Nutrition Survey in Murang'a District, Kenya

Jan Hoorweg, Rudo Niemeijer and Wil van Steenbergen

Part 1: Relations between Ecology, Economic and Social Conditions, and Nutritional State of Pre-School Children

Research reports No. 19/1983

asc

African Studies Centre Leiden / the Netherlands

NUTRITION SURVEY IN MURANG'A DISTRICT, KENYA

Part 1 : Relations between Ecology, Economic and Social Conditions, and Nutritional State of Pre-School Children

CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

A nutrition survey was held in two areas of Muranga District, during early 1978, as part of the Nutrition Intervention Research Project. The two locations differ in ecological conditions and agricultural potential. In each location 150 households with children in the age range of 6-59 months were visited. This report presents the findings regarding economic and social conditions, together with the anthropometric results for the young children.

The population studied belongs exclusively to the Kikuyu ethnic group. The typical household consists of the nuclear family: man, wife and children. In the rural areas the number of women without husbands is small, and so is the incidence of polygamous unions. Most of the differences between households can be understood in terms of economic resources and family composition.

Regarding economic resources a division in social class was developed taking account of the degree of commercial farming and employment of the husband. According to this division forty per cent of the households should be classified as poor: these households are not only less involved in the money economy but also have less subsistence potential and fewer possibilities to grow food for home consumption.

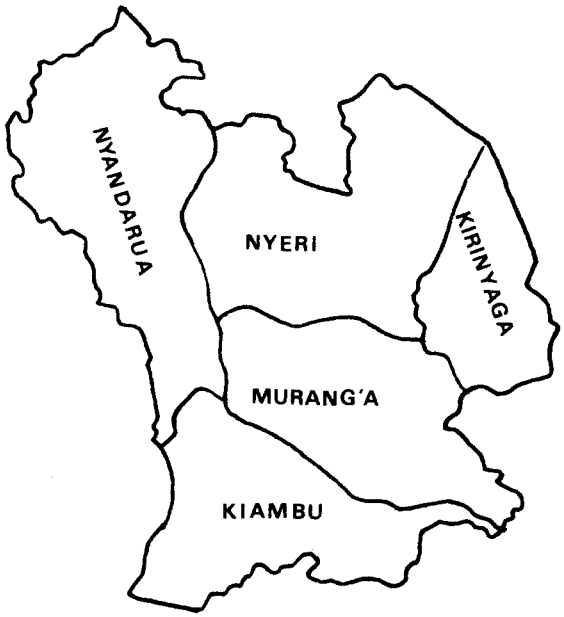
Variations in family composition concern the domestic stage of the family and the number of children in different age groups. In the later domestic stages, family size increases and so does the domestic workload for the housewife. For help she is dependent on other members of the household and grown-up children generally form a support in this respect.

Differences between the survey areas mainly concern population density and type of farming activities but the general standard of living in the two areas differs little. Although this could suggest a favourable balance between the carrying capacity of the environment and the pressure of the population, population density in the more fertile areas of Central Province is becoming formidable, often surpassing 500 people/km^2. In the fertile areas farmers tend to have relatively small farms and to concentrate on one cash crop, in the lower areas farmers have more land available and their agricultural activities are more diversified.

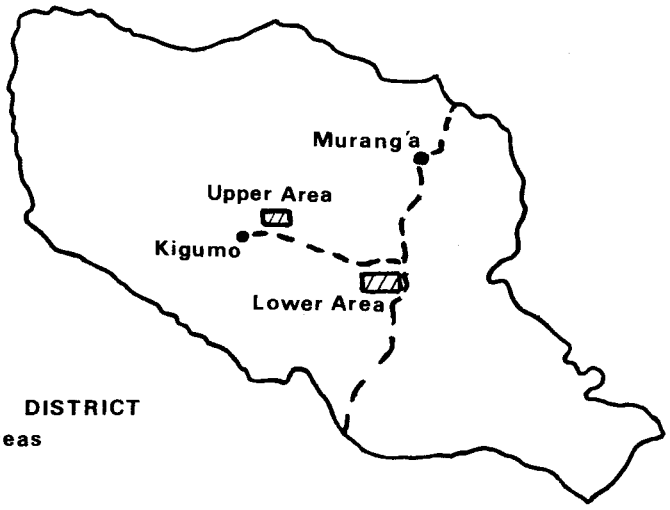
The general nutritional state of young children in this part of Central Province compared favourably with that of children in many other tropical countries, even compared with other parts of Kenya. No more than about a quarter of the children, aged 6-59 months, have a weight that falls below 80% of the reference standard.

Nevertheless, there are certain groups that give reason for concern, where more than 50 per cent of the children falls below W-A(80). The incidence of children falling below this critical value is strongly related to the available economic resources and family composition, with additional seasonal variations. Particularly children from poor households with more than two children of pre-school age constitute a group at risk.

Because of the rapidly growing population and the already intensive land use in Central Province it can only be expected that the pressure on the available agricultural resources will increase and the nutritional situation will become less favourable in the future. The findings further indicate the importance of child spacing and the need for selective nutrition intervention.



CENTRAL PROVINCE
Districts



MURANG'A DISTRICT
Survey Areas

1. INTRODUCTION

The Nutrition Intervention Research Project reviews nutrition programmes for children under five among the Kikuyu in Central Province, Kenya (NIRP,1976;1978). The objectives of the project are to provide systematic knowledge concerning the impact of nutrition programmes and to develop a model for the evaluation of such services. The effects of nutrition intervention are examined and related to ecological conditions and to economic and social differences among the participants.

Impact studies were carried out for three programmes: the Nutrition Field Worker Programme of the Ministry of Health, the Pre-School Health Programme of the Catholic Relief Services, and the Family Life Training Programme of the Ministry of Housing and Social Services (Hoorweg & Niemeyer,1980a;1980b; 1982). From each programme one clinic or centre was selected in each of the three following locations: a semi-arid area in the lower plains, a more fertile area in the coffee belt and an area of high agricultural potential at high altitude (see Meilink,1979). The studies cover not only the nutritional status of the children in the programmes but also the knowledge levels, preferences and dietary practices of the mothers.

Concurrently, between March 1978 and May 1979 surveys were conducted in Central Province among children aged 6 to 59 months. The previously mentioned programmes largely concentrate on children under five years. Children under six months were excluded from the surveys because they are usually still breastfed and because it is after the age of 5-6 months that persistent

nutritional problems start to manifest themselves among African children. The surveys were conducted in Kigumo Division in Muranga District, situated in the heart of Central Province on the Eastern slopes of the Nyandarua mountain range. Two survey areas were selected with different ecological characteristics.

The first, major, survey covered 150 households in each area; subsequently two smaller surveys were conducted consisting of two follow-up visits to 50 households in each area in the course of the next year. The primary aim of the first survey was to examine the dietary patterns and the nutritional status of the child population. A more specific aim was to furnish a set of social and nutritional data against which the participants at the nutrition programmes could be compared. For this reason the type of information collected in the first survey was largely identical to that collected during the impact studies.

The follow-up surveys among a smaller group of respondents served a different purpose. These respondents function as a control group for the mothers interviewed at the nutrition programmes. The follow-up visits also made it possible to examine the food consumption and anthropometry of the children in these households more than once, thereby providing a useful longitudinal perspective. This report is concerned with the results of the first survey, in particular with the social and economic characteristics of households and differences in ecology, how these are interrelated and how in turn they are related to the

nutritional state of young children. The detailed findings regarding food consumption are presented in a companion report (NIRPa).

The present report starts with an introductory section regarding the two survey areas, the ecological differences between them and a general description of the inhabitants, the Kikuyu. The survey methodology is described next, followed by a general review of residential and marital characteristics. In the next sections, we attempt to derive some order out of the many household and family variables that may influence the nutrition of young children. In section 6 this is done in regard of economic resources and the use that households make of them. In section 7 a similar exercise is carried out in respect of family composition and its concomitants. In section 8, finally, the relations of these ecological, economic and family factors with the nutritional status of young children are explored.

2. CENTRAL PROVINCE AND KIKUYU SOCIETY

The topography of Central Province is dominated by Mount Kenya and the Nyandarua range. The province is characterized by large variations in altitude, temperature and rainfall, resulting in considerable agricultural and economic diversity. In respect of arable land Central Province compares favourably with the rest of Kenya: 70 per cent of the land surface is suitable for farming.

On the basis of the ecological variations Central Province can be divided into distinct zones which are usually referred to by number from high to low altitude[1]. Zone II consists of forests and derived grasslands and bushlands with a potential for forestry and intensive agriculture. It is suitable for food crops such as hybrid maize, beans, Irish potatoes and vegetables as well as cash crops such a pyrethrum and tea. Zone III is land without forest potential but with variable vegetation and good agricultural potential. Subsistence crops such as hybrid maize, beans or cow peas are grown along with sweet potatoes and bananas. Coffee is the main cash crop. Zone IV is a semi-arid area of grass and woodland which is of marginal potential, but which offers possibilities for irrigation agriculture. Here drought resistant grains and roots are the main food crops while pigeon peas, grams and sisal are grown as cash crops.[2]

The population of the province numbers more than 2.3 million, according to the latest (1979) population census and comprises about 15 per cent of Kenya's total population (CBS, 1981a). The majority of the people live on the midslopes of

the mountain range, an area with a high population density. Most people (c.80%) live on smallholdings and the population mainly consists of one ethnic group: the Kikuyu. Muranga District has a total population of about 650.000 people with 96 per cent of the population being of Kikuyu origin (CBS,1981a).

The Kikuyu belong to the North-East Bantu-speaking peoples; their history has been traced back several centuries (Muriuki, 1974). It is fairly well established that they migrated south along Mount Kenya in the 15th and 16th century, subsequently dispersing through Muranga and later towards Nyeri to the North and Kiambu to the South. The first contacts with Europeans and European rule date from the end of the 19th century. At that time the Kikuyu numbered perhaps 500,000 people, organised in a system of age groups and lineages. Age groups and membership of the extended family constituted an important source of identity for the individual. Political decision-making and land ownership was vested in the lineages. There were no chiefs in this largely egalitarian society, and only limited social stratification.

Kikuyu society has undergone a dramatic change since the beginning of this century. The age-group system was soon discontinued and the nuclear family became increasingly important. There has also been a shift towards individual landownership culminating in the land consolidation of 1955-65. Commercial farming on smallholdings has assumed great proportions. Social stratification has become much more prominent and is now an important factor in rural Kikuyu society. The reasons and mechanisms

DIVISION OF LAND

The division of land between fathers and sons and later between heirs is a complex process. One aim of the land consolidation carried out in Muranga between 1955 and 1965 was to prevent fragmentation of land and after consolidation was completed further division of small-holdings was officially discouraged (Sorrenson, 1967), although this has not stopped further fragmentation from occurring. During the past century there has been a decisive shift from communal land ownership towards individual land ownership and land consolidation in fact putting the final seal on this development. This, if anything makes sons even more dependent upon their fathers for land than before.

Land may be divided temporarily or permanently. In the first case, the land is divided at the start of each season, in the second case each household uses certain parts of the land permanently although nothing is really permanent in this regard. The type of division has to do with several factors. Firstly, the age of the married children: a young couple may have to wait one or two seasons before getting some land. This depends on, among other things, whether the young husband is resident or works elsewhere. In the latter case his wife may have to wait a bit longer. Secondly, a related factor is whether people have invested in the farm. Coffee trees are expensive and take five years to first harvest and such an investment requires permanent ownership of the land concerned.

Over the years, however, divisions of land tend to become more formal and in the end there is usually a permanent division between the father and his sons. Sons who reside elsewhere with their families may or may not be allocated their part of the land at this time but they will certainly claim their rights when the father dies. In exceptional circumstances single or separated daughters may be allocated a piece of land but usually they work on the sub-plot which the parents have reserved for themselves.

behind this transformation have been admirably described by Tignor (1976); land reform has been studied by Sorrenson (1967). Contemporary daily life of the Kikuyu must be viewed against the background of these profound social changes.

Today the residential pattern of Kikuyu in the rural areas is patri- or neolocal: sons marry and settle on the land of their fathers or acquire land elsewhere to strike out on their own. After marriage daughters leave home to follow their husbands. The most common residential situations are land being occupied by one man and his wife, land divided between a father and his sons or, after the father's death, between his sons (see box). Single or separated women may live with their parents or their brothers. Widows live independently or with the relatives of their deceased husband. When land is shared between a father and his sons it is usual for the sons to build their houses next to that of their father. The consequence is an extended family living on one compound, although households remain independent in that each tends to have its own kitchen and work its own part of the land. Sometimes a second compound is built elsewhere on the holding, due to the specific conditions of the terrain, or because of disputes between households.

Traditionally each married woman lived with her children in her own hut built from wooden planks, round, with a thatched roof and a kitchen in the centre. The husband had a separate hut while teenage sons would built their own 'boys house'. Nowadays most houses are rectangular, often with corrugated iron roofs and several rooms. Since suitable wood is both scarce and expensive, the walls today are usually made of mud on a frame of poles and twines (cf. Andersen,1977:82). The house serves as a shelter for the whole family. Husbands no longer have their own hut, but a small house or room with a

separate entrance may still be built for the older boys. In small houses the kitchen is often combined with a living room but in the larger houses it is usually a separate room or even a separate building. Around the house a small area is cleared where most day-time activities take place.

FOOD HABITS

Usually a family eats three meals a day: a meagre breakfast, a second meal early in the afternoon between 1 and 3 o'clock and the last meal in the evening between 7 and 9.After these meals people often drink tea prepared with plenty of milk and sugar, tea may also be taken in the morning or the afternoon. The staple food of the Kikuyu is maize, which can be roasted or boiled on the cob when fresh, although the grains are usually removed from the cob. The favourite dish is whole maize with kidney beans boiled together (githeri).This is usually prepared every day or two.Individual meals usually consist of a portion of this basic dish to which vegetables, green bananas, potatoes,or seasonings may be added to give some variety to the two main meals of the day.

In some areas the githeri meals are usually mashed, in other areas this is hardly ever done. Stiff maize flour porridge (ngima) serves as an alternative either when whole maize is not available or as a quick dish that requires less preparation and time. Another alternative is gitoero, a stew of starchy roots or tubers. Some roots like sweet potatoes are also eaten separately, boiled with a little salt. Occasionally, a rice dish may be served.

Children are usually breastfed till the age of one year but receive additional foods from the age of three to five months. Millet and sorghum flour are commonly given to children as a light porridge while green bananas and Irish potatoes are often given,mashed together. Children are given fairly large amounts of milk, usually added to tea. Young children are not given maize kernel,but maize flour porridge is introduced at an early age. They are also given beans without maize. Gradually during the third and fourth year a shift occurs towards the adult diet. (For further information on food consumption, see Hoorweg & Niemeyer, 1980c; NIRPa).

3. SURVEY AREAS

The trunk road from Nairobi to Nyeri cuts across the lower foothills of the Nyandarua mountains. About 20 km. before Muranga town the main tarmac road through Kigumo division turns off towards the West and starts its ascent towards the mountain forests. The landscape changes from low hills with swampy valleys to steep parallel ridges with small streams. The road follows major ridges from which secondary ridges start in turn with their own murram or mud roads. After about 25 km, the divisional headquarters, Kigumo town, is reached. The two survey areas are situated along secondary ridges at a short distance from this road. The upper area, known as Kiiriangoro, lies in Kirere location, not far from Kigumo town. The second area, Kagurumo, is situated in the lower end of the division, in Gikaranga-Ruanganga location (see map on page 10).

