen percent were attended by friends or neighbors, and 8% were unattended.

Eighty-five percent, or 829 of the mothers in the sample, received some sort of prenatal care, and only 40% of these women recall being told anything about infant feeding. Of those recalling prenatal feeding advice, 15% report being told that it was best to feed cow's milk or infant formula; 69% report being told it was best to breastfeed only; 11% report being told to feed both breastmilk and cow's milk/formula; and the remaining 5% report being told that neither type of feeding was better, or couldn't recall what they were told. Counting all those not told

that exclusive breastfeeding is best, we find nearly one-third of those mothers receiving prenatal feeding advice reported being either misinformed or uninformed.

Of the 757 mothers giving birth in hospitals, clinics or maternity homes, only 14% recall being given any information on infant feeding at the health facility. Of those who did receive information, 52% report being told it was best to feed formula or cow's milk, 27% report being told it was best to breastfeed only, 9% report being told to feed breastmilk and infant formula/cow's milk, and the remaining 12% report being told that neither type of feeding was best or couldn't recall the advice. Again, counting all those not told that exclusive breastfeeding is best, we find nearly three-fourths of those receiving any advice on infant feeding recall leaving the hospital either with wrong information or without information. Of all mothers delivering in health care facilities, nearly one-fourth report thinking that the health workers in that facility preferred either exclusive bottle feeding or a combination of breast and bottle feeding. Feeding advice given to mothers in hospitals appears even less supportive of breastfeeding than prenatal advice, with cow's milk or formula feeding recommended to most mothers. Similarly, advice given in hospitals is much less likely to recommend exclusive breastfeeding (27%) than advice given prenatally (69%).

More than three-fourths (80%) of the women delivering in health care facilities report that the baby stayed in the same room as the mother during the first day and night after birth. This figure agrees with the data from the medical infrastructure study of government maternity facilities, where almost all follow a policy of rooming-in. When asked who fed the baby at the health care facility, 73% of the mothers reported this was done exclusively by the mother, 18% reported it was done only by the staff, and another 4% reporting shared feeding by the mother and staff. When asked what the baby was fed at the facility 73% reported breastmilk, 17% reported infant formula, and 21% reported glucose solution (percentages add up to more than 100 because some mothers reported more than one food). Of those mothers reporting that their babies were fed infant formula at the health care facility, 59% could recall the brand.

Eight percent of the mothers recalled that a particular brand of infant formula had been suggested by a health care worker. The suggestions most often recalled were Nan or Lactogen (the two Food Specialties/Nestles Products) by 45 mothers and Wyeth's S-26 by 9 mothers. Only 7% of the mothers reported buying formula at a discount price from the facility, and 5% reported receiving feeding bottles from the hospital on discharge respectively. Eighty-nine mothers, or 12%, reported receiving infant feeding booklets upon discharge.

Given the practices described in Nairobi hospitals, there is the possibility that place of birth may influence future infant feeding decisions among mothers. For example, among the one-fourth women giving birth in hospitals, who believe that hospital staff prefer bottle feeding; this impression may influence post-discharge decisions concerning breastfeeding duration and use of bottles. Similarly, the levels of use of infant formula feeding in hospitals (17%) and use of glucose solutions (21%) may have an adverse effect.

Place of birth (hospital and non-hospital) does seem associated with differences in initiation of breastfeeding (Table 7-1). In fact, even if breastfeeding for at least two weeks is used to denote true initiation, about 95% of all mothers did so. The analysis does, however, lend support to the hypothesis that giving birth in a hospital is associated with shorter duration of breastfeeding Fig. (7-1) and earlier use of bottles. For the longer breastfeeding durations (BF6MO to BF12MO), for example, the percentage of women who continue to breastfeed is consistently lower among those experiencing hospital births than those with births outside the hospital. A consistent association is also seen with respect to early bottle feeding. More hospital-born children are introduced to bottle feeding by two months than those not born in the hospital.

Current feeding patterns can be grouped by whether or not the mother delivered in a hospital/clinic (modern) or was delivered by a traditional birth attendant, friends, family or not attended (Table 7-2). Exclusive breastfeeding is clearly more persistent in the traditional delivery group among children 2 and 3 months old; 40% of the traditional group are exclusively breastfed while only 18% of the modern delivery group are fed in this manner. Mothers who deliver in a traditional manner are more likely to favor a diet of breastmilk and food for their babies than are mothers who experience modern deliveries. On the other hand, women who have had modern deliveries are much more likely to offer their infants diets composed of breastmilk substitutes and food supplements.

More children delivered in hospitals were ever fed formula than those delivered at home (58% vs. 37%), (Table 7-3). Babies delivered by health workers were more often fed infant formula (58%) than those delivered by traditional midwives (50%) or family, friends, or unattended (37%). Differences in use of formula both by place of delivery and birth attendant are statistically significant at the .001 level using the chi square and contingency coefficient tests. These differences may be partially caused by income differences with the poorest women in the sample being able to afford neither a hospital delivery nor infant formula.

