ASSESSMENT OF SELECTED MATERNAL ATTRIBUTES AND FOOD PRACTICES IN HOUSEHOLDS WITH MALNOURISHED AND HOUSEHOLDS WITH WELL NOURISHED CHILDREN BELOW FIVE YEARS IN PERI-URBAN NAIROBI.

BY

FANITA T. MUKASA-MWANTHI.

THIS THESIS IS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT OF THE MASTER'S DEGREE IN APPLIED HUMAN NUTRITION IN THE DEPARTMENT OF FOOD TECHNOLOGY AND NUTRITION, COLLEGE OF AGRICULTURE VETERINARY SCIENCES.
UNIVERSITY OF NAIROBI.
KABETE CAMPUS.

1990.

DECLARATION

THIS IS MY ORIGINAL WORK AND IT HAS NOT BEEN PRESENTED TO ANY OTHER UNIVERSITY.

FANITA T. MUKASA-MWANTHI

THIS THESIS HAS BEEN SUBMITTED FOR EXAMINATION AFTER THE SUPERVISION AND APPROVAL OF

DR. G. K. MARITIM PhD.

Lecturer
Department of Food Technology.
and Nutrition
University of Nairobi. Kabete Campus.

Date 14/6/1994

DR. N. M. MUROKI PhD.

Senior Lecturer
Department of Food Technology
and Nutrition.
University of Nairobi. Kabete Campus.

Date 14/6/94

DEDICATION

TO MY GRANDMOTHER AZIZA MUKIRI,

MY PARENTS,

AND MUTUKU,

WHO HAVE DEARLY WORKED FOR MY SUCCESS.

TABLE OF CONTENTS.

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACKNOWLEDGMENT

The funding from my benevolent sponsors through the University of Nairobi, for the completion of my degree requirement is gratefully acknowledged.

I wish to thank the numerous individuals at the College of Agriculture and Veterinary Sciences (CAVS) who have participated in my academic life.

Particular appreciation goes to Dr. A.A. Kielmann, who was then the Applied Nutrition Program (ANP) officer for his endless guidance and steering of the course.

I sincerely wish to thank my ANP advisers for their continuous encouragement as we trudged in the study area. I thank my field assistants who tirelessly combed the area tracing the respondents for the second interview. Lastly, sincere thanks go to Mr. M. A. Mwanthi for his encouragement and patience during my study time.

ABSTRACT

This cross sectional descriptive study was conducted from February to July 1988 in North Kariobangi following the prevalence and the ecology of malnutritional studies that were undertaken by University of Nairobi researchers in 1986.

The overall objective was to assess selected household and maternal characteristics, and food practices which may determine the difference in nutritional status of the children in the area.

First, a cross sectional study was undertaken, and thereafter households were classified as "malnourished" or well nourished according to the nutritional status of the children, using the 70% weight for age and/or the 90% weight for height of the National Council of Health Statistics (NCHS) median as cut off points. Seventy six households were classified as malnourished and eighty two households as well nourished.

A questionnaire was administered to collect data on demographic characteristics , maternal attributes, the major food acquisition methods and

on the subsequent quantity of the purchased diet. The food intake was done on a subsample of index children.

During the interview households reported all the foods they had procured and where they had acquired them (source) during the last seven days (one week). Inquiries were made of the amount of time the mother remained with the child and also of the total duration the mother had lived in peri-urban settings. On a subsample of index children (30 in each type of household) a more detailed 24 hour dietary recall was done.

The study revealed that the duration the mother had stayed in the peri-urban area was associated with the nutritional status of the young children. A higher proportion (35%) of mothers with malnourished children had lived for a longer period in the peri-urban area than the mothers with well nourished children (27%). It was apparent that staying longer in peri-urban areas was associated with low nutritional status. Over 70% of mothers from well nourished households stayed with their children most of the time (approximately 24 hours) while only 38.2% of malnourished mothers did so. This could mean that the length of stay with the

children contributed to good nutrition status.

The survey on food practices showed that in both households, purchasing was the major food procurement method. Well nourished households had higher mean household food purchases of beans, milk, and bread per week. These also provided greater diet diversity in terms of vegetables and fruits.

The 24 hour dietary recall showed that a higher proportion of children in well nourished household were fed maize meal porridge in greater amounts and more frequently than were the children in malnourished households. Twelve (40%) well nourished children consumed over 3/4 of a cup of maize porridge daily compared to only 6 (20%) malnourished children. Malnourished households served more tea with milk, pastry (chapati) and doughtnuts (mandazi) while no well nourished child was reported to have fed on the above foods.

Other factors namely family size, marital status, employment patterns and income status were similar in both types of households, and could not explain the difference in the nutritional status.

Definition of Terms.

1. Food Practice: denotes any activity or means which the individual employs to procure food for the family and the subsequent feeding of the food to the young children.

2. Healthy or looking well: is taken as a state of well-being, as exhibited by the child physically as well as showing good mental alertness.

3. Household: denotes a group of individuals who may be related, living together in one housing or shelter and sharing meals, sleeping arrangements and other household amenities, for example latrines, and water. The individuals may be related by blood or any other affinity.

4. Mandazi (doughnuts) and chapati (pastry): are wheat based products prepared by pan frying. Mandazi is sweet and golden brown, while chapati is a salty thin pastry.

5. Traditional (informal) sector: refers to owner-occupier small scale business enterprises usually without accounts or record books.

6. Ugali: is a "stiff" meal of ground maize which is made by mixing the ground maize in boiling water.

CHAPTER 1

INTRODUCTION

1.1. Introduction to the Study.

Nutritional studies of underfive year old children have an important place in public health because of the nutritional vulnerability of this group. Malnutrition among children below five years does not affect the children's well-being alone, but it affects the entire community by limiting the children's potential growth and development. It drains the family resources, thus reducing productive returns of the human resources which are essential for social and economic growth (Winslow, 1984, Forde, 1978). Malnutritional problems occur frequently in the children under five years of age because of their higher nutritional needs, and their susceptibility to many types of infections. This is exacerbated by the fact that adults determine what they should eat (Martorell, 1984).

In uncontrolled peri-urban settings, the households have no space for cultivation (U.O.N\ADD,

1971). The food must be acquired by other means Food practices become important. These denote any activities or means which the households use in availing or procuring food and the subsequent feeding of its vulnerable members, in particular the young children.

Primary attention of this work has been given to studying the food practices and selected factors in households with undernourished and well nourished children. These factors are: the household characteristics, maternal period of stay in the peri-urban areas, the time devoted to child care, and child feeding practices. It is hoped that these should partially explain why the majority of young children thrive and their peri-urban peers fail. The main purpose of assessing these food practices and their relationship on the nutritional status of young children is to provide data that may be useful in nutrition education.

1.2. Statement of the Problem.

A number of researchers have carried out studies on the nutritional status of young children. The studies have been mainly in the rural areas (van Steenbergen et al., 1984, Oomen, 1981, Huemann, et al., 1970). A few studies carried out in the peri-urban areas have also shown that malnutrition problems exist.

Recently University of Nairobi researchers disclosed a variety of malnutritional problems including Protein Energy Malnutrition (PEM), and nutritional anemia among young children living in the peri-urban environment (Njama, 1988, Maina, 1988). In 1987 the prevalence of PEM among the underfive aid children in the peri-urban Nairobi areas (based on less than 70% weight for age of the National Council of Health Statistics (NCHS)) was 30% (Njama, 1988). The studies showed that over 60% of the underfive children were between 80% to 110% of the NCHS and were on the Road to Health.

The University of Nairobi researchers

identified a number of factors associated with undernutrition of the young children in peri-urban settings. These factors were interrelated and were basically social and economic in nature. However, the low proportion (30%) of undernutrition observed in this uncontrolled peri-urban settlement implied that there were factors other than those reported by the University of Nairobi researchers.

In 1981 Per-Pinstrup Andersen of the World Bank outlined a number of factors other than the economic ones which were closely related to the nutritional status of any individual. These factors included the ability and the desire of the head of the household to obtain the food to which he has access to, and the utilization of the obtained food by the household to meet each individual's nutritional needs. To reduce the prevalence of malnutrition among the young children, efforts should include investigations to determine which of these factors is the immediate cause of that problem as improvement in social and economic factors alone is not enough.

Since malnutrition has been cited as a problem

of ecology (Merrill, et al., 1981, Addo, et al., 1988), situational (environmental) factors should also be taken into account. In view of the observations made, it is clear that more nutritional studies need to be undertaken.

In nutritional epidemiology, general agreement holds that nutrient intakes have a direct fundamental relationship to good nutritional status (Dennis, et al., 1985). Therefore the concern for the inability to acquire good nutritional status must focus on the adequacy of the food that the household brings to the home. In view of the above children below five years are among the most vulnerable groups, nutritional studies must be carried out (Nabarro, 1981).

1.3. Aim of the Study.

Pathison (1963) stressed that nutrition affects how one grows and develops through its interplay with hereditary influences and the situational or environmental conditions. As is evident for any improvement in growth and overall health, understanding of the food or nutritional practices and conditions in the particular community is required. The overall aim of this study is to provide data on family food practices in order to facilitate improvement in the nutrition of young children.

1.4. Objectives of the Study.

The following objectives were formulated for this study:

1. To determine household characteristics that contribute to the occurence of poor nutritional status.

2. To determine possible relationship between the nutritional status and selected maternal attributes, namely the mothers period of stay in the peri-urban area and the amount of time the mother devotes to child care.

3. To determine household food procurement methods and the quantities of the procured foods in a week in well nourished and malnourished households.

4. To determine the food items fed to a subsample of the target children (30 malnourished and 30 well nourished children).

1.5. Research Hypotheses.

1. There is no difference in food procurement practice between households with malnourished children below five years of age and those with well nourished ones.

2. Undernutrition in the underfive year old children is significantly related to the quantity of food accessible to the household.

1.6. Benefits Expected from the Study.

Assessing the food practices and the subsequent diet provided to the child under five years of age in peri-urban areas should point out good endeavors that contribute to the elimination of undernutrition (PEM). These endeavors can be adopted by households afflicted with malnutrition.

The study will fill in a vital gap in knowledge on the intra-household data of who are affected as their circumstances changed from the rural to the peri-urban living. This will render the existing nutritional programs more effective. Hence the findings will be useful in the allocation of the scarce resources.

1.7. Limitation of the Study.

Due to the limited funds and time, the research was limited to households with children under five years living in peri-urban Kariobangi North. This setting is very similar to that in many high density areas.

CHAPTER 2

LITERATURE REVIEW

2.1. Malnutrition.

Malnutrition has been cited as both a cause and effect of underdevelopment. Berg (1987) defined it as:

> the pathological condition brought about by inadequacy of one or more of the essential nutrients that the body cannot make which are necessary for survival, growth and reproduction and for the capacity to work, learn and function in society (Berg, 1987).

The most common form of malnutrition among young children is Protein Energy Malnutrition (PEM) (Facts of Life, 1980). PEM predisposes children to many incidences of preventable morbidity with possible subsequent mortality (Berg, 1987).

In addition to the heightened morbidity, undernutrition may adversely affect the central nervous system and may impair intellectual, psychological and neuromuscular capacity (Cousin, 1985). Impairment of the above may lead to

inadequate realization of the individual's inherent potential (Dobbing, 1985). This may result in slow development of the community.

2.2. Factors that Influence Food Practices.

Graham (1972) has noted that malnutrition is a complex product of biological, physiological, economical, and social factors, all of which are interrelated. These factors cause malnutrition directly and/or indirectly by influencing food practices and diets.

2.2.1. Biological Factors.

Biological factors include agents that cause disease. These agents are abundant due to the fact that in tropical regions the temperatures and humidity are relatively stable. These factors favor the propagation and transmission of parasites and infectious agents (Leonardo, 1977) which cause undernutrition directly or indirectly by influencing food practices particularly regarding the feeding of the young child.

The biological agents causing disease precipitate malnutrition in many ways, which include increased

nutrient requirements of the body's needs for energy and nutrient, or increased nutrient loss and underutilization of the nutrients. The illnesses decrease the ability of the body to recover from the malnutrition (Berg, 1987). According to Scrimshaw (1965) a mutually aggravating relationship results between malnutrition and the illness. Consequently the child gets debilitated.

2.2.2 Physiological Factors.

The physiological factors include the state of health of the child and his or her vulnerability to malnutrition. Graves citing Srikantia (1972) stressed that the mother should act as a source of the infant's physical and emotional satisfaction. She should be a mediator and a source of stimulation for the young child during feeding.

In peri-urban areas, owing to the encroachment of an exchange system of monetarized activities, many mothers have to engage in out-of-home activities to earn money for the household upkeep. In most cases the children are not provided with adequate food when the mother is away. This practice predisposes the child to malnutrition.

2.2.3. Economic factors

The economic factors denote any commodity or services which yield satisfaction and must be obtained for a fee in cash or "in kind" (Tadaro, 1982). A number of studies on the effects of economic status and undernutrition have been conducted. Schnetz et al., (1984) observed that though undernutrition is closely related to poverty, it is not bound by the family income. Qualitative diet improvements have been noticed in some households but these have not essentially reflected increased incomes. Pellet (1977) also cited marasmus in the children below five years who were not necessarily from low income families. He observed that the low nutritional status was related to other factors.