Even to the casual observer the differences between the areas are evident. Kiiriangoro offers a green, lush landscape with steep ridges fairly close upon each other, densely cultivated from the top of the hills down into the valleys. The soil on the steep hillsides is protected from erosion by trees and terraces. In the lower area, Kagurumo, the hills are flatter and broader, the valleys wide and swampy. Vegetation is less abundant and large areas are left uncultivated. Where the ridges happen to be more pronounced there is often evidence of erosion.

These differences, although important, are not so great

as to distort comparison between the two areas. The climate and soil conditions are largely the same. Soils in both areas consist of well-drained, dark reddish brown, friable clay (Humic Nitosols) developed on basic igneous rocks (Braun,1979). The depth of the soil varies, it may be as deep as 6 feet in the upper area but only 1 or 2 feet at places in the lower area. There are two rainy seasons which allow for two harvests a year. The long rains fall between the end of March and the end of May, the short rains are in October and November. Of the two dry seasons the one between December and March is the more severe. The difference in altitude between the two areas results in differences in rainfall and moisture which correspond with different ecological zones.

The upper area (UA), Kiiriangoro, at an altitude of approximately 1650 m. and with an estimated rainfall of 1200-1250 mm. is situated in the border region between ecological zones II and III[3]. The area has good agricultural potential, lying just below the point where coffee cultivation gives way to tea cultivation. Many smallholders in the area grow coffee while dairy cattle are numerous.

The lower survey area (LA), Kagurumo, at an altitude between 1400 and 1450 m. has an estimated rainfall of 1000-1050 mm. It lies in the border area between ecological zones III and IV where agricultural potential becomes marginal[3]. Far less coffee is grown here. Livestock is more numerous except for graded cattle which do better in the upper area.

On the whole, then, the lower area is less attractive and the prices of land differ accordingly. In 1978, unimproved land,

i.e. land without cash crops or buildings, costs KSh. 6000/- per acre or more in the upper area, but could be purchased for about KSh. 4000/= in the lower area. Settlement is also more recent in the lower area: many adults settled there during their lifetime and brought the land under cultivation. The population in the two areas differs considerably. In 1979, the population density of the upper area was found to be 747 people/km^2, while this figure was 337/km^2 in the lower area[4].

DEFINITION OF TERMS

The domestic unit is defined as the people sleeping under one roof, including any older boys sleeping in a boys' house. Each unit usually has its own kitchen and in this report is alternately referred to as household and family.

The term household is used mostly in connection with the economic resources of the domestic unit,as in poor households. The term family is mostly used in connection with the domestic cycle and composition of the domestic unit, as in young families.

A plot of land as registered at the land office is called a holding. Many holdings are occupied by related households, each allocated its own part of the holding. The land at the disposal of a household is called farm (or shamba, the local term), and includes the share in the holding,together with any land rented elsewhere or otherwise acquired.

A compound is the small residential area on a holding where one or more families have built their houses. The term extended family is used to refer to related families sharing a compound.

4. SURVEY METHODOLOGY AND SAMPLE COMPOSITION

Whereas the two survey areas were selected for their differences in ecology, their exact locations were chosen with a view to comparable transport and health facilities. Both are situated along a secondary ridge branching off from the main tarmac road through Kigumo division which had the advantage that both areas remained reasonably accessible during the rainy season. The survey areas were defined as all the land between the streams in the valleys to the left and right of the selected ridges. This includes smaller ridges originating from the main ridge.

A systematic sampling procedure was developed with the help of the cadastral maps which date from the time of land consolidation, around 1960. Starting from points at the same distance from the nearest health centres, and proceeding in a direction away from the health centre, all holdings in the two areas were visited. In the upper area we proceeded in a direction downhill, in the lower area uphill. Holdings were selected for study when there were households residing with children aged 6-59 months. Holdings solely occupied by households without children in this age range and holdings where no people were residing at all[5], were excluded from the survey. On 60 per cent of the selected holdings there was one household with children in the required age range. cases where two or three households with young children were living together, one household was randomly selected. When four or five households were eligible on one holding, two

households were selected.[6] From the exceptional holdings with six eligible households, three households were included[7]. The survey continued until data had been recorded for 150 households in each area. This took about 6 weeks per area, in Kiiriangoro from February 22nd till April 4th, 1978, in Kagurumo from April 27th till May 31st of the same year.

In the upper area about 300 holdings had to be visited to arrive at the desired number of interviews, in the lower area more than 400 holdings had to be visited (table 1). In the upper area some 80 holdings were not inhabited, in the lower area this was the case with more than 200 holdings, thus reflecting the difference in population density. In both areas there were a further 60 holdings without eligible households The survey sample finally consisted of 141 holdings with eligible households in the upper area, and 143 holdings in the lower area. Table 2 lists how many households were drawn from what type of holding i.e. with one eligible household, with two etc. The 300 households for which detailed data were collected represent 439 households in all.

The selected households were visited on a prearranged day. If the female guardian of the young children was absent on the appointed day, the household was replaced by another eligible household on the same holding, according to a prearranged random order. If no replacements were available or if the women in the other households were also absent, repeat visits were made. Refusals were not encountered but the households on a few holdings proved unavailable or were otherwise rejected for various reasons.

SELECTION OF SAMPLE

1. CADASTRAL HOLDINGS IN SURVEY AREAS

	UPPER AREA		LOWER AREA	
	Number	Av.size (acres)	Number	Av.size (acres)
Holdings with eligible households[1]	145	3.6	148	4.8
Holdings without eligible households	67	3.0	50	5.0
Holdings without dwellings	81	1.5	225	2.1
Total number of holdings	293	-	423	-

2. SAMPLE COMPOSITION: HOLDINGS AND HOUSEHOLDS

	UPPER AREA			LOWER AREA		
	Number	Eligible h.holds	H.holds examined	Number	Eligible h.holds	H.holds examined
Holdings with 1 eligible household	87	87	87	95	95	95
Holdings with 2-3 eligible h.holds[2]	47	107	48	43	96	44
Holdings with 4-6 eligible h.holds	7	32	15	5	22	11
Holdings, unavailable or rejected	4	-	-	5	-	-
Total	145	226	150	148	213	150

1. Eligible households are households with children in the required age range of 6-59 months present.
2. On 2 occasions, when a visit to only 1 household on a holding was required, 2 households were erroneously studied

The research assistants were young Kikuyu women from Kigumo division, aged 20 to 25 years, with some years of secondary education. They were trained in methods of data collection for a period of 6 weeks prior to the actual surveys. Interviews were conduced in the vernacular.

In each household the female guardian of the children in the required age range was interviewed. All respondents were Kikuyu, their age and educational characteristics are listed on page 26. The interviews comprised questions on nutritional knowledge and preferences. The food consumption of one or more children was recorded by means of a dietary recall. For all the children in the household aged 6-59 months anthropometry was recorded. A comprehensive set of questions was furthermore asked about the social and economic characteristics of the household. The present report is mainly concerned with the results of the latter questionnaire covering residential situation; housing; marital situation; family composition; sex, age, employment and residence of different members of the household; age children; land use and farming activities; and finally domestic work.

The original questionnaire is presented in Appendix H, the results are presented below. Results are weighted for the number of households with children in the required age range present on the holding, i.e. the number of eligible households represented by the one selected for detailed study. In this way close estimates are obtained for the 439 eligible households in the two survey areas, on the basis of 300 interviews.(8)

RESIDENTIAL, PERSONAL AND MARITAL CHARACTERISTICS
(Listed are the weighted percentages of respondents/ households belonging in the various categories)

RESIDENTIAL CHARACTERISTICS		
AREA :	Upper	Lower
3. HOLDING		
Shared with male-related households	78%	62%
Shared with female-related households	8%	7%
Not shared with other households	14%	31%
4. HOUSE		
Mud walls	92%	86%
Wooden, Bamboo or Sisal walls	6%	10%
Stone walls	2%	5%
5. HOUSE		
1-2 rooms	12%	13%
3 rooms	35%	28%
4 rooms	27%	31%
5 or more	26%	29%

CHARACTERISTICS RESPONDENTS		
AREA :	Upper	Lower
6. FEMALE	100%	100%
7. KIKUYU	100%	100%
8. AGE		
xx-19yrs	2%	3%
20-29yrs	53%	38%
30-49yrs	45%	54%
50 and over	-	5%
9. EDUCATION		
none	35%	37%
standard 1-4	32%	25%
standard 5-7	29%	29%
secondary	4%	9%

MARITAL CHARACTERISTICS		
AREA :	Upper	Lower
10. MARITAL STATUS		
Single	4%	2%
Married,monogamous union	86%	83%
Married,polygamous union	6%	9%
Separated/Divorced	0.5%	4%
Widowed	4%	2%
11. STATUS IN HOUSEHOLD		
Female Head of Household	4%	3%
Spouse to Head of Household	92%	92%
Dependent,living with relatives	4%	5%

5. RESIDENTIAL AND MARITAL CHARACTERISTICS

Three quarters of the households examined shared the holding on which they were residing with other households, either other eligible households as explained previously or households without children in the desired age range (table 3). Usually residence is shared with kin of the male head of the household. A quarter of the households do not have to share the holding, and live independently. This is more often the case in the lower area than in the upper area. Holdings in the upper area are not only more often subdivided, when shared they are also divided into more subplots. Probably this is due to the lower population pressure in the lower area and the influx, here, of new settlers over the past decades, who have usually acquired their land through purchase rather than inheritance.

While most people live in mud-walled houses with a corrugated iron roof, about 10 per cent of the households live in houses with wooden or stone walls (table 4).[9] An even smaller percentage of the houses have paved floors. No cases were encountered where husbands had separate huts but in the 40 households with boys of 17 years and older, 28 had a separate or adjoining boys' house.

The typical household consists exclusively of man, wife and children: the nuclear family. This accounts for about 80 per cent of the households surveyed, while another 10 per cent of the households likewise consist of the nuclear family, but have an occasional relative living with them. In the remaining

10 per cent of the cases there is a different configuration. In a few instances there is no male head of the household, as in the case of families consisting of widows with children. Furthermore there are unmarried women who have children and who are still living with their parents. Finally there are some separated and divorced women, who have returned to the parental homestead with their children or who have moved in with one of their married brothers.

Although the survey concentrated on the household as unit of study, the actual respondents providing the information were the female guardians of the young children. These were nearly always the mothers of the children. Only 2 per cent of the children were not in the care of the natural mother, and living with another female guardian, usually the grandmother. Apparently the practice of sending young children to relatives, which has been reported in some parts of Africa and which has been related to poor nutrition, has a low incidence in this part of Kenya.

There is little difference between the two survey areas in respect of residential and marital characteristics of the households, except for the lesser fragmentation of holdings in the lower area.

Most respondents are married and spouse to the head of household (table 10-11). In a small number of cases (7.5%) their husbands are married to another woman as well, which accords with findings that the Kikuyu have by far the lowest incidence of polygamy in the country (CBS,1980:81). Polygamy of the husband, moreover, tells little about the household

concerned, because wives of the same husband, nowadays, usually live in different places.

It is noteworthy that the number of separated women in the areas is small, which does not seem to accord with findings that of the first marriages of Kikuyu women, at least 11 per cent are dissolved during the first ten years (CBS,1980:79). Indeed, it is likely that the low figure indicates that there is little place for separated women in the heavily populated rural areas. As long as a woman lives on her husband's land or on that of her in-laws she is considered married, whatever the further state of matrimony. When a woman leaves her husband she usually returns to her parents, but is rarely given a warm welcome, because the land rightfully belongs to her brothers, and considerable pressure is often put upon her to return to her husband. Alternatively the woman may try to find another husband. Sometimes she has no other choice than to find an existence elsewhere, for example in town or as a labourer at the large coffee and tea estates.

6. ECONOMIC RESOURCES

People in Central Province provide for their livelihood in a variety of ways. Subsistence farming and commercial farming, casual labour and regular employment are different activities by which individuals deploy their time and labour, not to mention the household chores that have to be done. Not all activities are open to everyone. Regular employment is largely limited to those with sufficient education or training. There are virtually no opportunities for regular employment for rural women, while men do few household chores. Farming requires land and commercial farming often requires investments. Individuals often partake in more than one activity with different degrees of success. The same, of course, applies to households as economic units and there are pronounced economic differences between Kikuyu households, as already mentioned earlier.

Affluence in the rural areas means that the husband has regular employment, that the household is not only able to grow enough food for its own consumption but also does a considerable amount of commercial farming. Poverty means the reverse: the husband has no regular employment, the household does little commercial farming and cannot even grow enough food for its own consumption. The latter households have to derive an income from day labour which is spent on food and other household necessities. In general it is not difficult to recognize such clear-cut cases,

but most households are not so easily placed in respect of their economic status, because of the differences in type of employment and in the extent of commercial farming.

6.1. Farming

The farming potential of a household depends, of course, on the amount and quality of available land. Less than 25% of the households in the upper area have large farms of 3 acres or more, the acreage usually regarded as the minimum economic size required for a farm to function as a viable enterprise.[10] About half the households have medium-sized shambas of 1 or 2 acres, but one third of the households have less than 1 acre at their disposal. In the lower survey area, farms are generally larger, and here about 20 per cent of the households must do with less than 1 acre (table 12). This difference in itself means little because the quality of the land and farming conditions are generally poorer in the lower area. Of course, variations in the quality of the land also occur within each survey area itself. The size of the farm therefore says relatively little about a household's resources, especially in view of the different uses that are made of the land.

All households, however little land they have, grow foodcrops. Virtually everybody grows maize as well as beans (table 13). In the upper area most people grow bananas and four out of the five households also grow some other root or tuber. In the lower area four out of five households cultivate

FARMING CHARACTERISTICS
(Listed are the weighted percentages of households belonging in the various categories)

FARM & CROPS

AREA :	Upper	Lower
12. FARMSIZE		
xx-0.4 acres	14%	5%
0.5-0.9 acres	22%	16%
1.0-1.9 acres	37%	31%
2.0-2.9 acres	12%	17%
3.0 or more	14%	32%
13. CROP CULTIVATION		
Food Crops:		
maize	97%	100%
beans	94%	100%
peas	5%	27%
bananas	95%	82%
roots & tubers	82%	91%
vegetables	67%	69%
fruits	35%	56%
seasonings	21%	16%
Export Crops:		
coffee	77%	31%
tea	3%	-

COMMERCIAL FARMING

AREA :	Upper	Lower
14. FARM AREA UNDER EXPORT CROPS		
none	22%	70%
0.1-0.2 acres	29%	12%
0.3-0.4 acres	26%	9%
0.5 or more	24%	10%
15. SALE OF FOOD CROPS		
never	73%	61%
occasionally	27%	37%
regularly	0.5%	2%
16. EMPLOY FARM LABOUR		
never	83%	78%
occasionally	15%	18%
permanently	2%	4%

17. LIVESTOCK

AREA :	Upper	Lower		Upper	Lower		Upper	Lower
CATTLE			GOATS			CHICKENS		
none	30%	43%	none	53%	37%	none	35%	24%
1 cow	53%	32%	1-2 goats	31%	33%	1-4 hens	43%	46%
2-3 cows	17%	23%	3 goats	12%	12%	5-9 hens	15%	23%
4 or more	1%	3%	4 or more	4%	18%	10 or more	8%	8%

18. FOOD AVAILABILITY

AREA :	Upper	Lower
Milk available from household production	52%	49%
Eggs available from household production	54%	65%
Reportedly able to grow enough food to feed members household	38%	48%

bananas with nearly everybody growing some other kind of root or tuber as well. Two out of three families grow one or more vegetables. In the lower area more people grow fruits and various pea variaties. Most foodcrops are used for home consumption but about 30% of the households sell some foodcrops, usually bananas, Irish potatoes or sweet potatoes. Asked whether they were able to grow enough food to feed the household, less than 50 per cent of the women replied affirmatively, fewer in the upper area than in the lower area (table 18)[11].