There are also significant differences in feeding related to type of information given either at prenatal visits or at the time of delivery (Table 7-4). Paradoxically, those mothers reporting ever having heard from a health worker that it is good to breastfeed, are significantly more likely ($p = .02$) to report the use of infant formula than those who did not report receiving this information. This surprising result might be due in part to the reported misinformation from health workers discussed earlier or the mothers' inability to remember correctly what they were told. It may be due to the fact that upper-income mothers are more likely to receive all kinds of information than poorer mothers, but also more likely to bottlefeed. Finally, this result may be partially due to the mixed signals that mothers receive from health care facilities. The institutional profiles from the medical infrastructure study are full of examples where the mothers are all told to breastfeed but where formula feeding is taught by posters or example. In such situations, any contact with modern medical facilities, even ones in which pro-breastfeeding information is dispensed, may encourage bottle feeding. Clearly, more needs to be done by health care facilities or health workers to educate mothers effectively about infant feeding and promote good infant feeding practices.

On the other hand, no relationship was found between rooming-in practices or what the baby was fed in the hospital and the introduction of breastmilk substitutes. Too few mothers in the sample received feeding bottles or booklets on discharge or purchased formula from the hospital at a reduced price to analyze the effects of these practices.

From the bivariate analysis, place of birth seems to influence some measures of infant feeding practices. When these influences are examined by multivariate analysis, evidence is seen for an independent effect of hospital births on breastfeeding duration even after controlling for other socioeconomic factors (Table 7-5). Being born in a hospital reduces the likelihood of being breastfed for six months or nine months but does not achieve significance for twelve months' duration. This is logical, since one might expect influences from the experience surrounding the baby's birth to be strongest in the earliest months of life. A child born in a hospital is only about 40% as likely to be breastfed for as long as six or nine months as a child not born there (Table 7-6). Although it is not possible to specify exactly what it is about being born in a hospital that influences behavior in this way, there is nonetheless compelling evidence that, in addition to the influence of other socioeconomic variables, there is an independent influence on duration of breastfeeding that is directly attributable to the environment and practices surrounding institutional births among Nairobi mothers.

It appears that being a less urban mother is the variable most strongly associated with the probability of still breastfeeding by the time a child reaches twelve months of age. For early introduction of bottlefeeding it is socioeconomic status that highly significantly associated true initiation with the outcome. In fact, of all the background factors, the POWPIPE (family socioeconomic status) is the only one significantly correlated with the practice of introducing bottles by two months.

In sum, most of the index children in this Nairobi sample were delivered in a health care facility, and eighty-five percent of their mothers received some prenatal care. Many of these mothers reported receiving either wrong information or no information about the importance of exclusive breastfeeding. More traditionally delivered children are more likely to receive breastmilk supplemented by other foods while more hospital/clinic delivered children receive a breastmilk substitute and food supplement. The use of infant formula and especially glucose solutions reported by mothers in health care facilities, while difficult to link to later feeding practices, are clearly remembered by the mothers and may partially account for the greater use of infant formula by mothers delivering in those facilities. Contact with health care workers giving pro-breastfeeding information actually appears to increase the probability that the mother will use infant formula to feed her child. This may be the result of the misinformation reported by mothers and the contradictory signals given to mothers by hospital/clinic practices, posters.

Hospital practices at the time of delivery appear generally supportive of breastfeeding with 80% of the children rooming-in with their mothers, and 75% of the mothers reporting they breastfed in the health facility. Nonetheless, there is a clear independent negative effect of having a hospital birth on duration of breastfeeding, even after controls for education, urban residence and socioeconomic status have been applied. This effect is, perhaps, accounted for by some of the specific hospital practices noted above. In any event, it is a finding of note for those interested in improving infant feeding practices in Kenya.

Table 7-1 Place of Birth and Infant Feeding Outcomes

Hospital Birth	EVERBF		BF3MO		BF6MO		BF9MO		BF12MO		BOTLBY2M	
	N	%	N	%	N	%	N	%	N	%	N	%
No	215	98.2	165	98.6	134	94.5	95	91.9	65	88.2	181	22.6
Yes	757	97.2	565	94.8	457	83.9	328	72.3	221	67.0	646	32.5

Table 7-2 Type of Feeding by Child's Age by Modern (Western Trained Medical) or Traditional (Traditional Birth Attendant, Friend, Family) Attendance at Birth

Child's Age in Months	Breastmilk only		Breastmilk+ Substitutes		Substitutes only		Breastmilk+ Substitutes + Food Supplements		Breastmilk + Food Supplements		Food Supplements only		Substitutes + Food Supplements		
	Trad	Mod	Trad	Mod	Trad	Mod	Trad	Mod	Trad	Mod	Trad	Mod	Trad	Mod	
0-1	61%	66%	26%	20%	0%	0%	4%	9%	9%	5%	0%	0%	0%	0%	Trad N = 34 Mod N = 98
2-3	40	18	26	34	0	2	19	26	14	18	0	0	0	2	Trad N = 42 Mod N = 74
4-5	9	8	14	18	0	0	46	46	31	19	0	0	0	8	Trad N = 20 Mod N = 87
6-7	2	1	6	2	0	2	27	46	60	34	0	1	4	14	Trad N = 27 Mod N = 93
8-9	6	0	4	3	0	0	44	37	37	25	0	8	8	27	Trad N = 31 Mod N = 79
10-11	8	3	8	0	0	0	18	29	44	38	0	1	22	30	Trad N = 19 Mod N = 58
12-13	0	5	0	3	0	2	30	28	57	25	0	9	13	29	Trad N = 21 Mod N = 77
14-15	2	0	0	2	2	0	44	23	39	18	11	9	2	47	Trad N = 20 Mod N = 62
16-17	0	3	0	1	0	0	41	21	40	18	7	23	12	35	Trad N = 10 Mod N = 45