In Thailand, for example, middle income families had the least shopping and consumption frequencies. For these families, a direct relation between the shopping and consumption was observed, excluding the income factor. Indeed existing infrastructure was found to be the major factor influencing nutrition (Schnetz, et al., 1984). In all cases the further the shops were, the less was the food consumption.

Considering all the afore-mentioned, it is clear that high income does not always imply optimum nutrition. Low income households in peri-urban areas can have good nutritional health among the young children if they have proper food practices.

Ritchie (1967), citing Food and Agriculture Organization (FAO) studies done by Perisse' in Ivory Coast and in Haii in 1965, noted that in spite of great differences in cash income the diets of all groups investigated, including farmers and the progressive persons, were identical. Other factors besides the income therefore influenced the food patterns.

A study carried out in Kenyan peri-urban areas by Otundo (1982), showed that the marginal propensity to consume food items decreases progressively in all households. The food practices remained similar. In other cases, evidence showed that the diets of the lowly paid were remarkably well balanced, in spite of their low monetary expenditure (Berg, 1981). From the observations given here it is evident that other factors are also involved and that income is not the most detrimental factor affecting the family diet.

2.2.4. Social Factors

The social factors embrace the situational organizations of the peri-urban households. These influence food practices in the causation of undernutrition as well. It has been known that people's food practices are deeply rooted in their culture as well being influenced by social changes of'modernization' (Ritchie, 1967, Nakatsuka, et al., 1986) and exposure to mass media. Food practices therefore tend to change and/or get modified frequently.

Imitation, prestige or misinformation from peers have resulted in greater changes in feeding practices. Breast feeding is one of the practices which has been influenced. Infants have been abruptly weaned or introduced to solids early. This has caused early infant feeding problems. The problems include diarrhea and/or gastroenteritis which precipitate malnutrition (Jelliffe, 1963). According to Kahn (1961) the shortening period of breastfeeding was observed more than among their rural peers.

2.3. Food Practices.

It has been mentioned that food practices are other factor that causes malnutrition as they are influenced by the factors above.

2.3.1. Food Procurement (Purchasing).

Food can be obtained by purchasing, received as gifts, or from one's own production. The method of acquisition depends on one's resources, availability in the markets, and advertisement. One's own production refers to availability of gardens and means of production. In peri-urban settings, where households have no space for cultivation (U.o.N ADD, 1971) the major procurement method is purchasing. The market becomes the major source of food supply (Oftedal, et al., 1974). Purchasing behavior therefore greatly influences the food consumed. Some factors influence the food purchasing behavior. These are foods available in the markets, the advertisement of all the commodities on sale, and income (which is already discussed).

Food Availability.

The availability of food has been found to be

food in the household (Addo et al., 1988). Den Hartog (1985) noted that urban people have greater variety of vegetables and fruits, more types of meats and do experience less seasonal influences on diet due to the presence of the markets. The greater variety of food may cause difficulties in the selection of food for the child. This is even aggravated by the wide variety of other consumables and luxuries for the adults' satisfaction.

A number of researchers have observed that these households which always purchase their food, constantly modify the quality and quantity of their diet depending on the agricultural seasons (Mwangi, 1982). Conditions in peri-urban areas facilitate the feasibility of a diverse diet for the young child. However a diverse diet is not always consumed because when people who have been accustomed to a subsistence economy need to purchase their food for cash they take the choices of food basically on prestige grounds.

Faced with the above situations, peri-urban populations are highly prone to changing the traditional diets which are more complimentary in

traditional diets which are more complimentary in nature and more nutritious for the maintenance of the body. As a result there has been increased prevalence of PEM due to urbanization (Kahn, 1961, Jelliffe, 1963).

Advertisement,

Marketing practices have been cited as important influences in Nairobi (CBS, 1984). PEM may persist because of the purchasing option even though all households have access to vendors of food. This is due to aggressive advertisements as Oftedal (1974) observed. He noted that migration to urban areas and exposure to mass media did not lead to nutritionally improved food patterns.

In Libyan households with adequate purchasing power, the influence of advertisement on food purchasing caused PEM among the children under five years of age (Kamel, et al., 1984). The households have been found to purchase inappropriate foods for the children because these foods were highly promoted by the food vendors.

2.3.2. Child Feeding.

2.3.2.1. Child Feeding Practices.

The actual feeding of the young child is an important practice that determines the outcome of his nutritional condition. Many nutritional advisers have recommended exclusive breast feeding 'on the child's demand' for the first four months of life (Williams, 1981). Thereafter solids are suggested to be included into the child's diet, one food at a time depending on the manner the child tolerates them.

Nutritional educators have discouraged the over use of processed foods in the child's diet and suggested the inclusion of more natural foods (Werner, 1981). Frequent giving of fluids and feeding using cup and spoon have been recommended as the best method (King, et al., 1981, King, et. al., 1972).

On the average, the young child in peri-urban areas is fed at the home three times a day. This includes the morning meal, an afternoon lunch and the evening meal. In many instances the food is

the evening meal. In many instances the food is cooked and served at the times and venues when the adults are eating. Casual snacking provided by the children's peers may occur as they congregate throughout the day.

During early childhood the child lacks certain enzymes (Krause, et al., 1979). The teeth are not fully developed. The food fed to the child must be properly handled to facilitate digestion in the gastrointestinal tract. The manner in which the food is prepared determines the ultimate utilization in the body tissues.

Softening and/or smoothening food items for the child under five years of age are feasible approaches in alleviating malnutrition. Mashing, mincing and grinding should be possible using the locally available tools. Enriching foods by addition of fats or milk improves the energy and protein qualities that have been suggested in the alleviation of undernutrition (Cameron, et al., 1983).

2.3.2.2. Factors Governing the Feeding of Children.

Food and feeding is influenced by a number of factors in the communities. Worsley et al.(1982) named some of these influences as being situational (environmental) and others indigenous or intra-individual. In other cases many prescriptions and restrictions, likes and dislikes coupled with food significances, also influence feeding of the younger children.

A social obligation to feed the younger members predominates. To most families, familiar foods they learned to eat in childhood may continue to be their preferences in adult life. In peri-urban areas people change and they learn what they can eat or feed the child rather than eat what they like, owing to the detachment from the rural homes. Loyalty to food and diets that people grew up with are no longer feasible in these areas. The children seldom feed on these diets.

Economical influences affecting child nutrition in peri-urban settings vary from family to family and time to time. As mentioned above in section 2.2.2., the mothers can provide many foods to the young children under peri-urban conditions. The mother should be able to nurse or feed her

adversely affect the nutritional health of the child under five years of age.

In peri-urban areas several ethnic groups live together 'in harmony' and develop new coping skills. Cultural prescriptions on child feeding do not appear to adversely prevent optimum nutrition to be provided to the young children. Though restrictions may exist, these are frequently overlooked due to the necessity to survive in the new environment.

The young children have the least psychological associations with food. Liking for certain foods is usually the result of satisfying hunger and occasionally the emotional relationship between the child and the mother/caretaker feeding him. The mother's devotion towards the child, her display of affection and encouragement determine the way in which the child will consume his or her meal. Thus the above do influence child nutrition.

CHAPTER 3

3.0. Background of Study Setting.

Kariobangi North is a squatter settlement on the outskirts of the Nairobi city. This area lies on the eastern side of the city center. It was first occupied in 1964 under the resettlement scheme for squatters from Pumwani and Gikomba who had to be moved far from the city center (Shihembetsa, 1989). More details on the origins of settlement of the area are discussed by University of Nairobi researchers (Maina, 1988, Weisner, 1975).

The first settlement covered an area of 0.445 square kilometers. Presently it is a sprawling residential area with a population density of 700 persons per hectare (Shihembetsa, 1989). The area is fairly heterogeneous: depicting a great variety of sheltering structures, several religious groupings, and many commercial /educational enterprises. Indigenous health healers and entertainment facilities exist throughout the area. The majority of the enterprises are owned by the area residents. From observation, all the services

and goods supplied within these enterprises require a fee.

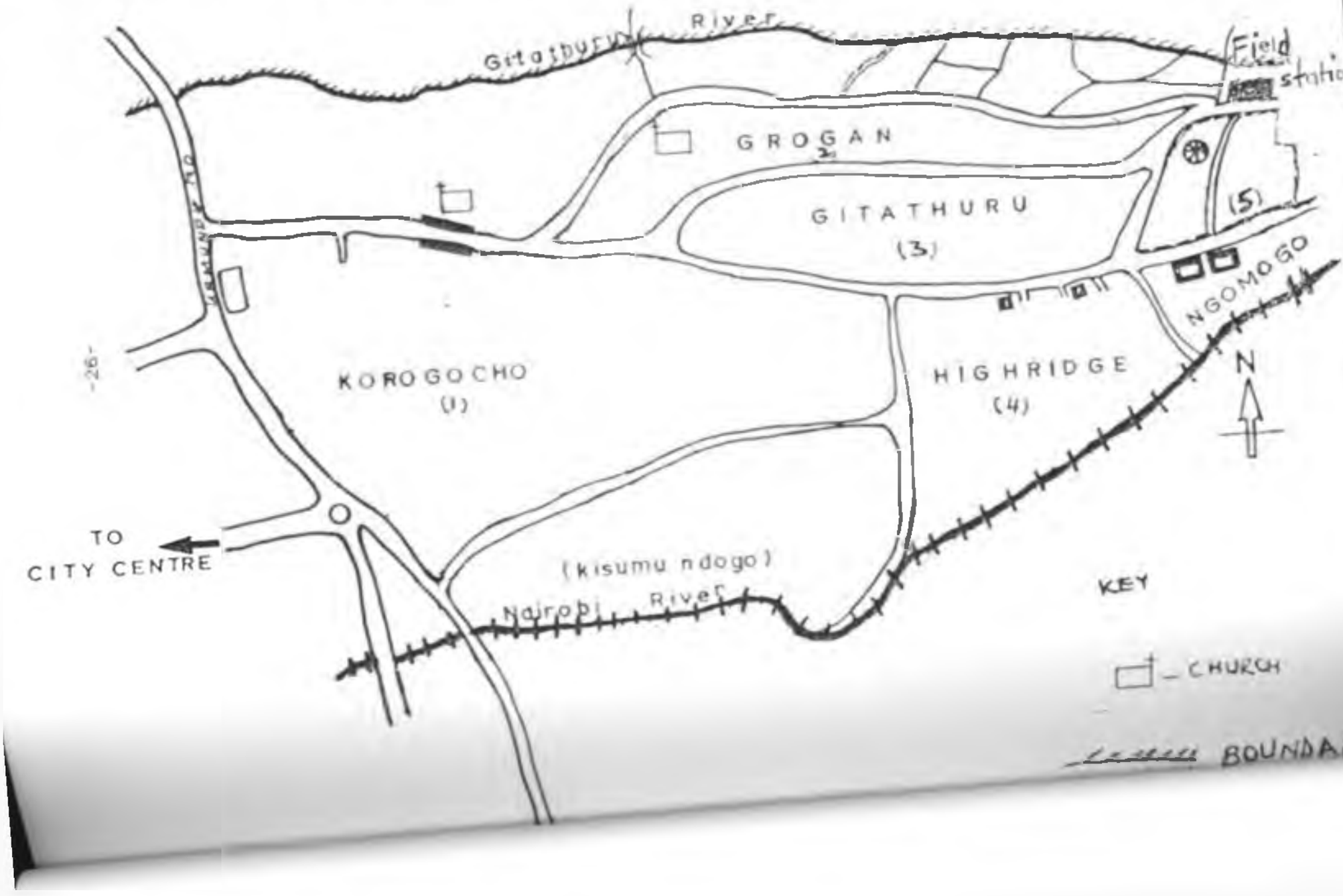
Kariobangi North is a conglomerate of smaller villages (clusters) which bear the names of the areas from where the people's former shelters were in the early and late 1970's (Weisner, 1975). The five villages, namely Gitathuru, Grogan, Highridge, Korogocho and Ngomongo are demarcated arbitrarily by the roads within (Figure 1).

In every village, about 80% of the houses are used for commercial/business undertakings while the families sleep in the back rooms. Piped water is available within, and each household owns a pit latrine. For easy collection of garbage by the City Commission authorities, wastes are dumped in heaps by the roadside at strategic places.

Within the village development of the houses is random (U.o.N ADD, 1971). Many houses are made up of mud and wattle (Chana, 1971), and are modifications of the traditional African hut while some others are made up of brick and corrugated iron sheets.

Figure 1:

NORTH KARIOBANGI



The inhabitants come from several regions, particularly Central, Rift Valley and Western Provinces. The distance from the city center to the rural home or place of origin of the head of the household determines the number of family members present within the household at a particular time. In 1985 the average occupancy rate was one room per household of 2.2 persons (U.o.N.ADD, 1971).

The African extended family system, including relatives and acquaintances of the spouses, prevails in the area. This living arrangement is traditional and socially desirable because the young child may be cared for by others when the biological parents are absent or missing.

