The Effects of Nutrition Rehabilitatic at three Family Life Training Centres in Central Province, Kenya

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THE EFFECTS OF NUTRITION REHABILITATION AT THR

TRAINING CENTRES IN CENTRAL PROVINCE, KEN

CONTENTS

With Many Thanks to Ros Howie

SUMMARY

This report contains an account of a study of the effects of nutrition rehabilitation at three Family Life Training Centres in Central Province, Kenya. Women with malnourished children (and their siblings) are admitted to these centres for a 3-week course consisting primarily of nutrition and health education, but also covering good housekeeping and agriculture. During their stay mothers are taught to prepare a balanced diet from local foods to treat the condition of their children. During the course of 1978, the three centres admitted 273 women accompanied by 674 children.

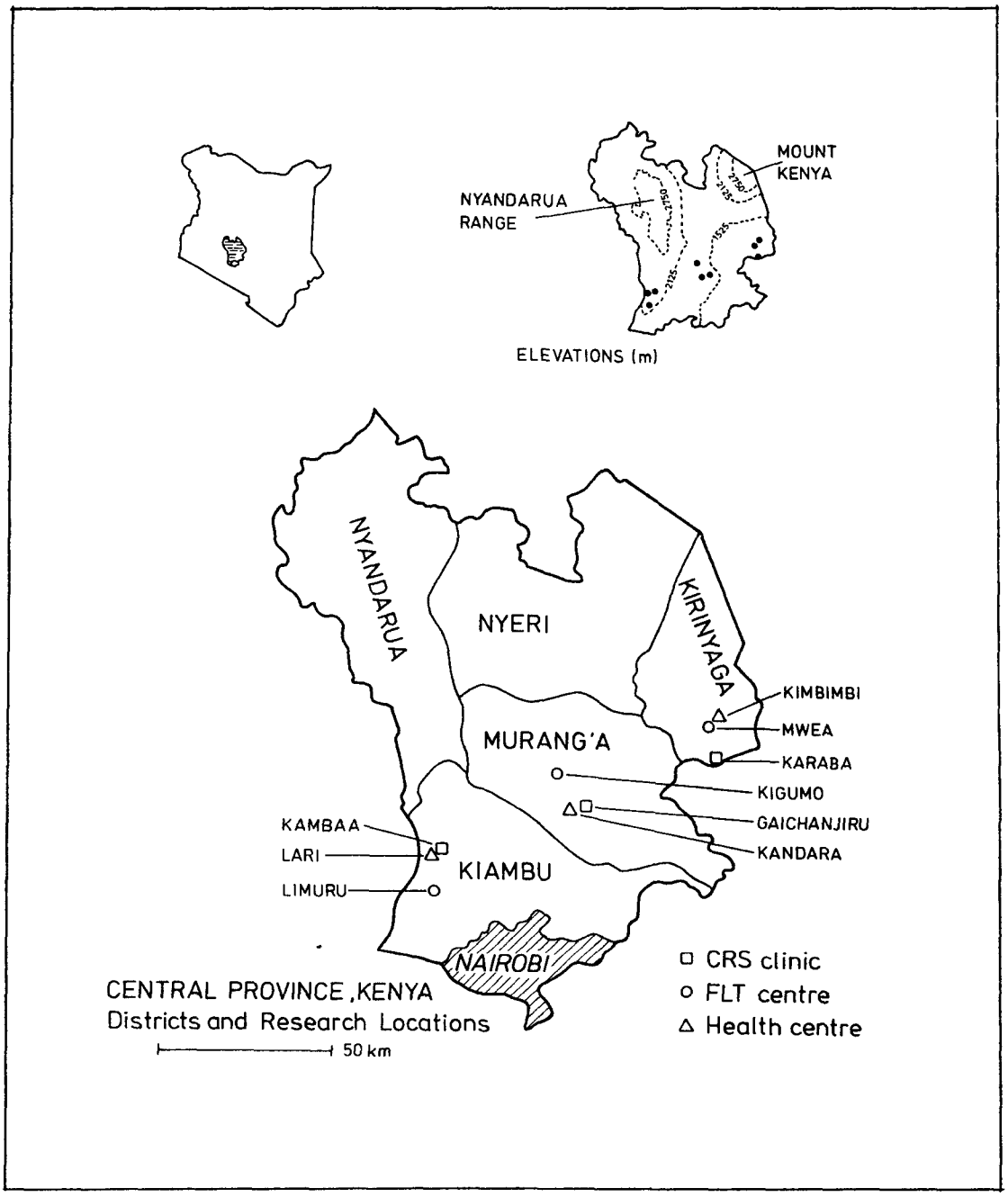
A group of 61 mothers and 94 children were interviewed and examined at admission, at discharge and at their homes, six months afterwards. A control group consisting of 100 mothers and 147 children drawn from two rural areas were interviewed and examined twice over the same period. The study concentrated on the following aspects: (a) socio-economic circumstances; (b) nutritional knowledge; (c) maternal food preferences; (d) food consumption of the children; and (e) nutritional status and progress of the children.