Total Trad =216
Total Mod =699

Table 7-3 Formula Use by Place of Delivery and Birth Attendant

Ever Use Formula	Place of Delivery		Birth Attendant		
	Hospital/ Clinic	Home	Health Worker	Traditional Midwife	Family, Friend Unattended
Yes	440 (58%)	79 (37%)	434 (58%)	12 (50%)	75 (37%)
No	317 (42%)	135 (63%)	309 (42%)	12 (50%)	128 (63%)
	$P \leq .001$		$P \leq .001$		

Table 7-4 Use of Formula by Receipt of Pro-Breastfeeding Information

Ever Fed Formula	Ever heard Pro-Breastfeeding Information from Health Worker	
	Yes	No
Yes	322 (57%)	204 (49%)
No	245 (43%)	210 (51%)

P = .02

Table 7-5 Logistic Regression Models for Different Infant Feeding Outcomes:
Beta Coefficients for Background and Health Services Predictor Variables

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS	BOTTLE BY 2 MONTHS
Mother's Education	-0.245 (4.46)*[1]	-0.051 (0.22)	-0.066 (0.27)	0.004 (0.00)
Socioeconomic Status	-0.148 (0.67)	-0.348 (4.01)*	-0.327 (2.64)	0.400 (12.39)***
Parity	0.068 (0.15)	0.255 (2.01)	0.309 (2.26)	0.056 (0.29)
Mother's Age	-0.204 (1.64)	-0.112 (0.52)	-0.128 (0.53)	-0.073 (0.63)
Hospital Birth	-0.847 (4.39)*	-0.923 (6.04)*	-0.687 (2.96)	0.320 (2.59)
Urban Mother	-0.700 (6.15)*	-1.065 (14.54)***	01.143 (12.70)***	0.340 (3.25)
Model X^2	(32.03)***	(39.43)***	(30.40)***	(27.91)***
R	.21	.25	.24	.12

[1]Numbers in parentheses are MLE chi-squares (Wald Statistics)

