

# *Maternal and Infant Nutrition Reviews*



***KENYA***

*an International Nutrition Communication Service publication*

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MATERNAL AND INFANT NUTRITION REVIEWS

KENYA

*A Guide to the Literature*

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## INTRODUCTION

### MATERNAL AND INFANT NUTRITION REVIEWS: A RESOURCE FOR NUTRITION PLANNERS AND EDUCATORS

The MATERNAL AND INFANT NUTRITION REVIEWS (MINR) profile existing data on nutritional status and nutrition-related beliefs and practices of mothers and children in developing countries. MINRs also contain information on current nutrition policies and programs of governments, the United States Agency for International Development, and other bilateral, international agencies and Private Voluntary Organizations (PVO). There are thirty-five MINRs in all, profiling forty-four different countries. (See list on next page).

Maternal and Infant Nutrition Reviews summarize important information obtained from available literature, government documents, consultant reports, and personal correspondence. The data is presented in bulleted form under six major headings: nutrition and health status, dietary beliefs, dietary practices, nutrition status correlations, nutrition and health policies and programs, and commentaries. A bibliography at the back of each monograph describes the listed documents in terms of type of study, methodology, sample characteristics and location, and a summary. Special thanks are extended to Dr. Michael Latham of Cornell University for his assistance in reviewing this report and supplying information.

Nutrition planners and policy makers can use MINRs to help identify a given country's data base. For example, the information contained in each review enables the reader to identify key planning factors such as problem areas of malnutrition, prevailing beliefs about breast feeding, the extent of bottle feeding, types of weaning foods, the government's inter-agency five-year nutrition plan, the amount of donated food being distributed at MCH centers, and major PVOs involved in administering food and nutrition programs.

MINRs can be used as background documents for consultants going into the field and for program developers in-country. They can provide a frame of reference for an in-country workshop aimed at developing a national nutrition strategy. Technical assistance in organizing a workshop of this kind is available through the International Nutrition Communication Service. MINRs can also be used as a resource document in the development of journal articles and textbooks.

MINR data is stored on a computerized word processing system that allows for updates and individualized literature searches on specific topics. Patterns in a particular country or group of countries can be analyzed in accordance with user needs. A nutrition information retrieval service is available free to those working in developing countries and for a small fee to all others. Orders, inquiries, and comments should be addressed to:

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Newton, Massachusetts 02160, USA

MINR Country Reports:

AFRICA:	NEAR EAST:	ASIA:	LATIN AMERICA AND CARIBBEAN:
Cameroon	Egypt	Bangladesh	Bolivia
Gambia and Senegal	Jordan	Burma	Costa Rica
Ghana	Morocco	India	Dominican Republic
Kenya	Tunisia	Indonesia	Ecuador
Lesotho	Yemen	Nepal	Guatemala
Liberia		Pakistan	Haiti
Mali		Philippines	Honduras
Sudan		South Pacific*	Jamaica
Tanzania		Sri Lanka	Panama
Zaire		Thailand	Peru

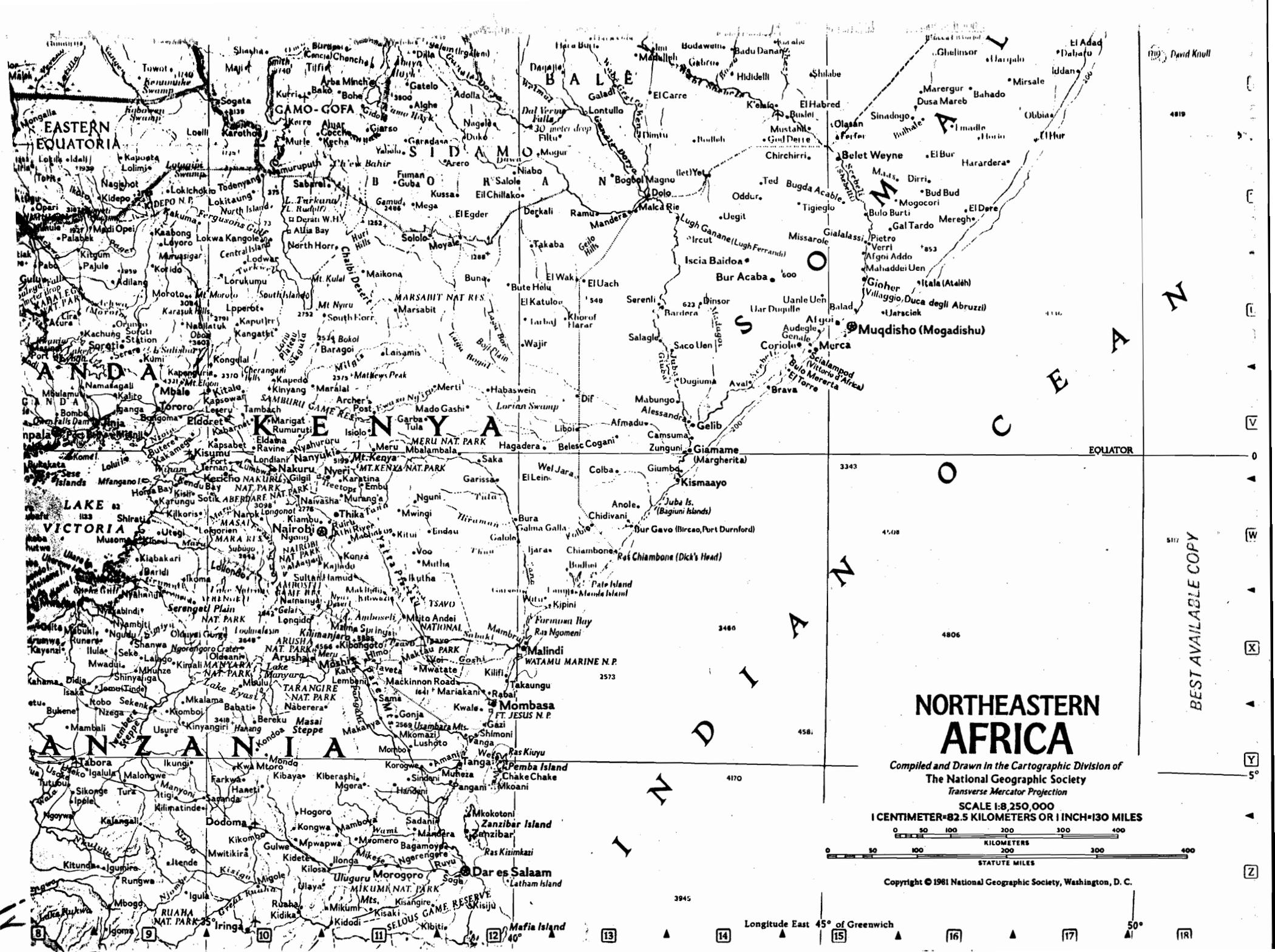
\*South Pacific Region includes the nations of Cook Islands, Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Western Samoa

# MATERNAL AND INFANT NUTRITION REVIEWS

## CLASSIFICATION SYSTEM

1. Nutrition and Health Status
  - 1.1 General
  - 1.2 Women, Pregnant
  - 1.3 Women, Lactating
  - 1.4 Infants 0-6 Months
  - 1.5 Infants 6-24 Months
2. Dietary Beliefs
  - 2.1 General
  - 2.2 About Pregnancy
  - 2.3 About Lactation
  - 2.4 About Breast Milk Substitutes (including bottle feeding)
  - 2.5 About Weaning
3. Dietary Practices
  - 3.1 General
  - 3.2 Women
    - 3.2.1 During Pregnancy
    - 3.2.2 During Lactation
  - 3.3 Infants 0-24 Months
    - 3.3.1 Breast feeding
    - 3.3.2 Weaning
    - 3.3.3 After Weaning
  - 3.4 Health and Medicine
4. Nutrition Status Correlations
5. Nutrition and Health Policies and Programs
  - 5.1 Policies
  - 5.2 Programs
6. Commentaries

Bibliography



David Knoll

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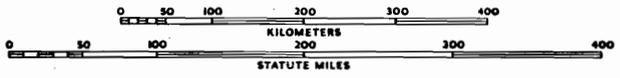
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# NORTHEASTERN AFRICA

Compiled and Drawn in the Cartographic Division of  
The National Geographic Society  
Transverse Mercator Projection

SCALE 1:8,250,000  
1 CENTIMETER=82.5 KILOMETERS OR 1 INCH=130 MILES



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Longitude East 45° of Greenwich

50°

EASTERN EQUATORIA

ANDAMBA

LAKE VICTORIA

TANZANIA

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TABLE I  
LOCATIONS STUDIED

Province	District or area	Amolo, 1979	AMREF, 1982	Blankhart et al., 1977	Bwibo and Ondijo, 1981	Central Bureau of Statistics, 1980	Hoorweg and Niemeijer, 1980	Hoorweg et al., 1981	Jansen et al., 1980	Kune, 1980	Muller et al., 1977	Mutanda et al., 1980a	Mutanda et al., 1980b	Stephenson et al., 1979	Stephenson et al., 1980	Van Steenberg et al., 1978	Van Steenberg et al., 1980	Van Steenberg et al., 1981
Central	Kikuyu area						X	X										
Coast	Mombasa											X						
Eastern	Machakos District			X					X	X								
	Nairobi		X								X							
	Kenyatta National Hospital				X								X					
	Nyanza																	
	Kisumu												X					
	Luo area					X												
	"Rural Masai"											X						
	National sample					X												

## HIGHLIGHTS

1. **NUTRITION AND HEALTH STATUS:** The population at high risk of malnutrition includes: (1) preschool children and pregnant and lactating women, (2) small landholders whose income is very low in Western and Nyanza Province, or those anywhere who produce seasonal cash crops, (3) pastoralists who are vulnerable to weather conditions, and (4) urban poor with incomes less than 35 Kenyan shillings per month. Goiter is endemic, particularly in Western, Nyanza, and Rift Valley Provinces.

Among infants (age birth to 1 year), the mortality rate was 91 deaths per 1000 live births in 1979. The incidence of infant infections is seasonal. E. coli is more prevalent in June than in any other time of the year, shigella is most prevalent in May, and the peak incidence for rotavirus occurs in September.

In 1979 the mortality rate of children 1 to 4 years old was 15 deaths per 1000 children that age. 25% of pre-school children suffer from moderate protein energy malnutrition, and 5% suffer from severe malnutrition resulting in marasmus and kwashiorkor. Eastern, Central, and Coast Provinces have the highest rates of malnutrition. Hookworm associated iron deficiency is a major health problem in Kenya.

2. **DIETARY BELIEFS:** Pregnant women continue to do hard work without resting, because a woman who does not work is thought to be lazy. Many mothers believe that commercially manufactured weaning foods are superior to locally prepared weaning foods. In rural areas green bananas and millet flour are the most popular foods for two year olds, as determined by mothers' preferences. An expectant mother may not have sexual relations.

3. **DIETARY PRACTICES:** Cereals, primarily maize, account for 60% of calorie and 50% of protein intake. Per capita supply is around 2085 calories (excluding fish) per day, per capita protein supply is 57.7 grams per day, and the per capita fat supply is 37 grams per day. Isyo, the dish most frequently served in every house, is made from whole maize and whole beans or pigeon peas.

Unsupplemented breast feeding is reported to last about 3 months. 97% of lactating women in Kenya breast feed their infants, for an average of 14.5 months; in urban areas the average is 10 months. First feeds for babies in hospitals in urban Kenya often consist of glucolin or boiled water salt-sugar solution. Over 50% of children in rural areas and nearly three-fourths of urban children are given a weaning porridge consisting mainly of maize flour, according to the 1978-79 Child Nutrition Survey. Commercial weaning foods often are introduced into the infant's diet during the first two months or life, a practice which interferes with breast feeding. In rural Machakos, reasons most cited by mothers for weaning include a new pregnancy or the possibility of obtaining a salaried job. Many hospital maternity units do not have rooming-in facilities. The ensuing separation of mothers and infants may cause difficulties in the establishment of breast feeding.

4. **NUTRITION STATUS CORRELATIONS:** The national nutrition survey found that the Akamba were the most frequently malnourished ethnic group. Preschool children located near presumably impure water sources were found more apt to be malnourished. Households producing food partially or predominantly for sale generally have a lower incidence of malnutrition. Rural children aged 6 to 60 months who receive a weaning porridge in which cassava is the main ingredient have a higher rate of wasting and stunting than do children

receiving porridges based on maize only, millet only, maize and millet, bananas, or other ingredients. More frequent cereal consumption is positively correlated with weight for height among preschool children. Children in the lowest height for age category receive bananas or cassava twice as often as those in the highest category. Children who are breast fed for longer than 12 months tend to be more stunted than those breast fed for shorter periods.

**5. NUTRITION AND HEALTH POLICIES AND PROGRAMS:** A Food and Nutrition Planning Unit is being established within the Ministry of Economic Planning and Community Affairs. The Unit is responsible for the overall coordination of food and nutrition related policies and programs of all Ministries and non-government agencies. The Ministries of Agriculture and Health each have a full-time planning office responsible for nutrition planning. In 1978, \$5.00 was spent per capita for central government health expenditures.

The government adopted a national code of marketing of breast milk substitutes in July 1983. Explicit attention is drawn to the dangers of using breast milk substitutes in situations of poverty, poor sanitation, and illiteracy. The Director of Medical Services has issued a directive to all medical personnel and staff of religious agencies, specifying actions to be taken to support appropriate breast feeding practices. Guidelines include: restrictions on the use of prelacteal feeds and on posters and samples provided by manufacturers; initiation of breast feeding immediately after delivery; provision for rooming-in; and scheduling maternity ward timetables for the convenience of the mothers rather than the staff.

Karen College of Nutrition, under the Ministry of Health, has responsibility for training Nutrition Field Workers (NFW) for all government hospitals and health training centers. In 1979 there were approximately 135 clinics in Kenya with a total of 45,000 children enrolled in a Pre-School Health Program. The Family Life Training (FLT) Program of the Ministry of Housing and Social Services aims at preventing malnutrition and poor health among children by giving mothers instruction in preventive health measures. By 1980 there were nine FLT centers in operation that provided special food and training for 3,000 mothers and 8,000 children.

The Kenya Institute of Education (KIE) has produced a series of radio scripts to teach nutrition to primary school teachers. The African Medical Research Foundation (AMREF) is developing a low-cost comprehensive rural health system in the Makindu Division of Machakos District. The Central Bureau of Statistics, in cooperation with UNICEF and WHO, is developing a breast feeding surveillance system. The Nairobi Breastfeeding Information Group (BIG) is a community-based support group that promotes breast feeding to mothers in Kenya. Catholic Relief Service, Kenya Freedom from Hunger, and the Kenyan Red Cross Society are voluntary agencies conducting nutrition education and feeding programs. A study of the determinants of infant feeding practices among the urban poor in Nairobi is being conducted by a research consortium composed of the Population Council, Columbia University and Cornell University together with the the Central Bureau of Statistics and the African Medical Research Foundation. The study is being funded by the United States Agency for International Development.

## 1. NUTRITION AND HEALTH STATUS

### 1.1 NUTRITION AND HEALTH STATUS, GENERAL

#### NATIONAL

**GROUPS AT HIGH RISK OF MALNUTRITION:** The population groups at particularly high risk of malnutrition include: 1) preschool children and pregnant and lactating women, 2) small land holders whose income is very low (<KSh50/yr) in Western and Nyanza Provinces or who produce seasonal cash crops; 3) pastoralists who are vulnerable to weather conditions; and 4) urban poor with incomes less than KSh35 per month; (Ministry of Health, 1978)

**UNDERNUTRITION:** Between 1972 and 1974, 3.7 million people (30% of the population) were estimated to be undernourished, using 1.2 times the Basal Metabolic Rate as the critical intake limit below which some form of energy deprivation is assumed. (FAO, 1977)

**GOITER:** Goiter caused by iodine deficiency is endemic, particularly in Western, Nyanza, and Rift Valley Provinces. (Ministry of Health, 1978)

### 1.2 NUTRITION AND HEALTH STATUS, WOMEN, PREGNANT

#### NATIONAL

**NUMBER OF CHILDREN:** According to the 1977-1978 Kenya Fertility Survey, women in Kenya bear an average of 8.1 children each--a rate higher than that of any other country in the world. (Anonymous, 1980)

#### RURAL

**HEIGHT AND WEIGHTS--MACHAKOS:** The mean height and weight of 97 pregnant women in Machakos was 156.4 cm  $\pm$  5.9 cm. and 52.1 kg  $\pm$  7.1 kg (median 50.0 kg). This was less than the comparable figures for 49 upper middle class urban women: 156.9  $\pm$  7.3 cm and 60.3 kg  $\pm$  7.8 (median 59 kg). (Jansen et al., 1980)

**AVERAGE WEIGHT GAIN--MACHAKOS:** The average weight gain during pregnancy of 97 women in rural Machakos was about 6.4 kg (12.3% of pregravid weight); higher-income urban women gained 7.9 kg (13.1%). Weight gain between early (3 to 4 months) and late (7 to 8 months) pregnancy was only 3.2 kg (5.8% of pregravid weight) for rural Akamba women; the "standard" average weight gain during this period is 6.6 kg. (Jansen et al., 1980)

**MORTALITY AND MORBIDITY--MACHAKOS:** Maternal mortality and morbidity have been found to be low in the Machakos Project study area. The nutritional status of elderly multiparae was found to be as good as that of young pregnant women as well. (Jansen et al., 1980)

**WEIGHT--MACHAKOS:** The weight for height ratio decreases among Machakos Project area women as the length of the pregnancy increases. Weight gain during pregnancy is only about 5 kg, according to earlier studies. (Van Steenberg et al., 1981)

## 1.2 NUTRITION AND HEALTH STATUS, WOMEN, PREGNANT (Cont.)

WEIGHT GAIN--MACHAKOS: In a study of 72 pregnant women in Ulkambani, Machakos area, the weight of the average rural multipara (woman who has had 2 or more pregnancies) did not increase as much as that of the urban multipara, but pregnancy outcomes appeared to be satisfactory. The maternal mortality rate was below the national average. (Baumslag, 1980)

## 1.3 NUTRITION AND HEALTH STATUS, WOMEN, LACTATING

### RURAL

FOOD INTAKE AND NUTRITIONAL STATUS--MACHAKOS: Lactating mothers in the Machakos Project area averaged 2250 calories and 67 gm protein intake per day during their first year of lactation. They did not lose weight during lactation and in general were not underweight for height. (Van Steenberg et al., 1981)

## 1.4 NUTRITION AND HEALTH STATUS, INFANTS 0-6 MONTHS

### NATIONAL

INFANT MORTALITY RATE: In 1978 the infant mortality rate was 91 deaths per 1000 live births. (World Bank, 1981)

INFANT MORTALITY: The infant mortality rate between 1976 and 1978 was about 119 deaths per 1000 births. (Kent, 1981)