In the majority of cases male household heads come first to this peri-urban setting. They are then followed by the wives and children later. In some instances wives and other relatives visit their households according to the agricultural seasons in their rural home areas. During the planting up to the harvest seasons, the wives and underfive children are at the rural homes (U.o.N. ADD, 1971). This means the number of the persons living in the area changes frequently.

The self-employment enterprises include full meal restaurants referred to as kiosks, Mandazi or doughnuts kitchen type enterprises, butcheries and groceries, numerous raw vegetable and fruit vending. Hardware, manufacturing and repair shops, clothing, tailoring and hair saloon businesses are abundant. Several bars and inns are available throughout the five villages.

A variety of food items are available everywhere at most of the time within the area. The numerous kiosks offer many types of food including indigenous or traditional dishes. Popular meat dishes include beef, tripe (matumbo) stews, roasts; chicken, many types of fish, pork and veal. Each is available at a wide range of prices. There are numerous types of green leafy vegetables, cereals and citrus fruits. A large scale raw foods market is situated in the Korogocho village. There therefore exists an excellent opportunity for availing suitable and adequate food to the preschool children.

CHAPTER 4

RESEARCH METHODOLOGY

4.1. Study Design.

4.1.1. Type of Study.

This is a cross-sectional descriptive study that was undertaken in Kariobangi North from February to July 1988. It is an in-depth study assessing food practices in an effort to explain why some young children thrive while their peers fail in the same ecosystem.

4.1.2. Sampling Frame.

All the households with young children up to the age of sixty months who had been introduced to food and were living in Kariobangi North comprised the sample frame. This was in conformity with the Central Bureau of Statistics (CBS) Kenya (1984) finding that children as young as one month of age belonging to mothers from low and middle incomes in Nairobi were being given breastmilk and food supplements.

/

4.1.3. Study Criteria.

The households were classified according to the nutritional status of the children. To achieve this, the following criteria were strictly followed. For a household to be qualified as "malnourished", one of the children under five years of age had to be less than 70% weight for age AND/OR less than 90% weight for height of the NCHS median (Jelliffe, 1966).

For a household to be qualified as " well nourished": None of the children within were undernourished; i.e. all the children under five years of age were on the " ROAD TO HEALTH" according to their growth monitoring charts, (i.e. above 80% weight for age of the NCHS median). To reduce bias with regards to child feeding practices, the mother must not have attended the nutritional rehabilitation center within the preceding twelve months.

4.1.4. Sample Size.

Previous studies in this area had disclosed undernutrition at a cut off point of less than 70% weight for age to be 30%. Based on this, the sample size was calculated according to the following formula for the sample:

$$n = \frac{z^2 (pq)}{r^2}$$

where:

z represents the standard normal deviate. This was taken at 1.96;

r is the degree of accuracy desired. This was set at 0.05;

p is the established malnutrition rate that is 0.30.

$$\text{i.e. } n = \frac{1.96^2 \times (0.30 \times 0.70)^2}{0.05} = 323.$$

The ideal household sample size was found to be 323. According to the objectives and study criteria used to qualify the households, the team commenced to enroll as many households as could

qualify within the set study period. In total, 170 were investigated. Each household was visited twice.

First households were reached and the first interviews were done. After a minimum of two weeks, these same households were revisted for the second interview.

4.2. Research Preparation

4.2.1. Mapping the study area.

The researcher met the Assistant Chief and the other community leaders. She then toured the study area extensively. Three field assistants, two of whom were Community Health workers living within the area, were recruited, and involved in mapping the area. All three had participated earlier in community studies in peri-urban and rural areas, and were familiar with research methods.

4.2.2. Development and Testing of the Research Instrument.

The research instrument- questionnaire, was developed. It covered household characteristics,

a child identification, weekly household food budget survey and the 24 hour dietary recall sections. The researcher taught the three field assistants how to take weight and height measurements using the Salter Scales and the Infatometer respectively.

For the questionnaire emphasis was directed to ascertaining that the field assistants ask the respondents the questions in a manner that the latter would be able to recall the amounts of food which they had procured during the past week. The respondents were asked about the foods they had eaten the day before.

To ascertain its reliability, the questionnaire was pilot tested in Kinyango - Mathare Valley. This area has similar characteristics as Kariobangi North. The pilot study revealed that 17% of households had malnourished children while 23% had well nourished children.

Later a room was hired within the study area. This was used as a field office. The research team kept the survey tools in there. A month after the start of the actual survey, owing to the high at-

trition rate and/or internal migration within the study area, two more field assistants were recruited to enable the investigating team reach the respondents for the second interview as soon as possible.

4.3. Selection Procedure of the Household Sample.

Selection of the households was modified after piloting in Kinyango - Mathare Valley. Kinyango - Mathare Valley is an adjacent peri-urban area with practically similar living conditions with North Kariobangi. During piloting in Kinyango, random selection of numbered households yielded a lot of unneeded data. From this pilot survey the fifty households that were reached and their residents interviewed, only thirty households qualified to be included in the analysis. Using the set criteria, out of the thirty, only five households (17%) were classified as malnourished ones. From the remaining 83% of households, only 23% were classified as well nourished households. About fifty percent were excluded in the analysis.

/

In this area new shelters are constructed daily (Shihembatsa, 1989, Weisner, 1975) due to internal migration within the area. In order to avoid missing the households for the interview, every shelter was visited (Figure 2).

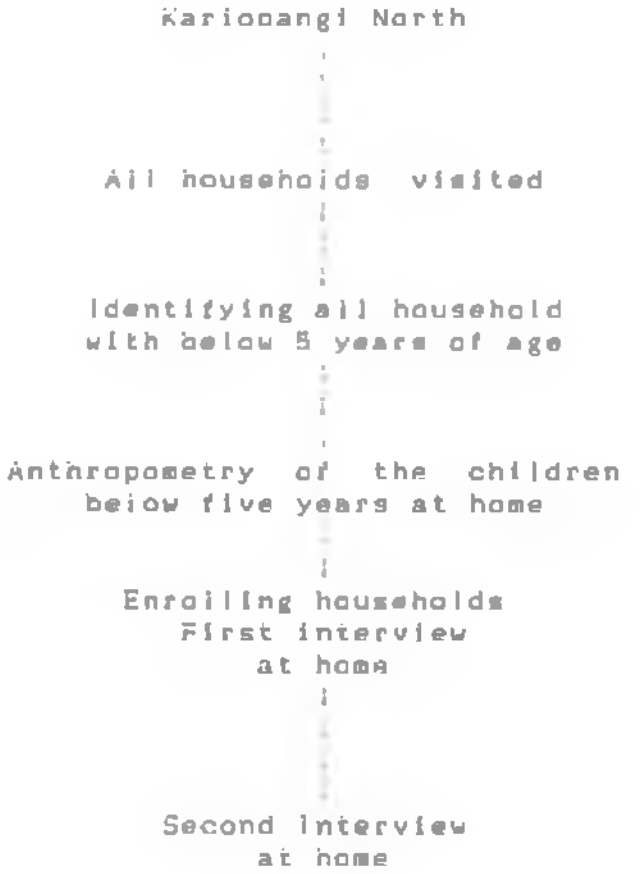


Figure 2. THE SELECTION OF HOUSEHOLDS

At the onset of the study period, from the first village, Grogan, the team worked from shelter to shelter starting from the east of the nutrition rehabilitation center in the area. The team asked the residents and their neighbors whether they had underfive year old children. Asking neighbors and/or making appointments to visit households through them has been found to be effective and hence been adapted in uncontrolled squatter settlements (U.u.N., 1971).

Reaching the households for direct observation was also necessary to enable the investigators to determine whether the households had children under five years of age. This was made possible by the facts that two of the field assistants had lived in this area for a minimum of five years, and both worked as community health workers. Hence the households were reached in that manner.

The investigators worked in groups. At the shelter, the questionnaire (Appendix 1) was administered to the child's mother or the adult

child caretaker. They frequently worked inside the shelters. They introduced themselves and thoroughly explained the purpose of their visit.

The investigators asked the mother or caretaker of all the children below five years about the ages of the children. For each child below five years, the team inquired whether the child had been introduced to food. If the child had been, they then requested the mother to show them the growth monitoring charts to verify the age and to ascertain the growth trajectory of the child.

The mother was asked if she had attended the nutritional rehabilitation center in the preceding twelve months. For the mothers who had not, the weight and height of their child were taken. Only one child was picked in accordance with the set anthropometric criteria. Based on the nutritional status of this index child, the household was qualified as either well nourished or malnourished. The household was enrolled in the study. If any of the conditions were not satisfied, the household was excluded from the sample.

4.4. Method of Data Collection - Questionnaire Administration.

Four hundred packs of the pilot tested questionnaire were made. These packs contained a first page of identification of the child, his weight and height, the name of the mother or care-taker, village name and the household number. This was meant to assist later in locating the household for the second interview.

(i) Demographic Data.

The mother of the selected child reported the needed demographic data pertaining to the household on the first visit. Information was collected on persons who regularly slept at the shelter. During the second visit, data on any visitor who had come after the first visit was excluded as these were not regular residents.

(ii) Weight Measurement.

For the weight measurements, each team of investigators used Salter scales calibrated to 0.1 of a kilogram supplied by UNICEF. For each measurement, the scale was first adjusted to zero.

There was the suspension plastic pants which came with the scale, and were worn by the child being weighed. Each child under five years of age was undressed and placed into the plastic weighing pants. The child was hung on the Salter scale. One field assistant took the first scale reading which was noted on the questionnaire.

A different field assistant read the scale as well for the second time in order to check on interobserver variation.

(iii) Height Measurement.

The infantometer was used for the children's length measurement, particularly those who were not walking then. For toddlers the metallic tape was used for their heights while standing by a firm wall.

The infantometer was placed on the floor. Children who were still undressed, were laid flat on it. Care was taken to ascertain that the scalp was on the upper board, and the feet were perpendicular to the board with the spinal vertebrae straight, and hips and knee joints well

extended (United Nations, 1988). Two field assistants read the scales consecutively.

A lot of crying and kicking were encountered when the toddlers were laid down. The standing posture was adapted. For the children who walked well, (children about twenty four months and over) the investigators requested the mother to stand the child straight against the wall. The metallic tape was stretched at the same spot (on the wall). Two field assistants took two readings of the measurement of each child's height. In other instances, the infantometer was used in the vertical position.

(iv) Age determination.

The reported age of each child was verified with the recording on the provided growth monitoring charts.

(v) Morbidity of the index Children

On the first visit, through observation facilitated by the field assistants who were community health workers and the medical students,

the investigators scrutinized the general appearance of each selected child; his eyes, skin and any other evidence that would conform to signs of undernutrition. The investigators assessed whether the child looked healthy or unhealthy. They checked whether the child had visual problems, skin lesions, any injuries, burns or scabies that would imply inadequate care which culminates in undernutrition.

(vi) Household Food Survey.

According to the method proposed by Kain (1985) the respondents were asked about each meal, namely breakfast, lunch, supper and snacks that they provided for their family the previous day. For every ingredient, the investigators inquired about its source with regard to purchasing, gardening, or if it was given free by relatives or friends. The teams asked about all the food items that respondents had purchased within the last one week. Then using the 'leading' approach they inquired how much of the following items had the household provided for the members. (Appendix 1 page 7 of 8). The budget survey was undertaken twice for every household during the study time.

The foods were reported in the amounts in which they were sold. These included reports of heaps or bundles. To ascertain the actual quantities (in kilograms) and the form of the food, market visits to the Korogocho fresh food depot were carried out daily during the study period. Milk was reported on the basis of the half litre and bread by the 1/2 kilogram loaf.

(vii) Twenty Four Hour Dietary Recall.

On the second visit the twenty four hour dietary recall of thirty malnourished and thirty well nourished children was carried out. These children were picked randomly. From previous reporting, it had been disclosed that the children fed at the same meal times and essentially from the same crockery with the adults. To facilitate the reporting of the measurements of the foods actually consumed by this subset, one 250 millimeter plastic cup and one 200 millimeter plastic bowl were given to every other household on the first interview visit.

The cup and bowl were products of Kenpoly, Kenya Plastics Limited. Both were easily calibrated in halves and quarters to ascertain quantities that the children ingested. These as well served as tokens to the families who accepted to keep them. During the second visit, the investigators asked the mothers to report all the food and the quantities that the child had eaten in the previous twenty four hours.

The investigators noted the source of the food with respect to whether the food was prepared at home or bought (already cooked) from the kiosk. The method by which the food was prepared at home with respect to mashing it, mincing it, grinding and enriching it with other nutrients were also noted. The quantities were reported in terms of the amount finished from the cup or bowl.

4.5. Data Management.

4.5.1. Data Cleaning.

Every day, each completed questionnaire on the first visit was checked to ascertain that all questions had been answered. The principal

investigator noted the household numbers so that the households could be traced for the second household budget survey. Reported quantities of food were compared frequently with the market quantities on sale in order to be certain of actual measurements.