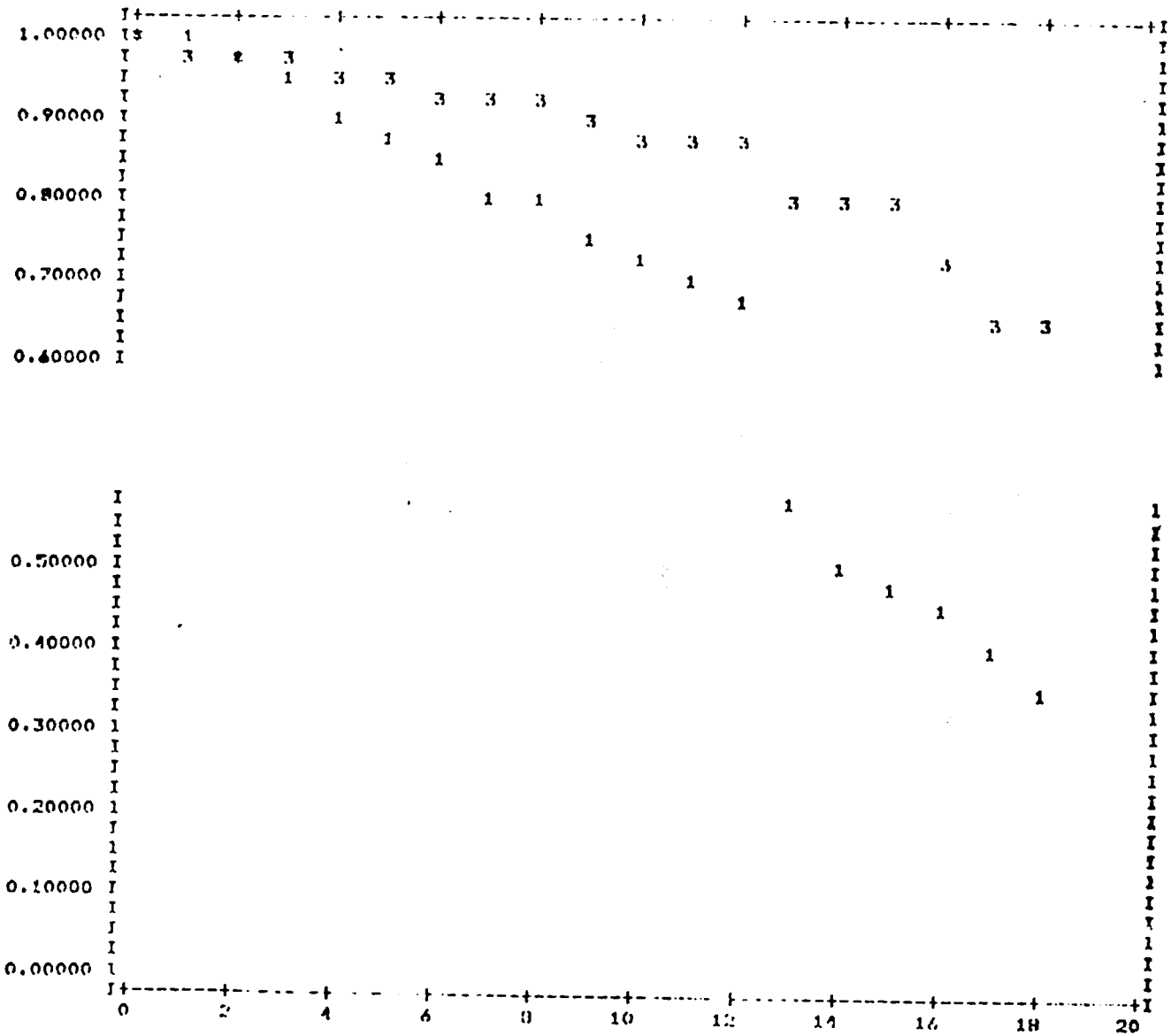
*P < .05, **P < .01, ***P < .001

Table 7-6. Adjusted Risk Odds Ratios and 95% Confidence Intervals for Background and Health Services Variables

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS	BOTTLE BY 2 MONTHS
Mother's Education	.78 (.62, .98)	NS	NS	NS
Socioeconomic Status	NS	.71 (.50, .99)	NS	1.49 (1.19, 1.86)
Parity	NS	NS	NS	NS
Mother's Age	NS	NS	NS	NS
Hospital Birth	.43 (.19, .95)	.40 (.19, .83)	NS	NS
Mother's Residence	.50 (.29, .86)	.34 (.20, .60)	.32 (.17, .60)	NS

Figure 7-1

Duration of Breastfeeding by Location of Birth



Key:

	N	Median Survival
1 hospital	741	14.32
2 elsewhere	209	18

CHAPTER VIII SUMMARY OF FINDINGS AND RECOMMENDATIONS

The results of this study are consistent with those of other surveys of Kenyan mothers, in terms of the demographic profiles, living conditions, and infant feeding practices uncovered. Forty-nine percent of the index children were female; 51% male. The ages were distributed fairly evenly over the range of 0 to 18 months. Sixty-five percent were born in government clinics or hospitals, 12% in private hospitals or clinics and 23% at home. Seventeen percent had been hospitalized overnight for an illness since birth and 44% were reported to have been ill in the last two weeks.

Ninety-seven percent had at some time been breastfed and 77% were breastfeeding at the time of the interview. The feeding pattern most often observed in our sample was breastfeeding with the early introduction of either cow's milk/infant formula or solid and semi-solid foods. Seventy-five of the ninety-seven percent who initiated breastfeeding started within the first 24 hours after birth. Most mothers breastfeed for a long period of time with 85% reporting breastfeeding at least once a day at six months and more than 50% still breastfeeding at least once a day at 15 months. Infant formula use at some point in time was reported for more than half of the index children. Formula use seems to peak at about three months and then decreases. This pattern contrasts with the use of cow's milk, which becomes part of the child's regular diet as it grows. Most of the index children were receiving food supplements in all age categories four months of age or older. The median duration of breastfeeding was calculated to be slightly over 16 months. Twenty-four hour recall data confirmed the information collected on feeding patterns and reflected the common use of glucose drinks also reported by the ethnographers.

Problems of maternal morbidity associated with breastfeeding were not common in the sample group, with only 11% of the mothers reporting any problem. Engorged breasts were most often reported, followed by sore nipples and infections. Survey data show 18% of the women to have used a modern birth control method since the birth of the index child with 12% using oral contraceptive agents and another 4% reporting use of an IUD.

Mothers strongly believe that they should not breastfeed while pregnant and that infant formula in addition to breastfeeding in the first three months will make a baby healthier. Most understand the contraceptive effect of breastfeeding and have mixed feelings about the appropriateness of breastfeeding in public. Knowledge and attitudes seem to be affected slightly by education but not much by length of time in Nairobi, age, or tribe.

Proxy factors were developed from the survey data to represent family socioeconomic status. Variables examined included household head's occupation, mother's education, an improved housing variable, POWPIPE, and a measure of persons per sleeping rooms, or density. These factors were then used as independent variables to look at both feeding practices (use of infant formula and packaged cereal and duration of breastfeeding) and outcome variables (reported illness in the previous two weeks and weight for age). The use of infant formula or packaged cereal increased with household head's occupational status, mother's education level, housing quality and decreased household density. Duration of breastfeeding was lowest for the best educated mothers and those with best housing quality. The lowest reported morbidity was for children whose mothers were in the highest and lowest education groups and for those with the most improved housing. Improved housing also positively affected weight for age.

More mothers of infants born in hospitals/clinics later feed formula than do mothers giving birth at home. One-third of the mothers receiving prenatal feeding advice and three-fourths of the women receiving feeding advice at delivery either recalled being given misinformed advice or could not remember what they were told. A significantly greater number of children delivered by modern health workers were found to have been given infant formula or infant formula/cow's milk in their first four months of life.