INFECTIONS: A study of enteropathogens from infants and young children from Kisumu, Mombasa, Nairobi, and rural Masai children showed that rotavirus was common. E. coli and shigella were also present. Salmonella was relatively infrequent: only 4 cases out of 160 were isolated. (Mutanda, 1980a)

INFECTIONS--SEASONALITY: E. coli was more often isolated from stool specimens in June than at any other time of the year. Shigella was isolated most often in May. Rotavirus was found to be present throughout the year; the peak was in September, and the lowest incidence in May. (Mutanda, 1980a)

### RURAL

BIRTH WEIGHTS--AKAMBA: Despite mothers' low weight gain during pregnancy, the incidence of low birth weight newborns among 64 Akamba women was about 6.5%. The average birth weight was 3190 grams. The reasons for these findings are not yet understood. (Jansen et al., 1980)

INFANT MORTALITY RATE--MACHAKOS: In the Machakos Project study area the baseline infant mortality rate in 1973-1974 was 35.2 deaths per 1000 live births. (Muller et al., 1977)

WEIGHT FOR AGE--MACHAKOS: At age 0 to 5 months, weight for age for the study children averaged 96% of Harvard standards. (Van Steenberg et al., 1980)

INFECTIONS: Rotavirus was found in only 3 out of 139 samples taken from asymptomatic rural Masai children. (Mutanda, 1980a)

## URBAN

INFECTIONS: Enteropathogens were isolated in specimens from breast fed, bottle fed, and mixed-fed infants 0-5 months of age, but the results failed to support the conclusion that bottle feeding increased the probability of rotavirus infections, although it was slightly correlated with the incidence of E. coli infection in infants less than 3 months of age. (Mutanda, 1980b)

INFECTIONS--ANTIBODIES: 73% of neonates sampled had rotavirus antibodies. The prevalence of antibodies was found to decrease thereafter, up to the age of 5 months. It subsequently showed a gradual increase up to the age of 3 years. (Mutanda, 1980b)

INFECTIONS AND AGE: Rotavirus infections peaked in the 3-8 month age group in Mombasa, but occurred with about equal frequency in the 0-2, 3-5, 6-8 month age groups in Nairobi and Kisumu. (Mutanda, 1980a)

INFECTIONS AND LOCATION: The overall prevalence of enteropathogens was highest in Nairobi. The differences between Nairobi and Kisumu were significant. Shigella, however, was more frequent in Mombasa. (Mutanda, 1980a)

## 1.5 NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS

### NATIONAL

CHILD MORTALITY RATE: In 1979 the mortality rate of children 1 to 4 years old was 15 deaths per 1000 children that age. (World Bank, 1981)

PHYSICAL QUALITY OF LIFE INDEX: The Physical Quality of Life Index for Kenya in 1975-76 was 39 points out of 100. This index is based on a combination of average life expectancy at age one, infant mortality rates, and national literacy rates. (Kent, 1981)

COMPARISON OF NUTRITION SURVEYS: Compared to the results of the first national child nutrition survey carried out in early 1977, the results of the 1978-79 Child Nutrition Survey indicated a small overall improvement in the nutritional status of young children. (Central Bureau of Statistics, 1980)

SEASONAL STATUS: Seasonal food shortages do not appear to have an effect on the aggregate nutritional status of children. Some deprivation may be present in the low farm income group. (Chambers et al., 1979)

PEM--HEIGHT FOR AGE: 58% of children 6 to 60 months old surveyed in the 1978-79 Child Nutrition Survey were found to have heights for age below 90% of the 1978 WHO standard. The proportion of stunted children (low height for age compared to expected values) was greatest in the rural parts of Coast and Nyanza Provinces and lowest in the urban areas of the larger towns. (Central Bureau of Statistics, 1980)

## 1.5 NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS (Cont.)

**PEM:** Surveys show that about 25% of pre-school children suffer from moderate protein energy malnutrition, and about 5% suffer severe malnutrition resulting in marasmus and kwashiorkor. These figures vary little between provinces or between urban and rural areas. Seasonal variations are of particular concern in rural areas; the pre-harvest period is the most difficult. (Ministry of Health, 1978)

**WEIGHT FOR HEIGHT--BY PROVINCE:** The percentage of children aged 6 to 60 months with weights less than the fifth percentile of the reference weight for height, by province, in order of decreasing prevalence, were as follows: Coast rural (13.7%); Coast urban (12.9%); Eastern rural (11.4%); Rift Valley rural (10.8%); other urban (10.1%); Nyanza rural (8.5%); Nairobi urban (7.4%); Central rural (5.8%); Western rural (4.92%); Nairobi nursery schools (2.6%). (Central Bureau of Statistics, 1980)

**WEIGHT FOR HEIGHT AND SEX:** Among children aged 6-60 months there were clear differences in weight for height by age and sex. There were more wasted boys than girls in both urban and rural areas. The highest proportion of wasted children occurs in the 12 to 23 month age group. This is the age at which the child is likely to be given an inadequate diet, and at which diseases such as measles, diarrhea, and whooping cough are most prevalent. (Central Bureau of Statistics, 1980)

**MALNUTRITION--BOTTLE FED CHILDREN:** The nutritional status of children aged 6 to 60 months breast fed for less than six months was as follows: normal, 65.4%; stunted only, 31.6%; wasted only, 2.3%; and wasted and stunted, 0.7%. (Central Bureau of Statistics, 1980)

**MALNUTRITION--BREAST FED CHILDREN:** The nutritional status of children aged 6 to 60 months breast fed 6 months or more, and supplemented before 3 months was as follows: normal, 58.3%; stunted only, 36.1%; wasted only, 3.6%; wasted and stunted, 2.0%. (Central Bureau of Statistics, 1980)

**MALNUTRITION--EARLY SUPPLEMENTS:** The nutritional status of children aged 6 to 60 months breast fed for 6 months or more, and supplemented before 6 months, was as follows: normal, 59.3%; stunted only, 35.3%; wasted only, 3.8%; and wasted and stunted, 1.5%. (Central Bureau of Statistics, 1980)

**MALNUTRITION--LATE SUPPLEMENTS:** The nutritional status of children aged 6 to 60 months, breast fed for 6 months or more, and supplemented 6 months or later was as follows: normal, 57.1%; stunted only, 38.3%; wasted only, 3.9%; and wasted and stunted, 0.7%. (Central Bureau of Statistics, 1980)

**STUNTING BY PROVINCE:** The percentage of children aged 6 to 60 months with heights less than the 5th percentile of the reference group, by Province in order of decreasing prevalence, were as follows: Coast rural, 53.8%; Nyanza rural, 50.5%; Eastern rural, 47.3%; Western rural, 46.1%; Rift Valley rural, 45.0%; Central rural, 43.9%; other urban, 38.2%; Coast urban, 33.7%; Nairobi urban, 27.5%; and Nairobi nursery schools, 6.0%. (Central Bureau of Statistics, 1980)

**CATCH-UP GROWTH:** The proportion of stunted children in the 6 to 11 months age group was less than in the 12 to 23 and 24 to 47 months age groups, in both rural and urban samples. The lower proportion of stunted children in the 48-60 month age group may be attributed either to "catch up" growth or to death related to malnutrition. Statistics show that it is more likely to be to "catch up" growth. (Central Bureau of Statistics, 1980)

**OTHER NUTRITIONAL PROBLEMS:** The major specific nutrient problems are widespread anemia, goiter, and vitamin A deficiency. The importance of vitamin A deficiency may have been overstated. (Ministry of Health, 1978)

**VITAMIN A DEFICIENCY:** Present knowledge based on a review of research studies suggests that although vitamin A deficiency occurs in Kenya, it does not appear to be a major health problem. This is not an undisputed finding. (Jansen and Horelli, 1982)

**ANEMIA AND ITS CAUSES:** Hookworm associated iron deficiency anemia is a major health problem in Kenya, and iron deficiency is the commonest cause of anemia. Malaria and sickle cell disease also cause significant anemia. (Kinoti, 1982)

**ILLNESS PREVALENCE:** 41.2% of rural children, and 42.6% of urban children aged 6 to 60 months were reported to have been sick (and confined to bed) at least one day during the two week period prior to the interview. The lowest prevalence of illness was reported in rural areas of Central, Rift Valley, and Eastern provinces. The highest prevalence was reported in rural Western Province. These differences may be due to differences in perception about illness rather than to actual differences in prevalence. (Central Bureau of Statistics, 1980)

**DIARRHEA:** The incidence of diarrhea does not appear to have seasonal fluctuations. However, deaths associated with diarrhea in under fives peak between March and July. (Chambers et al., 1979)

## RURAL

**CHILD MORTALITY RATE:** Between 1973 and 1974 the mortality rate among children 1 to 4 years old was 15.8 per thousand. (Muller et al., 1977)

**MALNUTRITION PREVALENCE:** Among the 1372 preschool children in the National Child Nutrition Survey, 33% had weights for age 80% of the Harvard Standard or less, and 1.4% were at or below 60% of the weight for age standard. Using height for age standards, 29% were equal to or less than 90% of standard. 29% of the sample were also at or below 90% of the standard for weight for height, and 4% were at or below 80% of the standard. The means for the total sample were 86%, 93%, and 96% of the Harvard Standard weight for age, height for age, and weight for height respectively. (Central Bureau of Statistics, 1979)

**HEIGHT:** 58% of rural Kenyan children aged 6 to 60 months were shorter than the shortest 10% of reference children. (Central Bureau of Statistics, 1980)

## 1.5 NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS (Cont.)

**SEASONAL GROWTH:** The curves for the weights of boys and girls aged 6 to 60 months in rural areas clearly show periodicity, which may be due to seasonal differences in the availability of food. (Central Bureau of Statistics, 1980)

**STUNTING--HEIGHT FOR AGE--FUNCTIONAL SUMMARY:** Preschool-age children from larger families, from households headed by a male, or from holdings operated mainly for subsistence or relying on inferior quality ground water were more likely to be stunted, according to the results of the 1977 National Child Nutrition Survey. (Central Bureau of Statistics, 1979)

**MALNUTRITION--HEIGHT FOR AGE--GEOGRAPHIC SUMMARY:** According to the Rural Kenyan Nutrition Survey, three-fourths of all rural one to four year olds having a height-for-age percent of standard below 90% were estimated to live in 5 ecological zones [2 (Coffee West of Rift Valley), 3 (Upper Cotton West of Rift Valley), 5 (Coffee East of Rift Valley), 7 (Lower Cotton East of Rift Valley), and 8 (High Altitude Grasslands)], of the 11 zones designated. (Central Bureau of Statistics, 1979)

**STUNTING BY ECOLOGICAL ZONE:** Zone 7 (lower cotton east of Rift Valley), which covers most of Machakos and Kitui Districts, had the highest percentage (44%) of children short for their age (height for age below 90% of standard). Zone 8 (high altitude grasslands) had 40% short children, followed by zone 5 (coffee east of Rift Valley) with 35% short children, zone 3 (upper cotton west of Rift Valley) with 30%, and zone 6 (upper cotton east of Rift Valley) with 28% short children. There is much overlap between these zones and the geographical distribution of ethnic groups. (Central Bureau of Statistics, 1979)

**MALNUTRITION--WEIGHT FOR AGE--BY PROVINCE:** A breakdown of 1977 malnutrition prevalence data by province showed that the Eastern and Central provinces had the highest rates (e.g., 41% and 39% of children below 80% of weight for age standard). Nyanza and Coast provinces had the lowest rates (each with 24% of children below 80% of W/A standard). The Rift Valley and Western provinces had 34% and 27% of their preschool samples below the standard. Other anthropometric measures showed similar results. (Central Bureau of Statistics, 1979)

**ACUTE PEM--PROVINCE COMPARISONS:** Estimates of the number of children per 1000 with acute protein energy malnutrition (weight for height not over 80% of standard) based on the 1977 national data indicate that the Coast Province had the highest rate (75), followed by the Western and Eastern Provinces (53 each), Rift Valley Province (47), Central Province (35), and Nyanza Province (26). The combined figure for all provinces is 45 per 1000. (Central Bureau of Statistics, 1979)

**MALNUTRITION BY ECOLOGICAL ZONE:** The proportion of children with height for age below 90% of standard increases steadily as one moves southeast from the higher altitude, higher potential land in zone 4 (25%) on the slopes of Mt. Kenya, to the lower altitude, lower land potential flatlands of zones 5 (35%) and 7 (44%). (Central Bureau of Statistics, 1979)

**MALNUTRITION BY ETHNIC BREAKDOWN:** The highest percentages of stunted preschool children (height for age below 90% of standard) were found among two ethnic groups of the central Bantu linguistic group, the Kamba (44.5%) and Kikuyu (32%). The rate among the Lao, who comprise most of the Nilotic speaking group, was 29.5%. The Kalenjin, with 25%, and the two Western Bantu linguistic groups, Lukya (22.5%) and Kisii (22%), have the next highest proportions of stunted preschool children. There is much overlap between ecological zones and ethnic distribution. (Central Bureau of Statistics, 1979)

**MALNUTRITION BY AGE:** More children in the one to two year old age category showed signs of wasting (low weight for height) and of combined wasting and stunting (low weight for height and low height for age) than the next two yearly age groups, in the 1977 national nutrition survey. (Central Bureau of Statistics, 1979)

**STUNTING AND WASTING--AGE 1 TO 2:** Among the 510 one to two year olds in the 1977 national rural nutrition survey, 55.5% were malnourished: 26% were classed as wasted (less than 90% of standard weight for height, but greater than 90% of standard height for age, Harvard Standards), 19% were classed as stunted (less than 90% of standard height for age but greater than 90% of standard weight for height), and 10.5% were both stunted and wasted (below 90% of both standards). (Central Bureau of Statistics, 1979)

**STUNTING AND WASTING--PRESCHOOLERS:** Among the total 1372 sample preschool children age one to four in the 1977 national survey, 49.5% were malnourished: 20% were classed as wasted (<90% WH and >90% HA), 21% as stunted (<90% HA and >90% WH), and 8.5% as both stunted and wasted (below 90% of both weight for height and height for age standards). (Central Bureau of Statistics, 1979)

**MALNUTRITION--MALE/FEMALE DIFFERENCES:** The 1977 Rural Kenyan Child Nutrition Survey showed that preschool-aged girls were more likely to be malnourished than corresponding boys in three data sets. If male and female preschool children were selected from the same household, the gap was larger than in the general population. Girls with closely-spaced brothers had inferior growth performance compared with pairs of similarly aged sisters. Girls who had older brothers in the same one to four year age ranges were more frequently malnourished than girls with younger brothers. The male/female gap was more pronounced in specific groups, e.g., among the Coastal Bantus who have a Muslim tradition. The male/female discrepancy was borne out by the Medical Research Council data base as well. (Central Bureau of Statistics, 1979)

**MALNUTRITION--MALE/FEMALE DIFFERENCES:** Within the one to two year old age group, female children were nearly twice as likely to be both stunted and wasted as males (13.2% vs. 7.2%) and more likely to be wasted (33.3% vs. 19.7%), according to the 1977 national nutrition survey. (Central Bureau of Statistics, 1979)

**SEX DIFFERENCES IN MALNUTRITION:** In the 1978-9 Child Nutrition Survey, girls were not found to be consistently worse nutritionally than boys, and in rural areas the girls appeared slightly less undernourished than

## 1.5 NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS (Cont.)

boys. These results are probably more reliable than those reported in the first national nutrition survey, which showed the opposite finding, because this survey used sex-based reference standards, whereas the 1977 survey used the Harvard Standards combined for both sexes. (Central Bureau of Statistics, 1980)

PEM--CENTRAL PROVINCE: In the 1977 Central Bureau of Statistics nationwide nutrition survey, 39% of the 225 children 12 to 48 months of age surveyed in the Central Province were below 80% of weight for age Harvard Standards, 31% were below 90% of the height for age standards, and 33% were below 90% of the weight for height standard. (Hoorweg et al., 1981)

MALNUTRITION TRENDS--CENTRAL PROVINCE: Data from two nutrition surveys in Kirinyaga and Nyeri districts in the late 1960s show results similar to the 1977 Central Province figures from the national nutrition survey. This concurrence suggests that there has been little change in nutritional status during the intervening period. (Central Bureau of Statistics, 1979)

MALNUTRITION--CENTRAL PROVINCE: 35% of the 106 children 1 to 35 months old sampled in the Central Province districts of Machakos, Matungulu, and Mbiuni were found to have weights for age less than 80% of Harvard standards, according to a 1976 report. (Central Bureau of Statistics, 1979)

MALNUTRITION--KIGUMO DIVISION, CENTRAL PROVINCE: A 1978 survey of 508 children 6 to 59 months old indicated that 28% were below 80% of the Harvard Standard for weight for age, 21% were below 90% of the height for age standard, and 22% were below the weight for height standard. Weight for height and height for age values were lowest in the age groups of 12 to 23 and 24 to 35 months, after which the values stabilized, without clear catch-up growth. (Hoorweg and Niemeijer, 1980)

WEIGHT FOR HEIGHT--COAST PROVINCE: In a 1976 report of a survey of 62 Orma nomad children (0-60 months old) in Hola district, 80% of the children were reported to have weight for heights less than 90% of Harvard standards. (Central Bureau of Statistics, 1979)

PEM--EASTERN PROVINCE: Baseline anthropometric data from 186 children 12 to 72 months old indicated a high prevalence of protein energy malnutrition: mean weight for age was 79% of Harvard standards, and mean height for age was 92% of standard. Only 15% of the sample were above 90% of weight for age standards. (Stephenson et al., 1980)

WEIGHT FOR AGE--EASTERN PROVINCE: Among children aged 6 to 12 months in Eastern Province, weight for age averaged 86% of Harvard standards. Among children older than 12 months, weight for age did not show a further deterioration, but no catch up growth was recorded. (Van Steenberg et al., 1980)

SIGNS OF MALNUTRITION--MACHAKOS: The nutritional status of children aged 0-36 months in the Machakos Project area was as follows: normal (71%); less than satisfactory (22%); and poor (7%). Frequently observed signs of malnutrition were as follows: pallor (19.8%); dyspigmentation of the

hair (22%); pot belly (25%); poor muscle development (14%); and liver enlargement (31%). (Van Steenberg et al., 1978)

**ANTHROPOMETRIC MEASURES--MACHAKOS:** Mean anthropometric measurements of children aged 6-72 months in Machakos district, as a percentage of the standard, were as follows: weight/age ( $79.3 \pm 10.6$ ); length for age ( $92.3 \pm 4.8$ ); weight for length ( $91.0 \pm 7.0$ ); arm circumference for age ( $88.8 \pm 6.4$ ); triceps skin-fold for age ( $97.7 \pm 21.6$ ); head circumference for age ( $98.0 \pm 3.2$ ); chest circumference for age ( $97.4 \pm 4.9$ ); and chest/head ratio ( $1.04 \pm 0.06$ ). (Stephenson et al., 1979)