The social circumstances of the women seeking admission to the centres are characterized by marital instability and poverty. Furthermore, there is a sizeable group of women who are in the process of separating from their husbands and who seem to use the centres as a temporary refuge; most of these women, however, are not included in this study. It was found that the nutritional knowledge and preferences of the women admitted to the centres were no less than that of other rural Kikuyu women. As far as Central Province is concerned it appears that ignorance is not an important factor in malnutrition, which is more related to adverse social and economic circumstances.

The repeated interviews show that the teaching at the centres has, at best, a minor effect on the knowledge and attitudes of the women. When at home the diet of the children of (former FLT)-mothers shows certain typical characteristics: the children drink less milk and eat less solid foods than their peers, while flours and vegetables compose a greater part of their diet.

Although the weight gains of the youngest group of children at the centres were unsatisfactory, only one child is known to have died during the period of study. Over the total period of six months the (former FLT)-children grew largely like other rural Kikuyu children of the same age, both as regards average increase in weight and average height growth. There were, however, several wasted children who showed little weight increase at the centres, and after discharge continued to grow less than the control children.

It is recommended that a more explicit choice be made regarding the primary objective of the programme: whether to provide family education, to rehabilitate malnourished children or to provide assistance to families. This study indicates that the needs of the women seeking admission are firstly of a medical and social nature, and it seems advisable therefore to concentrate more on the treatment of malnourished children and the provision of social assistance to mothers in difficult circumstances. More attention should, in particular, be given to the medical care and nutritional regimen of the very young children, and a close eye should be kept on the wasted children who show little weight improvement during their stay at the centres. Serious efforts should furthermore be made to ensure that, after discharge, the women and children can join other nutrition programmes.


MOUNT KENYA
NYANDARUA RANGE
ELEVATIONS (m)
NYANDARUA
NYERI
KIRINYAGA
MURANG'A
KIAMBU
NAIROBI
KIMBIMBI
MWEA
KARABA
KIGUMO
GAICHANJIRU
KANDARA
KAMBAA
LARI
LIMURU
CENTRAL PROVINCE, KENYA
Districts and Research Locations
50 km
CRS clinic
FLT centre
Health centre

Readers familiar with previous publications are advised that sections 1-3 of this report are largely identical to the introductory sections of ASC Research Reports 10 & 11.

1. INTRODUCTION

Nutrition intervention programmes in developing countries usually focus on mother and child. In Kenya, as in most African countries, such programmes take many different forms (PBFL,1973). A first distinction can be made between curative and preventive programmes. The former concentrate on children who already suffer from various degrees of malnutrition, while the latter tend to focus on mothers of young children in general, or even on the population as a whole. A second distinction can be made between feeding programmes, supplementation programmes, and educational programmes. Feeding programmes provide food which is eaten on the spot (e.g. at crèches, residential clinics). Supplementation programmes supply food free of charge, or at reduced prices, whereby preparation and distribution is left to the family concerned. The aim of educational programmes generally is to provide information, to influence food preferences and to foster certain food habits with a view to improving the diet. Although different approaches are often combined within a single programme, e.g. educational programmes comprising food distribution, the type of intervention that is most effective

is still a point of discussion.