4.5.2. Data Analysis.

In the analysis, information on the child given by any adult other than the mother or its adult caretaker has been excluded. Out of the 170 households, 158 have been included in the final analysis. Seven of the households were excluded because the respondents could not be traced for the second household food budget survey. One household was excluded because the responding mother got admitted to the mental hospital. Another four households have been excluded because the children had been to hospital seven days before the visit day.

The selected demographic characteristics of all households analyzed included total population and period of stay within the urban areas. Determination of frequencies and possible relationships were done using statistical tools.

CHAPTER 5

RESULTS

5.1. Introduction.

This study in Kariobangi North assessed maternal characteristics, and food practices and their relationship to the nutritional status of young children in the peri-urban area where a good number of children thrive while some of their peers fail. In order to achieve the objectives given in section 1.2, determination of household demographic characteristics was done. Weight and height measurements of all children were taken. Households were classified as either poorly nourished -"malnourished", or well nourished according to the nutritional status of their young children.

Selected maternal attributes that influence the nutritional health of the children within the household were investigated. The study looked at food acquisition methods, in particular the purchasing method. Establishment of the quality and quantity of the purchased foods and the 24 hour dietary recall were undertaken.

5.2. General Demographic Characteristics of the Study Population.

5.2.1. Composition and Age of the Study Population.

The inhabitants of this area were from all the provinces of the country. There was a total of 767 persons in the study households of whom 384 were males and 383 were females. This gave a 1:1 ratio of males to females. About half of this population (51.0%) had lived in the area for less than 2 years while 38.0% had stayed in the area between 2 and 10 years. The rest (10%) had been in the area between 10 and 35 years. The ages of this population ranged from less than one year to 69 years.

Fifty two percent of this population was under 10 years, while 10.5% was between 10 and 20 years. Thirty seven percent was over 20 years. The mean age for the entire population was 14.5 years with a median of 9 years hence implying a relatively young population.

There were many couples living with their children, grand children and relatives. Twenty one percent of the popuiation were household heads who

lived with their spouses. About 31% of all persons within were sons while 25% were daughters staying with the parents. One percent were grand children while 2% were relatives of the household head. A very small proportion (0.7%) were acquaintances to one of the household members (Appendix 2).

5.2.2. Income Status.

Many people depended on other household members for their welfare as 71.5% (including children) reported no income generating occupations. Only 5% of the adult population had regural salaried employment, while 23% were working in the informal (traditional) sector. The majority of the working people earned between 300 and 1500 shillings a month. This gave a mean monthly income of 212.0 shillings.

5.3. Classification of Households by the Nutritional Status of the Index Children.

Seventy six households were outrightly classified as poorly nourished -i.e. malnourished. In these households there were 42 male and 34 female children whose weight for age indices were below the 30th centile of the of the NCHS median.

Seventy one households were also outrightly classified as well nourished. The children in these households had their weight for age indices between 80 and 120% of the NCHS median. This group had 36 males and 35 females.

For the thirteen children whose weight for age fell between the 71-79 % range and could not be outrightly classified as malnourished or well nourished, eleven of them were considered well nourished because their weight for height was over 90% of the NCHS median. Of these children, 9 were males and 2, females.

Two households were excluded because the children were above 120% weight for age. Residents of two other households could not be traced during the second visit thus necessitating the omission of these households. In total, therefore, there were 82 households with well nourished children (Table 1).

Table 1: Distribution of Children Below Five Years by Sex and their Weight for Age.

Weight\age	Male n=90	Female n=72	Total 162
< 70	42	34	76
71-79	11	2	13
80-120	36	35	71
< 120	1	1	2

5.4. Morbidity of the Index Children.

About seventy percent of malnourished children were found "unhealthy", compared to only about 18.0% of children from well nourished households (Table 2).

Table 2: Percent Distribution of Malnourished and Well Nourished Households by Health Status as Judged by General Appearance.

Appearance	Percent Malnourished	Percent Wellnourished
Not well	69.7	18.0
Healthy	27.6	68.0
Excluded	2.7	12.00
	100.0	100.0

About three percent of children from malnourished households were excluded because they had been to hospital seven days before the visit day.

More malnourished children (44%) presented signs of pale conjuctiva than the well nourished for whom the condition was seen in only 13% of the children (Table 3).

About 35.5% of malnourished children presented open lesions\scratches on their skin, while only 9.7% of the well nourished children presented this condition (Table 3).

On checking on edema and the condition of the hair which frequently accompany prolonged undernutrition, it was observed that two of the 76 malnourished children had edema while twenty six had straight discolored hair. This suggested a deficiency of protein in the diet. None of the well nourished children presented these signs.

Table 3: Health Status of Malnourished and Well Nourished Children as Jugded by Different Criteria.

Household Type	Scabie like Scratching		Straight & Discolored		Edema	
	n	%	n	%	n	%
Mal-nourished n=76	27	(35.5)	26	(34)	2	(2.6)
Well nourished n=82	0		0		0	

5.5. Distribution of the Households in the Study Area.

The distribution of the households is given Table 4 . A total of 158 households were investigated. The Korogocho village has the highest number of households that were studied. This village was the first to be settled. Grogan has a lower number of studied households possibly due to its vicinity to the nutritional rehabilitation center.

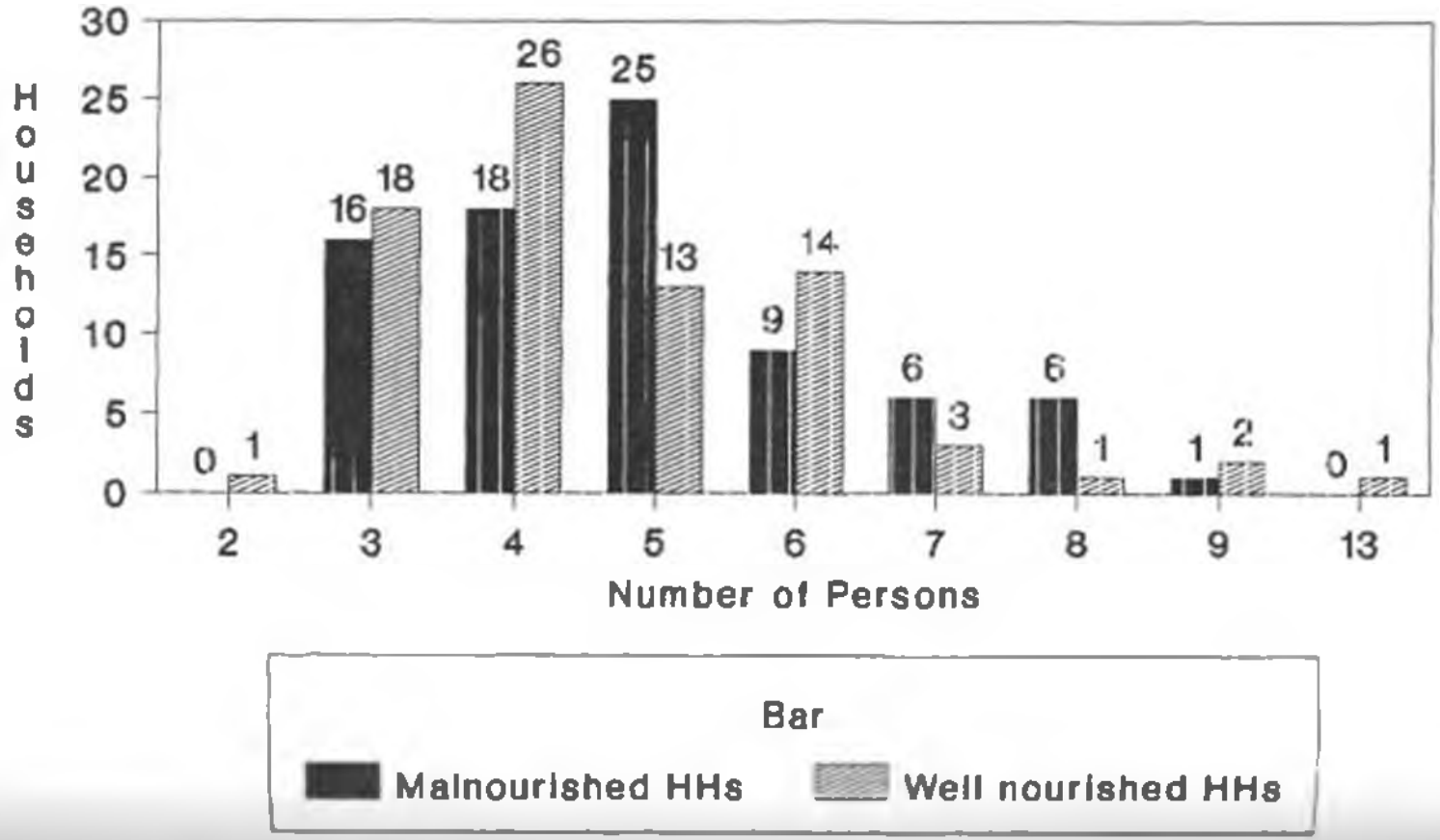
Table 4: Distribution of Households in the Five Villages.

Village	Number of Households				Total
	Mal-nourished		Well nourished		
	n	%	n	%	
Gitathuru	8	25	24	75	32
Grogan	9	64	5	36	14
Highridge	20	44	25	56	45
Korogocho	34	67	17	33	51
Ngomongo	5	31	11	69	16
Total	76		82		158

From the total population of 787, there were on average more persons in malnourished households than in well nourished households (4.91 persons per malnourished household compared with 4.67 persons in well nourished households).

From Figure 5, it is apparent that a great number of households had 4 to 5 residents. On close examination, 27% of well nourished households had 5 or less residents compared with the 15% of malnourished households who had that same number. Malnourished households had as well more households with 7 and 8 persons (i.e. 6 and 6 respectively compared to 3 and 1 respectively in well nourished households).

Figure 3: Distribution of Malnourished and Well Nourished Households by Family Size.



5.6. Characteristics of Persons in Malnourished and Well Nourished Households.

5.6.1. Distribution of Persons by Different Age Categories.

Table 5 shows the distribution of the people by age in malnourished and well nourished households. Differences were seen for all age groups in both types of households. The differences were found not to be significant.

The proportion of the population between 0-5 years (preschool children) was practically the same (i.e. 38.0% in malnourished households and 40.9% in well nourished households). The proportion of the population below 15 years is also practically the same (57.-% in malnourished households and 55.8% in well nourished households). The similarity was also observed for the age groups of 16-25 and 26-64 years (17.7% and 25.0% in malnourished households and 17.6% and 26.1% in well nourished households respectively). There was no person over 64 years in malnourished households while one person was 65 years old in well nourished household group.

The dependence ratio in these two types of households therefore was 1.33 in malnourished

households and 1.28 in well nourished households.

Table 5: Distribution of Persons in the Different Age Groups.

Age category years	Persons in the households			
	Malnourished Household		Well nourished Household	
0 - 5	154	(39.0)	153	(40.9)
6 - 10	58	(14.7)	38	(10.1)
11 - 15	12	(3.1)	18	(4.8)
16 - 20	23	(5.8)	27	(7.2)
21 - 25	47	(11.9)	39	(10.4)
26 - 30	48	(12.5)	58	(15.5)
31 - 35	34	(8.6)	24	(6.4)
36 - 40	9	(2.2)	9	(2.4)
41 - 57	7	(1.7)	7	(1.8)
Total	392		373	

5.8.2. Gender and Marital Status of Household Heads.

Table 6 shows that in both malnourished and well nourished households, about 90% of the heads of the households were males. From Table 6 it is also clear that the pattern of marital status is practically similar. In both cases about 84% were married while 16% were single.

Table 6: Distribution of Household Heads by Gender and Marital Status.

Household Type	Gender of Head				Marital Status			
	Male		Female		Married		Single*	
	n	%	n	%	n	%	n	%
Malnourished n = 76	68	89.5	8	10.5	64	84.2	12	15.8
Well nourished n = 82	73	89	9	11	69	84.7	13	15.9

* Household heads who were widowed: separated or divorced from their spouses.

5.6.3. Occupation of Household Members and Household incomes.

The majority of household heads 72.4% in malnourished and 76.8% in well nourished households) reported no full time occupations (Table 7). These were either casual workers or occasionally self employed. About five percent and one percent of the household heads from malnourished and well nourished households respectively had no work. These had only recently arrived in the area.

Table 7: Occupation of Household Heads in both Types of Households.