Many households keep livestock. More than 60 per cent own one or more cows, about 55 per cent own goats or sheep, and more than 70 per cent keep chickens. Goats and sheep are commonly kept for traditional purposes, such as exchange or slaughter on ceremonial occasions. Cow's milk and eggs are often used for home consumption. More than 50 per cent of the households had milk and about 60 per cent had eggs for their own consumption. In this respect there is little difference between the two areas, although it must be kept in mind that the milk yields per animal are likely to be much smaller in the lower area. Some of the animal produce is sold. Milk is often sold to neighbours and although there are no dairy co-operatives in the areas, some of the milk still finds its way elsewhere. Eggs are also traded off.

There are some crops which are grown only for commercial purposes, the most important being coffee. In the upper area 3 out of 4 households cultivate some coffee, but in the lower area this is only 1 in 3. A small number of farmers furhtermore cultivate specialised products such as cucumbers

and tomatoes; or vegetable seedlings for the local market. The sale of agricultural products takes different forms. Coffee must be sold to the central purchasing agency, the Kenya Coffee Board. Other products, however, can be sold to wholesale traders who supply the urban market, but can also be sold in smaller quantities at the local markets. These local markets, in turn, are tied in with the national food trade.

There is considerable variation in the type and amount of commercial farming. Some households concentrate on one product, other households engage in several activities but to a lesser extent in each activity. For some households commercial farming is only marginal: when in need of money they sell some of their foodstock at the local market. In other households commercial farming is a planned activity and certain crops are specially cultivated for this purpose. Some households concentrate exclusively on agriculture, others also engage in livestock farming.

Because of this variety in practice it is not easy to distinguish the degree of commercial farming of individual households and the income derived from it. Nevertheless, after detailed analysis of individual variables[12] it was possible to draw a distinction between households that are relatively much involved in commercial farming and households that are only marginally involved. Firstly, households are classified as farming commercially when there is a substantial involvement in one specific farming activity i.e. when food crops are sold regularly or when half an acre of

land is under coffee cultivation. Secondly, households are included in this group that do not concentrate on one specific activity but that are involved to a lesser degree in two or more simultaneous activities i.e. when food crops are sold occasionally, and/or 0.3 acre is planted with coffee, and/or 4 cows are owned, and/or 10 chickens are kept. Lastly, the households that did not qualify according to the above standards but that reportedly employ farm-labour are also included among the commercial farmers (cf. table 14-17).

According to these criteria 33 per cent of the households are substantially involved in commercial farming. The remaining group is mostly involved in subsistence farming, although this terminology suggests an absolute difference where, of course, there is only of degree. The commercial farmers also grow foods for their own consumption, while the non-commercial farmers sell some of their produce as well. The incidence of commercial farming as defined in this way is more or less the same in the two areas surveyed, although there is some difference as regards the type of farming activity. In the upper area coffee cultivation is the most important commercial activity while the lower area shows a more diversified picture with slightly more farmers selling food crops and keeping livestock and poultry.

6.2. Employment Husband

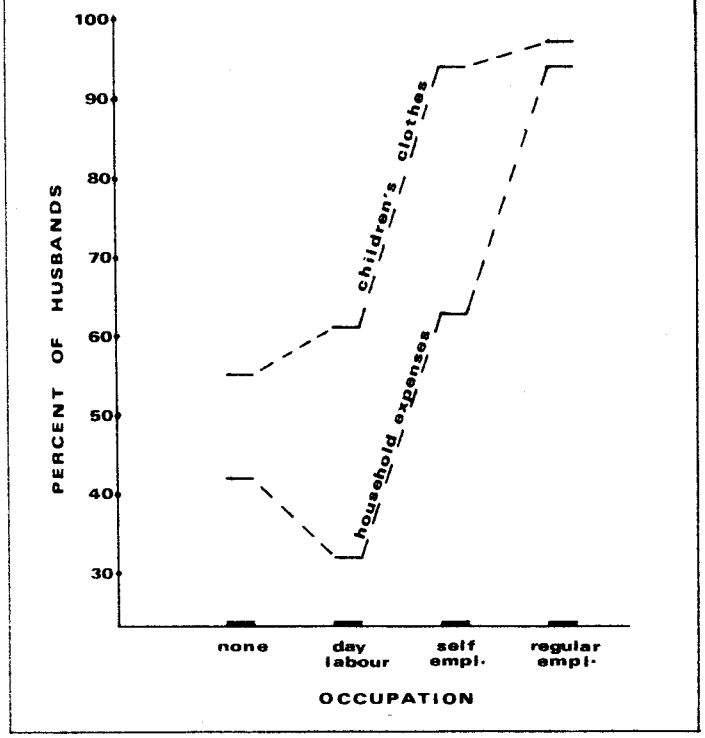
Another important source of income, in cases where respondents (i.e. mothers interviewed) are married, is employment of the

CHARACTERISTICS HUSBANDS
(Listed are the weighted results for married respondents : 92 per cent of all cases)

AREA :	Upper	Lower
19. EMPLOYMENT HUSBAND[1]		
regular employment	33%	41%
self-employed	26%	8%
day-labourer	33%	41%
none	8%	10%
20. RESIDENCE HUSBAND		
household	52%	45%
elsewhere	48%	55%
21. FOR HUSBANDS RESIDING ELSEWHERE, OCCASION OF LATEST HOME-VISIT		
within 1 week	49%	40%
1-2 weeks ago	17%	18%
3-4 weeks ago	17%	28%
5 weeks or more	19%	14%

1. Other than home-farming

Figure 1. PERCENT OF HUSBANDS PAYING CHILDREN'S CLOTHES & DAILY HOUSEHOLD EXPENSES BY OCCUPATION (weighted results)



husbands. The vast majority of husbands (c.90%) engage in some form of gainful activity other than farming. About 35 per cent have regular employment with government or industry and a small group of men are self-employed as traders, artisans and shopkeepers. Another 35 per cent are engaged in day-labour of various kinds (table 19). The number of husbands who have no work outside their farm is the same in both survey areas. There are, however, substantially more self-employed husbands in the upper area while in the lower area more husbands are involved in day-labour or regular employment. Because employment opportunities, in the rural areas are small, about 50 per cent of the husbands, reside elsewhere. Some of them visit their homes every week-end, others stay away for longer periods, but most visit quite regularly. Absences are not prolonged like those of migrant labourers elsewhere in Kenya and, indeed, half of the non-resident husbands had visited home during the last 14 days.

Many self-employed husbands did hold regular jobs in the past which often gave them the financial means to start their private enterprises. The income of these two groups is generally higher than that of the day labourers whose income is not only uncertain but whose wages are low. Even when day-labourers work in the urban areas where wages tend to be higher, the extra income is quickly lost to the expense of living in town and little money remains to be taken home.

As figure 1 shows nearly all the regular- and self-employed men provide money to buy clothes for the children

and most of them provide money for daily household expenses. The day-labourers and others not employed do so far less often. As regards income from employment there is good reason to classify the regularly-employed and self-employed as one group (of regularly employed) and the day labourers and those with no work outside their farm as another group (of not regularly employed), with some exceptions (table 29).[13]

6.3 Labour of Women

The first responsibilities of a housewife are the farm and the running of the household, but some women also have to provide an income for their family.

Although there is a traditional division of farm-labour between men and women, this division by now is more nominal than real. Husbands are (theoretically) responsible for breaking new land, the cultivation of cash crops and looking after any cattle; the wives are responsible for the cultivation of food crops and domestic chores. However, many men live away from home and this is one reason why women, if not wholly responsible, are at least charged with all farming activities, although it must be admitted that there is considerable variation between households in this respect. Thus many women spend much time in cultivating cash crops or tending dairy cattle, although the earnings of these farming activities are usually handled by the husband.

There are virtually no opportunities for regular employment for rural housewives and their only possible wages

come from day-labour with neighbours or at estates further away. Many women occasionally engage in day-labour and the incidence of this kind of work is the same in both areas[14] (table 22). It must be mentioned though that day-labour carries a low status and points to a lack of other resources in the household. Women who have little land available and who do not receive an adequate income from their husbands are inevitably dependent on day-labour for the upkeep of their family. It is true that women who are somewhat better-off also engage in day-labour but probably less frequently and only when they can spare the time to earn this extra income. In households with much commercial farming and where the husband is regularly employed the wife will seldom or never engage in day-labour because she often acts as a kind of farm manager (see also below, table 30).

The running of the household of course implies the various home duties of rural women everywhere: cooking, cleaning, washing, looking after children, mending clothes etc. Physically most demanding are probably collecting firewood and fetching water. Most people still draw water from the river, which means a regular walk uphill with a full container. In the majority of households water is collected 2 or 3 times a day, often by the housewife herself but also by the children who are strong enough to carry the weight. There is litte or no difference between the two areas in this regard (table 23-24).

This is not the case with the supply of fuel. Although in both areas the overwhelming majority of women (c.95%)

LABOUR OF WOMEN
(Listed are the weighted percentages of respondents/ households belonging in the various categories)

22. EMPLOYMENT RESPONDENT[1]

AREA :	Upper	Lower
regular employment	-	-
self-employed	1%	3%
day-labourer	50%	55%
none	50%	43%

1. other than home-farming

23. SOURCE OF DRINKING WATER

AREA :	Upper	Lower
River	71%	69%
Spring	13%	16%
Borehole	10%	4%
Tap or tank	6%	11%

24. FREQUENCY OF COLLECTING WATER

AREA :	Upper	Lower
1x a day or less	10%	3%
2x a day	35%	42%
3x a day or more	48%	43%
not applicable	7%	11%

25. SOURCE OF ENERGY

AREA :	Upper	Lower
Firewood,collected on farm[1]	31%	61%
Firewood,collected locally	3%	32%
Firewood,bought	65%	4%
Other energy source,bought	2%	4%

1. or on holding,shared with kin.

26. TIME NEEDED TO COLLECT FIREWOOD

	AREA :	Upper	Lower
Collecting:	less than 1 hour	12%	10%
	less than ½ day	16%	61%
	½ day or more	5%	20%
Buying:	less than 1 hour	12%	-
	less than ½ day	29%	1%
	½ day or more	24%	3%
Other energy source		2%	4%

27. RESPONDENTS WHO REPORT ASSISTANCE IN HOUSEHOLD

AREA :	Upper	Lower
None	46%	41%
help from elder children	30%	37%
id. from husband	6%	6%
id. from mother-in-law	11%	8%
id. from others	7%	9%

28. RESPONDENTS WHO REPORT ASSISTANCE IN CARE OF CHILDREN IN CASE OF ILLNESS

AREA :	Upper	Lower
None	3%	5%
help from elder children	25%	27%
id. from husband	20%	13%
id. from mother-in-law	39%	39%
id. from others	14%	16%

use firewood this is acquired in different ways. In the lower area nearly all women collect firewood on their own farm or in the neighbourhood (c.90%). In the upper area only a minority of women fetch firewood from their own farm while the others who are not so lucky have little or no opportunity to collect in the neighbourhood, and the majority of women (c.65%) have to buy their firewood somewhere else, often at a considerable distance from their home (table 25-26). This scarcity, of course, reflects the much higher population density and the smaller size of farms in the upper area. In the lower area c. 80% of the women spend more than one hour in collecting firewood. Buying firewood does not necessarily involve less work, 50% of the women buying firewood in the upper area, also regularly spend the same amount of time on bringing the fuel home.

In many households the women receive some assistance with their household work. Most help comes from elder children (table 27; see also next section). Many mothers-in-law live quite near, even in the same compound but in only 10 per cent of the cases do they lend a helping hand. This is not surprising since it is the younger woman who should help her mother-in-law, according to Kikuyu custom. Husbands also rarely assist with the daily household tasks. In case of illnes and other emergencies, however, many husbands as well as mothers-in-law do help with looking after the children (table 28). Still, almost half the mothers of young children (c.45%) seem not to receive any help with their household work, although this is closely related to the domestic cycle

and it is mostly the young women who receive no assistance, as we will see later on.

6.4. Social Class

In the previous paragraphs the two major sources of income of rural Kikuyu households, apart from subsistence farming, were discussed: commercial farming and regular employment. Table 29 shows that about 20 per cent of the households are in the favourable position where they avail of both sources of income. According to rural standards these households are well-off and we will refer to this group as 'rich households'. At the other end of the spectrum there is a large group of households (c.40%) that are not in a position to farm commercially and where the husbands have no regular employment either. By the same rural standards these are 'poor households'. In between are the remaining households with only one major source of income, either regular employment (c.25%) or commercial farming (c.12%). Since we have no adequate means to differentiate between income from farming and income from employment, these households are combined in one group. This results in three social classes: rich, medium and poor households. This classification, though, requires validation and further description before it is used for analytical purposes.

The various information in table 30 shows that there are indeed all kinds of differences in living circumstances between the three classes, as one would expect. The rich

group more often lives in houses built of wood or stone, more often have a water tank on the premises and a few households in this group even use another source of energy than firewood. These obvious indicators of status are largely limited to the group of rich households.

As regards day-labour by women it was already mentioned that this activity carries a low status and points to a lack of other resources. Indeed, three out of four respondents in poor households report that they engage in day-labour, while this is the case for only one of nine respondents from rich households. Moreover, the few women who themselves employ help in the household all belong to this latter group.

As could be expected women in rich households are generally more educated than women from the medium group, who in turn have received more schooling than women from poor households. There is, however, no straightforward relation with age, except that the respondents from the middle group tend to be younger. These, in fact, are mostly wives of husbands with regular employment and who have not yet developed their farm to such an extent that they classify as commercial farmers, but who can be expected to do so some time in the future.

Most of the husbands from medium and rich households are residing elsewhere because of work, while most men in poor households reside at home. Of the husbands who reside elsewhere those from rich households visit home slightly more often than those from poor households. (The men in

SOCIAL CLASS CHARACTERISTICS
(Listed are the weighted percentages of households belonging in the various categories)

29. INCIDENCE OF COMMERCIAL FARMING AND REGULAR EMPLOYMENT OF HUSBANDS

	AREA : Upper	Lower
(1) Regular employment & Commercial farming	22%	20%
(2a) Regular employment & Non-commercial farming	28%	24%
(2b) No regular employment & Commercial farming	13%	11%
(3) No regular employment & Non-commercial farming	36%	46%

30. LIVING CIRCUMSTANCES & OTHER CHARACTERISTICS OF DIFFERENT SOCIAL CLASSES

SOCIAL CLASS :	Poor	Medium	Rich
House with wooden or stone walls	8%	6%	27%
Water tank or tap on premises	3%	5%	21%
Energy source other than firewood	2%	1%	8%
Respondent engaging in day-labour	75%	48%	13%
Respondent employs help in household	-	-	10%
Age respondent; 30 years or more	59%	42%	57%
Education respondent; Standard 5 or more	23%	38%	57%
Husband residing elsewhere	25%	72%	63%
Visit by husband[1] within last 2 weeks	50%	62%	67%
Farm size; 1 acre or more	56%	75%	94%
Reportedly able to grow enough food to feed members household	25%	44%	76%
Milk available from home production	32%	54%	80%
Eggs available from home production	45%	61%	85%

1. Non-resident husbands only

this latter group work as day-labourers and can perhaps less easily afford the travel expenses).

Although the class division is not based on farm size it is, of course, not surprising that there is a strong relation. The average farmsize of rich households is larger than that of medium and poor households (3.7; 2.4 and 1.7 acres respectively). More than 40% of the poor households have less than 1 acre at their disposal. This suggests that the poor not only have a smaller share in the money economy but are also less well off as regards subsistence potential. This is indeed the case as information concerning food production shows. The majority of rich households (c.75%) are able to grow enough food for their own consumption. Only 40% of the medium households say they are able to do so and even fewer of the poor households (c.15%). The same applies to the number of households that have milk or eggs available: the percentage drops from 80 in rich households, to 45 per cent or less in poor households.