**WEIGHT FOR AGE--MACHAKOS:** The mean weight for age of children, expressed as a percentage of the standard, was as follows: less than 1 year (92.6%); 1+ (80.6%); 2+ (78.2); 3+ (80.1); 4+ (78.2); 5+ (73.7); all ages (79.3). (Stephenson et al., 1979)

**LOW ARM CIRCUMFERENCE AND AGE--MACHAKOS:** Among 54 children with low arm circumference, age and prevalence was distributed as follows: 0-5 months (2%); 6-11 months (22%); 12-23 months (46%); 24-35 months (22%); 35-59 months (7%). (Blankhart et al, 1977)

**ANEMIA--MACHAKOS:** Signs of anemia were common in children aged 6-72 months in Mwatati and Kanzalu. Pallor of the conjunctivae of the lower eyelid, tongue, and nail beds were present in 19%, 18%, and 21% of the cases observed, respectively. (Stephenson et al., 1979)

**VITAMIN A SIGNS--MACHAKOS:** Follicular hyperkeratosis was observed in 11% of the children aged 6-72 months sampled in Mwatati and Kanzalu, but no corneal xerosis or active lesions of xerophthalmia were observed. The availability of mangoes and paw paws is seasonal, suggesting that signs of vitamin A deficiency may also be seasonal. (Stephenson et al., 1979)

**GOITER--MACHAKOS:** Goiter is not prevalent among children 6 to 72 months old in Mwatati and Kanzalu. (Stephenson et al., 1979)

**HEALTH PROBLEMS--MACHAKOS:** Mothers of children aged 6 to 72 months asked about their children's health problems most commonly cited cough (55%); head cold or 'fever' (59%); malaria (raised body temperature) (17%); diarrhea (23%); and abdominal complaints other than diarrhea (33%). (Stephenson et al., 1979)

**HEALTH PROBLEMS--MACHAKOS:** Other diseases and conditions common in Mwatati and Kanzalu were splenomegaly (23%); umbilical hernia (10%); eye and ear infections, skin lesions, and respiratory and gastrointestinal infections. (Stephenson et al., 1979)

**HEALTH PROBLEMS--MACHAKOS:** Health problems observed or diagnosed among children 0-36 months of age in the Machakos project area were splenomegaly (3%) and endemic schistosomiasis. Skin infections such as scabies, impetigo, and ringworm were infrequent. (Van Steenberg et al., 1978)

## 1.5 NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS (Cont.)

**PARASITE INFECTIONS--MACHAKOS:** The following parasites were isolated in stool specimens of children aged 6 to 72 months in Mwatati and Kanzalu: Ascaris lumbricoides (27%); Entamoeba (14%); hookworm (6.7%); Trichuris trichiura (1.8%); Schistosoma mansoni (0.3%); and Enterobius vermicularis (0.3%). One-third of the children had at least one infection; 8.8% had two infections; and 0.5% had 3 infections. Sex differences in the incidence of infection were not significant. (Stephenson et al., 1979)

**ASCARIS AND AGE--MACHAKOS:** Ascaris infections were positively correlated with age: they were present in 4% of children under one year, 18% of children one year of age, and 29-34% of children over two years of age. (Stephenson et al., 1979)

**DENTAL HEALTH--MACHAKOS:** Dental carries were not commonly observed in children aged 6 to 72 months in Mwatati and Kanzalu. (Stephenson et al., 1979)

**WEIGHT FOR AGE--NYANZA PROVINCE:** In two areas of Kisumu district (a semi-malaria free area and the Kano plains), British Medical Research Council surveys of 725 and 821 children 0 to 42 month old reported 22% and 33% of the children, respectively, were less than 80% of Harvard weight for age standards (similar figures for weight for height). (Central Bureau of Statistics, 1979)

**ILLNESS PREVALENCE:** Rural mothers, asked if their children had been sick (confined to bed) during the two weeks prior to the interview responded as follows: not sick, 58.8%; 1 day, 5.2%; 2-3 days, 10.6%; 4-7 days, 11.0%; and 1 week or more, 14.3%. (Central Bureau of Statistics, 1980)

**ILLNESS:** Rural mothers responding to questions about their children's illnesses in the two weeks prior to the interview classified illnesses as follows: fever, 24.6%; diarrhea, 5.5%; fever and diarrhea, 4.9%; other, 6.2%; and not sick, 58.8%. (Central Bureau of Statistics, 1980)

### URBAN

**ILLNESS PREVALENCE:** Urban mothers, asked if their children had been sick (confined to bed) during the two weeks prior to the interview, responded as follows: not sick, 57.4%; 1 day, 5.0%; 2-3 days, 13.9%; 4-7 days, 12.2%; and 1 week or more, 11.6%. (Central Bureau of Statistics, 1980)

**ILLNESSES:** Urban mothers responding to questions about their children's illnesses in the two-week period prior to the interview classified them as follows: fever, 24.1%; diarrhea, 3.2%; fever and diarrhea, 3.8%; other, 11.5%; and not sick, 57.4%. (Central Bureau of Statistics, 1980)

## 2. DIETARY BELIEFS

### 2.1 DIETARY BELIEFS, GENERAL

#### NATIONAL

FOOD CLASSIFICATION: Kikuyu women were found to classify their foods into at least six major food groups: cereals; roots, tubers, and starchy fruits; legumes; vegetables; fruits; and meats and animal products. The only peculiarities of interest for nutrition education concern whole maize and rice being classed as roots or tubers in a significant minority of cases and green bananas not being classed as a starchy fruit. In addition, milk and eggs were perceived as related to meats by only 42% and 63% of the women, respectively. (Hoorweg and Niemeyer, 1980)

### 2.2 DIETARY BELIEFS, ABOUT PREGNANCY

#### NATIONAL

TRADITIONAL PRACTICES--SEX AND WORK: An expectant mother may not have sexual relations. Pregnant women continue to do hard work without resting because a woman who does not work is thought to be lazy. (Njoki, 1979)

### 2.3 DIETARY BELIEFS, ABOUT LACTATION

#### RURAL

INCREASING MILK YIELDS: Maize and beans were mentioned most frequently by 85 lactating Akamba mothers as foods that stimulated milk yields. (Van Steenberg et al., 1981)

COLOSTRUM: Colostrum and water were considered the only foods suitable for the newborn among 183 mothers interviewed in the Machakos Project area. There was no bias against feeding the child colostrum. (Van Steenberg et al., 1978)

#### URBAN

COLOSTRUM: 84% of mothers from the Kibera location felt that colostrum was good for babies. 6% had no opinion, and 9%, mainly Luo mothers, believed that the first milk flow after delivery was bad and should be discarded because it is dirty (or no reasons were given). (AMREF, 1982)

### 2.4 DIETARY BELIEFS, ABOUT BREAST MILK SUBSTITUTES (INCLUDING BOTTLE FEEDING)

### 2.5 DIETARY BELIEFS, ABOUT WEANING

#### NATIONAL

COMMERCIAL WEANING FOODS: Many mothers believe that commercially manufactured weaning foods are superior to locally prepared weaning foods. (Ministry of Health, 1983)

## 2.5 DIETARY BELIEFS, ABOUT WEANING (Cont.)

### RURAL

**MOST POPULAR FOODS:** Among the most popular foods from each food category, beans and eggs were highly preferred for young children by women respondents. Kale was next, with millet flour, green bananas and oranges less popular. Using the second most popular food from each category, meat and sweet banana were highly preferred, with cabbage and peas high on the list as well. Maize flour, Irish potato, and rice were low in popularity for young children. In general, the staple foods (green bananas, millet flour, rice, maize flour, and Irish potatoes) were preferred less than other foods. (Hoorweg and Niemeyer, 1980)

**FOOD PREFERENCES:** For their young children, Kikuyu mothers prefer high protein foods which also have high caloric values such as beans, peas, meat, and eggs. Their next preference, however, is for foods that are low in protein such as green bananas, Irish potatoes, and cabbage. It is likely that when their first choice is unavailable, they will fall back on these foods. (Hoorweg and Niemeyer, 1980)

**FOOD PREFERENCES FOR CHILDREN:** Mothers' preferences of foods for a 2-year old child were: eggs and chicken among meat and animal products due to their relative tenderness; among cereals, millet flour due to its use in ucuru, a children's porridge; sweet banana and orange (although orange is uncommon) among fruits; kale and cabbage among the vegetables; beans are the most popular legume; and green banana and Irish potato among the roots and tubers. (Hoorweg and Niemeyer, 1980)

**STAPLE FOODS:** Green bananas and millet flour were the most popular staple foods for 2-year-olds, as determined by mothers' preferences. Maize flour and Irish potatoes followed in popularity. Rice and whole grain maize were the least popular staple foods. (Hoorweg and Niemeyer, 1980)

**VEGETABLES, LEGUMES, MEATS AND ANIMAL PRODUCTS:** Women respondents reported that beans were the most liked food for 2-year-old children among the vegetables, legumes, and meats and animal products groups. Eggs and kale were the next most popular. Meat, peas, and cabbage were lower on the list of preferences. (Hoorweg and Niemeyer, 1980)

## 2.6 DIETARY BELIEFS, ABOUT ILLNESS AND CURE

### NATIONAL

**FAMILY LIFE TRAINING CENTERS:** To some, there is a stigma attached to attendance at Family Life Training Centers. It is viewed as a great shame to go and reflects badly on the family. Husbands are sometimes a big obstacle to entering this program. (Baumslag, 1980)

### 3. DIETARY PRACTICES

#### 3.1 DIETARY PRACTICES, GENERAL

##### NATIONAL

**CEREALS:** Cereals, primarily maize, account for 60% of calorie and 50% of protein intake. (Ministry of Health, 1978)

**CALORIE SUPPLY PER CAPITA:** Based on food balance sheets, FAO estimated that the per capita daily calorie supply for the years 1977 to 1979 was 2085 calories (excluding fish). (U.S.A.I.D., 1982b)

**CALORIE SUPPLY PER CAPITA:** In 1977 the per capita supply of calories was 2,032 calories, which was 88% of the FAO recommended requirement. (World Bank, 1981)

**CALORIE SUPPLY PER CAPITA:** Between 1972 and 1974, the per capita daily calorie supply was 2137 calories, which was 92% of the recommended requirement. (FAO, 1977)

**PROTEIN SUPPLY PER CAPITA:** The per capita protein supply for 1977 to 1979 was 57.7 grams per day, according to 1980 FAO estimates. 13.9 grams were estimated to be from animal products. (U.S.A.I.D., 1982b)

**PROTEIN SUPPLY PER CAPITA:** In 1972-1974 the per capita daily supply of protein was 60.6 grams. (FAO, 1977)

**FAT SUPPLY PER CAPITA:** The per capita supply of fat during 1977 to 1979 was 37 grams per day, according to FAO estimates. (U.S.A.I.D., 1982b)

##### RURAL

**MAIN FOODS--MACHAKOS:** The main foods in the Machakos Project study area are maize, beans, cowpeas, and pigeon peas. Other, less important, staples include sorghum, bullrush millet, sweet potato, taro, cassava, and plantain. A variety of green vegetables and fruits are available, some seasonally. (Jansen et al., 1980)

**ISYO:** Isyo is the dish most frequently served in every house and is made from whole maize and whole beans or pigeon peas. This dish is consumed by only a few children under two and even in the third year children eat it less often than adults. (Van Steenberg et al., 1978)

**LUO DIET CHANGES:** The Luos of Nyanza Province have changed their dietary pattern in response to contact with western civilization. Many of the foods traditionally eaten are now considered primitive and degrading. Production of these foods has consequently decreased. (Amolo, 1979)

**SEASONAL SHORTAGES--MACHAKOS:** Rainfall in the northern division of Machakos District has a bimodal distribution. The long rainy season lasts from March to May. The short rainy season goes from October to December. Crops are planted twice a year. Pigeon peas are short rains crops; beans are long rains crops. Maize is planted twice a year. The

### 3.1 DIETARY PRACTICES, GENERAL (Cont.)

most severe food shortages occur between September and December, a period that coincides with the short rains, land preparation, and weeding. Food is imported to make up the gap, and prices are high. (Chambers et al., 1979)

**HUNGER PERIODS--MACHAKOS:** No hunger periods have been observed in the nutrition Project Study area, even though there are seasonal fluctuations in food intakes. (Van Steenberg et al., 1981)

**VEGETABLES--MACHAKOS:** Overall vegetable consumption in the Machakos project area was less during the dry season (mean 23 g) than in the rainy season (mean 38 g). Most commonly eaten was heading cabbage (Brassica capitata), which constitutes approximately 25% of total vegetable consumption. Tomatoes are an important addition to the diet in the dry season, and African cabbage (Brassica carinata) and cowpea leaves in the rainy season. (Van Steenberg et al., 1978)

### URBAN

**MAJOR FOOD EXPENDITURES:** The major food expenditures were for cereals, milk, meat, sugar, and vegetables (and fats for the upper income groups) for all income groups in the Urban Food Purchasing Survey, 1977. For the lowest income group (<300 KSh per capita per month) 63% of the total expenditure was for food, while the average food expenditure was only 39%. (FAO, 1977)

### 3.2 DIETARY PRACTICES, WOMEN

#### 3.2.1 DIETARY PRACTICES, WOMEN DURING PREGNANCY

#### 3.2.2 DIETARY PRACTICES, WOMEN DURING LACTATION

### NATIONAL

**TRADITIONAL PRACTICES--NUTRITION:** Some traditional nutrition practices during confinement and after delivery are useful because they stress good nutrition. Meat and soup made from the animals killed especially for this purpose are given to these women. (Njoki, 1979)

### RURAL

**FOOD TABOOS:** There were virtually no food "taboos" or restrictions during lactation among 85 Akamba mothers. (Van Steenberg et al., 1981)

### 3.3 DIETARY PRACTICES, INFANTS 0-24 MONTHS

#### 3.3.1 DIETARY PRACTICES, INFANTS 0-24 MONTHS, BREAST FEEDING

### NATIONAL

**INCIDENCE:** 96% of children born in the three years preceding the 1977 World Fertility Survey were breast fed. (Kent, 1981)

**EXCLUSIVE:** Unsupplemented breast feeding was reported to last about 3 months on the average, according to the 1977 World Fertility Survey. (Kent, 1981)

**DURATION:** 97% of lactating women in Kenya breast fed their infants for an average of 14.5 months. (Dodd and Smith, 1982)

**DURATION:** In 1977-1978, 98% of lactating women (n=8,100) breast fed their infants for an average of 15.4 months. (Dodd and Smith, 1982)

**DURATION:** In the national sample (n=6,340), 91.2% of infants were ever breast fed. The percentage still breast fed by age was as follows: 1 month, 90.8%; 2 months, 90.0%; 3 months, 88.7%; 4 months, 87.6%; 5 months, 86.2%; 6 months, 83.5%; 9 months, 74.9%; 12 months, 44.1%; 18 months, 24.3%; 24 months, 11.4%; 36 months, 6.4%. The median duration was 12 months. (Dodd and Smith, 1982)

**PROLONGED BREAST FEEDING--BY PROVINCE:** Children still breast fed at the age of 24 months, by province and areas were as follows: Central rural, 7.0%; Coast rural, 18.1%; Eastern rural, 13.5%; Nyanza rural, 14.1%; Rift Valley rural, 5.2%; Western rural, 7.3%; other urban, 5.8%; Coast urban, 1.7%; Nairobi urban, 4.6%. Summary figures for rural and urban Kenya were 10.3% and 4.2%, respectively. (Central Bureau of Statistics, 1980)

**DURATION--RURAL/URBAN DIFFERENCES:** The mean duration of breast feeding the next-to-the-last child was 31% longer among the rural sample than in the urban sample of the 1977 World Fertility Survey (13.4 months vs. 10.2 months). (Kent, 1981)

**DURATION:** On the average, rural mothers breast fed for 14 months, and urban mothers for 10 months. (Central Bureau of Statistics, 1980)

## RURAL

**PREVALENCE AND DURATION:** The 1977 national nutrition survey concluded that among rural Kenyan smallholders breast feeding is nearly universal and reasonably prolonged. On average, breast feeding was terminated in the fourteenth month. 20% of the sample breast fed for more than 18 months, whereas only 7% breast fed less than 6 months. (Central Bureau of Statistics, 1979)

**FEEDING PATTERN--KIKUYU:** Like other sedentary African tribes, the general pattern of child feeding among the Kikuyu consists of breast feeding on demand, and the first supplementary foods are introduced at 4 to 5 months. Additional foods are introduced in the following months. Most children are weaned between six and 18 months, usually around 12 months. (Hoorweg and Niemeyer, 1980)

**EARLY BREAST FEEDING PATTERN--AKAMBA:** During the first two to three months, breast feeding was mainly on the demand of the infant among Akamba mothers studied. Frequent suckling, both day and night, was common with feeds every two hours. Each feeding lasted around 10 minutes. Mothers spent most of the days and evenings at home. During mothers' short but frequent daily trips away from home for farming,

### 3.3.1 DIETARY PRACTICES, INFANTS 0-24 MONTHS, BREAST FEEDING (Cont.)

shopping, or collecting firewood and water, young infants were carried on the mothers' backs or left with suitable caretakers. Infant and mother slept together. (Van Steenbergen et al., 1981)

**LATER BREAST FEEDING PATTERN:** At about 6 months of age, infants were breast fed more on the mother's schedule, with about 6 or 7 feeds per 24 hours. If the mother was not present for a long period, cow's milk or porridge was left for the infant who was fed by a caretaker at the latter's convenience. Beyond the sixth month children were still nursed 5 to 7 times per 24 hours. (Van Steenbergen et al., 1981)

**FIRST FEEDINGS:** New babies are put to the breast soon after birth. Colostrum and water are the only foods given to the newborn. (Van Steenbergen et al., 1978)

**FIRST FEEDS:** Breast feeding was started within a few hours after birth among 85 lactating Akamba mothers; only a few waited till the next day. (Van Steenbergen et al., 1981)

**EXCLUSIVE—MACHAKOS:** Breast feeding was un-supplemented for the first one to four months, median time about two months, among a sample of 183 mother-child pairs in Machakos Project area. (Van Steenbergen et al., 1978)

**PREVALENCE:** At 6 months about 85% of infants are being breast fed, according to the 1978 Kenya Fertility Survey. (Latham, 1982)

**PREVALENCE:** In rural Kenya, 91.8% of infants were ever breast fed; the percentage of children still breast fed, by age, was as follows: 1 month, 91.5%; 2 months, 90.9%; 3 months, 90.0%; 4 months, 89.1%; 5 months, 87.9%; 6 months, 85.6%; 9 months, 77.4%; 12 months, 46.2%; 18 months, 25.7%; 24 months, 12.1%; 36 months, 6.8%. (Dodd and Smith, 1982)