Only 11% of the women interviewed were working outside the home, and, of those, half were usually able to see their child during the work day. Working away from home does not appear as a constraint to breastfeeding for most mothers in our sample. Using 24 hour dietary recall data, and controlling for child's age, there are, however, significant differences in the diets of children whose mothers work outside of the home and those who do not. Significantly more children whose mothers worked outside of the home consumed infant formula, uji with milk, commercial cereals, protein rich foods, vegetables, and fruits. Significantly more children of mothers either not employed or working at home received breastmilk in the previous 24 hours, and the median duration of breastfeeding for this group was longer than for children whose mothers worked outside the home (16.23 versus 12.04 months).

Results show that most mothers using cow's milk use KCC or fresh, unprocessed milk. Of those using formula, about 85% use one of the Food Specialties products (Nestle's Nan or Lactogen). Ninety-six percent of mothers who use commercial cereal use the Food Specialties product, Cerelac. Most mothers use the same brand most of the time for formula or cereal and choose it because of price, availability, or because "it is best for the baby." The cost of exclusively formula feeding a baby for six

months, depending on brand is between 36% and 64% of the minimum wage at 1982 prices and wages. Many mothers recall past infant formula advertising even though it has been stopped for 4-5 years.

Logistic regression has been used to examine how combination of variables relating to maternal employment, health services, and background factors are related to different infant feeding outcomes. At this point, the same analytical method is extended to build an overall model of the determinants of infant feeding in Nairobi, combining the variables used in earlier analyses. When all the variables (socioeconomic, maternal employment, and health services) are combined in the same models (Table 8-1), essentially no increase in explanatory power is achieved beyond that afforded in the health services model alone. Because working outside the home has relatively little effect in this population, its addition to the health services model does not change much.

In the overall model, the principal determinants continue to be urban mother, hospital birth, and mother's education (for breastfeeding duration), and socioeconomic status (for early bottle feeding). The risk ratio for the significant determinant variables give an indication of the magnitude of the individual effects (Table 8-2). Correcting for all the other variables, the effect of having an urban mother remains the single most powerful factor that reduces the likelihood that a Nairobi child will be breastfed for 6, 9 or 12 months. Children of "urban" mothers are only about one third as likely to breastfeed for nine or twelve months durations. Being born in a hospital reduces the odds of being breastfed six months or nine months to less than half those of non-hospital born children. Higher maternal education also reduces the odds of breastfeeding for at least six months, but the magnitude of the effect is not as large. Early use of bottle is associated with higher family economic status. That alone emerges as a significant determinant of this outcome, although it appears unrelated to duration of breastfeeding. The results indicate that in higher income families a child is almost one and one-half times as likely to be introduced to bottlefeeding by the second month of age.

The potential effect of early bottlefeeding is displayed when the variable bottle by two months is added to the set of predictors in the breastfeeding duration models (Table 8-3). The models increase slightly in explanatory power, especially at the shorter durations. The effect of a bottle by two months is highly significantly related to breastfeeding duration of six and nine months. At the same time, hospital birth loses some of its strength of association for the six months model and the P value is no longer < .05. "Urban" mother is also slightly diminished in strength of association but remains as statistically significant. The effect of adding bottle by two months on the

risk ratios is shown in Table 8-4. There is really very little difference in the estimates of these ratios for the significant variables.

A schematic representation of the factors associated with different aspects of infant feeding is presented in Fig.8-1. It is clear that breastfeeding initiation is so common that it can be viewed as universal -- with no variation left to explain. On the other hand, one might presume that some of the factors most closely associated with shorter duration of breastfeeding in Nairobi may come to be associated with failure to initiate breastfeeding if traditional infant feeding patterns are further eroded.

Most of the associations in these models serve to highlight factors which depress breastfeeding duration. Higher education of the mother has a weaker relationship than the other three variables identified: urban mother, hospital birth, and early use of bottles. The identification of urban residence, higher education and institutional birth as factors predisposing towards shorter breastfeeding suggest that this pattern may become more common as trends toward urbanization and improved access to health facilities continue. On the other hand, it is reassuring to note that higher family socioeconomic status does not seem independently to predict shorter breastfeeding and the effect of higher educational levels is only marginal.

The importance of identifying the significance of early bottlefeeding and hospital births as determinants of infant feeding behavior in Nairobi is that both may be subject to modification. The preceding analyses suggest that if practices and procedures in hospitals are modified, this may translate into less ambivalent messages about breastfeeding and less mixed feeding early in life.

The only variable which appears related to early bottlefeeding is higher socioeconomic status. Working outside the home does not appear to predispose mothers to this behavior nor does higher maternal education. Since early bottlefeeding is associated with higher income group families who are generally accessible to educational messages via all media, the health consequences of this practice could potentially be the subject of educational campaigns. As in the U.S. and Western Europe, higher income families may, in fact, be amenable to changing their infant feeding practices once the benefits of breastfeeding are made explicit and widely known.

Because it is widely recognized by physicians, research scientists and manufacturers of breastmilk substitutes that exclusive breastfeeding provides the best possible diet for an infant for the first 4-6 months of life, all policies that foster this practice will also promote optimal infant nutrition.

Continued breastfeeding after 4-6 months, supplemented by semi-solids and solid foods is the best regimen for children in the period following exclusive breastfeeding. Policy, based on the results of this study, should reflect the need to decrease the amount of early supplementation of breastfeeding: almost all Nairobi mothers breastfeed and almost all do so for substantial periods of time. The most striking deficit in nutritional patterns is the extent to which early breastfeeding is supplemented -- both with food and with other milk.