What has been described above applies both in the upper and the lower areas, but there are some minor differences worth pointing out. Although the division of households over the three social classes is roughly the same, there are slightly more poor households in the lower area (table 29). As we have seen, many of the women in poor households hire themselves out for day-labour, but in the lower area this is more often the case - another indication that the people in this category are slightly poorer in the lower

area. At the same time it looks as if the rich households in this area are relatively better off than the comparable group in the upper area. Rich households in the lower area more often live in wooden or stone houses and own water-tanks, while fewer of the corresponding households in the upper area have acquired these possessions.[15] This suggests that the socio-economic differences between households are slightly more pronounced in the lower area than in the upper area.

7. FAMILY COMPOSITION

In the previous section differences between households as regards economic resources were analyzed. The present section will concentrate on another important factor: the size and composition of the family unit. The reader is reminded that the survey was limited to households with children aged 6-59 months. These households nearly all consist of man, wife and children as mentioned (p. 25). Variation in family composition therefore occurs mainly in respect of domestic stage and the number of children.

7.1. Domestic Cycle

The domestic stage is largely decided by the duration of the marital union and three stages can easily be distinguished. The first period is when the couple has married recently and any children are still young, the second period starts when the children start going to school. A third stage can be distinguished when the elder children have already left school, while some of their younger siblings are still under school-age.

Like all newly weds a young Kikuyu couple has to settle in, and man and wife have to get used to each other's ways. Usually the young wife also has to learn to adapt to the other members of her husband's family, in particular to her mother-in-law. This settling in, though, implies more

than getting to know new people. The recently married often have to wait some time before they are allocated some land by the husband's father (p.14). Sooner or later a child is born, an important occasion because it gives proof of the fertility of the union. Like young mothers all over the world, young Kikuyu mothers have to learn to tend their babies, some are good at it but others are less gifted and dedicated, and this will not escape the notice of the mother-in-law. Gradually, after the birth of other children, when it appears that the children will live and the marriage will last, the young women will establish a position among the other women of the family. The duration of this early period in the domestic cycle differs individually but for purposes of this study is defined as the period when the first-born child is still younger than 6 years. This is also roughly the age at which, traditionally, the child and its parents would have gone through the important second birth ceremony (Leakey, 1979: 550); nowadays it is about the age when the child starts attending primary school. Families who have not yet reached this point will be referred to as 'young families'.

Once families have school-age children they are termed 'middle-stage families'. Over the next years more children are usually born and the family generally consolidates its position. Traditionally, the next important step in the domestic cycle was the circumcision of the first-born child which for girls usually took place between the ages of 10 and 14 years, and for boys between 15 and 18 years. This

was an important occasion not only for the child concerned but also for its parents, because it marked their acceptance among the elders of the tribe (Leakey,1979:996). In the present day such formal rites of passage for the parents have largely disappeared. Nevertheless the time when the first-born child, reaches the age of 16 or 17 and comes to be regarded as an adult is still an important transition. At that age the child has usually finished schooling and from then on is expected to contribute his or her labour to the household. It is at this time that children change from a liability into an asset. Families with children aged 17 or older are therefore classified separately, as 'senior families'. The distribution of families at different stages in the two areas is given in table 31. In about 25% of the cases we are dealing with young families, 50% of the families have children of school age, while another 20% are senior families with grown-up children. There is little or no difference between the two survey areas in this respect.

Some further characteristics of families at different domestic stages are listed in table 32. At some time in the course of the years about half of the families start to reside by themselves i.e. they no longer share the holding on which they live with kinfolk, but become independent units. The size of the household also increases and more people have to be looked after and more mouths have to be fed. For example, in senior families water has to be collected more often, only one sign of the greater workload involved. On the other hand, with time, women are able to

DOMESTIC CYCLE
(Listed are the weighted percentages of families belonging in the various categories)

31. DOMESTIC STAGE

AREA :	Upper	Lower
Young Families	27%	23%
Middle Stage	54%	60%
Senior Families	19%	17%

32. CHARACTERISTICS OF FAMILIES AT DIFFERENT DOMESTIC STAGES

D.STAGE :	Young	Middle	Senior
Residing independently	5%	24%	45%
Number of people in household (average)	4.1	7.1	9.1
Collect water; 3x or more per day	25%	51%	59%
Respondents report household help	35%	58%	85%
Farm size; acres (average)	1.3	2.2	4.3
Number of cattle (average)	0.6	1.0	1.3
Reportedly able to grow enough food to feed members household	60%	40%	28%

33. DOMESTIC STAGE AND SOCIAL CLASS

D.STAGE :	Young	Middle	Senior
Poor Households	42%	41%	38%
Medium H.holds	39%	35%	47%
Rich Households	19%	24%	15%

command more help in the household, which assistance is largely given by the elder children as we have seen. It is also true that senior families have much more land to farm. However, fewer women in senior families are able to grow enough food to feed the household members, perhaps because of the greater amount of work involved or perhaps because adolescent children eat relatively much. In general, there is no relation between the economic resources of the household as discussed in the previous section and the domestic stage. Whether young or senior families, the number of poor or rich households is more or less the same (table 33).

7.2. Family Size

It is evident that the larger the family the more mouths have to be fed, the more children have to be looked after, and the greater the demands made on the mother and the household resources. Family size varies from small units of only 3 or 4 people to larger units of 9 people or more (table 34). It appears that there are slightly more large families in the lower area, although the further distribution of family size is very similar. Family size as such means little as long as the ages of the different members of the household are not taken into account. Young children, of course, require most attention although Kikuyu children soon learn to look after themselves and by the age of six start to do small jobs such as looking after

FAMILY COMPOSITION
(Listed are the weighted percentages of families belonging in the various categories)

34. NUMBER OF PEOPLE

AREA :	Upper	Lower
1-2 persons	-	-
3-4 persons	24%	20%
5-6 persons	25%	24%
7-8 persons	33%	26%
9 or more	19%	30%

35. NUMBER OF ADULTS (17 yrs and older)

AREA	UA	LA
1 adult	1%	2%
2 adults	72%	72%
3 or more	27%	25%

36. SCHOOL-AGE CHILDREN (6-16 years of age)

	UA	LA
none	28%	23%
1-2 s-a children	36%	31%
3-4 s-a children	27%	36%
5 or more	9%	10%

37. PRE-SCHOOL CHILDREN (0-5 years of age)

	UA	LA
1 p-s child	22%	24%
2 p-s children	44%	41%
3 p-s children	27%	27%
4 or more	7%	8%

38. NUMBER OF PRE-SCHOOL CHILDREN PER HOUSEHOLD BY AREA, SOCIAL CLASS, AND DOMESTIC STAGE

HOUSEHOLDS with :		Few / Several[1] Pre-School Children	
By Area :	Upper Area	66%	34%
	Lower Area	65%	35%
By Social Class :	Poor	69%	31%
	Medium	64%	36%
	Rich	63%	37%
By Domestic Stage:	Young	79%	21%
	Middle	58%	42%
	Senior	70%	30%

1. Few = 1-2 pre-school children
Several= 3-4 pre-school children

the very youngest children. Later, when physically stronger they have to carry water, collect firewood and generally help on the farm after school hours, the girls more so than the boys. Gradually children relieve the mother of some of her work. After the age of sixteen when most children are no longer at school, they are regarded as grown-up and are expected to contribute their labour to the household. Table 35 and 36 give detailed information on the number of adults and the number of school-age children in families.

Children under the age of six require most attention and place the greatest demands on the attention and care of the mother. When a mother has several pre-school children to care for at the same time it is likely that the attention given to individual children will suffer. About 35% of the women have to look after 3 or more children in this age group, the others look after 1 or 2 children, an easier task (table 37). Families with several young children are found among all kinds of households, as table 38 shows. They are found equally in the upper and the lower area, equally among poor and rich households. They are also found equally among young and senior families. It appears that the number of pre-school children is independent of the main characteristics introduced until now (with the exception of middle-stage families which rather often have several pre-school children). The number of pre-school children is also an important characteristic related to the nutritional state of the children, as we will see below.

8. NUTRITIONAL STATE

8.1. Method

Nutritional status was assessed by means of anthropometry. Weight, height, birth-date and sex for all children aged 6-59 months were recorded. All measurements were taken by one of the authors while visiting the household in the course of the interviews conducted by the research assistants.

Weights were measured in tenths of kilograms with Salter scales, model 235. The children were placed in a harness of plastic trousers which was hooked to the scale. Children were weighed without clothes except for a blouse or light jersey. All weights were later corrected for this by subtracting 150 grs. Weighing scales were checked every week.

Heights were measured with a collapsible length-board which featured a fixed head-rest, a detachable foot-rest and a fixed tape measure.[16] Each child was placed on the board in supine position with its head against the head rest. The knees were pressed down and the foot-rest, which moved at a right angle to the tape measure, was placed against the child's heels.

Birth-dates were recorded to the day where possible. With some patience, probing and rifling through family papers it was possible to arrive at the exact date for most children. Where the exact date of birth was unknown at least the month of birth was recorded. The total number of children examined is 507 and their distribution over different age groups as

well as the weighted distributions are listed in appendix A.

Results for each child were compared against the Harvard standards as listed in Jelliffe (1966), and three indices were computed:

Height-for-Age (H-A) expresses the height of the child as a percentage of the standard height expected for the age of the child.

Weight-for-Height (W-H) converts the weight of the child into a percentage of the standard weight expected for the height of the child.

Weight-for-Age (W-A), finally, does not allow for height and simply expresses the weight of the child as a percentage of the standard weight for the age of the child.

These indices reflect different, although not altogether independent aspects of nutritional status. When a child is not adequately nourished its weight gain slows down and it may even start to lose weight. The child becomes wasted and shows a low weight-for-height. Length growth will also slow down when this situation persists and in the long run the child may become stunted and show a low height-for-age. When nutrition is improved the weight of the child may recover rapidly until it reaches the weight corresponding to its height. Height growth may also respond but more slowly and the losses suffered are often not made up for. Height-for-age, therefore, reflects the nutritional history of the child and a low height-for-age (stunting) indicates the chronicity of possible malnutrition. In contrast, weight-for-height reveals transitory variations in the condition of the child and a low weight-for-height (wasting) reveals acute deficits. Weight-for-age is a useful combined index of nutritional state and a low

weight-for-age often reflects a combination of wasting and stunting.

Apart from presenting various measures of central tendency it is common practice to list the distributions of these indices, in particular the percentage of children falling below certain values. A height-for-age of 90 percent is usually accepted as the critical value for height: H-A(90). The values used in respect of weight-for-height vary from 90 to 85 and 80 per cent. The divisions for weight-for-age are usually drawn at 80 and 60 per cent, indicating mild and serious malnutrition respectively. (For a discussion of various critical values, see Waterloo, 1976).

Another way to identify specific groups of children is cross-classification of height-for-age and weight-for-height, originally suggested by Waterlow & Rutishauser (1974). In this way four groups can be distinguished: (a) children in normal condition; (b) children who are wasted but not stunted; (c) children who are stunted but not wasted; and (d) children who are wasted and stunted (the last group is generally regarded as requiring priority for treatment).

A detailed presentation of findings follows below. The subsequent analysis of the relations between anthropometry, ecology and social environment concentrates on a few selected measures: weight-for-height, height-for-age and the percentage children with a weight-for-age below 80.

8.2. Results: General

The means and standard deviations of weight-for-height, height-

39. SUMMARY OF ANTHROPOMETRIC EXAMINATIONS OF CHILDREN IN CENTRAL PROVINCE FROM NIRP- and CBS-SURVEYS

	Means & *Standard Dev.*			Percent Children below Critical Value :		
	W-H	H-A	W-A	W-H(90)	H-A(90)	W-A(80)
1. NIRP (1978) (Central Province)	95.6 *(7.3)*	93.4 *(4.5)*	85.6 *(10.3)*	22%	21%	28%
2. CBS, 1977 (Central Province)	94	93	84	33%	31%	39%
3. CBS, 1979a (Central Province)	*	*	*	20%	22%	23%
4. CBS, 1979a (Kenya)	*	*	*	26%	27%	25%

* not listed in original source
1.N=508; age 6-59 months
2.N=225; age 6-48 months
3.N=300; age 6-60 months
4.N=3525;age 6-60 months

for-age and weight-for-age for the total group of children are listed in table 39. The mean of height-for-age lies at 93 per cent which is about 1.5x standard deviation below the reference population. Mean weight-for-height is 96 per cent which is only 0.5x standard deviation below the reference mean. The average weight-for-age is 86 per cent.

The distributions of the three indices are presented in appendix B. The number of children falling below W-H(90) is roughly 20 per cent, the same percentage falls under H-A(90). Almost 30 per cent of children had a W-A below 80, and just over 1% (1.1) of the children were under W-A(60).

During the same period, in 1977 and 1978, the Central Bureau of Statistics held two nutrition surveys in selected locations in Central Province, as part of national surveys. The first of these surveys indicated a more serious state of affairs: it was reported that 31 per cent of the children fell below H-A(90) and 33 per cent below W-H(90). The results of the second CBS-survey, however, are much closer to those

of the present survey (held in early 1978), which indicates that this is the more accurate reflection of conditions[17] (table 39).

Further comparison with the H-A(90)/W-H(90) cross-classification also reveals a close correspondence between the present results and those of the CBS-survey of late 1978 (table 40). The number of children malnourished is 3-4%, the number of children that are wasted or stunted amounts to 35-36%. The remaining 60% can be regarded as being in normal condition. It must be pointed out, though, that the critical value of W-H(90) is not commonly used in this type of cross-classification, but that W-H(80) is usually preferred instead. The percentages corresponding with this stricter classification are also given in table 40. In this case 78 per cent of the children can be regarded as being in normal condition. The remaining 22 per cent - children that in some way give reason for concern - consists largely of stunted children.

Although the weight-for-age results indicate a public health problem of a certain degree, it is also evident that the situation in Central Province was not alarming at the time of the survey. When compared with children in other parts of Kenya, and even more when compared with children

40. RESULTS OF CROSS-CLASSIFICATION OF WEIGHT-FOR-HEIGHT AND HEIGHT-FOR-AGE FOR NIRP- AND CBS-SURVEYS

Survey	Percent Children that is :				Critical Values Employed
	In Normal Condition	Wasted Only	Stunted Only	Wasted & Stunted	
NIRP (1978) (Central Province)	61%	18%	17%	4%	HA(90) & WH(90)
CBS, 1979a (Central Province)	61%	17%	19%	3%	HA(90) & WH(90)
NIRP (1978) (Central Province)	78%	0.9%	20%	0.5%	HA(90) & WH(80)

in other tropical countries the condition of Kikuyu children in fact appears relatively good. In Sri Lanka, East Java and several Sahel countries, for example, the number of children below W-H(80) reportedly was between 6 and 16 percent, and the number falling below H-A(90) was between 35 and 70 percent (Brink et al, 1976; Kardjati et al, 1977; IDRC, 1981). Still it remains true that a sizeable group of children in Central Province is rather short of stature, while elite children in Nairobi show virtually the same height as the reference population (CBS,1979a). Thus the growth of rural Kikuyu children is apparently impeded, although the loss does not assume large proportions.