**DURATION:** Mothers in the rural areas surveyed in the 1978-79 Child Nutrition Survey breast fed their children for an average of 14 months. (Central Bureau of Statistics, 1980)

**DURATION:** The mean duration of breast feeding the next-to-the-last child was 13.4 months among the rural sample of the 1977 World Fertility Survey (WFS). (Kent, 1981)

**DURATION:** Less than 2.6% of the children aged 6 to 60 months surveyed in all rural areas were breast fed for less than 3 months. (Central Bureau of Statistics, 1980)

**DURATION BY LINGUISTIC-ETHNIC GROUPS:** The Coastal Bantu ethnic-linguistic groups had the shortest mean duration of breast feeding (12 months), and the Nilotic groups on the opposite side of Kenya had the highest (16 months), according to the 1977 rural nutrition survey. The Western and Central Bantu and the Kalenjin each averaged 15 months duration. (Central Bureau of Statistics, 1979)

**DURATION BY ETHNIC GROUPS:** The Meru (Central Bantu) had the longest breast feeding duration (17 months) among the ethnic groups studied in

the 1977 rural nutrition survey. The Luo (Nilotic) breast fed for 16 months; the Kalenjin, Kisii Kamba, and Lukya, for 15 months; the Kikuyu, for 14 months; and the Chonyi, for 13 months. (Central Bureau of Statistics, 1979)

**DURATION--AKAMBA:** The majority of Akamba mothers studied (56%) nursed their children for a period of 1.5 to 2 years; 34% said they continued to breast feed until around 1.5 years; and the remaining 10% breast fed less than a year due to a subsequent pregnancy, work obligations, or school attendance. (Van Steenbergen et al., 1981)

**DURATION--AKAMBA:** As a rule, breast feeding was completely stopped around 18 months among the 183 Akamba children studied. The majority were weaned when they were 16 to 24 months old. (Van Steenbergen et al., 1978)

**DURATION--MACHAKOS:** Prolonged breast feeding is commonly practiced in Kanzalu and Mwatati. The mean duration of breast feeding was 14.7 months  $\pm$  6.8 months (ranged 0-36 months). Children receive most of their nourishment from breast milk for 5.6  $\pm$  3.1 months (range 0-24 months). (Stephenson et al., 1979)

**DURATION--NYANZA:** Mothers in rural Nyanza breast fed their children for an average of 15.2 months, the longest average in the survey. (Central Bureau of Statistics, 1980)

**ILLNESS--AKAMBA:** During the sickness of a baby, Akamba mothers continued to breast feed the child. If the mother was ill (or travelling) nursing was interrupted for one to three days. (Van Steenbergen et al., 1981)

**NUMBER OF FEEDS-DAYTIME--MACHAKOS:** During the first three months children in the Machakos Project area were nursed about seven times per 12 hours during the daytime. The number of feeds decreased to 6 times at age 4 to 6 months; 4 to 5 times at age 7 to 12 months; and around 3 times at age 12 to 24 months. (Van Steenbergen et al., 1978)

**QUANTITY OF MILK:** At age 0 to 3 months an average of 675 ml of breast milk was obtained daily; at 4 to 6 months, 555 ml; at 7 to 12 months, 487 ml; and at 13 to 24 months, 300-400 ml, in a study of 183 mother-child pairs. This amounted to 144, 88, and 64 ml. per kg. body weight in the first three age groups, respectively. The average quantity ingested per feed and the length of each feed remained substantially the same, at 60 ml and about 13 minutes respectively. (Van Steenbergen et al., 1978)

**VOLUME PER FEED:** The amount of milk delivered per feed was similar at ages 0 to 17 months, i.e., about 60 ml, in a study of 86 lactating mothers. (Van Steenbergen et al., 1981)

**BREAST MILK YIELD:** Using test weighing among 85 lactating Akamba women, breast milk yields in the first month of lactation were 778 ml (187 ml/kg child body weight); in the second and third month, 619 ml (120 ml/kg); in the fourth and fifth months, 573 ml (92 ml/kg); in the sixth through eleventh months, 493 (69 ml/kg); in the 12th to 17th months, 440 ml (52 ml/kg); and in the 18th to 23d months, 301 ml (31 ml/kg). Wide

### 3.3.1 DIETARY PRACTICES, INFANTS 0-24 MONTHS, BREAST FEEDING (Cont.)

variations between mothers and for individuals in milk yields were found. (Van Steenbergen et al., 1981)

**NUTRIENT CONTENT OF BREAST MILK:** The concentrations of calcium, retinol, and riboflavin in the breast milk samples of Akamba mothers were lower than those of well nourished mothers in the US and Europe. The content of beta carotene, thiamin, and ascorbic acid was higher. (Van Steenbergen et al., 1981)

**PROTEIN CONTENT OF BREAST MILK:** The mean total protein content of breast milk samples from 78 Akamba mothers was 1.07 g%, which compares favorably with the results of other studies cited. The true protein content, 86 g% was also similar to other studies. (Van Steenbergen et al., 1981)

**FAT CONTENT OF BREAST MILK:** The fat content of the breast milk samples from 44 Akamba mothers was 3.07 g%, lower than that reported for US (4.54 g%) and British (4.2 g%) mothers. Methodological considerations suggest caution in interpreting this difference; however, the fat content of milk is the major source of energy. The quantity of linoleic acid (essential fatty acid) was within the normal range. High values of lauric and myristic acids were recorded. (Van Steenbergen et al., 1981)

**VOLUME OF MILK--SEASONAL VARIATION:** The volume of breast milk consumed per 24 hours among 85 study children showed a seasonal variation, especially during the first six months of life. At 2 to 5 months, the average intake was 710 ml during the harvest season and 404 to 540 ml during the lean season. The difference was due to a higher volume of breast milk per feeding rather than a change in the number of feedings. (Van Steenbergen et al., 1980)

**SEASONAL INFLUENCE ON MILK YIELD:** Season had a significant influence on the breast milk yield during the first 5 months of lactation in the study population of Akamba mothers ( $p < .01$ ). During the harvest season 170 to 300 ml more milk was produced per 24 hours than in the lean season (708-710 ml vs 404-540 ml). A similar but not significant trend was observed at later stages of lactation as well. The impact of season was strongest on the amount of milk consumed per feed. (Van Steenbergen et al., 1981)

#### URBAN

**BREAST FEEDING PREVALENCE:** All 64 study respondents in the Kibera location breast fed their babies. 92% put the baby to the breast within the first six hours after birth and reported no problems. 86% had established lactation after two days. (AMREF, 1982)

**FIRST FEED:** 94% of the 64 Kibera mothers interviewed gave birth in a hospital where the first feed is glucolin or boiled water salt-sugar solution. Of those giving birth at home, 15% also gave the glucolin or water salt-sugar solution soon after the baby was born. Nearly all babies eventually received these solutions. 73% of mothers gave the solution with a bottle while the rest used a cup and spoon. (AMREF, 1982)

**PREVALENCE:** The 1978 Kenya Fertility Survey showed that at 6 months of age about 67% of urban infants were being breast fed. (Latham, 1982)

**DURATION:** Mothers in the urban areas surveyed in the 1978-9 Child Nutrition Survey breast fed their children for an average of 10 months. (Central Bureau of Statistics, 1980)

**DURATION:** In urban Kenya, 86.5% of infants were ever breast fed; the percentage of children still breast fed, by age, was as follows: 1 month, 84.8%; 2 months, 83.0%; 3 months, 78.7%; 4 months, 75.3%; 5 months, 72.4%; 6 months, 66.9%; 9 months, 54.6%; 12 months, 26.4%; 18 months, 12.7%; 24 months, 4.8%; and 36 months, 0. (Dodd and Smith, 1982)

**DURATION:** The mean duration of breast feeding the next-to-the-last child was 10.2 months in the 1977 World Fertility Survey. (Kent, 1981)

**DURATION--COAST:** Mothers in urban parts of Coast Province had the lowest mean duration of breast feeding in the survey: 9.3 months. (Central Bureau of Statistics, 1980)

**DURATION--COAST:** 15.1% of the children aged 6 to 60 months surveyed in urban areas of Coast Province were breast fed for less than 3 months. (Central Bureau of Statistics, 1980)

**DEMAND OR SCHEDULE FEEDING--KIBERA:** The feeding pattern observed among the Kibera area sample was related both to the location of delivery and to the socioeconomic status of the mother. Demand feeding was common among the low income village mothers giving birth in institutions not separating mothers and infants. Scheduled feeding was practiced by more affluent and employed women who delivered in hospitals which separate babies from their mothers. (AMREF, 1982)

**COMPOSITION OF HUMAN MILK:** An analysis of one time milk samples from 35 healthy women revealed a mean protein content of .81 gm% (range .48 to 1.11 gm%; standard deviation  $\pm$ .02 gm%), a mean lactose content of 6.0 gm% (3.3 to 9.7 gm%;  $\pm$ 1.7 gm% SD), and a mean calcium content of 23.8 mg% (17 to 33 mg%;  $\pm$ .45 SD). (Bwibo and Ondijo, 1981)

### 3.3.2 DIETARY PRACTICES, INFANTS 0-24 MONTHS, WEANING

#### NATIONAL

**PORRIDGE INGREDIENTS:** Over 50% of children in rural areas and nearly three fourths of the urban children were given a weaning porridge consisting mainly of maize flour, according to the 1978-79 Child Nutrition Survey. Cassava was a popular ingredient of children's porridge in rural Nyanza Province. Bananas were frequently used in rural Eastern Province. (Central Bureau of Statistics, 1980)

**WEANING PORRIDGE:** Mothers in all provinces and urban areas were asked whether they added milk or sugar to their children's weaning porridge. In rural Kenya, mothers answered as follows: none, 25.2%; milk only, 26.7%; sugar only, 21.7%; and milk and sugar, 26.4%. Urban mothers answered as follows: none, 15.3%; milk only, 18.4%; sugar only, 18.3%; and milk and sugar, 48%. (Central Bureau of Statistics, 1980)

### 3.3.2 DIETARY PRACTICES, INFANTS 0-24 MONTHS, WEANING (Cont.)

**WEANING FOODS:** In all parts of Kenya, it is feasible to prepare nutritious weaning foods based on maize, millet, or wheat flour. (Ministry of Health, 1983)

**COMMERCIAL WEANING FOODS:** Commercial weaning foods are often introduced into the infant's diet during the first two months of life, a practice which interferes with breast feeding. (Ministry of Health, 1983)

**COMMERCIALLY PREPARED BABY FOODS:** In the 1978-79 Child Nutrition Survey of 6 to 60 month old children, 30.3% of rural and 72.5% of urban children were said to have received a commercially prepared baby food, such as Nespray, Ostermilk, Cerelac, or Ujplus. There were no differences in nutritional status between children who had received such foods and those who had not. (Central Bureau of Statistics, 1980)

**SUPPLEMENTARY FOODS--AGE:** Almost all urban and rural children surveyed received some supplementary food before the age of one. 84% of urban children and 93% of rural children had begun receiving supplementary foods by the age of six months. There were no significant differences in age at supplementation between boys and girls. (Central Bureau of Statistics, 1980)

#### RURAL

**FIRST FOODS--MACHAKOS:** The first foods added to the infant's diet were local cow's milk and a thin cereal porridge, usually fed by bottle, among a sample of 183 Akamba children under three years. At about one year of age a hard maize dish, ngima or ugali (a common family dish), was introduced and after weaning a maize-bean stew, ioyo, was included. Small quantities of tubers, vegetables, and fruits were increasingly added to the diet. (Van Steenberg et al., 1978)

**FIRST FOODS:** The first solid supplementary foods, introduced at 4 to 5 months, are millet porridge (ucuru) or a mash of bananas and potatoes. Cow's milk may be given at an earlier age. Cooked beans are added soon, but whole maize is given after children are two or three years old. (Hoorweg and Niemeijer, 1980)

**FOOD CONSUMPTION FREQUENCY:** Cereal and milk are consumed frequently in all ecological zones, according to the 1979 Child Nutrition Survey. Consumption of meat, fish, and eggs is uniformly low. Zones 1 through 3 comprise a relative "vegetable" consumption area. Zones 4 through 6 are characterized by bean, potatoes, cassava, and banana consumption, that is, by a diverse diet. Zone 7 is associated with beans, zone 8 with vegetables and tubers, and the coastal zones with lower consumption of all these food groups. (Central Bureau of Statistics, 1979)

**WEANING PORRIDGE--CENTRAL:** In rural Central province, the main ingredient of the weaning porridge given to young children was as follows: maize, 55.6%; maize and millet, 22.4%; millet, 10.5%; and other, 11.4%. (Central Bureau of Statistics, 1980)

**PORRIDGE--CENTRAL PROVINCE:** Millet flour is mainly used to prepare ucuru, children's porridge. (Hoorweg and Niemeijer, 1980)

MAJOR FOODS--KIGUMO DIVISION, CENTRAL PROVINCE: 60 to 80% of the 6 to 59 month old children surveyed consumed tea prepared with milk. 50 to 60% of the children consumed ngima (stiff maize porridge). Ucuru (gruel of millet, sorghum, or maize) was eaten on the day of recall by 30 to 40% of the children. Vegetable stew was eaten by 20 to 30% of the children. Gitoero (mash of bananas and potatoes) was given mostly to the younger children, eaten by about 50% of them. The consumption of githeri (maize and beans) sharply increased with age; it was eaten by 50 to 60% of the older children. (Hoorweg and Niemeijer, 1980)

FOOD TYPES--KIGUMO DIVISION, CENTRAL PROVINCE: The types of foods consumed by 6 to 59 month old children varied considerably by age. Milk consumption was highest among the 6 to 23 month olds who were not breast feeding (about 400 gms. per child per day). The consumption of tubers decreased with age. Older children ate more cereals, legumes, and vegetables. Legume consumption was highest among the 24 to 35 month olds due to the custom of giving them the beans from githeri (maize and beans). The 3 to 4 year olds were given regular githeri. The children's diet was basically vegetarian, with a considerable quantity of milk. (Hoorweg and Niemeijer, 1980)

WEANING PORRIDGE--COAST: In rural Coast Province, the main ingredient of the weaning porridge given to young children was maize in 95% of cases. (Central Bureau of Statistics, 1980)

WEANING PORRIDGE--EASTERN: In rural Eastern Province, the main ingredient of the weaning porridge given to young children was as follows: maize, 55.2%; maize and millet, 14.1%; bananas, 5.8%; and other, 6.5%. (Central Bureau of Statistics, 1980)

NUMBER OF MEALS--EASTERN PROVINCE: Young children 7 to 36 months of age had about four meals per day. By 2 to 3 years the majority were sharing the family pot and also received an extra meal in between. (Van Steenbergen et al., 1978)

COW'S MILK--MACHAKOS: When cow's milk was given to 0 to 3 month old Akamba infants in Machakos district, it was diluted with a little water and heated. Older infants received undiluted milk. (Van Steenbergen et al., 1978)

COW'S MILK--MACHAKOS: Among most Akamba mothers cow's milk was first given as a supplement in the third month, usually by bottle. (Van Steenbergen et al., 1981)

NGIMA (UGALI) PORRIDGE--MACHAKOS: Ngima (ugali in Swahili), a hard maize porridge, is a common family dish which is served with milk or in combination with a tomato stew. Ngima was eaten about once a day by about three quarters of the infants studied in the Machakos area by the end of their first year. (Van Steenbergen et al., 1978)

FIRST FOODS--MACHAKOS DISTRICT: Foods first given to infants are cow's milk (occasionally goat's milk) introduced between 1 and 4 months of age. At 4 to 5 months, milk is replaced by porridge, which is given 2 or 3 times a day, up to the age of two years. Toward the end of the first

### 3.3.2 DIETARY PRACTICES, INFANTS 0-24 MONTHS, WEANING (Cont.)

year, ngima (or ugali in Swahili), a porridge made from hard-maize flour and served with milk or tomato stew, is also given. (Van Steenbergen et al., 1978)

**BOTTLES--MACHAKOS:** Bottles are commonly used in the Machakos project area for feeding milk and thin porridges. Some mothers clean bottles and nipples by simmering them over a low fire; others just rinse them with cold water. (Van Steenbergen et al., 1978)

**REASONS FOR WEANING--MACHAKOS:** Reasons most often cited for weaning were a new pregnancy, or the possibility of obtaining a salaried job. Some mothers who stopped breast feeding around 18 months cited child refusal, ability to eat other food, or size (or age--"child is big enough") as reasons for weaning. (Van Steenbergen et al., 1978)

**PORRIDGE--MACHAKOS:** Porridge is made from maize, millet, or sorghum. Some younger mothers prefer to use wheat flour (70% extraction) or instant flour mixtures. Instant flours are added to hot water, but homemade porridges must be cooked for 15-30 minutes. Porridge and milk are boiled only once a day, and individual portions are reheated before serving. A typical porridge consists of water, milk (200 ml. per liter), sugar (20g per liter), and cereal flour (60-150g per liter). (Van Steenbergen et al., 1978)

**PORRIDGE--MACHAKOS:** Children over 6 months of age in the Machakos project area are commonly fed porridge with a spoon, a cup, bowl, or calabash. (Van Steenbergen et al., 1978)

**NGIMA PORRIDGE--MACHAKOS:** Ngima is a porridge prepared with 350 g maize flour/kg with no salt or spices added. It is usually served with cow's milk, buttermilk, or 'stew'. Young children are usually given a very watery stew with 400 g of tomato/liter of stew. Children over 1 and a half years of age receive a stew containing leafy vegetables such as African cabbage, cowpealeaf, heading cabbage, and Irish potatoes (800 g/kg stew). It is commonly consumed by hand. (Van Steenbergen et al., 1978)

**MILK--MACHAKOS:** When children 0-3 months of age are given supplementary milk, it is usually slightly diluted with water and heated. Older children are given undiluted milk. (Van Steenbergen et al., 1978)

**SUGAR INTAKE--MACHAKOS:** Average sugar intake of children in the Machakos project area increased steadily from 1 g per day at 0 to 6 months, to 10 g per day at the age of 25 to 36 months. (Van Steenbergen et al., 1978)

**FRUITS--MACHAKOS:** Average fruit consumption by young children is 25 g per day, usually from papayas and bananas. Mangoes are also available in season. (Van Steenbergen et al., 1978)

**TEA--MACHAKOS:** Children begin drinking tea with milk and sugar at about the age of 2 years. It is usually given every 2 days. (Van Steenbergen et al., 1978)

**WEANING PORRIDGE--NYANZA:** In rural Nyanza, the main ingredient of the weaning porridge given to young children was as follows; maize, 70.1%; cassava, or cassava with maize or millet, 12.2%; maize and millet, 8.8%; millet, 7.8%; other, 1.1%. (Central Bureau of Statistics, 1980)