Occupation	Malnourished n=76	Well nourished n=82
Employed (regular)	17 (22.4)	18 (22)
Casual Employment (out of home)	39 (51.3)	42 (51.2)
Informal sector	16 (21.1)	21 (25.6)
Total Casual Employment *	55 (72.4)	63 (76.8)
No work (looking)	4 (5.3)	1 (1.2)

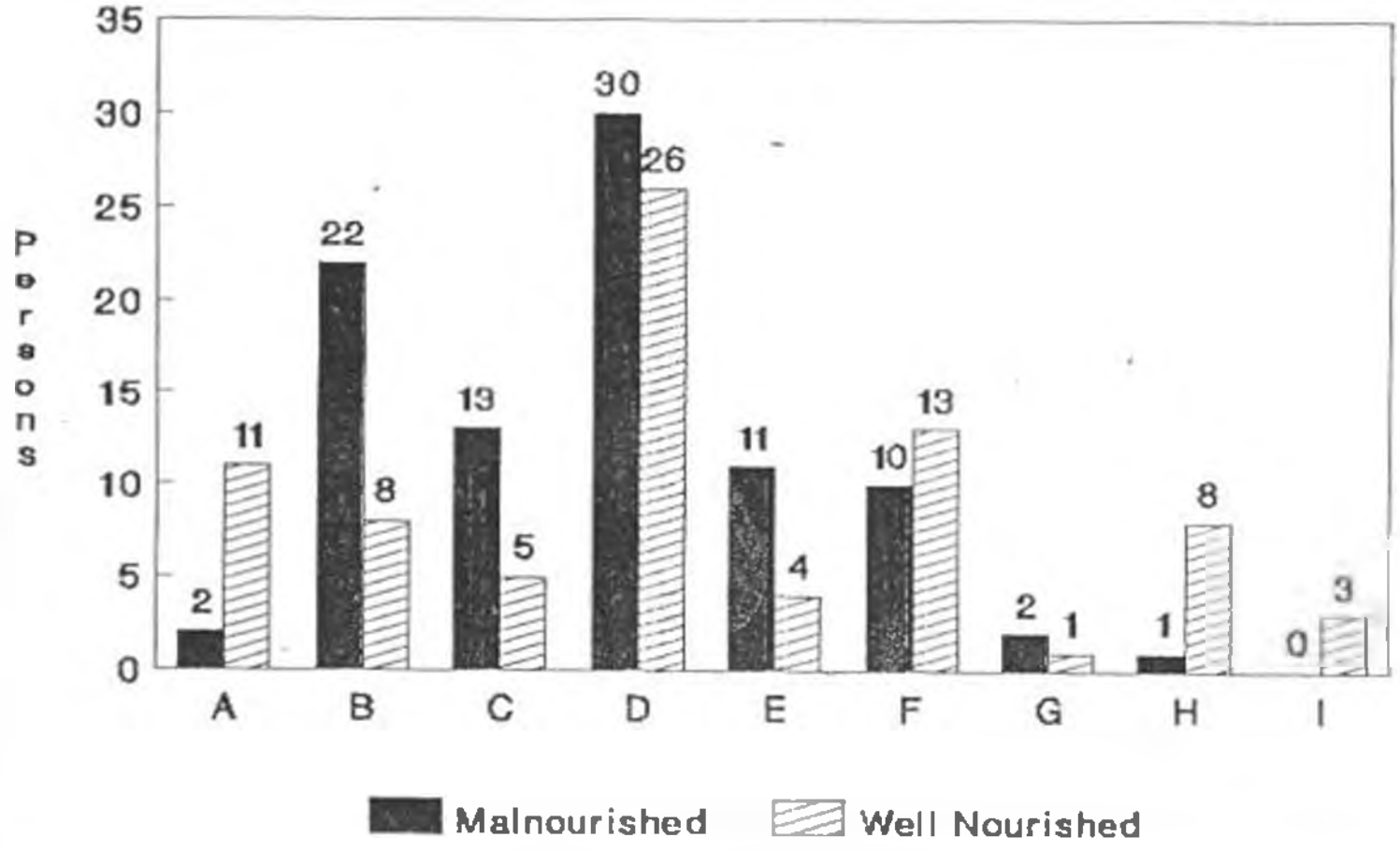
* Includes casual work in and out of home.

Figure 4 shows the number of persons who were earning income (in shillings) in both malnourished and well nourished households. The income groups were coded as follows:

A ----0 - 250
B ----251 - 500
C ----501 - 750
D ----751 - 1000
E ----1001 - 1250
F ----1251 - 1500
G ----1501 - 1750
H ----1751 - 2000
I ---- > 2000

Practically similar proportions of persons 76.8% in malnourished households and 78.9% in well nourished households (78.6%) had no income. In malnourished households there were more persons -76 (19.3%) earning incomes between 250 to 1250 Shillings compared to the persons in well nourished households who were only 43 (11.4%).

Figure 4: Distribution of Income Earners by Income Category and Household Type.



A ----0 - 250
B ----251 - 500
C ----501 - 750
D ----751 - 1000
E ----1001 - 1250
F ----1251 - 1500
G ----1501 - 1750
H ----1751 - 2000
I ---- > 2000

Income Reported in Shillings.

Income distribution is presented in Table 8. More well nourished households (24.4%) had no income compared to the malnourished households for which 13.2% had no income. In both cases a high proportion of households (55.2% in malnourished and 42.7% in well nourished households) had average incomes of 1000 shillings or less.

About one third of each type of households (malnourished and well nourished household) earned between 1001 to 2000 shillings. Only two well nourished households earned over 2000 shillings while no malnourished household earned above 2000 shillings. For three income categories (i.e. shillings 0, < 1000 and 1001-2000), there was statistical significance between the two household types.

In addition, well nourished households had higher mean monthly income per person and per household (Table 9). These were 229.6 and 1047.0 shillings respectively compared to malnourished households who had 195.8 and 1010 shillings respectively. The difference, however, was not significant.

Table 8: Distribution of Households by Income Category.

Monthly Income (shillings)	Malnourished n=76	%	Well nourished n=82	%
0	10	13.2	14	24.4
<1000	42	55.2	54	42.7
1001-2000	24	31.6	24	29.2
2001-Max.	0	0	2	3.6

Chi square value 7.642, df 2, $p < 0.05$.

Table 9: Mean Reported Income Per Person in Malnourished and Well Nourished Households.

Income (Kshillings)	Malnourished	Well nourished
Per capita	195.8	229.6
Per Household	1010.0	1047.0

5.6.4. Maternal Attributes.

Mothers who were household heads were few; only 4% in malnourished households and 11% in well nourished households.

In both cases about 59% of the mothers of the index children were home makers and 32% worked in the informal sector. More mothers from malnourished households (8%) had casual work compared to the mothers from well nourished households who were 6%. In malnourished households none of the mothers had regular salaried employment while in well nourished households there was one mother with regular salaried employment (Table 10).

Mothers from well nourished households spent more time with their children than those from malnourished households. In well nourished households, 70.2% of the mothers spent all the time (24 hours) with the children and only 13.2% spent less than 12 hours with their children.

In malnourished households on the other hand, 38.2% remained with the children over the 24 hour period while a much higher proportion (44.7%) of mothers from malnourished households remained with the children for 12 hours or less.

Table 10: Distribution of Mothers by Household type and Occupation.

Household type	Occupation			
	Regular employ-ment	Casual work	Informal sector	None Home maker
Malnourished Households	0.0	8.0	32.0	59.0
Wellnourished Households	0.01	6.0	32.0	59.0

Adult female who remained at the home and depended on the working male for the basic needs and amenities.

5.6.5. Mothers' Period of Stay in Peri-urban Areas.

Table 11 shows that about seventy four percent of mothers of well nourished children had lived in the area for 5 years or less while 65.8% of mothers from malnourished households had lived for the same period. In both cases a similar proportion (about 18%) had lived in the area for 6-11 years. Twice (15.8%) as many mothers of malnourished children had lived in the area for over 12 years as had the 7.3% of mothers in wellnourished children.

Although there were differences between the two types of households, no statistical difference was observed (Table 11).

Table 11: Maternal Period of Stay in the Study Area.

Number of Years	Proportion of mothers in Malnourished		in Well Nourished	
	n	%	n	%
0-5	50	65.8	61	74.4
6-11	14	18.4	15	18.3
>12	12	15.8	6	7.3

Chi square 2.726, df 2, $p > 0.05$.

5.7. Food Acquisition Methods and Purchasing.

Purchasing was the most popular method of food procurement for most of the households as is evident in Appendix 4. Gardening was reported by only 3.8% of the well nourished households who grew cabbage and kale. No gardening was reported by the poorly nourished households. No family reported gifts of food from relatives or friends.

Both types of households purchased the foods within the area. The money spent was directly related to the amounts that each households bought for the home. This implied that well nourished households spent more money for each food item.

Table 12 shows the purchasing behavior of high calorie and protein foods by the different households. Purchases of other food items that are served with the staples are reported in Table 13. These were purchased in smaller amounts.

For the foods considered in Table 12, more well nourished households purchased more food items than the malnourished ones. Twelve food items were bought by more well nourished households

Table 12: Number of Households Purchasing Selected Foods as Recorded from the Household Food Budget Survey.

Food Item	mal nourished	Well nourished	p Value
Maize meal	72 (94.7)	77 (83.9)	p >0.05
Potatoes	34 (9.2)	34 (41.4)	p< 0.05 *
Rice	4 (5.2)	14 (17.0)	p< 0.05
Millet	2 (2.6)	9 (10.9)	p> 0.05
Sorghum	2 (2.6)	3 (3.6)	----
Wheat based prod	24 (9.2)	13 (15.8)	p> 0.05
Sugar	67 (88.1)	82 (100)	p< 0.05 *
Bread [1]	17 (22.3)	66 (80.4)	p< 0.05 *
Legumes [2]	10 (13.1)	41 (50.0)	p< 0.05
Beef\tripe\liver	17 (22.3)	45 (54.8)	p< 0.05 *
Fish	18 (23.6)	31 (37.8)	p> 0.05
Milk	49 (64.4)	62 (75.6)	p> 0.05
Eggs	3 (3.8)	2 (2.4)	____
Cooking Fat	70 (92.1)	82 (100)	p< 0.05 *

* Significance difference observed between the malnourished and well nourished households purchasings.

1 Includes pastry (chapati) and doughnuts
2 Includes cow peas, green grams, and kidney beans.

compared to only 2 food items (millet and wheat based products) bought by more malnourished households than the well nourished ones. Therefore it is apparent that the well nourished households endeavored to provide greater diet diversity.

For the foods that are served with the staples, or eaten as snacks and the beverages (carrots, sweet bananas, cabbage and cow pea leaves, herbs and spices, cocoa and arrowroots) only an appreciable number of households from the malnourished and well nourished groups purchased these. These food items were purchased by the respective number of households in the proportions given in Table 13.

In all cases well nourished households purchased foods than the malnourished households. The proportions of well nourished households purchasing respective items were 8.5% for carrots, 13.4% for sweet bananas, 30.4% for cabbage and cow peas, 18.3% for herbal spices, 14.6% for cocoa and 4.8% for arrow roots. The proportions of mal nourished households purchasing similar items were as follows: 3.9% for carrots, 9.2% for sweet bananas, 9.2% for cabbage and cow pea leaves, 6.5% for herbs and spices and no cocoa or arrowroot (Table 13).

Table 13: Number of Well Nourished and Malnourished Households Purchasing Different Food Stuffs.

Food item	Percentage of households reporting the purchase.		
	Mal nourished	Well nourished	Total
Carrots	3.8	8.5	12.4
Bananas	6.2	13.4	22.6
Cabbage	9.2	30.4	39.6
Herbs & Spices	6.5	18.3	24.8
Cocoa	0	14.6	14.6
Arrowroot	0	4.8	4.8
Sour milk	0	4.8	4.8
Mutton	0	3.6	3.6
Pumpkins	0	3.6	3.6
Orange	0	1.2	1.2
Ovacado	0	1.2	1.2
Chicken	0	1.2	1.2
Duck	0	1.2	1.2

5.8. Quantity of Food Purchases.

Results of this survey on different food items purchased is given in Table 14. In order to account for the persons in the different types of households, a correction factor of 0.95 (i.e. 374/392, that is 374 persons in malnourished households and 392 persons in well nourished households) was used for the well nourished group.

The bulk of the diet comprised of maize meal and potatoes in both types of households. Mal-

nourished and well nourished households purchased practically the same amounts of these foods. In malnourished households mean quantities of maize meal and potatoes were 7.67 Kg and 2.44 Kg per week respectively. The corresponding values in the well nourished households were 6.92 Kg of maize meal and 2.25 Kg of potatoes. Rice was purchased in much smaller amounts which were practically the same in both types of households (i.e. 0.45 Kg in malnourished households and 0.41 Kg in well nourished households).

Higher amounts of beans (1.43 Kg) were purchased by well nourished households than by the malnourished ones bought only 0.43 Kg. Higher mean values were observed for sugar (1.60 Kg), milk (3.00 Kg) and bread (3.32 Kg) in well nourished households than in malnourished ones whose corresponding mean values were for sugar 1.52 Kg, milk 1.67 Kg and bread 2.19 Kg.

For beef and fish, the malnourished households and well nourished households had vitually similar means. Well nourished households had 0.77 Kg and 1.06 Kg respectively while the malnourished households had 0.71 Kg and 1.02 Kg respectively.

The mean value of cooking fat was more (0.91 Kg) in well nourished households than in malnourished ones where the mean purchase was 0.69 Kg. There was also a statistical significance at p<0.05 with respect to this food item. No other statistical significance was observed with the other food items.

Table 14: Average Purchases of Different Foods as Reported by the Malnourished and Well Nourished Households.