Which particular form of intervention is most suitable probably depends on the specific ecological environment and on the individual family at which it is aimed. It is likely that the best results with nutrition education are obtained in reasonably fertile areas and among families that are not too poor, while supplementation or feeding programmes are best suited to the conditions prevailing in the less fertile areas, and among poor families.

The need to evaluate existing nutrition intervention programmes is generally recognized. Evaluation is important for several reasons. It is necessary to assess results to gain insight into effective means of intervention and hence to improve existing methods. A more ambitious aim of evaluative research, however, is to create a basis for strategies of selective nutrition intervention, i.e. to establish under what circumstances different interventions are most effective for various sections of the population. To achieve this, evaluation must comprise more than a simple and direct assessment of end results and entail an analysis of why and how the observed effects are achieved: an evaluation of process (Suchman,1967). The intervention programmes must be placed against the background of the social environment in which they operate and it is necessary to study not only the nutritional status of children, but also the knowledge, attitudes and behaviour of the mothers as well as other social factors which may influence the diet and nutritional status of the individual child. Such comprehensive evaluation has rarely been undertaken, although of late some progress has been made (Klein et al., 1979; Hoorweg & McDowell,1979).

The general aim of the Nutrition Intervention Research Project (NIRP) is to contribute to this field of knowledge by studying nutrition programmes for children under five among the Kikuyu living in rural areas in Central Province, Kenya (NIRP,1976;1978;1980). The specific objectives of the project are to provide systematic knowledge concerning the effectiveness of these different nutrition programmes and to develop a model for the evaluation of such services. The effects of the different types of nutrition intervention are studied in relation to differences in the ecological, economic, and social environments of the participants. A brief re-

view of the project with a summary of the major findings can be found in an account of a seminar held in Nairobi in January 1981. (Hoorweg, Niemeyer & Van Steenbergen,1981)

Evaluation studies have been carried out concerning three programmes: Family Life Training Programme (Ministry of Social Services), Pre-School Health Programme (Catholic Relief Services) and the Nutrition Field Workers (Ministry of Health). The first programme covers a number of Family Life Training Centres (FLTC) in different districts throughout Kenya. The Pre-School Health Programme (PSH) is a world-wide programme aimed at children between the ages of 6-60 months in needy families. Once the children are enrolled in the programme, their mothers are required to pay monthly visits to the clinic, where the children are weighed, nutrition education is given and where mothers receive supplementary foods for the young child against payment of a nominal sum. Nutrition Field Workers are employed by the Ministry of Health and many of them work as members of the MCH team at Health Centres, where they give nutrition education to mothers attending MCH clinics and monitor the under-fives.

From each of these three programmes one centre was selected in the three following ecological zones: 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.

Since the present intervention programmes concentrate their activities largely on children between the ages of six months and five years, a series of nutrition surveys was conducted among children of this age group, independently from the evaluation studies but during the same period. These (NIRP) surveys were conducted in Kigumo division, Muranga, in two areas situated at different altitudes. The results of these surveys will be published in two parts, the first concentrating on the socio-economic results (NIRPa), the second on the diets and anthropometry of children under five (NIRPb). The studies on the Nutrition Field Workers and the Pre-School Health Programme were published as companion reports to the present one. (Hoorweg and Niemeijer,1980a; 1980b).

This report is exclusively concerned with the Family Life Training Programme. Prior to a description of the programme and the method of evaluation, brief descriptions will be given of the research

areas and of some relevant aspects of Kikuyu society, food habits and the general nutritional status of Kikuyu children.

2. CENTRAL PROVINCE

The selection of Central Province as area of study was based on the fact that it offers a wide variety of ecological conditions while being inhabited mainly by the same ethnic group: the Kikuyu. Restricting the studies to one ethnic group facilitates the evaluation of the programmes since it avoids the complications that would result from differences in food habits between ethnic groups.

Central Province is a region of considerable variations in altitude, temperature and rainfall. Consequently there is a considerable diversity in agricultural and economic potential. The topography of the province is dominated by Mount Kenya and the Nyandarua range (the former Aberdares). There are two distinct rainy seasons: long rains in April and May and short rains during the month of November. The numerous ridges consist of rich red soils which allow the cultivation of a variety of crops. As far as arable land is concerned Central Province compares favourably with the rest of Kenya where over 70 per cent of all the land is of poor quality and suitable only for wild life and the poorest type of ranching. In Central Province, however, 70 per cent of the land surface is suitable for farming.