**WEANING PORRIDGE--RIFT VALLEY:** In rural Rift Valley Province, the main ingredient of the weaning porridge given to young children was as follows: maize, 54.6%; maize and millet, 17.4%; millet, 9.1%; other 19%. (Central Bureau of Statistics, 1980)

**WEANING PORRIDGE--WESTERN:** In rural Western Province, the main ingredient of the weaning porridge given to young children was as follows: maize, 85%; maize and millet, 3.7%; cassava, 2.2%; other 9.0%. (Central Bureau of Statistics, 1980)

**CALORIE AND PROTEIN INTAKES--KIGUMO DIVISION, CENTRAL PROVINCE:** Among 6 to 23 month olds, calculated intakes were 1100 calories and 30 to 40 grams of protein, per day. Energy intake is 90 to 100% of the FAO/WHO recommendations; protein intake is over 100% of recommended intake per kg of body weight. (Hoorweg and Niemeijer, 1980)

**CALORIE INTAKE--EASTERN PROVINCE:** The average energy obtained in the diets (including breast milk) of 183 children under three year olds was 100 kcal at ages 0 to 6 months (86% of recommended intakes), 93 kcal at 7 to 18 months (90% of recommended intake), and 96 kcal at 19 to 36 months (96%) per kg of body weight. (Van Steenberg et al., 1978)

**PROTEIN INTAKE--EASTERN PROVINCE:** Among 183 children under three years of age, protein intake was satisfactory at all ages and varied between 2.1 and 2.8 g/kg of body weight. (Van Steenberg et al., 1978)

**PROTEIN INTAKE--MACHAKOS:** Average protein intake per kg. of body weight, expressed as a percentage of the requirement, was 96% at age 0 to 6 months, 118% at 7 to 18 months, and 160% at 19 to 36 months. (Van Steenberg et al., 1978)

**FAT INTAKE--MACHAKOS:** Average fat intake of children 0-36 months of age in the Machakos project area was 2 grams per day, mostly from vegetable sources. (Van Steenberg et al., 1978)

**CALCIUM INTAKES--EASTERN PROVINCE:** Calcium intake among 183 children (0 to 3 years) was between 52% and 60% of the 1974 WHO recommendations. 60% of the total consumption, more in the youngest age group, was milk. (Van Steenberg et al., 1978)

**RIBOFLAVIN INTAKES--EASTERN PROVINCE:** Riboflavin intakes among 183 0 to 3 year old children were low compared to 1974 WHO recommended intakes at each age group: 72% of RDAs at 0 to 6 months, 62% at 7 to 18 months, and 64% at 19 to 36 months. Milk was the major source of riboflavin for all age groups. (Van Steenberg et al., 1978)

**IRON INTAKES--EASTERN PROVINCE:** Among a sample of 183 0 to 3 year olds, iron requirements were assumed to be met in the first 6 months by body stores. Iron intake in the 0 to 6 month period was 17% of the 5 mg

### 3.3.2 DIETARY PRACTICES, INFANTS 0-24 MONTHS, WEANING (Cont.)

recommended by WHO (1974). By age 7 to 18 months, intakes averaged 83% of the WHO recommended allowance. At 19 to 36 months, intakes were 91% of the 10 mg recommended intake. (Van Steenberg et al., 1978)

**SOURCES OF IRON IN THE DIET--EASTERN PROVINCE:** The major sources of iron in the diet were cereals (72-78%), vegetables (3.6%) and legumes (13% after 18 months). (Van Steenberg et al., 1978)

**THIAMIN INTAKES--EASTERN PROVINCE:** Thiamin intakes increased with age in a cross-sectional study of 183 0 to 3 year olds: at early age, consumption was only 37% of 1974 WHO recommendations, but by 19 to 36 months intake was well above 100% of standard. After six months of age, the major source of thiamin in the diet was cereal. In the older age group legumes were the second major source. (Van Steenberg et al., 1978)

**ASCORBIC ACID INTAKES--EASTERN PROVINCE:** Among the 0 to 3 year old children studied, mean ascorbic acid (vitamin C) intake was above the recommended levels for each age group. Among the 0 to 6 month old group 98% of intake came from milk. At 7 to 18 months 62% was furnished by milk. Tubers and vegetables contributed about 75% of total intake at age 19 to 36 months. (Van Steenberg et al., 1978)

**ENERGY AND NUTRIENT INTAKE--SEASONAL VARIATION--EASTERN PROVINCE:** Seasonal differences were observed in the age group 0 to 11 months for energy intake and, in the over 2 year old group only, intake of retinol equivalents. (Van Steenberg et al., 1980)

#### URBAN

**INTRODUCTION OF SUPPLEMENTS:** Mothers in Nairobi began both bottle and mixed-feeding during the first month of life. (Mutanda, 1980b)

**INTRODUCTION OF SUPPLEMENTS:** Mothers in Mombasa and Kisumu did not begin bottle and mixed-feeding until the second month of life. (Mutanda, 1980b)

**WEANING PORRIDGE--COAST:** In urban Coast Province, the main ingredient of the weaning porridge given to young children was as follows: maize, 81%; millet, or maize and millet, 5.2%; and other, 14%. (Central Bureau of Statistics, 1980)

**WEANING PORRIDGE--NAIROBI:** In urban Nairobi, the main ingredient of the weaning porridge given to young children was as follows: maize, 70.8%; millet, 11.3%; maize and millet, 7.6%; other, and 10.4%. (Central Bureau of Statistics, 1980)

### 3.3.3 DIETARY PRACTICES, INFANTS 0-24 MONTHS, AFTER WEANING

#### RURAL

**CHILDREN'S DIET:** By the age of three, most children not only eat with the adults but also eat the same meals as the adults. They may still be given some extras such as millet porridge and perhaps eggs, depending on the mother. (Hoorweg and Niemeyer, 1980)

ISYO: Isyo, a dish made from maize and beans or pigeon peas, is seldom given to children under two because it is considered to be unsuitable. Three year old children sometimes eat isyo, rice, and home-made chapatti, but less frequently than adults. Isyo is usually eaten with a spoon or with hands. (Van Steenberg et al., 1978)

MEALS—MACHAKOS DISTRICT, EASTERN PROVINCE: Some mothers, when asked what foods their children had received that morning, responded that they had had only plain tea (1.5%). The remainder responded as follows: uji (tin maize meal porridge) with milk, sugar, lemon juice, and/or salt (57%); ugali (a maize dish commonly eaten by adults) with vegetables, beans, and/or milk (17%); teas with sugar and/or milk (17%); cow's milk (7%); bread or scones (8%); whole maize with beans or milk (6%); and breast milk (2%). A few children had more than one of the above. (Stephenson et al., 1979)

### 3.4 DIETARY PRACTICES, HEALTH AND MEDICINE

#### NATIONAL

MATERNITY CARE: Many maternity units do not have rooming-in facilities. The ensuing separation of mothers and infants may cause difficulties in the establishment of breast feeding. (Ministry of Health, 1983)

TREATMENT FOR ILLNESSES: Children aged 6 to 60 months described by their mothers as having had an illness other than fever, diarrhea, or fever and diarrhea during the two weeks preceding the interview were treated as follows: taken to a health center/dispensary, 37.6%; taken to a hospital or private doctor, 24.3%; given tablets (probably chloroquine), 25.4%; given traditional medicine, 5.3%; and no treatment, 7.4%. (Ministry of Health, 1983)

TREATMENT FOR DIARRHEA: Children aged 6 to 60 months described by their mothers as having had diarrhea during the two weeks prior to the interview were treated as follows: taken to health center/dispensary, 30.3%; taken to hospital or private doctor, 21.9%; given tablets (probably chloroquine), 32.3%; given traditional medicine, 7.1%; and no treatment, 8.3%. (Central Bureau of Statistics, 1980)

TREATMENT FOR FEVER: Children aged 6 to 60 months described by their mothers as having had fever during the two weeks prior to the interview were treated as follows: taken to health center/dispensary, 33.3%; taken to hospital or private doctor, 15.4%; given tablets (probably chloroquine), 44.5%; given traditional medicine, 1.9%; and no treatment, 5.0%. (Central Bureau of Statistics, 1980)

TREATMENT FOR FEVER AND DIARRHEA: Children aged 6 to 60 months described by their mothers as having had fever and diarrhea during the two weeks prior to the interview were treated as follows: taken to health center/dispensary, 38.7%; taken to hospital or private doctor, 21.1%; given tablets (probably chloroquine), 31.1%; given traditional medicine, 4.0%; no treatment, 5.2%. (Central Bureau of Statistics, 1980)

### 3.4 DIETARY PRACTICES, HEALTH AND MEDICINE Cont.)

ILLNESS IN CHILDREN: 41.2% of rural and 42.6% of urban children 6 to 60 months old were said to have been sick for at least one day in the two weeks preceding the 1978-9 Child Nutrition Survey. (Central Bureau of Statistics, 1980)

#### RURAL

HEALTH CARE FOR CHILDREN: Rural mothers asked what actions they took to treat sick children aged 6 to 60 months responded as follows: took child to health center/dispensary, 34.7%; took child to a hospital or private doctor, 15.4%; purchased drugs over the counter (probably chloroquine), 40.1%; used traditional medicine, 3.8%; and no treatment, 6.0%. (Central Bureau of Statistics, 1980)

MEDICATIONS FOR CHILDREN: Mothers of children aged 6 to 72 months, asked what medications they administered to their children, responded as follows: aspirin compounds (9%); cough medicine (4%); antimalarial drugs (3%); and stomach preparation (3%). (Stephenson et al., 1979)

#### URBAN

HEALTH CARE FOR CHILDREN: Urban mothers asked what actions they took to treat sick children aged 6 to 60 months responded as follows: took child to health center/dispensary, 31.1%; took child to a hospital or private doctor, 38.8%; purchased drugs over the counter (probably chloroquine), 25.7%; used traditional medicine, 0.0%; and no treatment, 4.4%. (Central Bureau of Statistics, 1980)

#### 4. NUTRITION STATUS CORRELATIONS

##### NATIONAL

**STUNTING AND DURATION OF BREAST FEEDING:** 26.2% of children aged 6 to 60 months surveyed and breast fed for less than 12 months were classified as stunted, compared to 38.2% of those breast fed for over 12 months. Wasting did not appear to be related to duration of breast feeding. (Central Bureau of Statistics, 1980)

**WEIGHT FOR HEIGHT AND SEX:** Among children aged 6-60 months there were clear differences in weight for height by age and sex. There were more wasted boys than girls in both urban and rural areas. (Central Bureau of Statistics, 1980)

##### RURAL

**BREAST FEEDING DURATION AND WEIGHT FOR AGE:** The 1977 national nutrition survey showed that children from families who cultivated land and were headed by an agriculturally employed person were breast fed five months longer, on average, than children from non-farming households whose head was employed mainly outside agriculture. Yet, the latter group of children had a statistically higher mean weight for age. Thus, in the rural areas the partial curbing of breast feeding accompanying withdrawal from agriculture appears not to engender a worse nutritional status. (Central Bureau of Statistics, 1979)

**BREAST FEEDING AND HEIGHT FOR AGE:** In the 1978-79 national Child Nutrition Survey, children breast fed longer than 12 months tended to be more stunted (low height for age) than those breast fed for shorter periods. (Central Bureau of Statistics, 1980)

**BREAST FEEDING AND HEIGHT FOR AGE:** The 1977 national nutrition survey found that among 12 to 24 month old children height for age was significantly less among children still nursing during this period than among those completely weaned. Nursing children in this age range received other foods less often than the non-nursing group. (Central Bureau of Statistics, 1979)

**SEX DIFFERENCES CORRELATES:** No substantial differences between the sexes were found for the total sample in the 1977 national rural Child Nutrition Survey by age, length of breast feeding, or frequency of consumption of any food group that might account for the male/female difference in nutritional status. (Central Bureau of Statistics, 1979)

**MALNUTRITION AND ETHNICITY:** The national nutrition survey found that Akamba children were the most frequently malnourished ethnic group. (Central Bureau of Statistics, 1979)

**MALNUTRITION AND WATER SOURCE AND DISTANCE:** Preschool children located near presumably impure water sources were more apt to be malnourished. Usually the proximity of water was associated with less PEM in the national survey, but children from households within one kilometer of a

#### 4. NUTRITION STATUS CORRELATIONS (Cont.)

still pool of water had a strikingly high rate of stunting and wasting. (Central Bureau of Statistics, 1979)

**MALNUTRITION AND CASH CROPS:** Households producing food partially or predominantly for sale generally had a lower incidence of malnutrition, according to the results of the national nutrition survey. However, in ecological zones 3 and 5, more preschool children were stunted in households growing than not growing sugar. In zone 5 the differences were very highly significant (61.5% vs. 34.4%) and may be due to the consumption of "hollow" sugarcane calories. (Central Bureau of Statistics, 1979)

**MALNUTRITION AND NUTRITIONAL KNOWLEDGE:** Women who were admitted with their malnourished children to Family Life Training Centers were found to have a relatively high level of nutritional knowledge; higher than the preschool health participants with whom they share a common economic background. (Hoorweg and Niemeijer, 1980)

**STUNTING AND WEANING FOOD:** Rural children aged 6 to 60 months who received a weaning porridge in which cassava was the main ingredient had the highest prevalence of wasting and stunting when compared with children receiving porridges based on maize only, millet only, maize and millet, bananas, or other ingredients. Children whose porridge was based on bananas had the highest rate of stunting. The group whose porridge was based on a combination of maize and millet or other ingredients had the lowest prevalence of stunting, and the highest proportion of nutritionally normal children. (Central Bureau of Statistics, 1980)

**MALNUTRITION AND BANANAS AND CASSAVA:** In the 1978-79 Child Nutrition Survey, children fed porridge in which bananas or cassava were one of the main ingredients tended to be more undernourished than children in the same areas who were fed porridge made from other ingredients. (Central Bureau of Statistics, 1980)

**WEIGHT FOR HEIGHT AND CEREAL CONSUMPTION:** In ecological zone 2 (Coffee West of Rift Valley), the national nutrition survey showed that more frequent cereal consumption was positively correlated with weight for height among preschool children. (Central Bureau of Statistics, 1979)

**SOCIO-ECONOMIC CORRELATES OF HEIGHT FOR AGE:** According to multivariate analysis of the 1977 national nutrition survey, the profile for children with a statistically higher rate of PEM (height for age) includes: the household cultivates land; dry season water source is neither a lake nor a still pool, but is less than 2km from the holding; the head of household is male; he is not employed in health/education/welfare, as an agricultural laborer, or in an urban occupation; the holding area is less than 5 hectares; 1 to 3 hectares were initially planted; and no cattle are on the holding. (Central Bureau of Statistics, 1979)

**HEIGHT FOR AGE, BANANAS, AND CASSAVA:** Discriminate analysis selected cassava and bananas as the foods best able to categorize children according to their height for age. Children in the lowest height for age category received bananas or cassava twice as often as those in the highest category. The frequency of consumption of bananas was positively correlated to cassava consumption and negatively correlated to cereal

consumption in ecological zone 3 (Upper Cotton West of Rift Valley). (Central Bureau of Statistics, 1979)

HEIGHT FOR AGE AND FARM SIZE OR CULTIVATED AREA: In ecological zones 3 and 4 there were significant but low positive correlations (.33 and .43 respectively) between the height for age of preschool children and holding area per household member for households without cattle or primary off-farm employment. Nearly all the sample children in the zone 3, no cattle, no off-farm employment category who had a height for age below 90% were found on holdings having less than .17 hectares per member. (Central Bureau of Statistics, 1979)

FEMALE HEAD OF HOUSEHOLD AND HEIGHT FOR AGE: There was less stunting among preschool children if a female was the head of the household, according to the national nutrition survey. This suggests an improved intrafamily distribution of food or utilization of existing resources. (Central Bureau of Statistics, 1979)

ENERGY INTAKE CORRELATES: In a study of dietary intakes of 167 children 0 to 3 years of age, energy intake was found to be significantly related to whether children received four or more meals per day ( $p=.006$ ), and whether (among the 18 to 23 month age group) children were breast fed ( $p=.01$ ). None of the socioeconomic or demographic variables showed clear associations with the intake variable. (Van Steenberg et al., 1980)

MALNUTRITION AND SOCIAL CLASS--KIGUMO DIVISION: Significant differences in nutritional status were found between children from different social classes. The percentage of children 6 to 59 months old falling below 80% of the Harvard weight for age mean was 40% among the "poor" households, 20% in the "intermediate" households, and 17% among "affluent" households. The average height for age values were 92%, 93.7%, and 95.7% of the mean, respectively, for poor, intermediate, and affluent households. (Hoorweg and Niemeijer, 1980)

MALNUTRITION AND FAMILY STAGE--KIGUMO DIVISION: Average height for age was higher and the percentage of children falling below the critical weight for age value was less among "elder" families (eldest child 17 or older) than among middle (eldest child less than 16 years) or young families (eldest child under 6 years), in a study of 300 households. (Hoorweg and Niemeijer, 1980)

WEIGHT FOR AGE AND ECOLOGICAL AREA--KIGUMO DIVISION: In the less fertile area studied in Kigumo Division, 36% of the 6 to 59 month old children fell below 80% of the Harvard weight for age mean, while in the more fertile area at higher altitude only 21% of the children fell below this level. No differences were found in height for age levels between the two areas. (Hoorweg and Niemeijer, 1980)

INCOME AND MALNUTRITION--MACHAKOS: Malnutrition, though not frequent in the Machakos Project area, was evenly spread in the poorer and richer sections, according to one study. This suggests that income was not critical in determining the child's diet or utilization of medical care services. (Kune, 1980)

#### 4. NUTRITION STATUS CORRELATIONS (Cont.)

**MORTALITY AND SOCIAL WELL-BEING--MACHAKOS:** In a complex multivariate analysis of mortality data from the Machakos Project area, it was found that children of unmarried mothers or whose fathers were not present, of mothers with the least education, and with the least hygienic conditions in their sleeping room were much more likely to die before their fifth birthday. In addition, the probability of finding a death of a child under five in a household increased with the number of under-fives present. Economic conditions of the households could not be shown to have a significant influence on child mortality. (Kune, 1980)

**ARM CIRCUMFERENCE AND WEIGHT FOR AGE--MACHAKOS:** Among 54 children 0-4 years old with "low" upper arm circumference (less than 12 cm. for a child over 6 months old), weight for age, expressed as a percentage of Harvard Standards, was distributed as follows: 30% weight/age, 4%; 40% weight/age, 8%; 50% weight/age, 23%; 60% weight/age, 34%; 70% weight/age, 21%; 80% weight/age, 10%; and 90% weight/age, 0. (Blankhart et al., 1977)

**SKINFOLD AND ASCARIS INFECTION--MACHAKOS:** Multiple regression analysis of longitudinal data from an intervention study showed that Ascaris infection was by far the most important variable of those studied in explaining the decrease in skinfold thickness before and increase after deworming. (Stephenson et al., 1980)