Food Item	Malnourished		Well nourished	
	Mean - Kg(x)	Sta. Error SD	Mean - Kg(x)	Sta. Error SD
Maize meal	7.67	0.58	6.29	0.53
Potatoes	2.44	0.34	2.25	0.33
Rice	0.45	0.10	0.41	0.07
Beans	0.45	0.10	1.43	0.06
Beef	0.77	0.11	0.71	0.07
Sugar	1.52	0.12	1.60	0.11
Cooking fat	.69	0.09	0.91	0.20 *
Bread	2.19	0.24	3.32	0.28
Fish	1.02	0.21	1.06	0.19
Milk (liter)	1.67	0.50	3.00	0.25

* Statistical significance at P <0.05.

5.9. Twenty Four Hour Dietary Recall of the Subsample of Index Children.

Three daily meals were recorded in all the households. There was no separate preparation of

meals for the children. Thus no supplementary food preparation methods were reported with respect to mincing meat, mashing grains or enriching foods by the addition of fats\oils or protains in both types of households.

In both types of households, numbers of children consuming different types of foods is given in Figures 5 and 6.

Maize meal was the most widely consumed food. This was consumed as posho (ugali) or porridge. The porridge was consumed mainly in the morning and the ugali at lunch and supper times. The consumption of porridge varied in the two types of households.

More well nourished children (14)were fed the porridge than were the malnourished children (11). Twice as many (12) well nourished children were fed higher amounts (over 3/4 of a cup- 187.5 mls) compared to the malnourished children who were 6. Five malnourished children were fed 1/4 of a cup or less of maize porridge compared to the well nourished children of whom only two consumed that amount (Table 15).

Figure 5: Number of Households Feeding Specific Foods (Early Morning Meal)

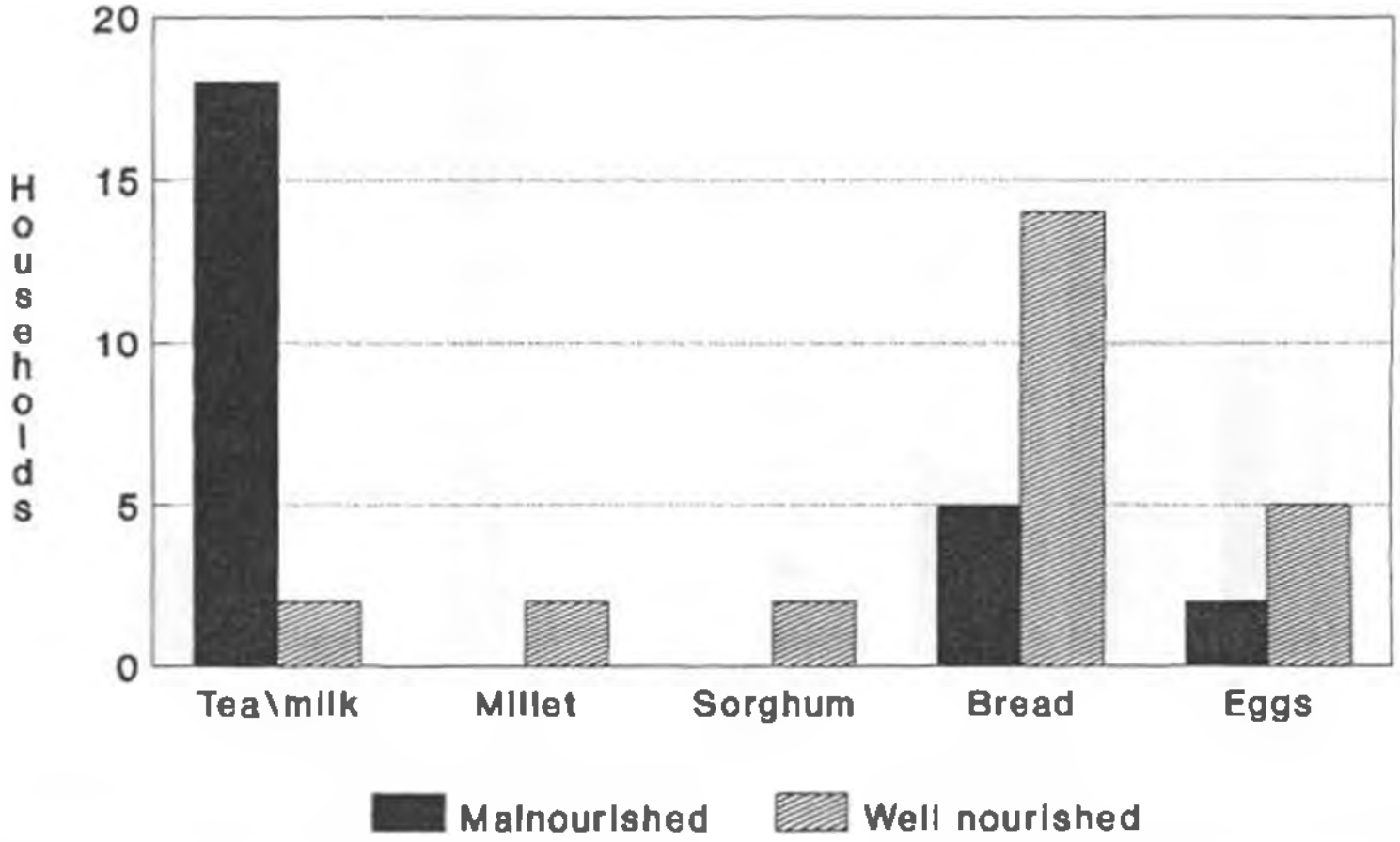


Figure 6: Number of Households Feeding Specific Foods at Lunch and Supper

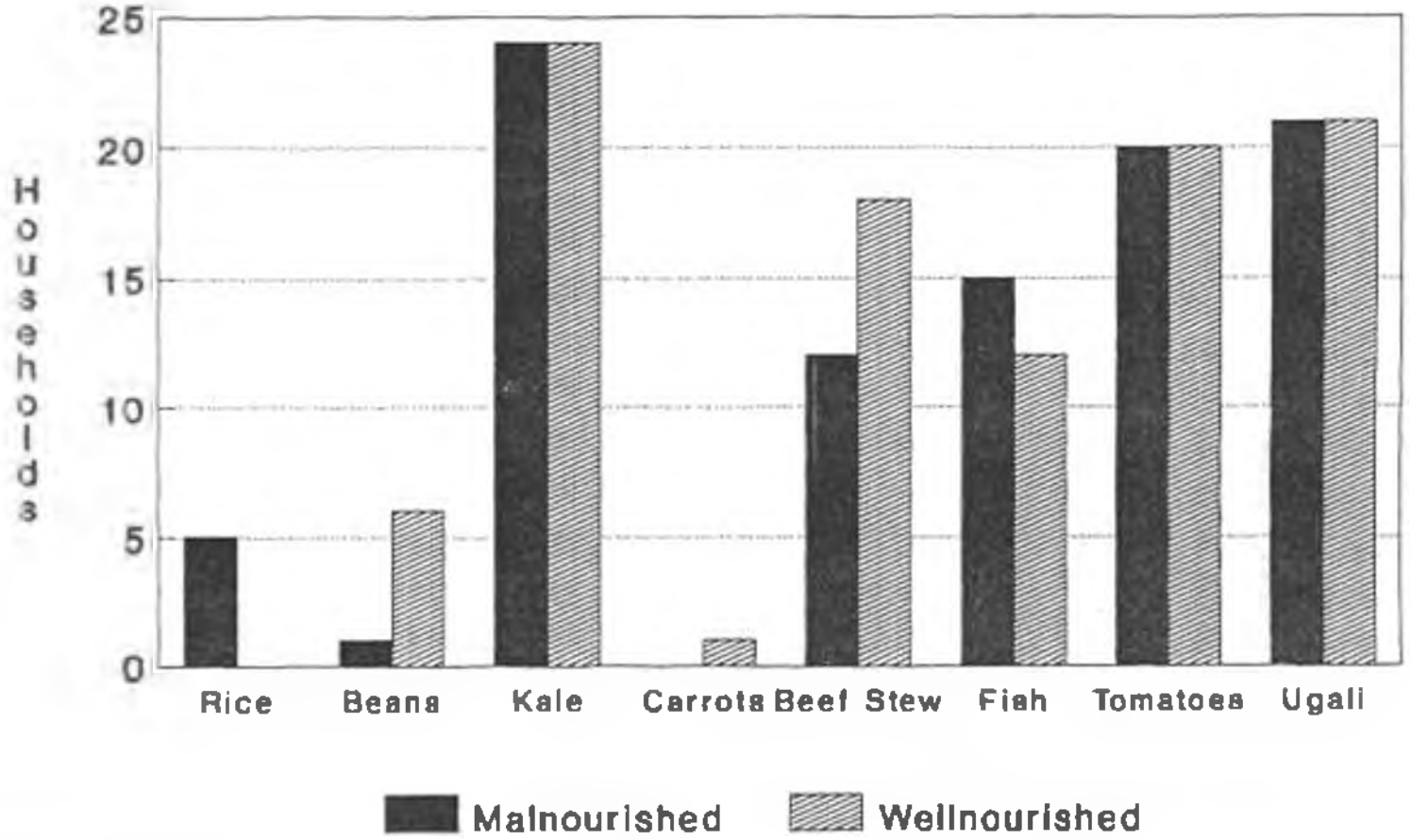


Table 15: Distribution of Children by Amounts of Porridge Fed in the Different Households During the Early Morning Meal.

Status	Amounts in millilliters				
	62.5	187.5	250	>250	
Malnourished (n=30)	5	1	4	1	=11 (36%)
Well nourish (n=30)	2	4	4	4	=14 (46%)

Similar amounts (200-300 grams) of maize meal (ugali) were reported for lunch and supper by both types of households. Approximately 16.6% of malnourished children were reported to have consumed rice at supper time. No well nourished child was reported to have consumed rice at any one time.

Beans were fed to more (6 (20%)) of the well nourished children than to the malnourished children. Only one (3%) consumed this food. Two of the well nourished children were given a dish with beans at breakfast, and the other 4 fed on beans at supper time. This implied the move from the traditional diets of whole grain consumption..

The children from the well nourished households fed on a combination of many other food items which included millet and sorghum. Two well nourished children were fed millet porridge at breakfast in quantities of 150 millilliters while another two were fed on sorghum porridge in quantities of 200 millilliters. Children in the malnourished households were not fed any of these.

Bread was served with margarine to more (46%) of well nourished children while only 16.6% of mal nourished chiidren were fed this food at breakfast. Bread alone was fed to 39% of the malnourished children between meals in unspecified quantities between meals.

Milk was fed in a brew of tea and sugar, mostly at breakfast, to 18 malnourished children compared to only 2 of the well nourished children. Eight well nourished children drunk milk after supper. No malnourished child drank milk after meals.

Two well nourished children ate eggs at breakfast while 3 others ate eggs at supper giving a total of 5 children. In malnourished households, only two children were given eggs at breakfast.

Beef stew was served to the children by both types of households in unspecified amounts. More well nourished households (18 (60%)) fed beef stew than the malnourished households where this was reported by 12 (40%) of the households.

Tomatoes were used in the beef stews in over 66% in both malnourished and well nourished children.

A clear soup of dry fish was given to more malnourished children (15 (50%)) than to the well nourished children (12 (40%)). In both types of households, this soup was served with the staple in unspecified amounts. No fish fillet consumption was reported by any of the households.

Kale was the most popular vegetable fed. It was fed to all of children at lunch and supper times in 80% of all the households. In most cases the well nourished households mixed the kale with the staple (maize meal). In three of the well nourished households, the kale was mixed with the beef stew. In malnourished households kale was simply cooked without being mixed with any food, and then consumed with ugali.

Carrots were eaten by only one well nourished child and no malnourished child fed on carrots although this food item is abundant in the area. All the children in both types of households consumed cooking fat because it was used in the preparation of of many dishes.

Occasional snacking was repoted in more well nourished households (14 (46.6%)) than in malnourished ones where only 5 (16.6%) of children were reported to have snacked. Snacking consisted mainly of sweetened tea and milk.

Seven (23.3%) malnourished households reported feeding pastry (chapati) and doughnuts (mandazi) to the malnourished children in unspecified quantities. These products were bought from the kiosks (grocery) stores. No well nourished household reported feeding pastry (chapati) or doughnuts (mandazi) to the children.

Three mothers of malnourished children and one mother of a well nourished child reported withholding eggs. Four mothers of well nourished children considered beans harmful to children under 18 months.

CHAPTER 6

DISCUSSION

6.1 Introduction.

In considering the results of this study it must be emphasized that the cause of malnutrition is multifactorial (Taylor, et al., 1976). Household practices have been known to be culturally determined while culture is defined as the peoples' way of life (Fieldhouse, 1986). In peri-urban areas there is a great deal of intra-cultural diversity as the individual household members are exposed to new ideas coupled with generational and educational differences (Pelto, 1987).

With regards to children's nutritional health, maternal attributes and food practices were important factors as shown by this study.

6.2 Selection and Classification of the Households.

During the study it was observed that many households in the peri-urban area are occupied by adults with no children. This is contrary to the observation made during a tour of this area which revealed that there were many young children at the road side.