The population of the province was estimated to be over 2 million in 1977, about 15 per cent of Kenya's total population (CBS, 1972). Since the province accounts for less than 3 per cent of Kenya's land surface, it has a relatively high population density. The majority of the population in the province (c. 80%), lives on the mid-

slopes of Mount Kenya and the Nyandarua range, an area which accounts for about 35 per cent of the total provincial territory. Also the majority of the population (c. 80%), lives on smallholdings. Although smallholders in Central Province have a greater interest in export crop production than farmers elsewhere in Kenya, smallholder agriculture is still primarily orientated towards the production of food crops and livestock products. The standard of living of the majority of the rural population is low.

The three districts in Central Province with which we are concerned, Kiambu, Muranga, and Kirinyaga, may be divided into distinct ecological zones, on the basis of altitude, rainfall and vegetation[1]. From high to low altitude these are the following[2]:

(Zone II) Forests and derived grasslands and bushlands with a potential for forestry and intensive agriculture and suitable for food crops such as hybrid maize, beans, Irish potatoes and vegetables as well as cash crops such as pyrethrum and tea. This zone and zone III are both densely populated.

(Zone III) Land without forest potential, 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) The semi-arid zone of grass and woodland which is of marginal potential, but offers possibilities for irrigation agriculture. In this drier zone drought-resistant grains and root crops are the main food crops. Pigeon peas, grams and sisal are grown as cash crops.

In each of these zones, one research area was selected. In each research area one representative of each nutrition programme was further selected for study i.e. a Health Centre, a PSH-clinic, and a FLT-centre. The three research areas are located in Limuru division of Kiambu district; in the Kandara and Kigumo divisions of Muranga district; and in the Mwea division of Kirinyaga district[3]. The Limuru area is situated at the highest, the Mwea area at the lowest altitude, and the Kandara-Kigumo area in between.

The higher the altitude the better the agricultural potential of the area. The Limuru and Kandara-Kigumo areas differ little in this respect, although the Limuru area is slightly more fertile. The Kandara-Kigumo area, on the other hand, has in recent years been favoured most as regards the income from cash crops, because of high coffee prices. In all respects the lower research area, Mwea, offers the least agricultural prospects to smallholders. A detailed review of smallholder farming in Central Province can be found in a separate report (Meilink,1979). Population densities in the three areas in 1969 were 410, 390 and 107 per km^2 respectively(4).

3. KIKUYU SOCIETY, KIKUYU FOOD HABITS AND THE NUTRITIONAL STATUS OF YOUNG CHILDREN.

The Kikuyu belong to the North-east Bantu-speaking peoples, and in 1969 they numbered about 2,200,000. In Kiambu, Muranga and Kirinyaga districts 96 per cent of the population was Kikuyu in that year (MoFEP,1970). The history of the Kikuyu has been traced back several centuries by Muriuki (1974), and 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.

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band a woman can seek refuge with her parents but usually there is no permanent place for her because the land rightfully belongs to her brothers. Considerable pressure may be put on her to return home or to find another husband. She may, of course, also try to find an existence elsewhere, for example as an agricultural labourer at a large estate.

The vast majority of people lives on smallholdings, the average holding being 2 to 3 acres. The percentage of landless people and people with very small farms varies throughout the province but is highest in Kiambu district near the Nairobi agglomeration. As regards farming: whenever people have land available, they grow food crops for their own consumption but the type and extent of commercial farming varies considerably. In the NIRP survey a distinction was drawn between 'cash farmers' and 'subsistence farmers', on the basis of the area planted with coffee, sale of food crops, number of cattle, number of chickens and whether farm labourers are employed by the household. This distinction is, of course, not absolute, but one of degree.

The Kikuyu living in the rural - survey - areas earn their living in a variety of ways. It was found that, not including own farming activities, 45% of the husbands had regular employment or were self-employed while another 45% did casual labour of some kind. Only 10% of the husbands reported no gainful activity at all outside their own farm. More than half the husbands worked as migrant labourers elsewhere and visited their homes with varying regularity.