A recent paper[1] by Greiner, divides policy in breastfeeding into three categories of activities: (1) protection of breast-feeding, (2) support of breastfeeding. and (3) promotion of breastfeeding. Protection of breastfeeding refers to activities which guard women already breastfeeding from forces which would influence them to do otherwise; support of breastfeeding refers to providing assistance to women who are motivated to breastfeed but who find themselves facing conditions which make this difficult; and promotion of breastfeeding refers to convincing women who are not motivated to breastfeed that they should do so. While all three categories of activity are important, Greiner argues forcefully that priority needs to be given to protection, then support and finally to promotion. An analysis of how the Nairobi situation fits these three policy categories follows.

1. Protection of Breastfeeding

From the cross-sectional survey and the ethnography it is evident that the Nairobi women we studied are successful, enthusiastic, and well motivated breastfeeders. Of the activities described above, clearly protection of breastfeeding is the most important for Kenya.

Since any feeding pattern that interferes or competes with breastfeeding gives an infant less than optimal nutrition, it is

[1]Grenier, T. "Infant Feeding Policy Options for Governments" Report for the Infant Feeding Study Consortium, Cornell University, November 1982.

these patterns that need to be avoided. The promotion and availability of breastmilk substitutes thus need to be examined. Cow's milk and infant formula must be treated separately because in Kenya the promotion, availability, and use of these two types of substitutes are not the same. The promotion of infant formula in Kenya has moved from the mass media advertising of the last decade to more subtle promotion through health care facilities. This promotion includes free supplies of formula to institutions, posters, booklets, hospital visits by "milk nurses," and in some cases, free samples to mothers at delivery. Legislative enactment of the provisions of the WHO code for the marketing of

infant formula, which the Kenyan government supported in Geneva in 1981, would go far to curb these practices. The cow's milk products that are labelled as breastmilk substitutes constitute a tiny fraction of the Kenyan market and their promotion would also be covered under the WHO code.

Both the marketing and cross-sectional data show infant formula to be widely available to even the poorest and least well-educated mothers in Nairobi and that these products are marketed not only to those who can afford them and have the education and facilities to use them safely. Infant formula use was reported by over half of the women interviewed in the cross-sectional survey. The pattern of use is as a supplement to breastmilk, and very few of the women studied formula fed exclusively.

The unnecessary use of infant formula as a supplement is detrimental because it deprives the infant of breastmilk and results in exposure to infectious agents. It is detrimental to the family as a whole because of the high cost of formula feeding compared to breastfeeding, and it is detrimental to the country because of increased need for health care and the foreign exchange loss for the importation of formula milks or raw materials in place of the much cheaper, locally produced and superior alternative--breastmilk. Finally, when formula use leads to a decline in breastfeeding, it also increases the fertility of the mother. This contributes to closer spacing of births, higher fertility, and rapid population increase. Policies which decrease the availability of infant formula (including restrictions on importation, production or distribution) would improve infant feeding practices in Kenya.

The most commonly used purveyor of breastmilk substitutes from both the cross-sectional study and the ethnography was the feeding bottle. This is used for the mother's convenience, so that the baby can "feed itself," in spite of the fact that the safest and most sanitary way to feed either cow's milk or infant formula is with a cup and spoon. Feeding bottles, especially the plastic ones most common in Kenya, are difficult to clean and sterilize, more so given the kitchen facilities and water sources seen in the study areas. Feeding bottles are also a drain on foreign exchange as most of them are imported. Restriction of their sale would not only encourage breastfeeding (as a more convenient alternative to cup and spoon feeding) but would promote the safest means of feeding breastmilk substitutes in the cases where their use cannot be avoided. Cow's milk is widely available in Kenya and is fed to children as well as infants. Its use as a breastmilk substitute could also be curbed, to the advantage of infant nutrition, if feeding bottles were less readily available.

2. Support of Breastfeeding

Two potential obstacles to successful breastfeeding are employment outside of the home (where the mother is physically separated from her child) and maternal breast morbidity or other problems in breastfeeding itself. Maternal employment outside the home is not an important obstacle to breastfeeding in the women studied because only around 6% were employed in circumstances where they did not usually have contact with their child during the working day. Employment outside the home and physical separation from the mother may be a more common problem for higher income women or may become a more serious problem as more women enter the labor force in Nairobi.

Kenya's current two month maternity leave policy helps ease this constraint, and the policy in some agencies of allowing annual leave to be added to the maternity leave period helps even more. The latter should be supported. Innovative policies for on-site day care facilities where mothers can breastfeed during breaks and at lunch, job sharing, and extended unpaid leave should all be considered.

Maternal morbidity and breastfeeding problems also appear not to be an obstacle to breastfeeding for most of the Kenyan women interviewed. Support to mothers with problems should be made available through health personnel, and facilities as well as women's groups and organizations like the Breastfeeding Information Group, which currently provides counseling for breastfeeding mothers as well as other educational inputs.
In order to provide effective support and information to breastfeeding mothers, it appears that the commitment to breastfeeding - as well as the knowledge base - needs to be increased among health care professionals and institutions.