## 5. NUTRITION AND HEALTH POLICIES AND PROGRAMS

### 5.1 NUTRITION AND HEALTH POLICIES AND PROGRAMS, POLICIES

#### NATIONAL

**FOOD AND NUTRITION ACTIVITIES:** Until the 1979-1983 Development Plan, food and nutrition activities in Kenya had been part of the responsibilities of many organizations and agencies. During this Plan the Government will attempt to integrate food and nutrition considerations into overall national policy. (Ministry of Health, 1978)

**FOOD AND NUTRITION PLANNING UNIT:** During the 1979-1983 Five Year Plan period, a Food and Nutrition Planning unit will be established within the Ministry of Economic Planning and Community Affairs. It will be responsible for the overall coordination of food and nutrition related policies and programs of all Ministries and non-government agencies. An Inter-Ministerial Co-ordinating Committee will also be established with representatives from all relevant Ministries and agencies. (Ministry of Health, 1978)

**INTER-MINISTERIAL NUTRITION GROUP:** The Ministry of Economic Planning and Community Affairs coordinates an inter-ministerial nutrition group. However, it meets infrequently and appears to lack technical direction. (Israel, 1981)

**NUTRITION PLANNING:** Under the 1979-1983 Development Plan, the Ministries of Agriculture and Health will each have a full-time planning office responsible for nutrition planning. Other relevant Ministries will also assign responsibility for assessing nutrition implications in formulation of their development projects. (Ministry of Health, 1978)

**NUTRITION REHABILITATION:** Kenya does not have a national nutrition rehabilitation program or a nutrition council, although there is a nutrition department within the Ministry of Health. There are locally based nutrition rehabilitation programs organized by private organizations such as the Red Cross and by churches. (Amolo, 1979)

**CODE OF MARKETING OF BREAST MILK SUBSTITUTES:** The Government adopted a national code of marketing of breast milk substitutes in April 1981. (WHO, 1982)

**MARKETING OF BREAST MILK SUBSTITUTES POLICY:** Kenya developed and published its own "Code of Ethics for the Marketing of Infant Formula and Other Products Intended for Use as Breast Milk Substitutes" prior to the passage of the WHO code. The Code's provisions are less specific than the WHO code, and less explicit attention is drawn to the dangers of using breast milk substitutes in situations of poverty, poor sanitation, and illiteracy. (Israel, 1981)

**FORMULA MARKETING:** The Ministry of Health is responsible for the implementation of the Kenya Code for the Marketing of Breast Milk Substitutes. (Ministry of Health, 1983)

## 5.1 NUTRITION AND HEALTH POLICIES AND PROGRAMS, POLICIES (Cont.)

**SUPPORT FOR BREAST FEEDING:** The Director of Medical Services of the Ministry of Health has issued a directive to all medical personnel and staff of religious agencies, specifying actions to be taken to support appropriate breast feeding practices, especially at the time of birth. Guidelines include restrictions on use of prelacteal feeds and posters and samples provided by manufacturers, initiation of breast feeding immediately after delivery, provision for rooming-in, and scheduling maternity ward timetables for the convenience of mothers rather than staff. (Koinange, 1983)

**FORMULA ADVERTISING:** Advertising of breast milk substitutes was officially banned in 1974, but it still takes place extensively through posters, calendars, educational materials, and free infant formula samples. Despite the Marketing Code, the practice of giving mothers commercial gift-packs in hospitals continues. (Ministry of Health, 1983)

**IMPORT DUTIES ON INFANT FORMULA:** Import duties on infant formula were lifted by the Government in 1981. (WHO, 1982)

**IODIZATION OF SALT:** Legislation requiring iodization of salt has been drafted and should shortly be enacted to enforce this requirement. Karen College of Nutrition will monitor the process of iodization. (Ministry of Health, 1978)

**HEALTH EXPENDITURES:** In 1978, \$5.00 (1975) was spent per capita for central government health expenditures. \$4.00 per capita was spent in 1972. (World Bank, 1981)

**PRICE CONTROL POLICY:** The Government's revised price control policy will cover about 41% of the urban poor's expenditure. (Ministry of Health, 1978)

## 5.2 NUTRITION AND HEALTH POLICIES AND PROGRAMS, PROGRAMS

### NATIONAL

**NUTRITION EXPENDITURES--1979-1983:** The total expenditure for direct nutrition intervention programs within the Ministries of Agriculture, Health, and Housing and Social Services over the Five Year Development Plan 1979-1983 period is estimated to be KSh4,531,271 of which KSh1,163,250 constitutes the capital budget and KSh3,368,021 is the recurrent cost associated with these nutrition programs. (Ministry of Health, 1978)

**MINISTRY OF HEALTH--KAREN COLLEGE OF NUTRITION:** Karen College of Nutrition is supervised by the Ministry of Health. Their role in preventing malnutrition will be enlarged during the 1979 to 1983 Five Year Plan through the construction of Malnutrition Rehabilitation Units. (Ministry of Health, 1978)

**NUTRITION FIELD WORKERS TRAINING--KAREN COLLEGE:** Karen College of Nutrition, under the Ministry of Health, has had the responsibility of training Nutrition Field Workers (NFW) for all government hospitals and health centers. Since 1967 it has trained 440 NFWs. (Karen College Staff, 1981)

**NUTRITION FIELD WORKERS (NFW):** NFWs are enrolled nurses who have received extra nutrition training. The majority are stationed at health centers and at regional hospitals. Their primary task is to give nutrition information to mothers of young children through maternal and child health services. The target group of the program consists of all children, the main intervention consists of nutrition education, and the frequency of contact is irregular. (Hoorweg et al., 1981)

**MINISTRY OF HOUSING AND SOCIAL SERVICES--PRESCHOOL FEEDING PROGRAM:** The Ministry of Housing and Social Services manages the Preschool Feeding Program in arid and semi-arid areas, covering Garissa, Wajir, Mandera, Marsabit, Isiolo, Lamu, and Tan River. During the 1979-1983 Five Year Plan, the coverage will be expanded to Turkama, Samburu, West Pokot, Elgeyo Marakwet, and Baringo. (Ministry of Health, 1978)

**CATHOLIC RELIEF SERVICES:** Catholic Relief Services runs a Pre-School Health supplementary food program at more than 100 health facilities. The target group is children from poor families. Mothers bring their children to the facility every month for weighing and receive nutrition and health education as well as the food rations. The food supplementation and nutrition instruction are the main intervention, and there is regular contact over a period of several years. (Hoorweg et al., 1981)

**PRESCHOOL HEALTH PROGRAM--FOOD RATIONS:** In 1979 there were approximately 135 clinics in Kenya with a total of 45,000 children enrolled in the Pre-School Health program (30 clinics with 17,500 children in the Central Province). Participation in the CRS-sponsored program is restricted to children 6 to 60 months of age. Mother and child are required to attend once a month on a fixed day. Children's weights are taken and some individual advice may be given. A lecture-demonstration is given regularly. The food ration distributed consists of several pounds of bulgur wheat, corn-soya mixture, or dried skimmed milk, and oil. (Hoorweg and Niemeijer, 1980)

**MINISTRY OF HOUSING AND SOCIAL SERVICES--FAMILY LIFE TRAINING PROGRAM:** The Family Life Training Program of the Ministry of Housing and Social Services aims at preventing malnutrition and poor health among children by giving mothers instruction in preventive health measures. The program treats malnourished children at Family Life Training Centres (FLTCs) by providing a high protein diet. Ten new FLTCs will be established in districts with a high incidence of malnutrition. (Ministry of Health, 1978)

**FAMILY LIFE TRAINING CENTRES (FLTC):** The Family Life Training Centres resemble nutrition rehabilitation centers in that malnourished children with their mothers and siblings are admitted for a period of three weeks. During their stay, mothers receive nutrition instruction which is immediately applied at the center when preparing meals for their children. The principal interventions are rehabilitation of the child and nutrition education for the mother. Contact is limited to the three-week period. (Hoorweg et al., 1981)

**FAMILY LIFE TRAINING (FLT) CENTERS:** By 1980 there were nine FLT centers in operation that have provided special food and training for 3,000 mothers and 8,000 children. (Baumslag, 1980)

## 5.2 NUTRITION AND HEALTH POLICIES AND PROGRAMS, PROGRAMS (Cont.)

**FAMILY LIFE TRAINING CENTERS:** In 1978 seven Family Life Training Centers (nutrition rehabilitation centers) were in operation with 1634 mothers and 2636 children admitted. Women attending centers in Western Kenya were relatively young and many were pregnant, while in Central Province relatively more women were not, or no longer, married and had little or no land. (Hoorweg and Niemeijer, 1980)

**KENYA INSTITUTE OF EDUCATION (KIE):** The Kenya Institute of Education has developed national level nutrition education materials. The KIE has produced a series of radio scripts to teach nutrition to primary school teachers. (Israel, 1981)

**INTEGRATED RURAL HEALTH AND FAMILY PLANNING PROGRAM:** In an attempt to fulfill the objective of "health for all by the year 2000," the Ministry of Health has developed the Integrated Rural Health and Family Planning Program. A major emphasis is being given to on-the-job training to strengthen management skills, particularly those of district health managers. (Kanani, 1982)

**NUTRITION INTERVENTION RESEARCH PROJECT (NIRP):** A comprehensive evaluation of child nutrition programs has been carried out in Central Province by the Nutrition Intervention Research Project. The comparative study covered not only the nutritional status of the children but also included the knowledge, attitudes, and dietary practices of mothers with respect to child nutrition. In addition to the two basic nutrition studies, other prior and supportive studies were conducted. (Hoorweg and Niemeyer, 1980)

**AFRICAN MEDICAL AND RESEARCH FOUNDATION--KIBWEZI RURAL HEALTH SCHEME:** In 1978 the AMREF-coordinated Kibwezi Rural Health Scheme in the Makindu Division of Machakos District was begun. Donors include the Kenya Government, Norwegian Church Aid, Switzerland, CIDA, and USAID. The goal is to implement a low cost comprehensive rural health system for the area which will serve as a model for health care in similar rural areas. A major feature of the project is the encouragement of community participation through the selection of local people for training as Community Health Workers (CHW). Baseline surveys on health-related practices and attitudes have been done. Training of CHWs and refresher training for existing health staff have begun. (AMREF, 1979)

**MACHAKOS PROJECT STUDIES:** The Machakos District, about 80 kilometers east of Nairobi, was studied in detail in order to assess accurately the malnutrition problem in the area and the effects of various interventions on children's health. Sponsors included AMREF and the Royal Tropical Institute, Amsterdam. This longitudinal study began in 1972; findings have been presented in many journal articles. The subtitle of the Project is "agents affecting health of mother and child in a rural area of Kenya." (Van Steenberg et al., 1978)

**NUTRITION REHABILITATION--MACHAKOS:** The method of rehabilitation used in the nutritional component of the Machakos project varied according to socioeconomic status. All children referred because of low upper arm circumference were visited by a nutritionist. If the family appeared to be relatively well-off, advice and nutrition education were offered, and

demonstrations using locally available food were given. If the family appeared to be very poor, supplementary food consisting of dried skimmed milk and beans was provided free of charge, at intervals that depended on the progress of the child. The results of the rehabilitation program showed that malnourished children from relatively well-off families had better growth velocity during rehabilitation than children from poor families. Younger children had a more satisfactory rehabilitation rate than older children, and children with a relatively large weight deficit had better growth velocity during rehabilitation than children with smaller weight deficits. (Blankhart et al., 1977)

**KENYAN NATIONAL COUNCIL OF WOMEN:** The Kenyan National Council of Women, in collaboration with the World Health Organization, is testing a set of guidelines for use by national women's organizations and other groups to support their efforts in carrying out surveys of factors affecting women's breast feeding, reviewing existing social support measures, and assessing the types of new measures which may be required. (WHO, 1980)

**BREAST FEEDING WORKSHOP:** WHO and UNICEF organized a regional workshop on the social and economic aspects of breast feeding in Nairobi in late 1980. (WHO, 1982)

**BREAST FEEDING SURVEILLANCE SYSTEM:** The Central Bureau of Statistics, in cooperation with UNICEF and WHO, is developing a breast feeding surveillance system. (WHO, 1980)

**BREAST FEEDING INFORMATION GROUP:** The Nairobi Breastfeeding Information Group, a local group, promotes breast feeding practices at Kawangware Health Center as part of a family planning project sponsored by Family Planning International Assistance. (U.S.A.I.D., 1982a)

**BREAST FEEDING EDUCATIONAL MATERIALS:** The Breastfeeding Information Group has published a series of educational materials including posters, pamphlets, articles, fliers, and slide shows. The group has appeared on TV and radio shows and has produced teaching posters done by hand to fit particular hospitals and clinics. (Armstrong, 1982)

**VOLUNTARY AGENCIES:** Catholic Relief Service, Kenya Freedom from Hunger, and Kenya Red Cross Society are voluntary agencies conducting nutrition education and feeding programs. (Ministry of Health, 1978)

**NURSING MOTHERS' INTERNATIONAL WORKSHOP:** The World Health Organization provided financial support for participants from Kenya to attend a nursing mothers' international workshop organized in Sydney in March 1981 by the Nursing Mothers' Association of Australia for organizations in Africa, South-East Asia, and the Western Pacific. The main purpose of the workshop was to foster breast feeding by providing a forum for voluntary self-help associations of nursing mothers of the three regions. (WHO, 1980)

## 5.2 NUTRITION AND HEALTH POLICIES AND PROGRAMS, PROGRAMS (Cont.)

### URBAN

**USAID INFANT FEEDING PRACTICES STUDY:** A study of infant feeding practices among urban poor in four developing countries (Colombia, Kenya, Indonesia, and Thailand) is being conducted under USAID contract by a Research Consortium consisting of the Population Council, Columbia University's Center for Population and Family Health, and Cornell University's Division of Nutritional Sciences. All work in Kenya is being planned and executed in collaboration with the Central Bureau of Statistics and the African Medical and Research Foundation. The purpose of the study is to investigate the impact of a broad range of biological, social, and economic factors on infant feeding practices in order to determine the nature and magnitude of their contribution to problems of infant nutrition. (Laukaran et al., 1981)

**INFANT FEEDING PRACTICES STUDY:** The United States Agency for International Development, Washington, has funded an urban study in Nairobi that examines infant feeding practices (e.g. breast milk substitutes and weaning foods). The United States contractor is a consortium of institutions consisting of the Population Council, Cornell University, and Columbia University. The Kenyan subcontractors, the Central Bureau of Statistics (CBS), and the African Medical Research Foundation, have received \$54,000 in FY 1982. The major components of the study are: 1) an ethnographic analysis of anthropological data collected across ethnic groups; 2) a marketing survey of sales, distribution, and promotional activities; 3) an analysis of the medical infrastructure that examines practitioner attitudes and health and nutrition facility practices; and 4) a cross-sectional survey of the practices and attitudes of 1,000 women who have given birth in the last 18 months. (U.S.A.I.D., 1982a)

**INFANT FEEDING:** The findings of the Infant Feeding Practices Study, although not yet officially released, have been used as the basis for workshops in Nairobi for policymakers. New activities were identified which would utilize the research organizations with government agencies and other national organizations to further effective policy and programs. Data cover themes such as constraints faced by women of lower socioeconomic status in the care of their infants, the effects of women's roles and status on their decisions regarding child care, effects of health care services and structure on mothers' choices of feeding and child care, the impact of modernization such as marketing of infant foods, effects of health promotion activities, and the relation between feeding patterns and child health and growth. (Population Council, 1983)

## 6. COMMENTARIES

### NATIONAL

**MALNUTRITION--MALE/FEMALE DIFFERENCES:** The 1977 national survey finding that girls 12 to 48 months of age were worse off nutritionally than boys was not found to hold in the more recent 1978-79 survey. The difference between surveys is probably due to the fact that in 1977 the Harvard standards for both sexes combined were used, whereas in 1978-79 separate reference data were used for boys and girls. The latter survey is probably more reliable because the use of separate standards takes into account the difference in growth potential of the two sexes. (Central Bureau of Statistics, 1980)

**NUTRITION RECOMMENDATIONS:** The participants of a USAID-sponsored maternal and infant nutrition workshop in May 1981 developed a set of Policy and Program Recommendations that were presented to the Ministry of Health. Their concerns included: 1) improved rooming-in facilities; 2) the trend toward bottle feeding; 3) need for more coordinated promotion of breast feeding; 4) need to revise the Kenya Code of Marketing of Breast Milk Substitutes to make it more consistent with the spirit and content of the WHO Code; 5) need for locally produced processed weaning foods; 6) desire to ban all advertising of weaning foods; 7) administrative support for nutrition field workers; 8) potential of primary school teachers to act as nutrition "change agents"; 9) more research on maternal nutrition issues; and 10) need for suitable weaning food recipes for specific areas of the country. (Israel, 1981)

**NUTRITION EDUCATION:** The Kenya National Workshop on Infant Feeding Practices recommended that future educational programs targeted at improving maternal and infant feeding practices take issue with the following problems in particular: mass ignorance, antenatal and postnatal maternal feeding problems, diarrheal infections, health care systems, marketing practices, and support systems for working women. (Ministry of Health, 1983)

**NUTRITION EDUCATION:** Many ongoing public nutrition education programs have been criticized on the grounds that they are ineffective in promoting appropriate breast feeding and maternal and infant feeding practices, and give confusing or inconsistent information. The programs in question were the following: the Maternal and Child Health programme (Ministry of Health); the Family Life Training Programme (Ministry of Culture and Social Services); the Preschool Feeding Programme (Ministry of Basic Education); the Home Economics Extension Services (Ministry of Agriculture); the Educational Media Service and School Curriculum Radio Programme (Ministries of Basic and Higher Education); "Femine Touch" and "Akina Mama" (Ministry of Information and Broadcasting); programmes of the Family Association of Kenya, and educational activities of the Breastfeeding Information Group. (Ministry of Health, 1983)

**FEEDING PRACTICES TRENDS:** Participants in the Nyeri Workshop noted that the prevalence of traditional feeding practices in Kenya has declined and that health workers and health institutions are the source of certain

## 6. COMMENTARIES (Cont.)

negative influences. "Current knowledge" is not widely used to improve feeding practices. (Ministry of Health, 1983)

**BREAST FEEDING PROMOTION:** There is inadequate support for breast feeding practices by health institutions and health personnel, and there is a need for the promotion of breast feeding, and for education about proper diets for pregnant and lactating women. Support for breast feeding is particularly lacking in urban areas. (Ministry of Health, 1983)

**BREAST FEEDING AND WORKING MOTHERS:** Most women in wage employment cannot breast feed their infants exclusively for the recommended four to six months because of difficulties related to the prolonged daily separation from their infants. Alterations in existing labor legislation have been recommended. (Ministry of Health, 1983)