Starting out from these two important factors, commercial farming and employment, three socio-economic strata were distinguished in the NIRP survey: 'affluent', 'intermediate' and 'poor' households. In the 'poor' households there is no question of regular employment or serious commercial farming; these households depend on subsistence farming and an irregular and meagre income from the day labour of the husband, the wife or both. Households in the 'intermediate' group derive a cash income from either commercial farming or regular employment (this includes the self-employed). The 'affluent' households enjoy a double income having both resources. This stratification, which reflects the share of the family in the money

economy, shows a striking correlation with the proportion of households which report that they are able to grow enough food for home consumption.

Most differences between rural Kikuyu families can, in effect, be attributed to differences in social class or in family organisation. Family organisation is determined primarily by the domestic stage that a family has reached. In the NIRP survey three stages were distinguished: 'young' families with children under six, 'middle-age' families with children under seventeen and 'elder' families where the eldest child has reached the age of seventeen or more. Naturally, every additional child that is born in the family means another mouth to feed and more domestic work, but older children, on the other hand, offer domestic help. Under the age of five, children require most attention. Six is about the age at which they start doing small jobs such as looking after the younger children. As they grow older and stronger they have to carry water and help on the farm after school hours. Gradually they relieve the mother of some of her tasks. After the age of seventeen, when most of them are no longer at school, they are no longer regarded as children and are expected to contribute their labour to the household, particularly with respect to the farming that has to be done.

3.1. Food habits

Most Kikuyu housewives in the rural areas still prepare meals over a wood fire, as their grandmothers used to do, wedging pots and pans between a few large stones. 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 staple 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. Other kinds of beans or peas may be added, or they may replace the kidney beans. Occasionally some meat may also be added. In some areas the githeri meals are often mashed, in other areas this is hardly ever done. Githeri is highly favoured as the basic dish but 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 are also eaten separately, boiled with a little salt. A common lunch consists of boiled sweet potatoes. On rare occasions, a rice dish may be served.

Although the Kikuyu used to plant a variety of grains they now grow mostly maize, which was introduced early in the last century (Bertin et.al.,1971). Millet and sorghum flour are commonly given to children as a light porridge. Green bananas and Irish potatoes are the most frequently consumed roots and tubers and are often given as a combined stew to small children. Irish potatoes, which were introduced at the turn of the century have rapidly become popular. The most common legumes are the kidney bean, the ordinary pea, and the cowpea. The bonavist bean, njahi, and the pigeon pea, njugu, are regarded as delicacies and served in festive dishes at marriage and child birth ceremonies.

The vegetables most often prepared are cabbage, cowpea leaves, pumpkin leaves and kale. This last vegetable, although introduced only recently, has become very popular. It has replaced many other plant leaves, particularly the wild varieties, whose consumption appears to have greatly declined. Onions, peppers, tomatoes and carrots are used frequently as seasonings. Fruits are usually eaten by children between meals, sweet banana, mango and passion fruit being especially common.(8)

Children are usually breastfed until the age of one year but receive additional foods as from the age of three to five months. They are weaned to a diet which has a high milk content, and further comprises fairly large quantities of roots and tubers, particularly the aforementioned mash of bananas and potatoes. After the second year

milk and root consumption gradually declines and a shift occurs towards maize and beans. Young children are not given maize kernel, but maize flour porridge is already introduced at an early age. They are also given beans without maize. Gradually there is a further shift towards the adult diet. (Detailed data will be presented in NIRPb).

3.2. The nutritional status of Kikuyu children

In recent years two nutrition surveys have been held in Central Province, the first as part of a national survey by the Central Bureau of Statistics in 1977, the second in Muranga in 1978 as part of the Nutrition Intervention Research Project. A summary of the results of these two surveys is presented in table 1 (p. 18). The average weight-for-age (W-A), height-for-age (H-A), and weight-for-height (W-H) are almost identical, but the percentage of children falling below critical values of W-A(80), H-A(90) and W-H(90) is larger in the CBS survey. In a later survey by CBS these latter percentages, however, turned out to be smaller and much closer to our figures.(9) The results of the CBS survey also showed that the nutritional status of children in Central Province was not much different from that of children in other parts of Kenya and, if anything, fell slightly below the national results. Compared with other developing countries these results are neither strikingly positive nor negative. A significant finding, however, is that in Central Province some 30-40 per cent of the young children fall below W-A(80) at a given moment in time and, by that standard, suffer from mild malnutrition.