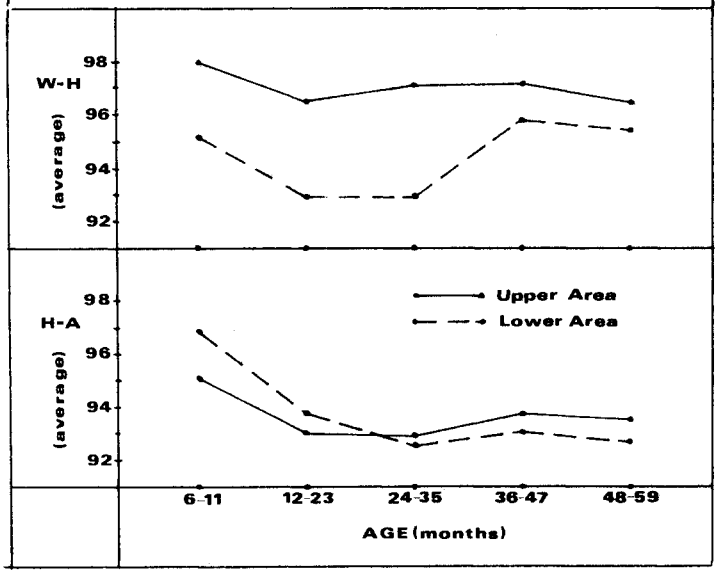
The above results also indicate that the use of W-H(80) in the previously mentioned cross-classification is too strict because very few children in Central Province fall below this criterion which is probably not suited to identify cases that will later falter. The criterion W-H(90) on the other hand appears too lenient. In section 8.6. concerned with children-at-risk we will therefore not rely on such cross-classification but on W-A(80) as the main critical value. Classification above and below this value is slightly stricter than by means of the 90/90 cross-classification and is also more gradual. It covers only two-thirds of the children classified as either wasted or stunted according to the cross-classification, since only the children whose overall condition gives reason for concern are included. The further relation between the two different classifications is presented in appendix C.

8.3. Results: Age and Sex

The half-yearly means and standard deviations of weight and height are listed in appendix D, broken down by sex. Appendices E and F present growth curves for height and weight as fitted by a spline least squares method. It is evident that the girls remain somewhat behind the boys, as regards both weight and height. The degree of this sex difference, however, is similar to that reported from other surveys in tropical countries, as well as among western populations.

Both height and weight tail off after the first year of life. This relative declivity is shown most clearly by comparison with the reference standards: weight-for-height and height-for-age as presented in figure 2. Height-for-age shows a decline during the second year of life, the time when weight-for-height also shows the greatest deficits. Weight-for-height also remains relatively low during the third year.[18]

Figure 2.
RESULTS OF ANTHROPOMETRIC EXAMINATIONS
BY AGE GROUP AND AREA, CHILDREN 6-59 MONTHS
(weighted results)



8.4. Results: Area

Figure 2, and the data listed in appendix G show that there is little or no difference between the children in the two areas in respect of length, but that there is a considerable difference in weight-for-height at the time of the survey. This last difference is particularly strong in the vulnerable age groups of 12-23 and 24-35 months, but it is also present in the older age groups. This is probably a seasonal phenomenon since no corresponding difference in height is found.

The surveys were planned at the end of the local dry season and the start of the rains. The wet season starts in the upper area, and follows slightly later in the lower area. For that reason the survey commenced in the upper area, followed by the lower area, with a period of 8 weeks in between. It is possible that this period was too long, and that the wet season was already further advanced in the lower area when the survey started in that location. The higher consumption of fresh, green vegetables occurring in the lower area also points in this direction (NIRPa). There have been several reports of seasonal fluctuations in the weight of young children in tropical countries (Chowdhury et al,1981; Rowland et al,1981). If this is indeed the cause of the difference in weight-for-height between the two areas, it means that seasonal weight losses develop over a relatively short period of time.

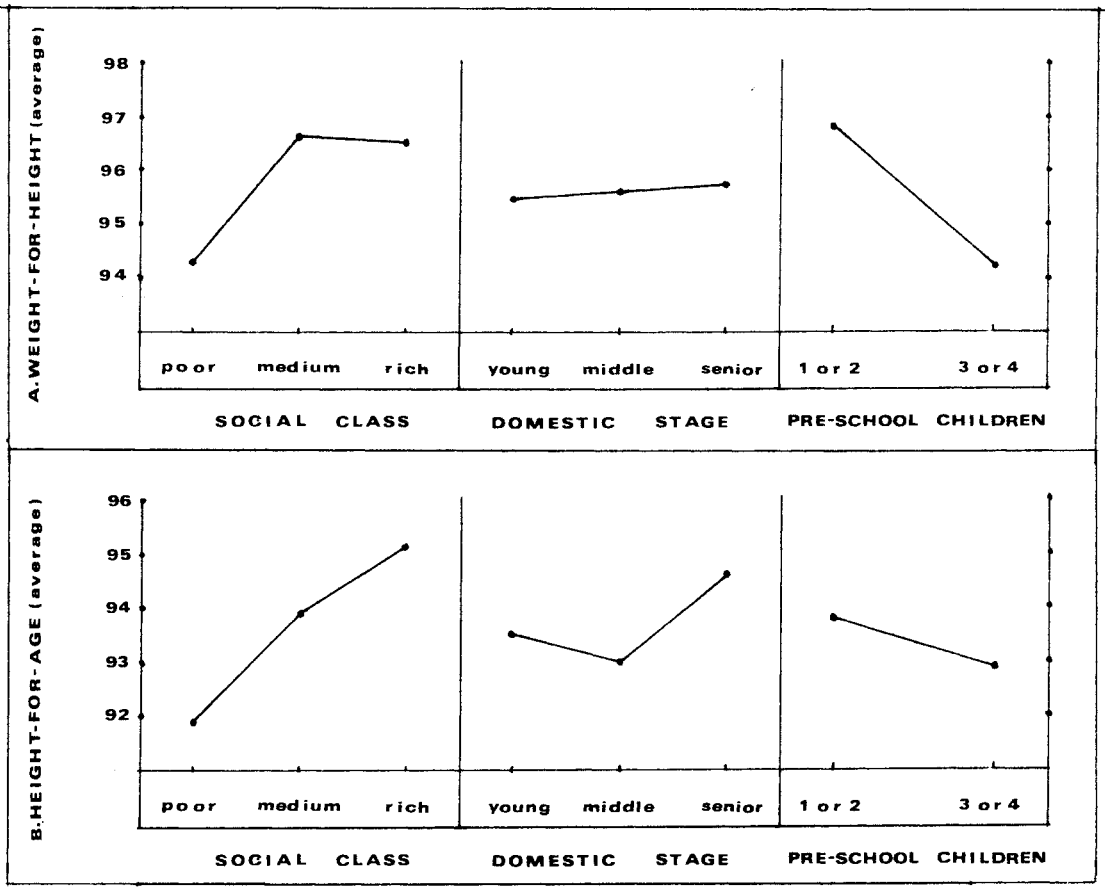
The absence of differences in height-for-age, however, indicates that the children in the two areas develop equally

well. A similar finding was reported from nearby Machakos District, where anthropometric examinations of Akamba children in two ecologically different areas neither revealed differences (Oomen et al,1979). It must be mentioned that the ecological differences in that case, as in the present survey, were relatively small in the sense that it was a comparison between a fertile and less fertile area, but not a comparison between ecological extremes. Nevertheless within the arable regions of Kenya the present areas present a considerable difference in living conditions as demonstrated by the mutual difference in population density and as described in the first part of this report. The findings suggest that within this scale of ecological variation there seems to exist a balance between agricultural production, the additional income from jobs in town and casual labour on estates, and the needs of the population, at least as reflected in the nutritional state of young children.

8.5. Results: Social Environment

Detailed data regarding the relation between social environment and nutritional state are listed in appendix G. In figure 3 the average weight-for-height and average height-for-age are graphically presented for social class, domestic stage and number of pre-school children present in the household. Weight-for-height is lower for the children in poor households and in households with several young children. These two conditions are also associated with low height-for-age.

Figure 3.
RESULTS OF ANTHROPOMETRIC EXAMINATIONS BY SOCIAL ENVIRONMENT, CHILDREN 6-59 MONTHS (weighted results)



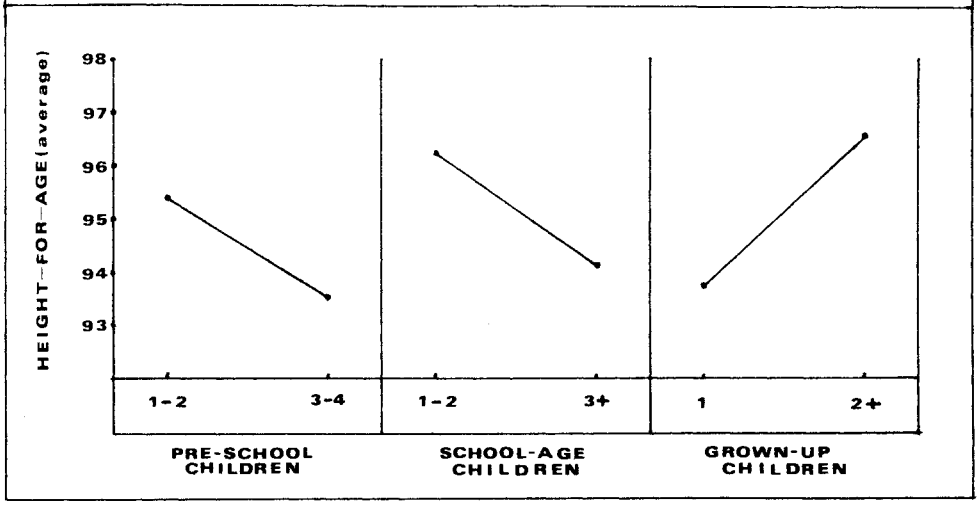
Social class is clearly the dominant factor: the largest difference in height-for-age occurs between children from poor and children from rich households. The greater resources of rich households clearly appear to benefit the young children. The number of young children present in the household also seems to influence their nutritional state. Most likely the mother, in that case, can give less attention to each child individually, or not enough attention when it is most needed, as in the case of illness. Other mechanisms, however, cannot be ruled out: the mother has given birth to several children in recent years and her physical condition may have suffered as a result, alternatively the presence of several young children may increase the risk of infections.

Relations with domestic stage are less straightforward. There is no difference in weight-for-height, while height-for-age shows no consistent pattern either: it is lowest in the middle-stage families and highest in the senior families. Nevertheless it is worthwhile to explore whether and why children in senior families generally do better, particularly whether this is perhaps related to the presence of children from other age groups. Previously we have described how young children place the greatest burden on the mothers, and that older children not only require less attention, but in time also make their own contribution to the household.

8.6. Sub-Analysis: Senior Families

The average senior family numbers 9 people. Apart from the respondent and her husband, there are, on average, 2 grown-up children of 17 years or older, as well as 3 school-age children and 2 pre-school children.[19] Figure 4 presents the average height-for-age of young children in senior families when these families have to care for few or several pre-school children, few or several school-age children and few or several grown-up children respectively (Results for weight-for-height show identical trends[20]). In the previous section it was already established that with 3 or more pre-school siblings present, their nutritional state shows negative effects. Among the senior families this trend is also present, and even somewhat stronger. The results further show that the same occurs with respect to school-age children. Where

Figure 4.
SENIOR FAMILIES: RESULTS OF ANTHROPOMETRIC EXAMINATIONS, CHILDREN 6-59 MONTHS, BY NUMBER OF CHILDREN OF DIFFERENT AGES IN HOUSEHOLD (weighted results)



several school-age children are present, the average height-for-age of the young children is lower than in families with fewer children of that age. Clearly there exists an inverse relation between the number of children in the age groups under 16 years, and the nutritional state of the youngest children.

Interestingly, though, this is not the case with respect to grown-up children: here relations are reversed. In families with several grown-up children, the condition of the young children is generally better than in families with few adult children. It has already been argued that grown-up children provide various kinds of help in the household, which probably means that more individual attention can be given to the youngest children.

The dividing age of 17 years between school-age and grown-up children is, of course, somewhat arbitrary and will differ in individual cases. The present findings, however, support the idea that at this age children turn from a burden into an asset and explain why young children from senior

families generally are in slightly better nutritional state than children from young and middle-stage families.

8.7. Children-at-Risk

In the previous sections the relations between nutritional state, household resources and family composition were analyzed. This concluding section concentrates on the incidence of children-at-risk among groups from different backgrounds; a perspective that offers insight in the social and practical importance of the trends noted until now.

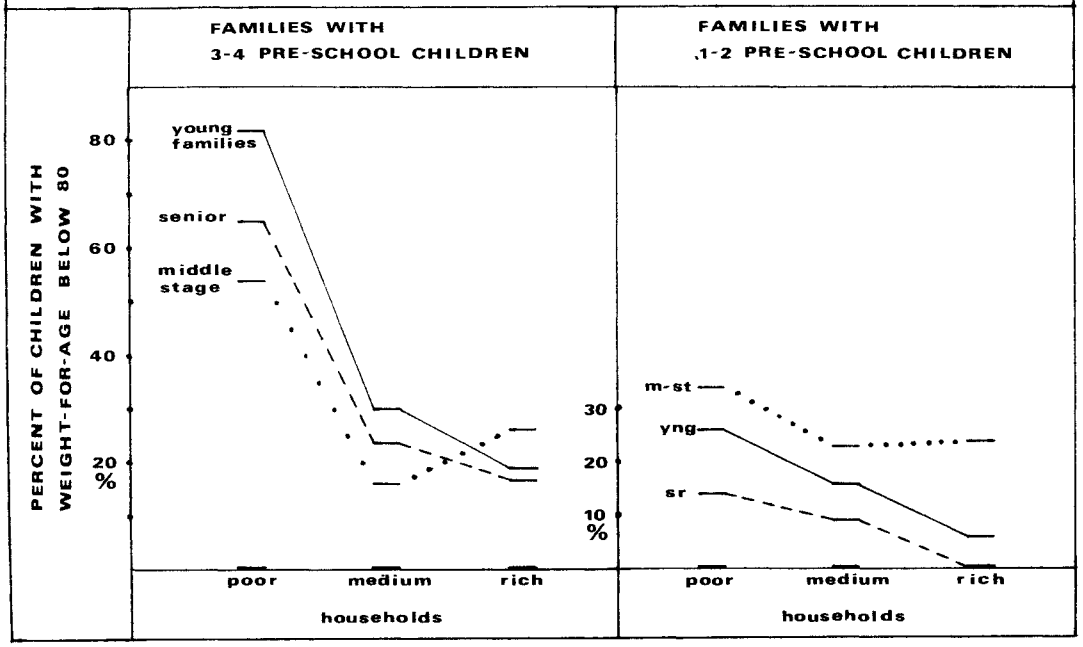
We have already argued that in this case the critical value suitable to identify children at risk is W-A(80). Children with low weight-for-age are the first in danger of severe malnutrition, while there are also indications of the negative effects of mild, but often chronic, undernutrition. A further reason to rely on W-A(80) and not on cross-classification of weight and height is that many nutrition programmes avail only of weights of children for monitoring and evaluation purposes.

It has already been reported that among this population 28 per cent of the children fall below W-A(80), not an unduly high figure. Table 41, however, shows that the percentage is

41. PERCENTAGE OF CHILDREN BELOW W-A(80) FOR VARIOUS CATEGORIES OF HOUSEHOLDS (weighted results)

BY SOCIAL CLASS		BY DOMESTIC STAGE		BY NUMBER OF PRE-SCHOOL CHILDREN IN FAMILY	
a. poor h.holds	41%	a. young families	27%		
b. medium "	19%	b. middle-stage "	31%	a. few (1-2)	22%
c. rich h.holds	20%	c. senior families	21%	b. several (3-4)	36%

Figure 5. PERCENTAGE OF CHILDREN BELOW W-A(80) BY SOCIAL CLASS x DOMESTIC STAGE x NUMBER OF PRE-SCHOOL CHILDREN (weighted results)



considerably higher in poor households: over 40 per cent of the children fall below this critical value. There are only small differences between families at different domestic stages, although there are relatively few children-at-risk among senior families. It is also evident that families with more than 2 children of pre-school age form a relatively unfavourable environment. These observations, of course, are little more than a reiteration of the previous findings.