Many study findings have shown that the basic causes of most of the malnutrition in the world today are social (Ritchie, 1967). Peri-urban areas present a population of diverse ethnic origins which has migrated from the rural homes and has formed large conglomerates of shelters within the city limits (Dywer, 1979).

Of the 158 households, 76 of these were outrightly classified as having malnourished children. The children in these households had measurements that conformed to the international norms whereby children's weight for age of 60-85% (or below 70%) of the National Council of Health Statistics (NCHS) are undernourished according to the Gomez classification. According to Jelliffe (1966) also these children were in the lower range of the second degree malnutrition (60%-75%).

The nutritional status of these children showed patterns similar with the patterns identified by Stephenson (1979) in rural Kenya. According to this categorization, the children in rural Kenya presented past chronic malnutrition (low weight for age, low height for age and normal

weight for height) and current long duration (low weight for age, low height for age and low weight for height) malnutrition. The results of this study confirm that it is some of these similar families that have moved to the peri-urban areas, and the children still maintain the same nutritional status. This same pattern of deprived growth was also found by West (1986) in Bangladesh. Hence rural to urban migration has not solved nutritional problems.

Kigondu (1986) stated that children grow both in weight and height with age. Weight for age index was used in qualifying the children as it combines both acute and chronic malnutrition. In addition it is recommended by World Health Organization (WHO) in describing the nutritional status of children.

6.3. Effect of Selected Household Characteristics on the Nutritional Status of Young Children.

Family Size.

The number and the ages of persons in the household are important determinants in the prevalence of optimum nutritional health. These two demographic characteristics influence the amounts

of food available to the household (Pelto, 1987) and the subsequent distribution of that food in the home. High numbers of adult persons require high amounts of food to be provided. High numbers of young children necessitate the provision of high energy density and high protein foods to meet the increased nutritional needs of the growing children. In cases where eating utensils (plates and bowls) are shared, children may not consume adequate amounts if the number of persons in the household is large.

This difference (0.24) in the family size between malnourished and well nourished households both of which were observed to have similar age distribution of the residents, similar occupations and marital status, is too small to account for the difference in the nutritional status of the children.

Marital Status.

Marital status has been cited as a factor in the well being of all household members including the nutritional health of the children: as observation reveals many problems associated with single parenthood. In this study the

difference in the nutritional status between the children in the two households can not be explained by the marital status as this was practically similar (section 5.6.2.).

Dependence Ratio, Employment Pattern and Income Status.

The economic status of any household depends on the earning capabilities of its members. Children below 15 years and adults over 65 years are usually regarded as incapable of bringing in any income for the household upkeep. High numbers of these two groups imply high dependence ratios for the particular household.

The dependence ratio of malnourished households (1.33) though somehow higher than that of well nourished households (1.28) does not account for the difference in the nutritional status of the children as it is too small.

The employment pattern which was also found to be similar in the two types of households does not also help to explain the the differing nutritional status. Similarly the income does not explain the difference in the nutritional status of the

children as the proportion of those getting between 250-1250 shillings was higher (19.3%) in malnourished households compared to the one (11.4%) in well nourished households.

There were three persons earning over 2000 shillings in well nourished households. These higher earnings possibly account for the slightly higher per person and per household income (229.6 and 1047.0 shillings per person and per household respectively in well nourished households compared with 195.8 and 1010.0 shillings per person per household respectively in malnourished households).

The results are consistent with other previous studies which have incorporated the analyses of income and poor nutritional status. These studies have disclosed that with urbanization and development (change) new nutritional hazards have come up, and in some cases income alone ceases to be the most detrimental factor to the household diet. Several illustrational studies and observations show that diet have failed to improve in some households in spite of rising incomes in the peri-urban areas.

6.4. Effects of Maternal Attributes.

The mother's period of stay in peri-urban areas (section 5.6.5) was found to have influences on the practices due to the exposure to new ideas from peers and the mass media. With long residence, household members may learn or adapt new coping skills (Dennis, 1985) in order to survive better in the new environment. It was found that that a higher proportion of mothers (34.2%) from malnourished children had lived longer - over 6 years in the peri-urban area compared to the proportion of mothers (25.6%) in well nourished households who had stayed in the area for that same period. with the long stay, it appears these mothers encounter more hardship in terms of increased family size with respect to dependants. Hence the nutritional status of the vulnerable members deteriorates.

The better nutritional status observed in the children whose mothers remained with them for longer periods implies that intentional child neglect can lead to malnutrition of the child. There has been evidence in support of closer child mother contact.

In this study, mothers in well nourished households spent more time with the children although these same mothers had similar demographic characteristics, marital status and employment patterns as the mothers in malnourished households. Cultural characteristics or education of the mothers may account for the difference. This has, however, to be established.

6.5. Effects of Food Practices and Food Intakes.

The observation with respect to food acquisition methods showed that purchasing was the most common method as households in peri-urban areas have no space for cultivation. Well nourished households had higher purchasing frequencies for most of the food items (Appendix 2). This should explain why the children in this households had good nutritional health compared to their peers in the malnourished households.

Although there is considerable casual eating outside of the home in the urban areas (Dennis, et al., 1986, Webb, 1988), it has been possible to estimate correctly the nutrient deficiency for vulnerable groups from the relationship between the

food accessibility at the household level without actually knowing how actual intakes have varied in the groups (World Bank, 1986). Household food budget surveys were used therefore as they are most appropriate methods of determining food accessibility at the household level.

Though this is basically a recall method, the results obtained show a striking difference with respect to the provision of diet diversity by the well nourished households. The results obtained show not only a greater diversity in well nourished households, but these households bought higher quantities of the major foods such as beans, milk and sugar which are good contributors of protein and energy; and relatively more varieties and higher quantities of vegetables. They also had more casual snacking which could have contributed to the improved nutritional status.

The observations are in agreement with other studies. For example, Latham (1979) stated that most of the food consumption is done at home. Davidson, et al., (1986) reported also that nutrient content intake has a fundamental relationship to good nutritional health.

With greater diet diversity, there is better provision of quality and quantity of nutrients. The better nutritional status of these households purchasing more variety of foods is even explained better by the fact that the children in these households are likely to consume a greater variety of micronutrients. It has been well established that in order for the body to metabolize the major nutrients, certain key vitamins and minerals are required.

It is important to note that malnourished households reported purchasing more mandazi and chapati from the kiosks. This could have considerably reduced their purchases of the more nourishing foods for the child. Hence this partially accounts for the low nutritional status.

6.6. Child Feeding Practices.

It is evident that child feeding practices were better in well nourished households. The feeding of maizemeal porridge in higher amounts (over 3/4 cup) to 12 children (40%) in well nourished households is a far much better practice than feeding tea with milk and sugar which was practiced by the malnourished households in feeding

18 (60%) of malnourished children. This high frequencies of feeding this low energy drink explains the prevalence of undernutrition among these children. Considerable snacking was observed as well in well nourished households.

From the results, it is reported that more malnourished children were fed on rice than the well nourished children. Only one malnourished child (3%) ate beans compared to the 6 (20%) of well nourished children. This finding conformed to Witcher's observation in Ecuador where the women and children who migrated to urban areas changed their dietary patterns. These women and children reported low consumption of whole grains owing to the availability of refined grain products. This move from the traditional diets which have been cited long ago as appropriate for the maintenance of the body accounts for the low nutritional health among these children in the malnourished households.

Summary.

The over all observation is that even if household age distribution and income factors which influence the food practices are similar, differences in nutritional status can be observed.

The hypothesis that no difference exists in food procurement between the households was not true, while the second hypothesis stating that undernutrition is significantly related to the quantity of food accessible to the household was true.

It is obvious maternal and food practices are also determined by other factors. Such factors may be cultural practices and nutritional knowledge which this study did not address.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion.

Family food practices are major determinants in the prevalence of undernutrition among children in households with relatively similar characteristics living in the same ecosystem. Exposure to new ideas is not always the most important determinant of good nutritional status among young children because long residence in peri-urban areas nurtures more concerns as household members adjust to the new settlement.

The household characteristics considered here namely family size, employment patterns and marital status did not explain the poor nutritional status in the households.

The mothers' period of stay in the peri-urban area was an important determinant as would be expected due to the detachment from the rural homes.

In urban areas, purchasing is the most important method of food acquisition and it is an indicator of food consumption.

7.2. Recommendations.

Families newly migrated from the rural homes should be counseled on living in peri-urban areas in order to reduce recurrence of poor nutritional health status among their vulnerable members. These families should make use of the available government nutrition rehabilitation facilities and the non-governmental ones for the example the churches'and the World Vision, Danish International Development Agency in the urban settings in order to improve their welbeing in the new settlement.

Cultural practices pertaining to feeding of the young children should be studied in urban areas to determine their influence on food practices.

Programs promoting better nutrition must ascertain that diets that are recommended are feasible and suitable with respect to the new culture that the peri-urban residents adapted.

REFERENCES

Addo, A. A. Kareem, F.M., Sampson, T.I., Jibrin, C.L. (1988). Anthropometry and Nutrient Intake of Nigerian School Children from Different Ecological Zones. Ecology of Food & Nutrition Volume 21: No 4 p271-272.

Berg, A. (1981). Malnourished People, a Policy. View. Poverty Basic Needs Series p26.

Berge, A. (1987). Malnutrition. What can be done? Lessons from World Bank Experience p2,4. 86.

Cameron, M., Hofvander, Y. (1983). Manual on Feeding Infants and Young Children. Oxford University Publication Third Edition. p23.

Central Bureau of Statistics. Social Perspectives (1984). Ministry of Planning-Kenya.

Chana, A. S. (1971). Uncontrolled Urban Settlements Case Study for Kenya. Policy Indicators. Tutein & Koch Capenhagen 3.03.

Coursin, (1965).

Effect of Undernutrition on Central Nervous System Function. Nutrition Reviews 23: 65 1965.

Davidson F.R., Hayek, A. L., Altschul A. M. (1986).

Towards Accurate Assessment of Children's Food Consumption. Ecology of Food & Nutrition 18: p309-317.

Den Hartog, A. P. and van Staveren, A.W. (1985).

Manual for Social Survey on Food Habits and Consumption in Development Countries. Pudoc Wageningen p16.

Dennis, B., Shufflett, P. A. (1985).

A Conceptual & Methodological Model for Studying Dietary Habits in the Community. Ecology of Food & Nutrition. 17 p253-262.

Dwyer, (1979).

People and Housing in Third World Cities. Longmans London.

Dobbing, J. (1985).

Infant Nutrition and Later Achievement. The American Journal of Clinical Nutrition 41 Febraury p477 -484.

Facts of Life A Communication Challenge (1980s).
Published by UNICEF & WHO and UNESCO
3 UN Plaza New York p41

Fieldhouse, P. (1986).
Food & Nutrition Customs and Culture.
Croom Helm Publishers. New York.
p1-2.

Folde, R. (1987).
The Use of Traditional Ingredients in the Development of Weaning Foods in the Expert Consultation on Upgrading of Traditional Food Techniques Volume 2 p81.

Graham, (1972).
Environmental Factors Affecting the Growth of Children. The American Journal of Clinical Nutrition 25 p1184-1188

Graves, P.L. (1972).
Nutrition, Infant Behaviour and Maternal Characteristics, a Pilot Study in West Bengal India. The John Hopkins University Department of Pathobiology.

Huenemann, R., Schrimshaw, M. (1970).

Dietary Practices and Beliefs in the Ecological Assessment of the Nutritional Status of a Guatamala Finca Population Volume1. INCAP Summer Course in Clinical And Public Health.

Jelliffe, D.B. (1963).

Urbanization and Child Nutrition in Africa. International Child Welfare Reviews. 16 (2): p87.

Jelliffe, D. B. (1966).

The Assessment of Nutrition Status of the Community. (With Special Reference to Field Surveys in Developing Regions) WHO Monogram Serial No 53.

Kahn, E. (1961).

Peadiatrics in an Industrialized Part of Africa. Journal of Pediatrics, 58: p277.

Kain, J., Oscar, R. (1985).

A Description of the Use of Household Budget Surveys to Estimate the Dietary Intake of Low Income Urban Families. Ecology of Food & Nutrition Volume 18; p19-27.

Kamel, B. S. and Martinez, O. B. (1984).

Food Availability in Kuwaiti and Non-Kuwaiti Households. Ecology of Food and Nutrition Volume 15: p191-201.

Kigondu J. D. (1986).

A Guide for Health Workers in Kenya M.O.H. Kenya. March. p10.

King, M., King,F., Martodipoero, S. (1981).

In Primary Child Care. Manual for Health Workers Book 1 Oxford Medical Pulications p90.

King, M,. King, F., Morley, D., Burgess, L. Burgess, A. (1972).

Nutrition and Developing Countries Oxford University Press Chapter 8.8.

Krause M. V., Mahan L.K. (1979).

In Food, Nutrition and Diet Therapy. W.B. Saunders Company Sixth Edition p312.

Latham M. C. (1979).

Human Nutrition in Tropical Africa. FAO Roma p226

Leonardo, M. J. (1977).

Environmental Determinants and Signs of Malnutrition in Edit R.M Suskind Raven Prev. New York. p14.

Maina G. W. (1988).