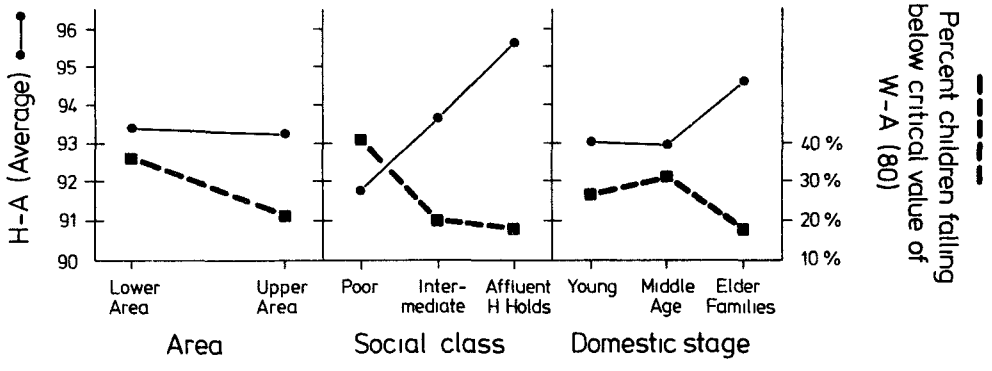
Both the CBS survey and the NIRP survey explored the relationship between the nutritional status of young children and social and economic variables at household level. The first survey found that of the three variables - farm size, employment of the head of the household and degree of commercial farming - the latter two showed a positive relationship with the nutritional status of young children (CBS,1979). This finding, namely that households which cultivate agricultural products for sale had a lower incidence of mal-

Table 1. Summary of anthropometry of children in Central Province from CBS (1977) and NIRP(b) surveys.

	Average			Standard Deviation			Children (%) falling below critical value of		
	W-A	H-A	W-H	W-A	H-A	W-H	W-A (80)	H-A (90)	W-H (90)
CBS*	84	93	94	-	-	-	39	31	33
NIRP**	85.6	93.3	95.6	10.2	4.5	8.0	28	21	22

* N=225; age range 12-48 months.
** N=508; age range 6-59 months.

Figure 1
Summary of anthropometric results by Area, by Social class and by Domestic stage
n = 300. (NIRPa)



nutrition, was confirmed by our own survey. More attention will be paid here to the results of the latter survey, because they determine the framework for the analysis of the present evaluative studies. The major findings follow below, and are graphically presented in figure 1.[10]

(-) There were no differences in average H-A between the children in the two ecological areas covered by the survey. There were, however, differences in W-A. In the less fertile area 36 per cent of the children fell below W-A(80), while in the more fertile area at higher altitude only 21 per cent of the children fell below this weight level.

(-) Significant differences in nutritional status were found between children from different social classes. This is reflected in the average H-A, which increases from 91.8 among children from 'poor' households, and 93.7 among children from 'intermediate' households, to 95.7 among children from 'affluent' households. The percentage of children falling below the 80% critical value of W-A, naturally, follows the inverse trend, decreasing from 40 per cent, to 20 per cent, and is only 17 per cent among 'affluent' households.

(-) There are also differences in nutritional status between children from families at different domestic stages, although these differences are less pronounced than those relating to social class. Both H-A and the percentage of children falling below the critical W-A value are more positive among 'elder' families, while there is little or no difference in this respect between children from 'middle-age' and 'young' families. The presence of one or more grown-up children seems to pose a positive condition for the welfare of the younger children (NIRPa).

4. FAMILY LIFE TRAINING CENTRES

During 1974-75 the Department of Social Services took charge of several nutrition clinics which had until then been managed by the Kenya Red Cross and other voluntary organizations. The clinics were reorganized to some extent and renamed Family Life Training Centres. This new F.L.T. programme started with three centres in Western Kenya (in Kisumu, Busia and Bungoma districts) and two centres in Central Province (in Kiambu and Muranga district). In the following years, centres were also established in Kirinyaga, Machakos, Kilifi and Siaya districts, and by the end of 1979 there were 9 Family Life Training Centres in all.