3. Promotion of Breastfeeding

Eighty-five percent of the women sampled expressed the view that babies are healthier if given infant formula in the first four months of life. This widespread misconception and the fact that many women stated they would use formula if they could afford it suggests that only lack of resources, and not desire, has helped contain formula use to its current levels. This in turn indicates a need to reeducate women to the financial and health benefits of exclusive breastfeeding.

According to Greiner, breastfeeding promotion activities involving motivation or reeducation of mothers are cost and labor intensive. Where resources are scarce, these activities probably should be deferred in favor of activities aimed at breastfeeding protection and support. This argument makes sense in light of Kenyan budgetary constraints, but there are still things that can be done. In our Nairobi sample, most women had contact with health workers either during ante-natal care or at the time of delivery. Yet few of these women recall being told of the importance of exclusive breastfeeding for the first 4-6 months of their child's life. This contact seems to be an under utilized opportunity to promote breastfeeding, as well as a forum for teaching mothers to delay feeding supplemental foods at least until after four months of age.

In addition, efforts of the Ministry of Health, the media, and organizations such as Maendeleo Ya Wanawake, and the Breastfeeding Information Group, should be supported in their continued work to promote breastfeeding.

In April 1983, an Infant Feeding Practices Workshop was held in Nyeri, Kenya to discuss this and other recent work in infant feeding and to make policy recommendations to improve infant health and nutrition based on this new knowledge. The summary recommendations follow.

1. Programmes and policies for training in health and in other disciplines related to infant feeding

The workshop noted the importance of correct infant feeding, the decline in traditional infant feeding practices, the negative influences of some health workers and health institutions, and the failure to use current knowledge to improve infant feeding.

It recommends the preparation of a manual for infant feeding, to be distributed by the Ministry of Health to all health workers as well as to extension and other workers. The manual should be concise and include explicit guidelines. Recommendations were made for a group to be responsible for the production of the manual, and for the use of the manual once produced. Suggestions for the subject areas of the manual and for its evaluation were also included.

2. Government regulations and other strategies related to marketing and distribution of breastmilk substitutes

The workshop appreciated the work completed by the committee studying the Kenya Code for Marketing of Breastmilk Substitutes which is expected to be ratified soon. The workshop strongly recommended that the provisions of the Code be enforced as soon as possible in the interests of infants, young children and mothers.

2.1 The Kenya Code should be ratified by the National Standards Council and be gazetted, as a matter of priority, and the Food, Drug and Chemical Substances Act be revised to include provisions for implementation of the Code. The Code should be published and distributed through the Ministry of Health; an abridged version for easy understanding, should be prepared for wider distribution; the Code should be publicized through the mass media.

2.2 The workshop recommended reductions in the importation and local manufacturing of feeding bottles, teats and related items. Amendments to the labelling section of the Code were also recommended.

2.3 To conserve scarce foreign exchange, infant formula in its finished form and other breastmilk substitutes covered by the Kenya Code should no longer be imported into Kenya, with the exception of special formulas which should be used only on the recommendation of a physician.

2.4 Donations of breastmilk substitutes and other products covered by the Kenya Code and entering the country through relief agencies are sometimes substandard and not appropriately labelled. For this reason recommendations were made to safeguard their use.

2.5 The government should continue controlling the price of breastmilk substitutes to be consistent with the goal of encouraging breastfeeding.

3. Policies and strategies to improve infant feeding through the health services

3.1 Recommendations were made for ways to help mothers during the antenatal months, at the time of delivery and during the postnatal period. All health personnel and institutions would provide advice and support for breastfeeding to mothers during pregnancy, immediately after delivery and postnatally. All infants should be breastfed as soon as possible after birth. No pre-lacteal feeds should be given, and supplementary feeds, including water, should not be provided to the infants in maternity facilities. Breastfeeding should be on demand, rooming-in should be mandatory, feeding bottles should be prohibited in all health facilities in Kenya and every health institution should eliminate all commercial company influences, including posters and items such as "Road to Health" charts which have company logos or company names on them.

3.2 It was recommended that weaning should be gradual. Breastfeeding should continue while weaning foods are introduced between four and six months of age. Weaning foods should consist of locally produced foods and should be provided by cup or by plate and spoon. These foods should be given frequently, and breastfeeding on demand should continue for 18 months or longer. Manufactured weaning foods are expensive, unnecessary, and should not be advertised or otherwise promoted.

3.3 During illness of either mother or infant, breastfeeding should be continued. Mothers and infants should not be separated when either one is hospitalized.

3.4 The correct advice and treatment for mothers who complain of insufficient milk is reassurance that breastfeeding is usually possible and adequate during the first four to six months, and that more frequent breastfeeding is likely to

stimulate increased breastmilk production. Supplementary infant feeds should not be recommended.

3.5 No oral or injectable contraceptives should be given to mothers during pregnancy and lactation. There is no need to use special or purchased foods. Breastfeeding information groups should be encouraged at the local level.

4. Policies related to women in paid employment

4.1 Women in wage-employment away from home often experience special difficulties with infant feeding, including breastfeeding. It was recommended that women should continue breastfeeding after they return to work.

4.2 All women employees should be given two months' paid maternity leave without forfeiture of annual leave due to them.

4.3 Employers should help women employees to continue to breastfeed by providing time off or creches.

4.4 Research was recommended into the questior of professional discrimination against women on account of pregnancy.

5. Programmes and policies related to public information and education to improve infant feeding

The workshop expressed deep concern over the ineffectiveness of the existing public nutrition education programmes as they relate to breastfeeding and the inconsistent information provided.