Figure 5 presents further data on the incidence of children-at-risk in the different social classes specified by domestic stage and number of pre-school children. These results, while confirming the general trends, indicate some inconsistencies and also demonstrate interaction among certain conditions.

The effects of social class appear consistent under nearly all conditions. The negative effects when families

have to raise several children of pre-school age are equally consistent. It is furthermore evident that senior families form a more favourable environment than young families but that the trends for middle-stage families are not consistent.

Whereas middle-stage families have the relatively highest percentage of children at risk in families with 1-2 pre-school children, this is not the case when 3-4 children of that age are present. The reasons for this are not clear. Perhaps the category middle-stage requires further differentation. It is also likely that in the middle-stage families among rich households the workload of the housewife is relatively heavy. In these households the wife is often responsible for the commercial farming because the husband is absent for reasons of employment, while she cannot yet rely on the help of grown-up children.

The results also indicate that certain combinations of factors are particularly unfavourable. The incidence of children-at-risk is highest when poor families have to care for several pre-school children, irrespective of domestic stage. At the other end of the spectrum, in the rich households consisting of senior families with few children of that age, none of the children is at risk. The most unfavourable combination of conditions is met in poor households consisting of young families that have 3 or more children of pre-school age to care for. In this group more than 80 per cent of the children must be considered at risk, falling below W-A(80), which is a striking demonstration of the importance of the economic and social factors discussed here.

9. CONCLUSION

This survey covers, firstly, living conditions among the rural population in different areas in Muranga District, and an analysis of the economic and social characteristics of rural households. Secondly, the nutritional state of young children is examined, with an analysis of the relations with ecological, economic and social factors.

The material concerning the economic and social characteristics is much like that presented in other rural surveys, most notably the Integrated Rural Survey (CBS,1981b). This latter survey emphasizes economic and farming conditions, and covers the total smallholder population. The present survey is limited to households with pre-school children and gives more attention to the social characteristics of families. Otherwise the surveys can be taken in combination.

One interesting aspect of the present findings concerns the different ecological conditions. These relate directly to differences in population density and differences in socio-economic conditions such as farmsize, foodcrops cultivated and type of commercial farming. Despite the lesser agricultural potential it does not appear as if the population in the lower area are in poorer condition, rather that they make their living differently. The incidence of commercial farming in the two areas, for one, is similar. In this sense one would like to think of a balance kept between the carrying capacity of the land and the agricultural demands placed by the inhabitant population. It must be

pointed out though that population pressure in Central Province is becoming awesome, particularly in the most fertile belt, with recent densities in many locations reaching 500 per km^2 or more (CBS, 1981a).

A second interesting finding is that many if not most differences between Kikuyu households can be understood in terms of social class and domestic stage.

The division in social class employed in this report is based on commercial farming and employment outside the farm. Poor households avail of neither source of income and depend on whatever income is derived from day-labour by husband and wife and what they are able to grow on their usually modest farm. Social class in these terms is closely connected with subsistence farming. Poor households not only have a smaller share in the money economy but also have less subsistence potential. It is not surprising that this factor, social class, shows the strongest relation with the nutritional state of young children.

It may be noted, in passing, that the husband's income from employment apparently benefits the other members of the household, despite the often heard opinion that husbands generally spend most of their income on themselves (Stamp, 1975). Another commonly held opinion that is not supported here is that commercial farming competes with food cultivation and negatively influences the nutritional situation of the household. In this case, rather the opposite appears true in the sense that the small children of commercial farmers are generally in better nutritional state. In his analysis

of national survey data Hitchings also did not find evidence that cash crop cultivation influences the nutritional state of young children negatively (CBS,1979b). This, of course, is not to say that in certain situations commercial farming will not negatively affect the food situation but that mediating factors have to be considered, such as ecological potential, and the availability of land and labour (cf. Tosh, 1980).

Although it was not the intention of this survey to assess the degree to which basic needs are met, it is worth mentioning that forty percent of the households were qualified as poor and that from these households 3 out of 4 report that they are not able to grow enough food to feed the members of the household.

The second group of variables related to nutritional state has to do with family composition: domestic stage and family size. The striking thing about present-day Kikuyu life is the degree to which the nuclear family predominates. This is reflected, first, in that few families have a composition other than husband, wife and children. Secondly, that half of the families that have reached senior stage reside independently and do not share the compound with any other family. Thirdly, it is reflected in the limited degree of outside support that housewives receive with their domestic work.

In respect of domestic chores, it can further be said that the presence of several young children poses a considerable burden, and that the same can be said as

regards school-age children. The negative influence on nutritional status when 3 or more children under five are present is quite pronounced. Grown-up children, however, are usually more of a help, particularly if there are several. Although this is not shown by the data it is probable that the contribution of grown-up girls lies in domestic and farm labour, that of the boys in farm labour and cash income.

The differences observed in the nutritional state of children in the two areas are probably due to seasonal influences resulting from the timing of the survey. However, the overall condition of the children, reflected in height, is virtually identical in the two areas. This fits with the finding that despite the lower agricultural potential of the lower area, people appear in very similar economic condition, due to lower population density and the accommodating role of employment in town.

In general it can be said that the nutritional state of young children in Central Province is not alarming but that high risk situations exist among certain households and at certain times of the year. There are signs of a rapid drop in weight due to seasonal changes. In an analysis of weight records at nutrition clinics over a three year period a strong variation in W-A was also reported, dropping from an average of 90 per cent for the period December-February to an average of 80 percent in the period August-October, (Hitchings, 1979).

A grave situation is further found among poor households with several children of pre-school age. In these households, no less than 60 per cent of the children fell below W-A(80) while this was only 20 per cent among the rest of the child population. It is to be expected that the condition of this group will be even worse later in the year. Not only are more children likely to fall below W-A(80) at that time, but the children in poorest condition will probably reach a lower level as well.

One finding of this survey is that the aetiology of malnutrition in Central Province is mainly connected with pressure on economic resources and peer pressure within families, unlike the situation in other parts of Africa (and Kenya) where malnutrition has often been related to 'ignorance', detrimental weaning practices and poor diets.

To conclude that poor households need more economic resources is a truism that has little practical meaning, given the already intensive land use while employment opportunities are not easily enlarged. With the rapidly growing population of Central Province there will be increasing pressure on the land and it is foreseeable that more families will fall below the poverty line, with the accompanying nutritional consequences. There are further indications of strong seasonal variations in weight that require attention. The findings that the presence of several children of pre-school age forms one of the at-risk conditions indicates the importance of child spacing and the need to include family planning in nutrition programmes.

The findings underscore the need to target nutrition intervention programmes and to take into account the specific needs of the groups concerned. The three major nutrition programmes in Kenya are the Nutrition Field Workers, the Family Life Training Centres and the Pre-School Health Programme. Nutrition Field Workers aim their activities at the general population and strongly concentrate on nutrition education. Family Life Training Centres serve for the rehabilitation of malnourished children but do not provide consistent follow-up or assistance after discharge, while at the time of these studies intakes were rather low. The Pre-School Health Programme is a supplementation programme aimed at needy families and in Central Province concentrates its clinics in the lower area mostly. Elsewhere we have reported on these programmes in detail but it is evident that the last programme is most geared to the circumstances in Central Province.

NOTES

1. There are various ways of classifying ecological zones (Atlas of Kenya, 1970; Ojany and Ogendo, 1973; Ominde, 1968). This report uses the division of zones in the Atlas of Kenya, a division based on different values of a moisture index. The moisture index used in the present report was suggested by Braun (1977, 1979) and is computed as follows:

   moisture=(mean annual rainfall(mm)/potential evaporation(mm))x100%
   (potential evaporation=2422 - 0.358 x altitude(meters)

Ecological zone	V	has a	moisture	index	of	37% or less
Ecological zone	IV	"	"	"	"	37-52%
Ecological zone	III	"	"	"	"	52-67%
Ecological zone	II	"	"	"	"	67% and more

2. Other ecological zones such as zone V (arid) and VI (very arid) do not exist in Central Province. Zone I, moorland, grassland and barren land at high altitudes, is largely uninhabited and of no relevance to this research.

3. The moisture index for the two survey areas can be computed at 67% (Kiiriangoro) and 54% (Kagurumo) respectively.

4. Figures for the Kirere and Gikarangu sub-locations respectively (CBS,1981a:37).

5. When there are no people residing on a holding this land is not necessarily lying fallow, although this may also be the case.

6. The term 'eligible children' and the derived terms 'eligible women' and 'eligible households' refer to children in the required age range of 6-59 months, to women looking after these children and the households to which they belong.

7. In the case of holdings with more than one compound where more than one household had to be selected for study, one household was selected from each compound if possible - if not, choices were made randomly.

8. Confidence limits are quite narrow since a large part of the population was sampled on a 1:1 basis, and the remainder was sampled on a 1:2 or 1:3 basis. The number of missing values, moreover, is very small. For this sample the 95% confidence limits for any proportion (p) can be calculated with the formula:

   $\pm$ 1.96 x 0.04 x $\sqrt{p(1-p)}$

   Sampling error constitutes only a marginal source of error in this case, and the reliability of the findings are therefore mainly dependent on the questionnaire.

9. Elsewhere in Africa the type of roof, thatched or corrugated iron, has often been used to indicate differences in wealth. By now, however, thatch is a rare commodity in the survey areas and a thatched roof is at least as expensive as one of corrugated iron.

10. At the time of land consolidation in Central Province, three acres was generally regarded as the minimum 'economic' farm size (Sorrenson,1967).

11. It is not only the households that reply affirmatively to this question that sell foodcrops: 17% of the respondents who say they cannot grow enough food to feed the household members, still sell foodcrops occasionally.

12. As a preliminary analysis all variables related to agricultural production were included in a non-linear principal component analysis: PRINCALS (Van Rijckevorsel & De Leeuw, 1979). The PRINCALS solution indicates two dimensions: a first dimension correlating with commercial farming and a second dimension correlating with the ecological differences between the two areas.
The PRINCALS procedure allows for investigation of the scaling properties of the individual variables and rescales the variables included in the analysis. The rescaled category scores produced in this way were used to decide on the scoring procedure as described in the text.
One variable, the number of goats (and sheep) does not vary in any systematic way with the presence of other economic resources and was excluded from further analysis. (Indeed, goats have always had a strong ceremonial function among the Kikuyu).

13. Non-married women (8%) were classified as belonging to households without regular employment with the exception of 3 cases staying at the parental homestead, where the father was regularly employed, and contributed to the purchase of clothes for his grandchild(ren).
Among the husbands who were regularly employed or self-employed very few did not contribute to the children's clothes, as we have seen (figure 1). This being so exceptional it can be assumed that these husbands do not contribute their income to the household at all, and the 11 households concerned were therefore reclassified as without regular employment.

14. Day-labour should not be confused with communal labour, the traditional help given to neighbours, for example in building a house. This kind of assistance, however, appears to be on the decline.

15. SOME CHARACTERISTICS OF HOUSEHOLDS BY AREA AND SOCIAL CLASS (UA = Upper Area; LA = Lower Area)

		Poor	Medium	Rich
Respondent engaging in day-labour	UA	70%	50%	16%
	LA	79%	44%	9%
House with wooden or stone walls	UA	7%	2%	22%
	LA	8%	11%	33%
Water tank or tap on premises	UA	0%	4%	12%
	LA	6%	7%	31%

16. Design copied by courtesy of the Central Bureau of Statistics.

17. The possible reasons for the differences in findings between the two CBS surveys are discussed in an appendix to the report on the second survey. It is suggested that the second survey was carried out more accurately than the first, while it is also mentioned that the period preceeding the second survey was a time of ample rainfall and good harvests in many parts of the country (CBS,1979a:44).

18. Since the data are cross-sectional in nature, conclusions regarding growth over time can only be drawn with this reservation in mind.

19. The average composition of the senior families (N=51) is as follows:

Adults	: Respondent	1.0
	Husband	0.9
	Grown-up children	1.8
	Others	0.0
Children	: School-age	3.3
	Pre-school	2.1
Total number of people		9.1

20. The corresponding averages for weight-for-height are the following:

a1. Senior families with 1-2 pre-school children : 98.3
a2. " " " 3-4 pre-school children : 92.1

b1. Senior families with 1-2 school-age children : 96.5
b2. " " " 3 or more school-age ch. : 95.5

c1. Senior families with 1 grown-up child : 95.3
c2. " " " 2 or more grown-up ch. : 96.6

REFERENCES

Andersen, K.B. (1977) African traditional architecture: a study of the housing and settlement patterns of rural Kenya. Nairobi: Oxford University Press

Atlas of Kenya (1970). 3d Ed. Nairobi: Survey of Kenya.

Braun, H.M.H. (1977) Proposal for an agro-climatological classification. Nairobi: Kenya Soil Survey, mimeo.

Braun, H.M.H. (1979) Personal communication.

Brink, E.W., Perera, W.D., Broske, S.P., Huff, N.R., Staehling N.W., Lane, J.M. & Nichaman, M.Z. (1978) Sri Lanka Nutrition Status Survey, 1975, International Journal of Epidemiology, 7, 41-47

CBS (1977). The rural Kenyan nutrition survey; February-March, 1977. Social Perspectives, 2, (4).

CBS (1979a) Report of the Child Nutrition Survey 1978-1979. Nairobi: Central Bureau of Statistics.

CBS (1979b) Child nutrition in rural Kenya. Nairobi: Central Bureau of Statistics.

CBS (1980) Kenya Fertility Survey: 1977-1978. First Report; Volume 1. Nairobi: Central Bureau of Statistics

CBS (1981a) Kenya Population Census,1979: Vol. I. Nairobi: Central Bureau of Statistics

CBS (1981b) The integrated rural surveys, 1976-1979: Basic Report. Nairobi: Central Bureau of Statistics.

Chowdhury, A.K.M.A., Huffman, S.L. & Chen, L.C. (1981) Agriculture and Nutrition in Matlab Thana, Bangladesh. In R. Chambers, R. Longhurst & A. Pacey (Eds.) Seasonal dimensions to rural poverty. pp. 52-61. London: Frances Pinter.

Hitchings, J.A. (1979) Indications of seasonal malnutrition in Kenya. Unpublished paper. Stanford University. Food Research Institute.

Hoorweg, J. & Niemeijer, R. (1980a) The impact of nutrition education at three health centres in Central Province, Kenya. ASC Research Report no. 10. Leiden: African Studies Centre.

Hoorweg, J. & Niemeijer, R. (1980b) The nutritional impact of the Pre-School Health Programme at three clinics in Central Province, Kenya. ASC Research Report no. 11. Leiden: African Studies Centre.

Hoorweg, J. & Niemeijer, R. (1980c) Preliminary studies on some aspects of Kikuyu food habits. Ecology of Food and Nutrition, 9, 139-150.

Hoorweg, J. & Niemeijer, R. (1982) The effects of nutrition rehabilitation at three Family Life Training Centres in Central Province, Kenya. ASC Research Report no. 14. Leiden: African Studies Centre.

IDRC (1981) Nutritional Status of the Rural Population of the Sahel. Report of a working group, Paris, April 1980. Ottawa: International Development Research Centre.

Jelliffe, D.B. (1966) The assessment of the nutritional status of the community. Geneva: World Health Organization, monograph 53.