In 1976 the objectives of the programmes were formulated as follows:

> (a) To assist individual families in their efforts to improve family welfare by training the mother in key areas of family care.
> (b) To prevent poor health among children by giving their mothers instruction on preventive health measures.
> (c) To treat malnourished children who accompany the mothers to the centres by giving them high protein-calorie diet of locally grown foods. (MoHSS, 1976:1)

In the recent programme manual these objectives have been widened to include other aspects of family life, while more attention is given to the role of the community:

> (a) To provide an education programme for those families in the community who, for various reasons, have not been able to maintain a healthy and productive life for all their members; and
> (b) To co-operate with other persons in the community in giving information, advice and assistance which can prevent those conditions which lead to deterioration of family life (MoHSS,1980: 13).

Nevertheless, the emphasis is still very much on the treatment of childhood malnutrition. This is demonstrated by the following description of the FLT centres which is again borrowed from the manual and in which the reader will recognize the major characteristics of what are internationally known as nutrition rehabilitation centres.[11]

> Each centre is equipped to feed, house and teach a number of mothers (approximately 20) from the local community who need to better understand how to care for their children. Mothers whose children have become weak or ill because of malnutrition are referred to the centre by social workers, health visitors or other persons responsible for social improvement in the community. Some mothers come on their own initiative.
>
> Each centre is staffed with a supervisor, an assistant supervisor, and one or two housemothers. These women are usually professionally trained in the fields of health care, nutrition, social work and adult education. They are responsible for running and maintaining the centre, as well as for giving mothers a practical education which will help them improve their lives and the lives of the members of their families.
>
> Mothers live at the centre for three weeks.[12] They receive instructions about many aspects of better child care. These include the importance of a balanced diet and of a clean environment in and around the home. Discussions are held about other aspects of family life such as home management and family planning.
>
> A special role of the staff is to visit mothers in their homes after they have been trained at the centre. These follow-up visits are extremely important since many mothers return to home situations which necessitated the services of the centre (MoHSS,1980,13-14).

To this description we may add that at the centres the mothers stay in cottages designed in a local style and built from locally available materials. The women are expected to cook and clean just as they would at home and also to work in the vegetable gardens attached to most of the centres.

Table 2 (p.22) lists activities during the years 1976-79, when the programme went through a rapid development and admissions more than doubled.[13] In 1978, the year the present study was conducted, the programme staff at the Ministry consisted of five officers, while the staff at the 7 centres then in operation numbered 33. UNICEF has played an important role in the funding of the programme and still provides money to cover food and transport expenses. The total recurrent expenses for the year 1978 were estimated at Sh. 882,000. This brings the cost per child to Sh. 300.-

There exist considerable differences in the size and activities of the individual centres. For example, in 1978, the centre in Kisumu admitted 650 women, and in Bungoma roughly half that number. The centres in Busia, Muranga and Machakos each admitted between 125 and 250 women during that year, while Kiambu and Kirinyaga each counted no more than about 75 women. (Hoorweg and Niemeyer,1979).

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TABLE 2. FAMILY LIFE TRAINING PROGRAMME: NUMBER OF CENTRES, ADMISSIONS AND HOME-VISITS, 1976-1979

	1976	1977	1978	1979
Centres	6	7	8	9
Admissions: women	906	1291	1692	2369
children	1703	2179	2970	4062
Homes visited	195	346	371	450

Source: MoHSS, 1976; 1977; 1978; 1979

TABLE 3. WEIGHT-FOR-AGE DISTRIBUTION OF CHILDREN AT ADMISSION TO FLT-CENTRES

	N	WEIGHT-FOR-AGE xx-59	60-79	80-89	90-xx
Index children[a]	1364	34%	50%	10%	6%
Siblings[b]	648	17%	41%	20%	22%
Rural Kenya Nutrition Survey[c]	1383	1%	32%	33%	34%

(a,b) Children, aged 6-59 months.
Source: Hoorweg & Niemeyer, 1979: 30
(c) Children, aged 12-48 months. Source: CBS, 1977

The prime reason for admitting a woman is that one (or sometimes more than one) of her children is malnourished. Many women, however, bring other children along to the centre and it is indeed standard policy to encourage mothers to do so. In the record forms a distinction is made between the child most in need of treatment (the index child) and its siblings. Table 3 lists the weight-for-age distribution at admission for the index children and for their siblings. Although the siblings are in better condition than the index children, allmost 60% of them still fall below W-A(80). This is considerably more than the corresponding figure for the general child population, which justifies the policy to admit these children as well.