Ecology of Preschool Malnutrition in Peri-urban Nairobi (CAVS) University of Nairobi. Kenya.

Merrill,S., Read U.S.A. (1981).

Ecological Assesement of the Nutrition Status of a Guatemalan Finca Population Vol 1 1981.

Martorell, R. (1984).

Nutrition and Health Status Indicators. Living Standard Measurement Study. Working Paper No 130 LSMS p 7.

Mwangi, W. N. (1982).

Low Income Food Systems and Food Safety in Kenya. A Case Study of Kangemi Peri-urban Area. IDS DP 278.

Nabarro, D. (1981).

Social, Economic, Health and Environmental Determinants of Nutritional Status. WHO-SEARO Workshop on Nutrition Monitoring and Evaluation. New Dehli, India. p18.

Nakatsuka H., Kasahara, M., Watanabe, T., Hisamichi, S., Shimizu, H. Fujisaku, S., Ichinowatari, Y., Ida, Y., Suda, M., Kato, K., Ikeda, M.(1988). Urban-Rural Differences in Food Habits in

North -Eastern Japan. Ecology of Food & Nutrition Volume 21: p77.

Njama, D. (1988).

Pre-school and Maternal Malnutrition in Peri-urban. (CAVS) University of Nairobi. Kenya.

Oftedal, T., Levinson, F.J. (1974).

Health, Nutritionand Income Distribution in International Nutrition Planning Program. Massachusetts Institute of Technology. Cambridge Massachussetts. p9-11.

Oomen, J. M. V. (1981).

Monitoring Health in African Dams. The Kamburu Dam Kenya as a Test Case. Chapter 9 p99.

Otundo, S. B. (1982).

Rural-Urban Dualism and the Consumption Behaviour of Kenyan Households. M.A. Thesis in Economics U.O.N.

Pathison, M. (1983).

Teaching Nutrition. The Iowa State University Press. Ames Iowa U.S.A. p130.

Pellet, P.L. (1977).

Marasmas in the Newly Rich Urbanised Society. Ecology of Food & Nutrition. Volume 6: p53-56.

Pelto, G.H. (1987).

Determinants of Childhood Feeding Practices, University of Connecticut. USA.

Per Pinstrip Anderson, (1981).

Nutritional Consequences of Agricultural Projects: Conceptual Relationship and Assessment Approaches World Bank Staff: Working Paper No. 456 May. p47, 89, 163.

Ritchie, J., AS. (1967).

Learning Better Nutrition. A second Study of Approaches and Techiniques by Department of Human Nutrition. London School of Hygiene and Tropical Medicine. p21.

Sai, F. T. (1963).

The Impact of Urban Life on the Diets of Rural Immigrants and Repercussions on the Nutritional Status of the Community Working Paper No. 4 WHO Working Paper.

Schmetz, M., Egoramaiphol, S., Leitzmann, C. (1984).

Migration and Nutrition in Thailand. Ecology of Food & Nutrition. Volume 15: p89-107.

Schrimshaw, N.S. (1965).

Malnutrition and Infection Bolden's Rev.

Nutritional Res., 26 p15

Shihembetsa, L.U. (1989).
Brief Notes on Kariobangi. University of Nairobi. International Workshop On Housing (UNCHS-PGCHS HRDU) p1

Stepheson, L.S., Latham, L.C., Crompton, D.W.T., Schulpen, T.W.J., Jansen, A.A. (1979).
Nutritional Status and Stool Examinations for Intestinal Parasites in Kenyan Preschool Children in Machakos District. East African Medical Journal. Volume 56: NO. 1.

Todaro, M. P. (1982).
Economics for a Developing World Second Edition Longman's Group Ltd. p426.

Taylor C.E., Taylor E.M. (1976).
Multi-factorial Causation of Malnutrition in Nutrition in the Community. A Text for Public Health Workers. Edit. D.S. McLaren England: John Wiley and Sons Ltd. (chap 7) p75-85.

Timmer, C. P., Falcon, W. P., Pearson, S. R. (1983).
Food Policy Analysis A World Bank

Publication. The Jonh Hopkins University Press. p38.

United Nations (1986).
How To Weigh and Measure Children. Assessing the Nutritional Status of Young Children In Housenold Surveys. New York. p21-41.

University of Nairobi Department of Architecture and Design (1971)
Mathare Valley Housing and Research Dev. Unit A case Study of Uncontrolled Settlement. p4.

Van Steenbergen, W.M., Kusin, J.A., Onchere S.R. (1984)
Food Consumption of Preschool Children in Maternal and Child Health in Rural Kenya. Edited by J.K. van Ginneken and A.S. Muller Croom Helm Limited. Kent p187-196.

Webb, R. E., Hyatt S. A. (1988).
Hatian Street Foods and their Nutritional Contribution to Dietary Intakes. Ecology of Food & Nutrition Volume 21 p199-200.

Weisner, T.S. (1975).
Kariobangi: The Case Study History of a Squatter Resettlement Scheme In Kenya.

Werner, D. (1981).

Where There Is No Doctor. The Hesperian Foundation. Chapter 11. p115-117.

West, K.P. Jr. (1986).

Peri-urban Malnutrition in Bangladesh. Differential Energy, Protein and Growth Status of Children. Ecology of Food and Nutrition. Volume 18: p99-112.

Williams, S. R. (1981).

Nutrition and Diet Therapy. The C. V. Mosby Company.

Winslow, C.C.A. (1984).

The Cost of Sickness and the Price of Health. Geneva WHO Monogram. Series No.7.

Witcher B., Kolasa, K., Bond, J.T. (1988).

Influence of Rural-Urban Migration on Adult Women's Food Patterns and Adequacy of their Children's Diet, in Ecuador. Ecology of Food & Nutrition Volume 21 p195.

Wolsley, A., Baghurst, P., Worsley, A.J., Coonan, W., Peters, M. (1985).

Australian Ten Year old's Perceptions of food: I Sex Difference Ecology of Food & Nutrition Vol. 15 pp231-246.

World Bank Policy Study (1986).

Poverty and Hunger.

APPENDICES

APPENDIX 1

HOUSEHOLDS CHARACTERISTICS QUESTIONNAIRE

FIRST STAGE

Circle - 1 Clinic Case - 2 Home Visit Case
3 Control :____:

DATE :___:____: :___:___: :__89_:
dd mm

CHILD'S
NAME_____ ___

Child's Date of Birth :___:___:___:___:___:____:
D D M M Y Y

Age in Months :____:____:

Was the date of birth verified by a document?

:___:

ie. Child Health Card, Registration Card etc.

1 = yes 2 = no

SEX _____Male / Female :____:

MOTHER'S / CARETATER'S
NAME_____

PLACE OF RESIDENCE: HOUSEHOLD
NO._____

CLUSTER_____ :____:

1 = Gitathuru
2 = Grogan
3 = Highridge
4 = Korogocho
5 = Ngomongo

FOOD PRACTICE QUESTIONNAIRE.
Circle (Healthy or Malnourished)

Page 2 of 8
Use pencil for filling: Initials of interviewer : ____
Cluster _____ H.H. Number : ___ | Date : ___|___|___:/89

3 Name of the head of the household _____ Sex M/F : _____ :

4 Name of respondent _____

Ser. No.	Name	Age	Sex M\F	occup.	Relat. to H.H	Period of Residence.	Marital status	Mo Inco
01								
02								
03								
04								
05								
06								
07								
08								

Relation to the H.H
1 Head
2 Wife
3 Son
4 Daughter
5 Grand daughter
6 Grand son
7 brother

Occupation
1 Regular employment
2 Casual
3 Business
4 None

Marital Status
1 single
2 married
3 divorced
4 separated
5 widowed
6 other

CHILD INFORMATION

Page 3 of 8

Household No. :____:____:

1 Name of index child_____

2 Sex_____ 1= Male 2= Female :__:

3 Date of Birth :___:___/:__:___ :___:___:.

DD MM YY

Was the date of birth verified by a document? :__:
ie. Child Health Card, Registration Card etc.

1 = yes 2 = no

ANTHROPOMETRIC DATA.

	Enum. 1	Enum. 2	Average
Weight (Kg .1)	:__:__.__:	:__:__.__:	:__:__.__:
Height (Cm)	:__.__.__.__:	:__:__:__.__:	:__:__:__.__:

CLINICAL SIGNS OF MALNUTRITION:

(Fill in number of each observed sign)

General Appearence

1 = looks healthy
2 = looks unwell :___:

EYES
1 = pale conjuctive
2 = Conjuctivitis
3 = visual loss in any of the eyes :___:___:___:

CHILD INFORMATION

Page 4 of 8

Household No. _____

SKIN
1 = burns \ lesions due o fnjury
2 = scabies
3 = others specify----------:___:___:

Other signs:
1 = any evidence of edema
2 = muscle wasting :___:___:___:
3 = hair discolored
4 = other signs specify----------

What is the occupation of the mother \caretaker of the index child?

1 Regular employment
2 Casual work outside the home
3 Business at home
4 None :____:

If the mother is employed outside the home, how many hours is she away from the home during the day?

:____:____: hours

How many hours during the day does the mother care for the child?

:____:____: hours

HOUSEHOLD BUDGET SURVEY

Household No. 1___:___:
Page 5 of 8

I what foods were eaten by the family yesterday ?

Circle the day of the week to which you are referring:

Tuesday/ Wednesday/Thursday/Friday.

For each meal, list the food item and then below th dish - the ingredients used in the preparation. Beside each food item listed write down the source of the ingredient.

Codes for sources: 1 = purchased locally 2 = garden 3 = gift 4 = other

BREAKFAST	:sou:	LUNCH	:sou:	SUPPER	:sou:	SNACKS	:sou:
	: :		: :		: :		: :
	: :		: :		: :		: :
	: :		: :		: :		: :
	: :		: :		: :		: :
	: :		: :		: :		: :
	: :		: :		: :		: :
	: :		: :		: :		: :
	: :		: :		: :		: :
	: :		: :		: :		: :

Page 6 of 8 Household No. :____:____:

Within the last week, what foods did you buy?

Food item	Form of Food	Amount bought

Page 7 of 8 Household No. _____

Within the last week, did you buy any of the following foods?

Food Item	Form	Amount	Price
Maize meal			
Potatoes			
Whole maize			
Rice			
Millet			
Sorgum			
Mandazi			
Sugar			
Bread			
Flour			
Chapatis			
Beans/legumes			
Beef			
Fish			
Eggs			
Milk			
Tomatoes			
Kale			
Onions			
Carrots			
Blue Band			
Kimbo			
Salt			
Sodas			
Others			

Page 8 of 8. Household No ---------

DIETARY PRACTICES

Ask the mother or caretaker, what the child ate yesterday?
Start with breakfast and continue to probe the respondent about all the foods which the child received throughout the day

Food Given	Ingredients	Origin	Amount	How?
BREAKFAST				
LUNCH				
SUPPER				
OTHER				

CODES FOR HOW? 1 = mashing 2 = mincing
3 = grinding 4 = enriching with nutrients

Origin of food 1 =prepared at home
2 =bought at kiosk.

Are there any foods you think are harmful\ not fit for this child?

YES\NO :____:

If yes, name them.

1_____ 3_____

2_____ 4_____

APPENDIX 2

Number of Persons Related to the Head of the Household.

Relation to household head	Malnourished	Well nourished
Son	124	111
Daughter	95	99
Grand Daughter	3	2
Grand Son	2	1
Brother	6	1
Sister	5	3
Others	4	4
Total	237	221

Includes in laws and acquaintances.

APPENDIX 3

FOOD ACQUISITION METHOD: PURCHASING

Food	Malnourished n=78		Well nourished n=82	
	n	%		%
Maize meal	72	94.7	77	93.9
Potatoes	7	9.2	34	
Whole maize	2	2.6	23	28.0
Rice	4	5.2	14	17.0
Millet	2	2.6	9	10.9
Sorghum	0	0	3	3.8
Mandazi	3	3.9	0	0
Sugar	67	88.1	13	15.8
Bread	17	22.3	82	100
Wheat flour	2	2.6	66	80.4
Chapatis *	2	2.6	0	0
Beans/legumes	10	13.1	41	50.0
Beef	17	22.3	45	54.8
Fish	18	23.6	31	37.8
Eggs	3	3.9	2	2.4
Milk	49	64.4	62	75.6
Tomatoes	45	59.2	64	78.0
Kale	50	65.7	67	81.7
Onions	45	59.2	78	95.1
Carrot	3	3.9	7	8.5
Blue Band	7	9.5	40	48.7
Cooking fat	70	92.1	82	100
Salt	69	90.7	78	95.1
Bananas	7	9.2		13.4
Cabbage	7	9.2	25	30.4
Coffee	5	6.5	16	19.5
Spices	5	6.5	15	18.3
Pumpkins	0	0	3	3.6
Cocoa	0	0	12	14.6
Chicken	0	0	1	1.2
Sour milk	0	0	4	4.8
Orange	0	0	1	1.2
Duck	0	0	1	1.2
Mutton	0	0	3	3.6
Arrowroot	0	0	4	4.8
Ovacado	0	0	1	1.2

* Pan fried pastry.