Kardjati, S., Kusin, J.A. & De With, C. (1977) Geographical distribution and prevalence of nutritional deficiency diseases in East Java, Indonesia. East Java Nutrition Studies: Report I. Amsterdam: Royal Tropical Institute.

Leakey, L.S.B. (1977) The Southern Kikuyu before 1903: Vol I, II, III. London: Academic Press.

Meilink, H. (1979) Smallholder farming in Kiambu, Muranga and Kirinyaga districts of Central Province, Kenya, with special reference to the three research areas. NIRP Report no. 11. Leiden: African Studies Centre.

Muriuki, G. (1974) A history of the Kikuyu, 1500-1900. Nairobi: Oxford University Press.

NIRP (1976) Nutrition intervention and environment: Research proposal. Leiden: African Studies Centre, Nutrition Intervention Research Project.

NIRP (1978) Revised Research Plan. Leiden: African Studies Centre. Nutrition Intervention Research Project, Report no. 5.

NIRP(a) Nutrition survey in Muranga District, Kenya. Part 2: Food consumption of children under five. Leiden: African Studies Centre. In preparation.

Ojany, F.F. and Ogendo, R.B. (1973) Kenya: A study of physical and human geography. Nairobi: Longman.

Ominde, S.H. (1968) Land and population movements in Kenya. Nairobi: Heineman.

Oomen, H.A.P.C., Jansen, A.A.J. & tMannetje, W. (1979) Growth pattern of rural Akamba pre-school children. Tropical and and Geographical Medicine, 31, 422-439.

Rowland, M.G.M., Paul, A., Prentice, A.M., Muller, E., Hutton, M., Barrell, R.A.E. & Whitehead, R.G. (1981) Seasonality and the growth of infants in a Gambian village. In R. Chambers, R. Longhurst & A. Pacey (Eds) Seasonal dimensions to rural poverty. pp. 164-175. London: Frances Pinter.

Sorrenson, M.P.K. (1967) Land reform in the Kikuyu country. Nairobi: Oxford University Press.

Stamp, P. (1975) Perceptions of change and economic strategy among Kikuyu women of Mitero, Kenya. Rural Africana, 29,19-43.

Tignor, R.L. (1976) The colonial transformation of Kenya: The Kamba, Kikuyu and Maasai from 1900 to 1939. Princeton: Princeton University Press.

Tosh, J. (1980) The cash-crop revolution in tropical Africa: An agricultural reappraisal. African Affairs, 79,79-94.

Van Rijckevorsel, J. & De Leeuw, J. (1979) An outline of PRINCALS. Leiden University : Faculty of Social Sciences, Department of Data Theory.

Waterlow, J. (1976) Classification and definition of protein-energy malnutrition. In G.H. Beaton & J.M. Bengoa (Eds.) Nutrition in preventive medicine, pp. 530-555. Geneva: World Health Organization.

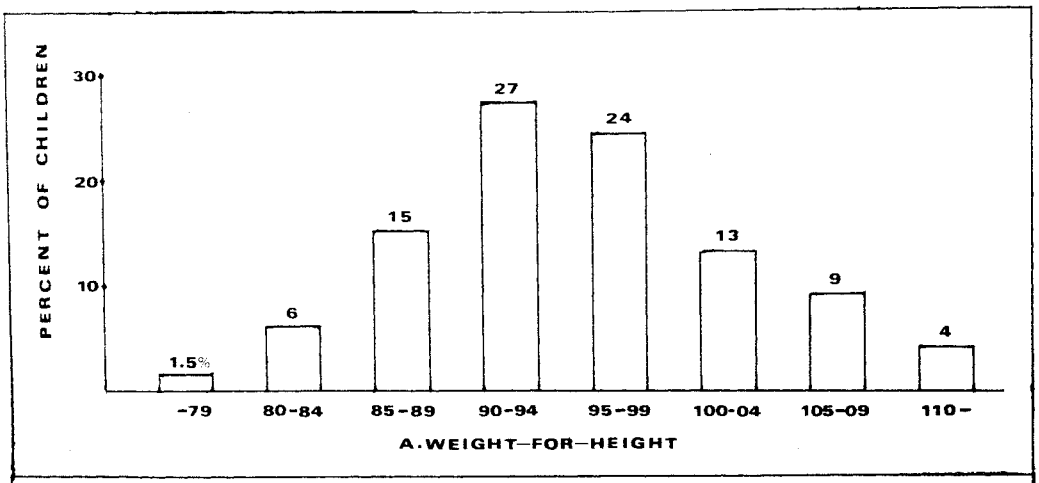
Waterlow, J.C. & Rutishauser, I.H.E. (1974) Malnutrition in Man. In: Symposia of the Swedish Nutrition Foundation, XII, part I, pp. 13-26. Uppsala.

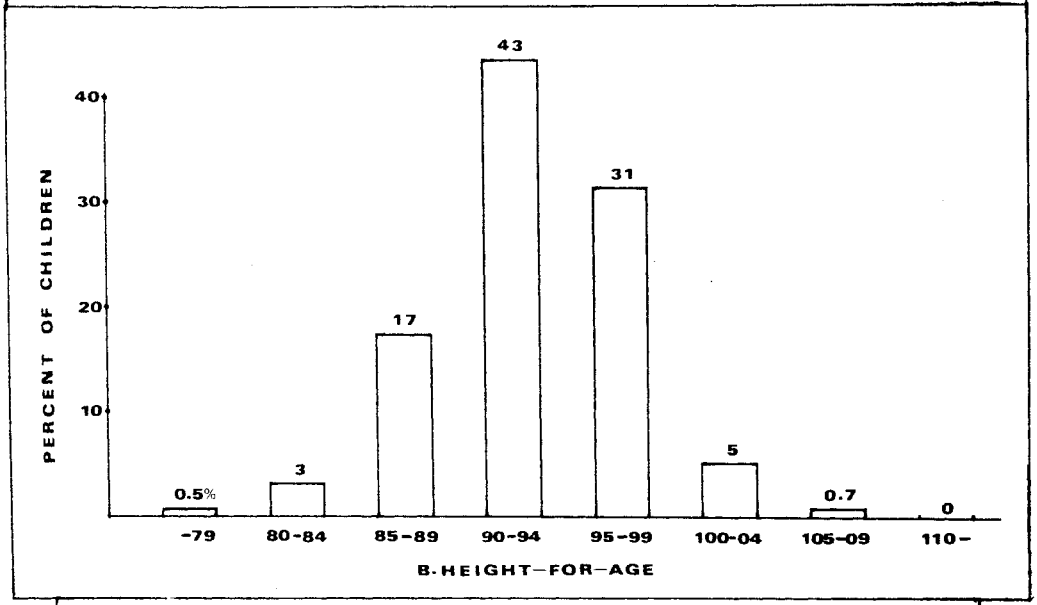
APPENDICES

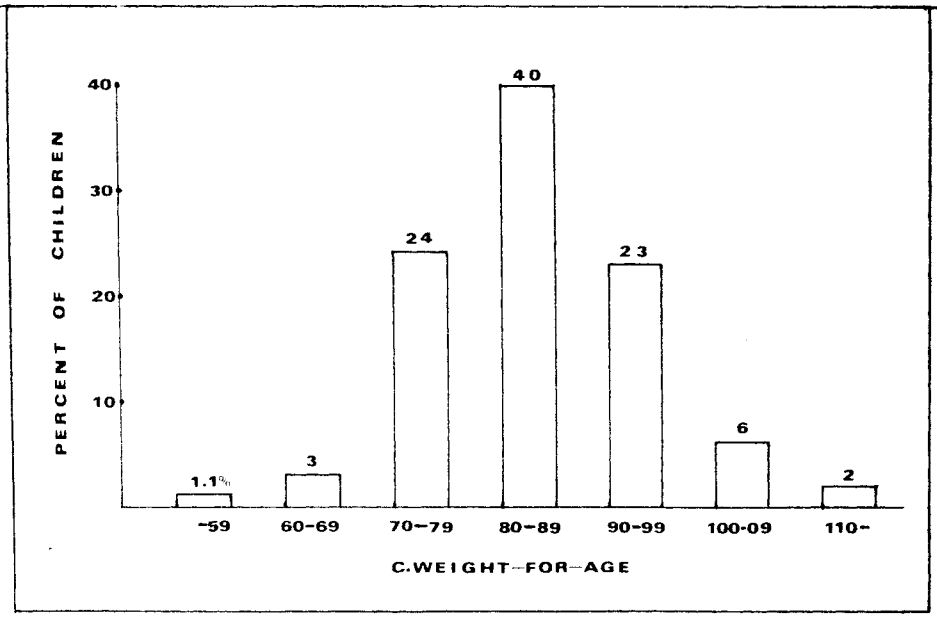
Appendix A.
COMPOSITION OF SAMPLE OF CHILDREN

AGE (months)	NOT WEIGHTED				WEIGHTED	
	Boys		Girls		Boys	Girls
	N	%	N	%	%	%
6-11	25	9	19	8	8	9
12-17	29	11	20	8	13	7
18-23	30	11	29	12	11	13
24-29	25	9	41	17	9	17
30-35	28	11	31	13	10	13
36-41	29	11	33	14	11	13
42-47	30	11	19	8	12	8
48-53	39	15	25	10	13	9
54-59	30	11	25	10	13	11
	265	100	242	100	100	100

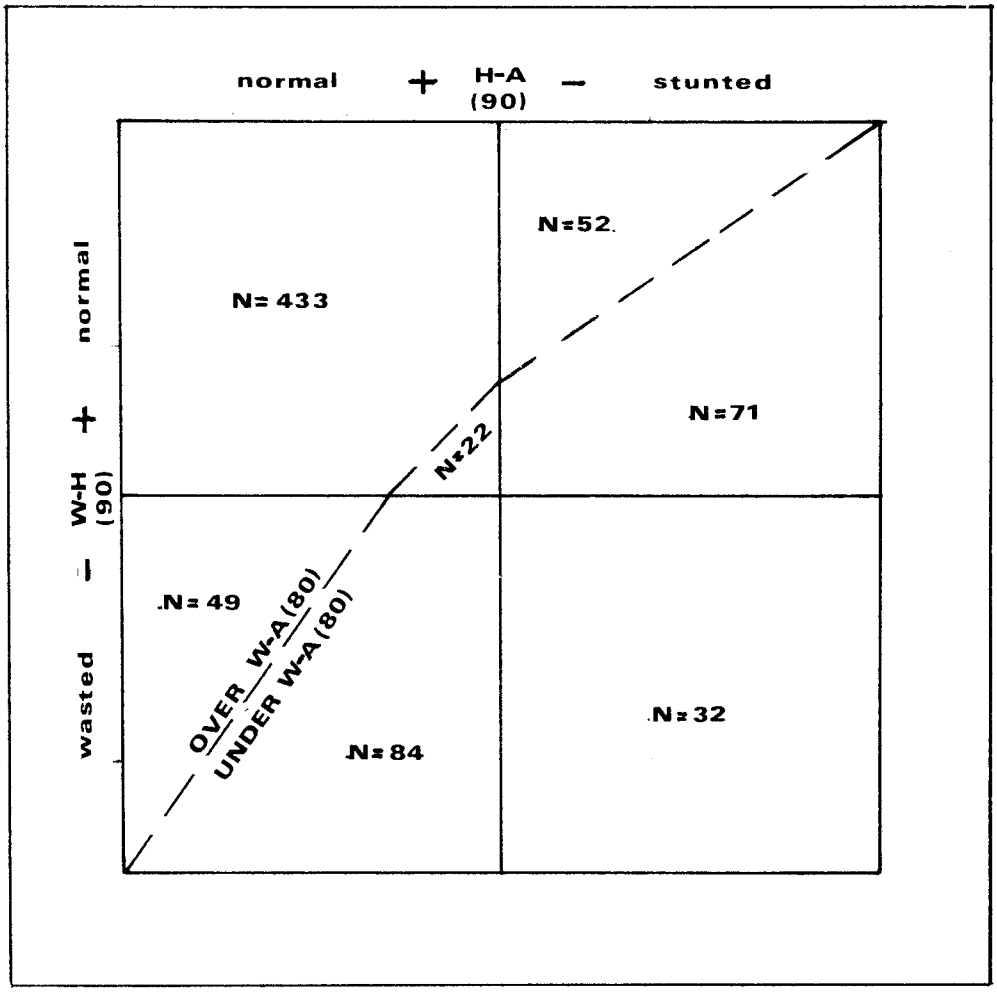
Appendix B.
DISTRIBUTION OF WEIGHT-FOR-HEIGHT, HEIGHT-FOR-AGE AND WEIGHT-FOR-AGE AMONG CHILDREN AGED 6-59 MONTHS
(weighted results)







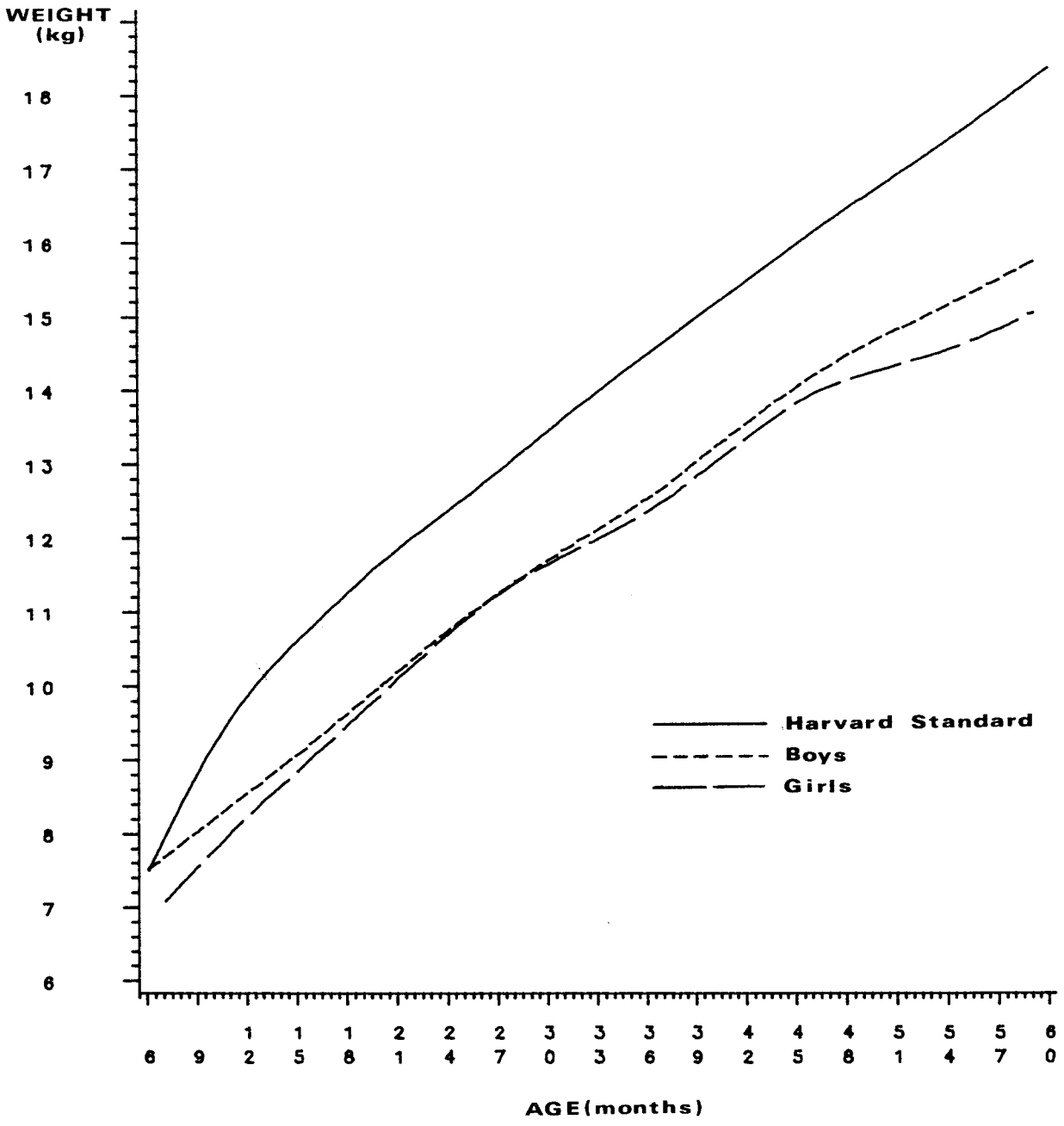
Appendix C.
TABULATION OF CHILDREN, AGED 6-59 MONTHS, ACCORDING TO H-A/W-H CROSS-CLASSIFICATION IN COMBINATION WITH W-A(80) (weighted numbers)