**EVALUATION OF NUTRITION FIELD WORKER PROGRAMS:** Frequent visitors to MCH clinics with Nutrition Field Workers, as compared to infrequent visitors, appeared to have more knowledge of the need to start supplementing a young child's diet at an early age, as well as the need to keep the child on its own type of diet for a relatively long time. However, the centers appear to have little or no impact on either the nutritional attitudes and behavior of the mothers or the nutritional status of their children. The relative ineffectiveness of the program suggests that the current goal of reaching all mothers with nutrition education at the MCH clinics should be reassessed. Activities should be targeted on groups of greatest risk which would require a better record keeping system. (Hoorweg and Niemeijer, 1980)

**CRITIQUE OF THE KAREN COLLEGE NUTRITION PROGRAM:** The nine-month nutrition program for enrolled nurses at Karen College was thought by several people interviewed to be too long and inappropriately focused upon home economics rather than clinical nutrition. The requirement of a nursing degree was also questioned. (Baumslag, 1980)

**TRAINING FOR NUTRITION WORKERS:** An evaluation of some nutrition training materials suggested that more emphasis should be placed on the "Road to Health Chart" and maternal nutrition and health. Information on the use of gas stoves was thought to be impractical because three-stone fires are most commonly used. Nutrition field workers were found not to be well prepared for community work and are expected to do mainly hospital and clinic work rather than follow up and home visiting. (Baumslag, 1980)

## RURAL

**IMPLICATIONS FOR NUTRITION EDUCATION:** Most of the conclusions of the 1977 national rural Child Nutrition Survey with implications for nutrition education fall under three categories: 1) male/female discrepancies; 2) weaning practices; and 3) feeding patterns. (Central Bureau of Statistics, 1979)

**MALNUTRITION--MALE/FEMALE DIFFERENCES:** Although females one to four years of age were more likely to be malnourished than corresponding males, females were breast fed just as long as males and were given various types of foods with the same frequency. It is likely the

quantities were less, although the national nutrition survey did not measure actual intakes. (Central Bureau of Statistics, 1979)

**MIDARM CIRCUMFERENCE:** Analysis of two large surveys (Central Bureau of Statistics, 1977 and MRC, 1976) indicate that midarm circumference (MAC) may be useful for monitoring emergencies if other measures are not feasible, for initial screening at clinics, or for determining fat and protein stores in the body when combined with triceps skin fold thickness. However, MAC does not correlate highly with weight for height (WH) or weight for age (WA) ( $r^2 = .25-.35$ ). Half of the children having a WA below 60% had a MAC above 11 cms, and four out of five children who were below 11 cms in MAC were above 60% of WA. The extensive analysis indicates the limitation of using MAC in isolation from other nutrition data. (Central Bureau of Statistics, 1979)

**NUTRITION EDUCATION BASED ON FOOD PREFERENCES:** In general, nutrition education among the Kikuyu can safely be based on the common nutritional classification of foods. Based on paired comparisons of foods, nutrition education among these women should emphasize foods of high caloric value such as maize flour, millet flour, and rice, rather than the previous stress on high protein foods. (Hoorweg and Niemeyer, 1980)

**SEASONAL VARIATION IN MILK YIELD:** The reasons for the significant differences in milk yields among Akamba mothers between the harvest and lean seasons are not clear. The differences imply either a reduced capacity for lactation (due to maternal diet or nutritional status) or an over-representation of less vigorously suckling infants in the lean season, or both. The relatively good nutritional status of lactating women and the relatively low percentage of low birth weight babies tend to weaken both alternatives. Further investigations within the longitudinal Pregnancy Study may increase our understanding of this issue. (Van Steenbergen et al., 1981)

**RECOMMENDATIONS FOR DIETARY IMPROVEMENTS:** In the Machakos Project area, the recommendations for improving growth and nutritional status of the 0 to 3 year old children are: 1) safeguard the habit of prolonged breast feeding; 2) modify the watery gruels into higher caloric density porridges; 3) introduce ugali (common family hard maize porridge) with milk or stew from 9 months age onward; and 4) frequency of feeding should be 4 or more times per day. (Van Steenbergen et al., 1980)

**NUTRITION EDUCATION--FOOD UTILIZATION:** It may be beneficial to disseminate information on the undesirability of foods with a low protein calorie to total calorie ratio, or having little energy for their bulk, particularly in ecological zone 3. However, the unavailability of nutritious foods may overshadow issues of utilization and hinder education efforts. Agricultural and rural development policies are needed as well. (Central Bureau of Statistics, 1979)

**SUGGESTIONS FOR NUTRITION EDUCATION:** Based on the precise assessment of Akamba infant and young toddler diets, it is suggested that the quantity of energy intake be increased in the 7 to 18 month old period. This could be achieved by a thicker porridge with an addition of fat and by an earlier introduction of the ngima dish. (Van Steenbergen et al., 1978)

## 6. COMMENTARIES (Cont.)

**CALORIES AS LIMITING FACTOR:** Studies of children's dietary intakes in both Machakos District, Eastern Province, and Kigumo Division, Central Province, suggest that cereal based diets (certainly when supplemented with milk and beans) contain sufficient amounts of protein and that energy intake is the limiting factor in children's diet. (Hoorweg and Niemeijer, 1980)

**NUTRITION ACTIVITIES IN CENTRAL PROVINCE:** A seminar based on the research efforts of the Nutrition Intervention Research Project concluded that malnutrition in Central Province has a strong socioeconomic background and that child nutrition has to be regarded as one aspect of the larger problem of development in general. The task facing nutrition programs in Central Province is not so much to improve knowledge and attitudes of mothers but to find ways to help them improve their living conditions. (Hoorweg and Niemeijer, 1980)

**EVALUATION OF THE PRE-SCHOOL HEALTH PROGRAM:** A study of three clinics with Pre-School Health Programs found that the CRS policy of targeting the most needy families was apparently being followed. In a comparison of long-time participants and recent entrants, long-time mothers showed certain gains in nutritional knowledge and attitudes but did not show differences in their actual behavior, i.e. what they gave their children to eat, excluding the use of food rations. In terms of nutritional status, the study's general conclusion was that children once enrolled in the program continued to grow at the level at which they were admitted. Socioeconomic conditions are seen as the limiting factor, and the strength of the program lies primarily with the food distribution. (Hoorweg and Niemeijer, 1980)

**EVALUATION OF FAMILY LIFE TRAINING CENTERS:** An evaluation study conducted at three Central Province Family Life Training (FLT) Centers showed that nutritional knowledge levels among participants were relatively high and remained so 6 months after the 3-week course at the FLT centers. Food preferences showed an improvement; at discharge women chose highly nutritious foods more often and this was sustained over time. However, only half the women at best understood the causes of malnutrition or the three food groups. The FLT mothers were characterized by general lack of resources, high marital instability, and a low level of education. During the stay the index children had an average weight gain of 200 grams, with older (2 years or older) children gaining the most; and infants under 12 months showed no average weight gain. At six month follow-up the nutritional status of infants had not improved, but had in fact showed a decline similar to infants in the general population. Children 2 years and older also showed no improvement over their levels at admission to the FLT centers. The one year olds, however, did show improvements in weight for height and weight for age, although no catch-up in height for age was seen. These unimpressive results are in line with the causes of malnutrition in Central Province and may not be generalizable to other areas. Women and children return to the same conditions of poverty and marital instability that precipitated the problem in the first place. (Hoorweg and Niemeijer, 1980)

## URBAN

ROLE OF RESEARCH: The urban poor participants in the Infant Feeding Practices Study around Nairobi felt very unsympathetic to the idea of "research." The Kibera location had often been studied, but the residents had seen no improvement in their living conditions. they wanted action and felt research would not help them. (AMREF, 1982)

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This study highlights the magnitude of malnutrition in Kenya. It focuses in particular on the nutritional problems of Nyanza province, which is largely populated by Luo people. The nutritional problems of Luo children are seen as a consequence of changes in land utilization and child-rearing practices that occurred in response to contact with western civilization. The author concludes that the government should allocate efforts to combatting malnutrition.

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- 1982 A Report for the Infant Feeding Consortium: Phase One. (The Population Council, Columbia University - Center for Population and Family Health, Cornell University - Division of Nutritional Sciences) Nairobi, Kenya: AMREF, October.

Original data

Method: three sources of data for this cross-sectional study: written data sources, participant observation, and informal interviewing; a small gift was given to each mother at the end of the contact.

Sample: 64 currently breast feeding mothers; 44 were Kikuyu and 20 were Luo mothers (the two most influential ethnic groups); 35 mothers were from the low class villages, and 29 were from the three middle class estates.

Location: six urban poor villages and three middle class urban estates in the Kibera section of the Kibera-Woodley location, Kibera Division of Nairobi (approximately 7 km southwest of the Nairobi City Center).

This document presents a detailed report on the first phase of the Infant Feeding Practices Study, the ethnographic component. The report consists of a summary of the study methods, six case studies, an overview of infant feeding practices, a review of the factors influencing these patterns, and conclusions and recommendations. It offers interesting insight into the difficulties of such research efforts. Details of the life conditions and practices of both the poor urban villages and the relatively well-off middle class estates are presented.

AMREF

- 1979 African Medical and Research Foundation Annual Report, 1979. Nairobi, Kenya: African Medical and Research Foundation.

This Annual Report briefly reviews the various activities and on-going projects being conducted by the African Medical and Research Foundation. Several programs in Kenya are discussed. More information is available on request.

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Anonymous

- 1980 Fertility in Kenya: high and rising. AFYA, 14:170-72.

This brief article reviews recent information on the fertility rate in Kenya. The high fertility rate is a focus of government concern. The rate appears to be rising and official family planning programs do not seem very effective. Preliminary data from the Kenya Fertility Survey are discussed.

Armstrong, H.

- 1982 Personal communication to INCS.

This letter to the International Nutrition Communication Service Clearinghouse briefly describes the breast feeding education materials that the Breastfeeding Information Group in Kenya have produced and distributed. It mentions some of the other activities of the group as well. Copies of some of the materials are now housed in the Clearinghouse.

Baumslag, N.

- 1980 Kenya Field Trip, October 1980: Observations and recommendations. (In Mothers and Children--Nutrition and Health Care in Kenya, Zimbabwe, Mozambique, and Botswana. Baumslag, N.)

This brief report summarizes the author's observations and recommendations on nutrition activities during her August 1980 visit.

Blankhart, D. M., Latham, M. C., and Schulpen, T. W. J.

- 1977 Low Arm Circumference Reporting and Nutrition Rehabilitation of Under Fives. Environmental Child Health February, pp. 8-11.

Original data

Method: This article describes the use of upper arm circumference measurements for casefinding and evaluation of home rehabilitation programs for under fives. Homes were visited on a fortnightly basis, and upper arm circumference measurements were taken. Children were also checked for the presence of edema. If the upper arm circumference for a child aged 6 months or more was less than 12 cm. or showed a reduction of 1.5 cm. since the previous visit or if edema was present, the child was reported to the project nutritionist. Field workers were subsequently sent to the home to record further anthropometric measurements and to compile dietetic histories.

Sample: approximately 4,000 children under 5 years of age.

Location: Machakos District, approximately 80 km. from Nairobi.

Of 91 children reported between September 1974 and May 1975, 54 were followed at home. Detailed follow-up information was available for 34 children. Of these 82% showed satisfactory or good growth velocity during rehabilitation. The authors concluded that the use of upper arm circumference measurements together with checks for the presence

or absence of edema has potential as a technique for case-finding because it can be carried out by health workers with minimal training.

Bwibo, N. O. and Ondijo, S. O.

- 1981 Composition of human breast milk in Kenyan women. East African Medical Journal, 58(7):510-14.

Original data

Method: cross-sectional study in March and April 1980; a 5 to 10 ml milk sample was collected by manual expression in the morning from each woman while she waited in the clinic; analyses were done by standard biochemical methods

Sample: 35 healthy women

Location: Well-baby clinic at Kenyatta National Hospital

This paper presents the results of an analysis of the lactose, protein, and calcium contents of human milk in the study sample and compares the findings with those from previous research. One possible explanation for the somewhat lower quantities found in this study may be the one-time method of milk collection without clarifying whether it is fore or hind milk.

Central Bureau of Statistics, Ministry of Economic and Planning Development

- 1980 Report of the Child Nutrition Survey 1978/79. Nairobi, Kenya: Central Bureau of Statistics, Ministry of Economic Planning and Development, Republic of Kenya.

Original data

Method: cross sectional national nutrition status survey. November 1978 to January 1979; weights and heights of children; maternal interviews on child's age, food consumption, and health.

Sample: a stratified sample, based on population density, of 3523 children 6 to 60 months old

Location: all parts of Kenya, except North Eastern province, the northern part of Rift Valley Province and parts of some other arid areas.

This document reports the results of the second national survey of the nutritional status of young children carried out between 1978 and January 1979. Like the previous nutrition survey, this survey was treated as part of the Integrated Rural Survey (IRS) series and used the sample respondents of the IRS phase IV. Provincial level data are presented. A later report will present nutritional correlates in a more disaggregated fashion. The results are compared to the first national survey conducted in early 1977. Methodological differences are pointed out and specific comparisons are presented. There appeared to be a slight overall improvement in nutritional status, and differences between provinces were less marked than in the first survey.

## BIBLIOGRAPHY (Cont.)

Central Bureau of Statistics, Ministry of Economic Planning and Community Affairs

1979 Child Nutrition in Rural Kenya. Nairobi, Kenya: UNICEF.

Original data

Method: cross-sectional anthropometric nutrition survey as part of the Second Integrated Rural Survey (IRS-II) in February and March 1977; stratified random sample in 29 districts; national coverage excluding arid northern regions and most partoralists; weight, height, and arm circumference; interviews; comparisons with larger IRS II data base  
Sample: 1372 one to four year old children of rural smallholders  
Location: all parts of Kenya, except North Eastern province, the northern part of Rift Valley Province and parts of some other arid areas.

This monograph presents the findings of the first national nutrition survey, examining the data as it applies to prevalent assumptions about the relationships between malnutrition and "agro-socio-economic variables." The findings of this survey were also used as the basis upon which the 1978 survey was designed. Separate sections describe the data on nutrition status, food intake, and socioeconomic variables. The data also were analysed for their relevance to classifying children's nutrition status. Appendices provide sampling cluster and zone maps, and the quantitative methods used.

Chambers, R., Longhurst, R., Bradley, D., and Feachem, R.

1979 Seasonal Dimensions to Rural Poverty: Analysis and Practical Implications. Brighton, England: Institute of Development Studies at the University of Sussex.

This report summarizes the proceedings of a conference on the seasonal dimensions of rural poverty, which included presentations on climate, energy balance, vital events, individual tropical diseases, nutrition, rural economy, and women. The case studies were drawn from the rural areas of the Gambia, Nigeria, Mali, Kenya, Tanzania, India, and Bangladesh. Evidence from the disciplines mentioned above suggests that the wet season is the time of greatest hardship for rural people due to food shortage, disease, high demand for work, and indebtedness. The authors of the report conclude that seasonal analysis, frequently overlooked, should be included in rural planning.

Dodd, D. A. and Smith, N. M.

1982 The International Breast-feeding Compendium, Volume 2, 1982. Columbus, Ohio: Ross Laboratories.

This document reports on over 400 scientific articles on the prevalence and duration of breast feeding in 83 countries throughout the world, presented in tabular form and arranged by country and region. Principal resources were national nutrition and fertility studies, the World Health Organization Collaborative Study, published articles, papers from conferences, and papers prepared by research organizations.

- 1977 The Fourth World Food Survey. Rome: Food and Agriculture Organization of the United Nations. FAO Statistics Series No. 11; FAO Food and Nutrition Series No. 10.

This survey, part of the FAO's continuous work in assessing the world food situation, is based on the best data available. Most data presented in this report are aggregated by continent or by development categories. National data are given for agriculture and food production, and for calorie and protein supplies per capita. Calculations are made of the per capita calorie requirement for each nation and for the "critical limit" of calorie intake (set at 1.2 times the estimated Basal Metabolic Rate) below which an individual is nearly certain to be calorie deficient.

Hoorweg, J., Niemeijer, R., and Van Steenberghe, W.

- 1981 Findings of the Nutrition Intervention Research Project. NIRP Report No. 15. Leiden, the Netherlands: African Studies Centre.

Original data

Method: three quasi-experimental research designs of three nutrition intervention programs--Nutrition Field Workers Program, Family Life Training Centres, and Preschool Health Centres; background surveys on the food habits and nutritional status of young children; questionnaire on nutrition knowledge, maternal food preferences, one day dietary recall, and anthropometry

Sample: Kikuyu ethnic group

Location: three ecologically different areas of the Central Province

Between 1976 and 1979 a team from the African Studies Centre studied three child nutrition programs in Kenya: 1) Nutrition Field Workers Program (Ministry of Health), 2) Family Life Training Centres (Ministries of Housing and Social Services), and 3) the non-governmental Preschool Health Program (Catholic Relief Service). This report contains a brief account of a seminar held at the Medical Research Centre, Nairobi, January 8-9, 1981 in which the objectives, the outline, and general findings of the overall Nutrition Intervention Research Project were presented.

Hoorweg, J. and Niemeijer, R.

- 1980 Preliminary studies on some aspects of Kikuyu food habits. Ecology of Food and Nutrition 9:139-150.

Original data

Method: 4 studies: 1) exhaustive list of regional foods generated; 2) classification of foods by groups by local respondents; 3) food preference comparisons by mothers for 2 year olds; and 4) specific food preference comparisons of food groups for same population

Sample: Kikuyu tribe respondents; mothers from three areas; study 2-180 respondents; study 3-480 respondents; study 4-240 respondents  
Location: Kiambu (district capital) and Kambaa village, 50 km from

## BIBLIOGRAPHY (Cont.)

Nairobi, Kiambu District; Kigumo village, Muranga District, Central Province

This paper presents some studies conducted prior to the comprehensive evaluation of child nutrition programs in Central Province that deal with foods, food classification, and food preferences of the Kikuyu, the tribe living in the area. A general description of the Kikuyu household, kitchen, and foods is given and results from four studies presented. Through a series of studies using paired comparisons, this report shows that maternal food preferences can be measured. The results of mothers' preferences for their children's diet are presented and discussed in terms of their relevance to nutrition education and research. The most common foods are listed and their popularity compared.

Israel, R.

- 1981 Consultant report for Kenya, May 18-28, 1981. International Nutrition Communication Service. Newton, MA: Education Development Center.

This INCS consultant report summarizes the findings of a recent national nutrition survey and other nutrition projects, and recent national efforts in the health and nutrition sectors. It also contains a brief discussion of the workshop itself and the complete text of the workshop participants' recommendations to the Ministry of Health. Suggestions are made concerning future nutrition-related activities.

Jansen, A. A. J. and Horelli, H. T.

- 1982 Vitamin A deficiency in Kenya past and present. East African Medical Journal, 59(2):107-13.