5.1 It was recommended that the Ministry of Health should formulate a clear-cut set of guidelines relating to infant and maternal feeding practices, stressing the importance of breastfeeding, and based on the standard manual (see 3.1.2).

5.2 Mass media should play a prominent role, and the messages used should be standardized and specific. They should be coordinated with the information contained in the manual recommended for training purposes. A special committee should be established for this purpose.

5.3 International donor agencies should be requested to provide technical and financial assistance for public education programmes on breastfeeding.

Table 8-1 Logistic Regression Models for Different Infant Feeding Outcomes:
Beta Coefficients for Overall Model (Background, Maternal Employment, Health Services)

	Breastfed 6 Months	Breastfed 9 Months	Breastfed 12 Months	Bottle By 2 Months
Mother's Education	-0.238 (3.97)*[1]	-0.028 (0.06)	-0.013 (0.01)	-0.010 (0.02)
Socioeconomic Status	-0.154 (0.69)	-0.316 (3.12)	-0.255 (1.48)	0.395 (11.45)***
Parity	0.049 (0.07)	0.239 (1.72)	0.319 (2.27)	.051 (0.24)
Mother's Age	-0.191 (1.41)	-0.085 (0.29)	-0.079 (0.20)	-0.074 (0.62)
Hospital Birth	0.326 (4.06)*	-0.816 (5.57)*	-0.889 (2.26)	-0.605 (2.63)
Workout	-0.120 (0.09)	-0.300 (0.60)	-0.759 (3.18)	0.038 (0.03)
Urban Mother	-0.639 (4.99)*	-1.016 (12.87)***	-1.050 (10.30)**	0.351 (3.37)
Model X^2	(31.28)***	(37.23)***	(31.16)***	(26.50)***
R	.20	.23	.23	.11

[1]Numbers in parentheses are MLE chi-squares (Wald Statistics)
*P < .05, **P < .01, ***P < .001

Table 8-2 Adjusted Risk Odds Ratios and 95% Confidence Intervals for Background, Maternal Employment, Health Services

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS	BOTTLE BY 2 MONTHS
Mother's Education (5-7 years vs. none)	.62 (.49, .79)	NS	NS	NS
Socioeconomic Status (Hi vs Lo)	NS	NS	NS (1.75, 2.77)	2.20
Parity	NS	NS	NS	NS
Mother's Age	NS	NS	NS	NS
Hospital Birth	.44 (.20, .98)	.41 (.20, .86)	NS	NS
Workout	NS	NS	NS	NS
Urban Mother	.53 (.30, .92)	.36 (.21, .63)	.35 (.18, .66)	NS

Table 8-3 Logistic Regression Models for Different Infant Feeding Outcomes: Beta Coefficients for Overall Models (Background, Health Services, Maternal Employment, Early Bottle Feeding)

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS
Mother's Education	-0.257 (4.36)*[1]	-0.023 (0.04)	-0.001 (0.00)
Socioeconomic Status	-0.092 (0.24)	-0.297 (2.72)	-0.256 (1.49)
Parity	0.063 (0.12)	0.255 (1.94)	0.320 (2.27)
Mother's Age	-0.201 (1.50)	-0.076 (0.23)	-0.072 (0.16)
Bottle by 2 Months	-0.905 (11.22)***	-0.748 (7.79)**	-0.340 (1.12)
Hospital Birth	-0.768 (3.55)	-0.850 (4.99)*	-0.556 (1.88)
Workout	-0.146 (0.13)	-0.334 (0.73)	-0.761 (3.18)
Urban Mother	-0.594 (4.20)*	-0.960 (11.19)***	-1.024 (9.70)**
Model X^2	(42.40)***	(44.21)***	(31.81)***
R	.24	.26	.22

[1]Numbers in parentheses are MLE chi-squares (Wald Statistics)
*P < .05, **P < .01, ***P < .001

Table 8-4 Adjusted Risk Odds Ratios and 95% Confidence Intervals for Background, Health Services, Maternal Employment and Early Bottle Feeding Predictor Variables

	BREASTFED 6 MONTHS	BREASTFED 9 MONTHS	BREASTFED 12 MONTHS
Mother's Education (5-7 years vs. none)	.60 (.47, .76)	NS	NS
Socioeconomic Status	NS	NS	NS
Parity	NS	NS	NS
Mother's Age	NS	NS	NS
Bottle by 2 Months	.40 (.24, .69)	.47 (.28, .80)	NS
Hospital Birth	NS	.43 (.20, .90)	NS
Workout	NS	NS	NS
Urban Mother	.55 (.32, .97)	.38 (.22, .67)	.36 (.19, .68)

Figure 8-1

Determinants of Infant Feeding Practices

	Initiation	Duration	Early Bottles
Urban mother	0	-	0
Family SES	0	0	+
Mother's Age	0	0	0
Mother's Education	0	(-)	0
Mother's Parity	0	0	0
Hospital Birth	0	-	0
Work Out	0	0	0
[Early Bottles	0	-	]

0 = no relationship

+ = increases

- = decreases

() · weaker relationship