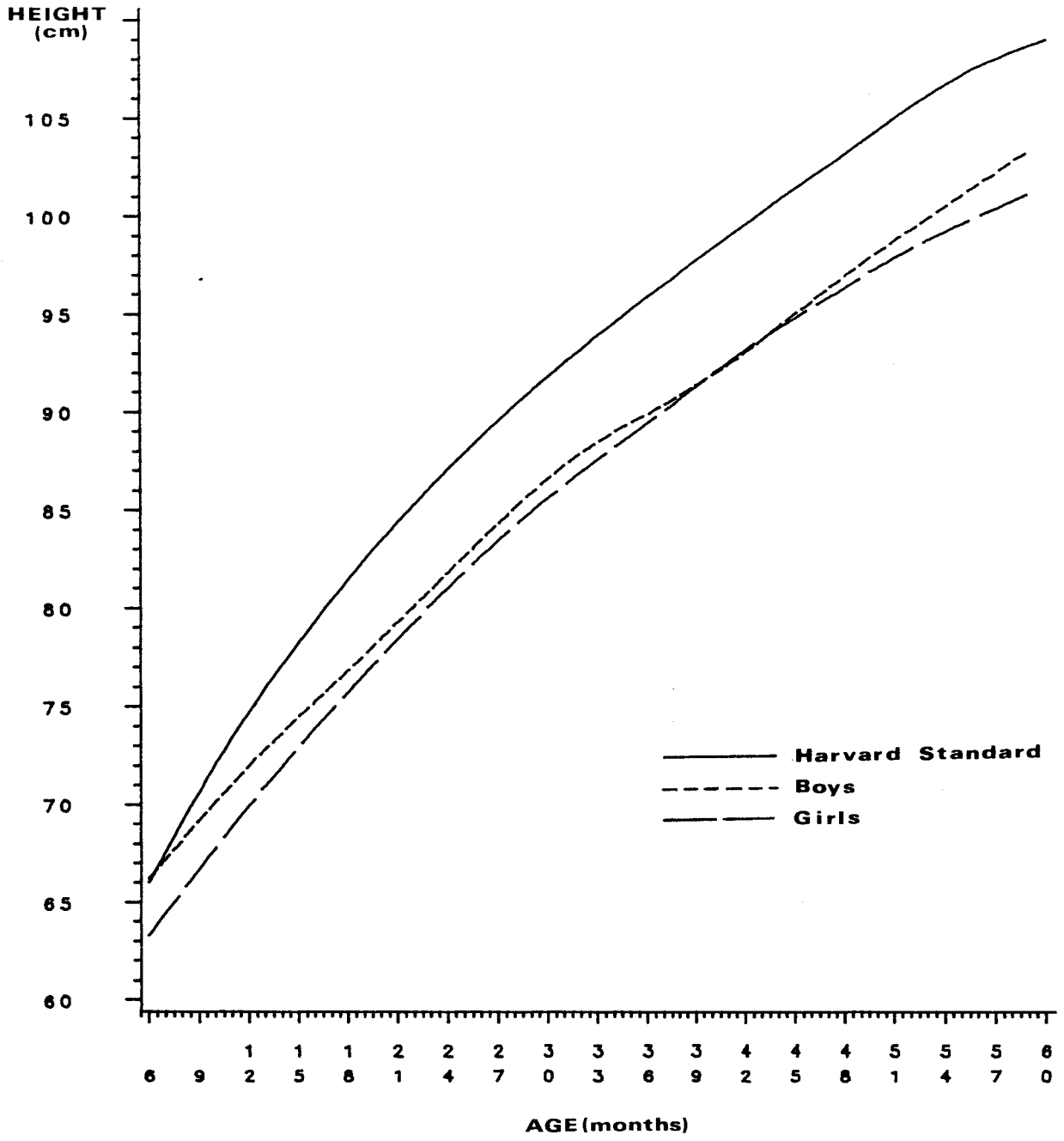
Appendix D.
WEIGHT AND HEIGHT OF CHILDREN, 6-59 MONTHS:
MEANS AND STANDARD DEVIATIONS BY HALF-YEAR GROUPS
(weighted results)

WEIGHT (KG)				
AGE (months)	BOYS Average	S.D.	GIRLS Average	S.D.
6-11	7.8	1.1	7.3	1.7
12-17	9.2	1.2	8.6	0.8
18-23	10.1	1.2	9.9	1.1
24-29	10.9	1.5	10.8	1.4
30-35	11.9	1.4	11.6	1.4
36-41	12.9	1.7	12.7	1.4
42-47	13.9	1.3	13.9	1.4
48-53	14.6	1.7	14.4	1.3
54-59	15.4	1.3	14.2	1.6
HEIGHT (CM)				
AGE (months)	BOYS Average	S.D.	GIRLS Average	S.D.
6-11	67.6	3.0	66.7	4.2
12-17	73.4	2.5	73.0	2.5
18-23	78.4	3.7	77.6	3.5
24-29	83.1	4.7	81.2	4.5
30-35	87.7	4.0	86.9	4.0
36-41	91.0	5.9	91.4	4.1
42-47	94.5	4.2	94.9	5.6
48-53	97.9	5.7	98.1	4.1
54-59	101.7	3.7	98.1	4.9

Appendix E.
WEIGHT BY AGE, BOYS AND GIRLS, AGED 6-59 MONTHS
(cross-sectional data)



Appendix F.
HEIGHT BY AGE, BOYS AND GIRLS, AGED 6-59 MONTHS
(cross-sectional data)



Appendix G.
RESULTS OF ANTHROPOMETRY, CHILDREN 6-59 MONTHS, BY AREA, SOCIAL CLASS, DOMESTIC STAGE AND NUMBER OF PRE-SCHOOL CHILDREN IN HOUSEHOLD (weighted results)

	N (weighted numbers[1])	Means & Standard Dev. W-H	H-A	W-A	Percent Children below Critical Value: W-H (90)	W-H (80)	H-A (90)	W-A (80)	W-A (60)
AREA									
Lower Area	371	94.3 (7.3)	93.3 (4.9)	84.4 (10.2)	25%	1.6%	21%	35%	1.4%
Upper Area	372	96.9 (8.4)	93.4 (4.2)	86.9 (10.2)	20%	1.3%	21%	22%	0.8%
	N (weighted numbers[1])	Means & Standard Dev. W-H	H-A	W-A	Percent Children below Critical Value: W-H (90)	W-H (80)	H-A (90)	W-A (80)	W-A (60)
SOCIAL CLASS									
Poor Households	303	94.3 (8.1)	91.9 (4.4)	82.4 (10.2)	27%	2.3%	29%	41%	2.3%
Medium Households	284	96.6 (7.9)	93.9 (4.2)	87.3 (9.3)	19%	1.1%	16%	19%	0.4%
Rich Households	156	96.5 (7.3)	95.1 (4.6)	88.9 (10.5)	17%	0.6%	14%	20%	0.0
	N (weighted numbers[1])	Means & Standard Dev. W-H	H-A	W-A	Percent Children below Critical Value: W-H (90)	W-H (80)	H-A (90)	W-A (80)	W-A (60)
DOMESTIC STAGE									
Young Families	177	95.5 (6.8)	93.5 (4.5)	85.8 (9.4)	20%	0.0	20%	27%	0.0
Middle-Stage	439	95.6 (8.3)	93.0 (4.6)	85.0 (10.7)	21%	2.5%	23%	31%	1.8%
Senior Families	127	95.7 (8.2)	94.6 (4.1)	87.6 (9.9)	28%	0.0	16%	20%	0.0
	N (weighted numbers[1])	Means & Standard Dev. W-H	H-A	W-A	Percent Children below Critical Value: W-H (90)	W-H (80)	H-A (90)	W-A (80)	W-A (60)
NUMBER OF PRE-SCHOOL CHILDREN IN HOUSEHOLD									
Few (1-2)	408	96.8 (7.9)	93.8 (4.2)	87.4 (10.0)	16%	1.0%	17%	22%	0.7%
Several (3-4)	335	94.2 (7.8)	92.9 (4.9)	83.5 (10.2)	30%	2.1%	25%	36%	1.5%

1. N=509; Weighted total N=743;

Appendix **H.**

NUTRITION INTERVENTION RESEARCH PROJECT Number
C. Socio - Economic Questionnaire

1-3 Village
(+description)

4. Do you have a husband ?

1. single	2. married	3. sep/divorced	4. widowed	5. no reply

5. If married: Does your husband have another wife ?

1. yes	2. no	3. no reply

6. (Did you go to school and) which class did you reach ?

1. no ed	2. prim 1-4	3. prim 5-8	4. beyond prim	5. no reply

7/8/9 House

Walls: 1. mud | 2. wood/sisal | 3. stone/brick | 4. other specify: | 5. no reply

Floors: 1. mud | 2. partly cement | 3. cement | 4. no reply

Rooms (include living room, bedrooms, and kitchen)
number

10. Is there a house next to the main house for the older boys belonging to this household? 1. yes | 2. no

11. How many people are sleeping in this house (include the woman herself; and include any older boys staying in the boys house who belong to this household)

a. adults*	b. children**

12. How many of these children are your own and how old are your own children ?

Own children:

Total	<1 year	1-2	3-5	6-10	11-16 years**

13/14 Other children:

Total	<1 year	1-2	3-5	6-10	11-16 years**

Other children: What is their relation to the respondent (record total number in each category):

grandchildren			children of relatives
brothers/sisters			other children, not related

* Adults are persons, 17 years of age and older, and all women who have given birth (even when younger than 17 years)

** Children of 17 years and older should not be recorded here, they count as adults: check question 11 again!

15. Record for all adults living in the house (visitors are not included unless they are already staying for a period of 4 weeks or more)

Number A	Name B	Sex C	Age(yrs) D	Relation to Respondent E	Occupation off Shamba F
		1=Female 2=Male	1=17-19 2=20-29 3=30-49 4=50 +	1=respondent 2=husband 3=co-wife 4=father/mother 5=in-laws 6=son/daughter 7=grandchild 8=other relative 9=non-relative	1=none 2=schooling 3=casual labour 4=regular employment 5=self-employed (e.g. duka) 6=maid or labourer employed by the household
01		1		1	
02					
03					
04					
05					
06					
07					

When age is unknown, try to find out when born and record as follows:
during or after emergency (5)

before emergency but during or after the war (WW2) (6)

born before the war started (7)

very old (8)

Is there anybody we did forget? (inquire after husband if not mentioned above)

16/17 Do any of these people stay elsewhere regularly because of work or other reasons ? if yes, who and why

all are full time residents			

18. Is your house built on a shamba

	yes, go to 20A
	no, go to 19

19. Do you have a shamba or the use of a shamba

	yes, go to 20A
	no land, go to 21

20.	size holding mugunda wi wothe (acres) A	owner holding mugunda B	number of subplots ruthanju C	occupants other plots rutnanju D	size shamba /plot respondent E	other shamba(s) (total size) F	cash crops G	area under cash crops H	food crops on shamba (irio/nyeni/ matunda) I	food crops sold J
		1=respondent or husband 2=co-wife 3=parents-in-law 4=brother-in-law 5=parents 6=brother 7=other relative 8=non-relative	1 2 3 4 5 6 7 8 9		1=none 2=-0.4 acres 3=0.5-0.9 4=1.0-1.9 5=2.0-2.9 6=3.0 + 7=size unknown but small 8=D.K.	1 2 3 4 5 6 7 8 coding see E	1=none 2=coffee 3=tea 4=coffee + tea 5=rice 6=cotton 7=pyret. 8=others	acres: trees:		1=none 2=sometimes 3=grows foods as cash crops
			circle number	coding see B		Owned, rented or otherwise available	Ask only the relevant crops	Record acres or number of trees	Continue asking whether she grows anything else	

If not sub-divided circle and record information for number of families sharing this shamba

30. Do you mostly use | firewood (1) | or | charcoal(2) | for cooking or | paraffin (3) | or | gas (4) |

(When firewood continue with questions 31 and 32)

31. How do you get your firewood ?

1. buying	2. from the shamba	3. collected elsewhere	4. no reply

32. How much time does it take you to get it to the home ?

1. less than one hour	2. less than half a day	3. half a a day	4. more than half a day	5. no reply

33. Record number of animals kept by respondent

cattle	
goats/sheep	
hens	

34. Do you ever employ people to work on your shamba?

1. no	2. yes, sometimes	3. yes, permanently	4. no reply

35. Do you employ somebody who helps you in the household?

1. no	2 yes	3. no reply	(check against 15F)

36. Who does the work in the household ? | respondent | | Anybody else ?

1. no	2. mother (in-law)	3. sister (in-law)	4. elder children
5. husband	6. co-wife	7. other relative	8. non-relative
9. no reply			

37. When you are ill or not at home who looks after the children ?

1. nobody	2. mother (in-law)	3. sister (in-law)	4.elder children
5. husband	6. co-wife	7. other relative	8. friends/neighbours
9. others	10. no reply		

38. Nearest Market

39. Do you attend an MCH clinic; | yes | no |
which one? |

40. Do you a tend a CRS clinic ?

1. Kambaa	2. Ichagaki	3. Gaichanjiru	4. karaba
	5. no		

41. Did you ever stay at

1. Kirathimo FLT	2. Kigumo FLT	3. Mwea FLT
	4. No	

21. Are you able to grow enough food to feed your family ?

1. yes	2. no	3. no reply

22. Do you have any milk or eggs from your own shamba ?
(if she buys count as not present; if she gets free daily, for example from her mother-in-law, count as present)

1. none	2. milk only	3. eggs only	4.milk and eggs
	5. no reply		

23. Where do you get your money which you need for shopping ?

1. from husband	2. from sale cash crops	3. casual labour
4. from sale food crops	5. other specify:	6. no reply

24. When the small children need new clothes, who goes and buys them?

1. respondent	2. husband	3. either of the two	
4. respondent with husband	5. other specify:		6. no reply

25/26 If answer on previous question (24) was 'husband'; go to next question (27).

Where do you get that money from?

1. from husband	2. from sale cash crops	3. casual labour
4. from sale food crops	5. other specify:	6. no reply

27. When the husband lives elsewhere (see question 16); When did he last visit ? (record approximate time period since last visit)

not appl.(0)	

28. Main water source

(a)

1. tap	2. tank	3. bore hole	4. river	5. spring
6. other specify:	7. no reply			

(b) Water transport

1. present at house	2. delivered	3. collected using bicycle, cart, donkey	4.carried on back	5. no reply

29. If not present at the house and not mostly delivered against payment how often is water collected during the day ?

1. less than once a day	2. 1x a day	3. 2x a day	4. 3 or more times a day
		5. no reply	

African Studies Centre, Stationsplein 10, 2312 AK Leiden, the Netherlands