This article reviews the literature on vitamin A deficiency in Kenya from 1928 to the present. The authors point out that the clinical picture does not always reflect vitamin A intake and serum levels. Although some contrary evidence is presented, the overall judgement is that vitamin A deficiency is not a major health problem in the country.

Jansen, A. A., Lakhani, S., T-Mannetje, W., and Kusin, J. A.

- 1980 Some nutritional aspects of pregnancy in rural Kenya. East African Medical Journal, 57(2):97-104, Feb.

Original data

Method: part of the longitudinal population based Machakos Project; in January 1978, longitudinal study of the nutritional status of pregnant women; one to three exams during pregnancy including anthropometry, clinical, blood and urine, and food intakes; weights of newborns; control group of upper middle class women from Aga Khan Hospital, Nairobi.

Sample: 881 pregnant Akamba women, 97 of whom were seen 3 times; 50 control women (mainly Kikuyu) from the files

Location: five sublocations in two ecologically different regions of the Machakos Project Study area (see Muller et al., 1977)

This is one of the ongoing series of reports from the Machakos Project area. The objective of this study was to assess the relationship between food intake and nutritional status during pregnancy, outcome of pregnancy, lactation performance, and growth of the child during the first two to three years of life.

Kanani, S.

- 1982 Strengthening Management Skills in the Ministry of Health in Kenya (editorial). East African Medical Journal, 59(7):427-28.

In this brief editorial the author reviews past and present efforts in Kenya to strengthen the management skills of health workers, stressing the importance of these efforts.

Karen College Staff

- 1981 Karen College Curriculum for Nutrition Field Workers. Nairobi: Karen College (1979, revised 1981).

This curriculum is for the training of Nutrition Field Workers (NFWs) at Karen College. The college has the responsibility for training all the country's NFWs. The curriculum is addressed to the NFWs' needs such as basic nutrition, identifying populations with special nutritional needs, nutritional care of hospital patients, and liaison with other government agencies.

Kent, M. M.

- 1981 Breast-feeding in the developing world: Current patterns and implications for future trends. Washington, D.C.: Population Reference Bureau.

This report uses the data provided by the World Fertility Surveys to examine the breast feeding initiation and duration patterns in nineteen developing countries. Data from Kenya are presented and compared with that from the other countries. Twelve comparative figures and tables are presented and briefly discussed. Two basic measures are used: 1) the percentage of ever-married women who breast fed their next to the last child for any length of time; and 2) the percentage of all children born in the three years prior to the survey who were breast fed for any length of time. Limitations of the data are also mentioned.

Kinoti, S. W.

- 1982 Epidemiology of hookworm disease and iron deficiency anemia in Kenya. East African Medical Journal, 59(5):341-344. May.

Iron deficiency is noted to be the commonest cause of anemia in Kenya. Prevalence, laboratory and community diagnosis, public health

## BIBLIOGRAPHY (Cont.)

importance, and medicinal management of iron deficiency are discussed in the Kenyan context.

Koinage, W.

- 1983 Infant Feeding Practices. Nairobi: Ministry of Health. June 15.

This 2-page memo, from the Director of Medical Services, addressed to medical personnel and religious leaders and agencies, presents specific concerns and guidelines relevant to the appropriate feeding of infants. Recipients "are hereby directed to implement the following": (1) infants should be breast fed as soon as possible following birth, (2) all hospitals should allow rooming-in, (3) pre-lacteal feeds should be prohibited, (4) no supplementary feeds should be given in maternity facilities, (5) mothers in such facilities should be encouraged to breast feed, including arranging ward timetables to suit mothers, not staff, and (6) discontinue use of posters and samples contributed by companies manufacturing breast milk substitutes.

Kune, J. B.

- 1980 Some factors influencing the mortality of under-fives in a rural area of Kenya, a multivariate analysis. Journal of Tropical Pediatrics, 29:114-120, June.

Original data

Method: cross-sectional data; multivariate analysis in the context of structural model building; data base from previous Machakos Project studies in 1973 to 1976; analyses had a target and control group

Sample: 100 households in which a child under five had died, and 360 households in which no child under five had died

Location: Machakos Project area, 60 km east of Nairobi, 87 km<sup>2</sup> area, Machakos District, Eastern Province

In this study an attempt was made to assess the impact of a number of environmental factors on the mortality of 0 to 4 year old children in the Machakos Project area. The use of multivariate analyses combined with rudimentary theory allows for the exploratory use of structural models which help to unravel the separate contributions of specific determining factors. The method is new and exciting but difficult to present and understand.

Latham, M. C.

- 1982 Editorial; Insufficient milk and the World Health Organization Code. East African Medical Journal, 59(2):87-90. February.

This editorial reviews the reasons for promoting breast feeding and discusses the 1981 World Health Assembly Code of Marketing of Breast Milk Substitutes. Practical information on promoting breast feeding is presented.

Laukaran, V. H., Kellner, E. K., Winikoff, B., Solimano, G., Latham, M., Van Esterik, P., and Post, J.

- 1981 Research on determinants of infant feeding practices: A conceptual framework. Working Paper No. 15. New York: The Population Council, November.

This paper presents an interdisciplinary conceptual model which has served as the framework for development of a study of infant feeding practices among low income urban women in four developing countries, Colombia, Kenya, Indonesia, and Thailand. The model depicts the hypothesized relationships between several groups of possible determining factors and specific infant feeding practices. The study explores the impact of biological factors, health services, women's employment, and the structure and marketing practices of the infant food industry on infant feeding decisions. Dependent variables which will be measured include initiation and duration of breast feeding, timing of supplementation and introduction of solids, specific milks and/or foods fed to infants, and morbidity history, weight and height of the index child. The study design integrates several methodologies drawn from the disciplines of anthropology, epidemiology, and market research. These include participant observation, key informant interviews, cross-sectional survey, and secondary data analysis. (Author's abstract)

#### Ministry of Health

- 1983 Recommendations of the Kenya National Workshop on Infant Feeding Practices, Nyeri 12-15 April 1983. Nairobi: Ministry of Health, National Welfare Family Center.

A workshop on infant feeding practices was held in Nyeri, Kenya (12-15 April 1983) in order to present the results of a two-year study (1981-1983) of infant feeding practices and their determinants, and to discuss related policy issues. The study was undertaken by Cornell University, Columbia University, and the Population Council, with funds provided by USAID. The workshop participants recommended that policies and programs be formulated to improve training for health personnel, that existing government legislation regarding the marketing and distribution of breast milk substitutes be supplemented or modified, that policies and strategies be devised to improve infant feeding through existing health services, that existing labor legislation be modified to facilitate breast feeding among women in wage employment, and that policies and programs be designed to improve the dissemination of information relative to feeding practices.

#### Ministry of Health

- 1978 Food and Nutrition. In Government of Kenya, Development Plan, 1979 to 1983, pp. 146-151. Nairobi: Ministry of Health.

Only the Food and Nutrition sections (5.79 to 5.92) of the larger Development Plan, 1979 to 1983, were available. The Plan--Kenya's fourth--covers the projected growth of the economy over five calendar

## BIBLIOGRAPHY (Cont.)

years and, more specifically, the investment program of the Government in the five financial years 1978/9 to 1982/83.

Muller, A. S., Ouma, J. H., Mburu, F. M., Blok, P. G., and Kleeven, J. W.

- 1977 Machakos Project Studies. Agents affecting health of mother and child in a rural area of Kenya. I. Introduction: Study design and methodology. Tropical Geogr. Med., 29(3):291-302, Sept.

### Original data

Method: longitudinal data collection; fortnightly home visits to record demographic and morbidity data; growth study of 500 children 0 to 4 years old; attitude and behavior studies; socioeconomic, environmental sanitation, and climate data; use of a research area and a control area

Sample: 400 households in an 87 sq km area; all children under five; Wakamba Bantu tribe

Location: two areas approximately 80 km east of Nairobi; study area--Kambusu, Kingoti, and Katheka in Matungula and Ulaani and Katitu in Mbiuni, Machakos

This is the introductory report on the Machakos Project implemented by the Medical Research Center in Nairobi, a department of the Royal Tropical Institute of the Netherlands. The paper describes the project, the staff procedures, and the baseline demographic characteristics of the study population. The overall objectives of the study are: to develop a method for obtaining accurate data on patterns of ill-health in children 0 to 4 years of age, as well as on maternal and perinatal mortality, and to identify the relationships between environmental factors and patterns of morbidity and mortality in the child population.

Mutanda, L. N.

- 1980a Epidemiology of Acute Gastroenteritis in Early Childhood in Kenya. III: Distribution of Aetiological Agents. East Africa Medical Journal 57(5):317-325.

### Original data

Method: The study was undertaken to look at the distribution of enteropathogens in time and space in young children. Samples were chosen, and stool specimens were collected from patients with diarrhea. The study took place between May 1975 and November 1977.

Sample: In and outpatients under six years of age with diarrhea admitted to Kenyatta National Hospital (160) (Nairobi), provincial hospitals in Kisumu (104) and Mombasa (116), and 139 asymptomatic rural Masai children.

Location: 3 urban areas: Nairobi, Kisumu, and Mombasa; and one rural Masai area.

Rotavirus was the most commonly isolated pathogen, but E. coli and shigella were also found. Salmonella was relatively infrequent. Each enteropathogen showed a monthly peak, but the sample size was too small to draw definite conclusions about seasonality. The highest

overall prevalence of enteropathogens was found in Nairobi, although shigella was most frequent in Mombasa.

Mutanda, L. N.

- 1980b Epidemiology of Acute Gastroenteritis in Early Childhood in Kenya. V: An Inverse Relationship between the Peak Age-Incidence and the Waning of Rotavirus Maternal Antibodies. East Africa Medical Journal 57(8):545-549.

Original data

Method: The study was undertaken to test the hypothesis that there is an inverse relationship between the prevalence of severe childhood gastroenteritis and the waning of maternal antibodies. Blood samples were initially taken from the umbilical cord of neonates after delivery and subsequently from the same children by finger prick at 4-6 weeks, and 17-23 weeks after birth. Samples were placed in tubes containing 0.25 m. of phosphate buffered saline (PBS) solution, centrifuged, and kept at -20C until the complement-fixation (CF) microtitre technique for rotavirus was performed. Results of these tests were compared with those of other children randomly sampled from among those admitted to KNH for various complaints.

Sample: breast fed, bottle fed, and mixed fed infants 0-5 months of age.

Location: Kenyatta National Hospital, Nairobi

Antibodies were found in 73% of neonates, 11% of 2 to 5 month old children, and fewer in the 3 to 5 months age group, coinciding with the period of highest incidence of rotavirus infections. Thereafter, antibodies showed a gradual increase. By the age of 3 years, 86% of the children tested had acquired antibodies. The results support the conclusion that the prevalence of diarrheal infection increases as maternal antibodies wane.

Njoki, M.

- 1979 Traditional Practices in Relation to Childbirth in Kenya. Paper presented at seminar on traditional practices affecting the health of women and children, February 10, 1979. In WHO/EMRO, Traditional Practices Affecting the Health of Women and Children. Alexandria, Egypt: WHO/EMRO.

The Seminar report contains a short summary of Miss Njoki's paper on traditional practices surrounding pregnancy. Both harmful and useful practices are identified, and areas for health education are discussed.

Stephenson, L. S., Crompton, D. W. T., Latham, M. C., Schulpen, T. W. J., Nesheim, M. C., and Jansen, A. A. J.

- 1980 Relationships between Ascaris and growth of malnourished preschool children in Kenya. American Journal of Clinical Nutrition, 33(5):1165-72, May.

## BIBLIOGRAPHY (Cont.)

### Original data

Method: longitudinal study; anthropological, clinical, and stool examinations performed 3 times at 14-week intervals, December 1975 through July 1976; limited dietary recall; socioeconomic, agricultural, and home hygiene data from 1973 to 1974 study  
Sample: 186 children 12 to 72 months old were included in the final study sample; 375 children were seen originally  
Location: two villages in the Machakos Project area, Machakos District, Eastern Province

This study was conducted to determine the relationship between Ascaris infection (common round worm) and the growth of preschool age children in a community where PEM was known to be common. The study's longitudinal two-group design allowed comparison of children's growth both before and after deworming, and with the noninfected control group.

Stephenson, L. S., Latham, M. C., Crompton, D. W. T., Schulpen, T. W. J., and Jansen, A. A.

- 1979 Nutritional status and stool examinations for intestinal parasites in Kenyan preschool children in Machakos District. East African Medical Journal, 56(1):1-9.

### Original data

Method: The study reports the baseline measurements of preschool and primary school children taken at the beginning of a four-year longitudinal study of growth conducted to assist health workers concerned with malnutrition. A study of the effects of ascaris infection on growth was also undertaken, and socioeconomic data were collected. Anthropometric and clinical examinations were performed, and stools were examined for parasite ova and cysts. Health and breast feeding histories were taken from each mother, along with information about the child's morning food intake and medications administered.

Sample: 375 children 6 to 72 months old.

Location: Mwatati and Kanzalu villages, Machakos District.

Based on the results of this survey, the authors concluded that growth of children is poor, and mild signs of PCM are present. The mean weight observed in Mwatati and Kanzalu was lower than the figures for Machakos District overall in 1977. Nutrition rehabilitation is recommended. Except where obvious social problems exist, mothers are genuinely concerned about their children's health, and malnutrition cannot be attributed to neglect, but further studies are required to determine the exact causes.

U.S.A.I.D. (U.S. Agency for International Development, American Embassy, Nairobi)

- 1982a Telegram Re: Review of breastfeeding, weaning, and maternal nutrition programs. Nairobi, April.

This telegram was a response to an AID/Washington request for information on current breast feeding, weaning, and maternal nutrition programs.

U.S.A.I.D. (U.S. Agency for International Development)

1982b Indicators of Nutrition in A.I.D. Assisted Countries. Statistical Profile Series. Washington, D.C.: Economic and Social Data Services Division, Bureau for Science and Technology, AID.

This statistical report presents data for all 74 A.I.D.-assisted countries. Tables include indicators for food and nutrient intake, nutrition status indicators, and selected indicators related to nutrition.

Van Steenbergen, W. M., Kusin, J. A., and Van Rens, M. M.

1981 Lactation performance of Akamba mothers, Kenya: Breast feeding behavior, breast milk yield and composition. Journal of Tropical Pediatrics, 27:155-61.

Original data

Method: two cross-sectional studies; cluster sampling; four consecutive days and one night; interview; test weighing; 25-100 ml manually expressed milk sample on third day; biochemical analysis of samples

Sample: 85 lactating Akamba mothers with children under three years old; 34 in lean season, September-December 1975; 51 in harvest season, June-September 1976

Location: rural highland; five subregions of Machakos Project Study area, Machakos District, Eastern Province

This paper presents extensive details on breast feeding behavior, breast milk yield, and breast milk composition of Akamba mothers in a rural highland area of Kenya. The findings are part of the results of two cross-sectional studies on food intakes of infants and toddlers conducted in the Joint Machakos Project in 1975 and 1976. The results indicate that the lactation capacity of the Akamba mothers was comparable to that of well-nourished healthy mothers in the U.S. and Europe. Food availability and consumption during lactation were not major limiting factors, although seasonal variations in milk yield did exist.

Van Steenbergen, W. M., Kusin, J. A., and Jansen, A. A.

1980 Measured food intake of preschool children in Machakos district. East African Medical Journal, 57(11):734-44, Nov.

Original data

Method: part of Machakos Project longitudinal study; two periods of cross-sectional data collection; 4-day food consumption study using test weighing (including for breast feedings)

Sample: 167 children 0 to 36 months of age

Location: five sub-locations within the Machakos Project Study area (see Muller et al., 1977), Eastern Province

## BIBLIOGRAPHY (Cont.)

This study is one of a series generated by the Machakos Project that started in 1972. Data for this report was collected in the lean season, September through December 1975, and in the harvest season, June through September 1976. In addition to reporting in detail on children's food consumption, an attempt is made to identify the factors influencing their dietary intake.

Van Steenberg, W. M., Kusin, J.A., Voorhoeve, A.M., and Jansen, A.A.J.

- 1978 Machakos Project Studies: Agents affecting health of mother and child in a rural area of Kenya. IX. Food intake, feeding habits, and nutritional state of the Akamba infant and toddler. Tropical Geogr. Med. 30(4):505-22, December.

### Original data

Method: cross sectional; food intake by four day food weighing including test weighing for breast feeding; two observation points in 1975 and 1976; clinical and anthropometric examinations

Sample: 137 Akamba children 0 to 36 months old, 71 of whom were seen in the lean season and 107 (41 from the first time) in the harvest season

Location: five subdistricts of Machakos Project area

This report, one in a series on the Machakos Project in Central Province, presents the results of precise assessments of the diet of infants and toddlers under three. The results generally illustrate that Akamba mothers in Machakos District followed a child feeding pattern that was qualitatively favorable.

## World Bank

- 1981 World Development Report, 1981. Washington D.C.: International Bank for Reconstruction and Development/The World Bank.

This document is the fourth in an annual series assessing key development issues; the focus of this year's work was the international context of development. Chapters are devoted to trade, energy, finance, human development, and countries' experiences in managing adjustment. Annexes provide tables of country-specific development indicators, including factors in population, economics, labor, and government budgets. The per capita supply of calories was computed from the net food supplies available from domestic production, import less exports, and changes in stock; net supplies exclude animal feed, seeds, quantities used in food processing, and losses in distribution. FAO requirements are based on physiological needs for normal activity and health considering environmental temperature, body weights, age, and sex distribution of the population, and allowing 10% for waste at the household level.

## World Health Organization

- 1982 Infant and Young Child Feeding: Report of the Director General A35/8. Geneva: WHO, March 30.

This report by the Director General of the World Health Organization is intended to inform the Health Assembly on steps taken in the promotion of breast feeding and improved infant and young child feeding since the presentation of the first progress report on this topic to the 34th World Health Assembly in May 1981. Five themes are discussed: 1) promotion of appropriate weaning practices with local sources; 2) strengthening of education, training, and information; 3) the development of support for improved health and social status for women; 4) the promotion of breast feeding; and 5) the appropriate marketing and distribution of breast milk substitutes. The information on the final theme is provided in accordance with Article 11.7 of the International Code of Marketing of Breast-milk Substitutes.

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#### Anonymous

1977 The nurse as a change agent in infant feeding Practices. Kenya Nursing Journal, 6(2):21-5, Dec.

Central Bureau of Statistics, Ministry of Economic Planning and Community Affairs

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Central Bureau of Statistics

1978 Women in Kenya. Vol. 3(3), Nairobi: Government of Kenya. April.

Central Bureau of Statistics

1977 Urban Food Purchasing Survey 1977, Part I. Central Bureau of Statistics and FAO Marketing Development Project. Nairobi, Kenya: Ministry of Finance and Planning.

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