The aetiology of malnutrition in Central Province appears to be rather different from that in Western Kenya, as table 4 (p.24) clearly shows. In Western Kenya a higher proportion of the women admitted to the centres are young, have only one child to look after, or are pregnant. In Central Province, on the other hand, relatively many of the women admitted to the centres are not or no longer married, have no land at their disposal and engage in casual labour for their livelihood. It is, of course, possible that these differences merely reflect the living conditions in Central Province and Western Kenya respectively, but further comparison with the characteristics of the general population in these areas has shown that this is not the case.

There are three FLT centres in Central Province: Kiambu, Muranga and Kirinyaga FLTC. All three are included in the present study. Kiambu FLTC (also known by the name of Kirathimo) in the upper research area, is situated near the small town of Limuru. Muranga FLTC, in the middle research area, is located in the administrative centre Kigumo. Kirinyaga FLTC, in the lower research area, is situated on the perimeter of the Mwea irrigation scheme, in Wamumu village.

The first two centres were founded by the Kenya Red Cross during the 1950's, as centres for aid to poor families. Later they became nutrition rehabilitation centres, until they were finally handed over to the Department of Social Services in 1974. They offer accommodation in the form of rondavel cottages, 8 and 16 of them respectively. Kirinyaga FLTC was founded in 1976 and offers accommodation in wooden barracks that comprise 8 rooms.

During 1978 the three centres each admitted between 75 and 125

TABLE 4.
CHARACTERISTICS OF WOMEN ADMITTED TO FLT CENTRES DURING 1978

	CENTRAL PROVINCE[a]	WESTERN KENYA[b]
Age, 29 years or younger	47%	68%
Looking after 1 child only	10%	17%
Pregnant	17%	28%
Single, separated divorced or widowed	38%	12%
No land available for cultivation	43%	7%
Engaged in casual labour	59%	6%

(a) Kiambu, Muranga, Kirinyaga FLTC
(b) Bungoma, Busia, Kisumu FLTC
Source: Hoorweg & Niemeyer, 1979

TABLE 5. ACCOMMODATION, STAFF AND ADMISSIONS AT FLT CENTRES IN CENTRAL PROVINCE (1978)

	KIAMBU	MURANGA	KIRINYAGA
Cottages/Rooms	8	16	8
Staff charged with daily care	3	3	2
Women admitted	73	126	74
Children admitted	227	288	159

Source: Hoorweg & Niemeyer, 1979

women, accompanied by 150-300 children (table 5). In Kiambu FLTC each mother was, on average, accompanied by three children, while in the two other centres, the average number of children per mother was only two. It must be noted that attendance falls well below the number that the centres can accommodate and also below the number of potential cases in each district.(14) The centres in fact do not so much serve the district as the division in which they are situated, with the exception of Muranga FLTC.

This and further information about the centres can be found in the annual reports (MoHSS,1976;1977;1978;1979) and the two reports containing an analysis of the entries in the case record forms (Hoorweg & Niemeyer,1977;1979). An early study of the centre in Kiambu was conducted by Gachuhi, Chege and Ascroft (1972). Since a few years the African Medical and Research Foundation provides assistance to the programme, and has published brief reports on each of the centres in Central Province (AMREF,1978;1979;1980). The food intake of a small number of children at different centres was measured by Howie (n.d.). A detailed report on the FLT programme with extensive recommendations was further written for the British Council by Poskitt (1979).

5. METHOD

5.1. Design

Evaluation of nutrition programmes requires that certain measurements be taken before and after intervention in such a way that differences between the two conditions can be ascribed to that intervention. In this case, it was possible to interview the same mothers before and after their stay at the centre. Any effects of the nutrition rehabilitation should lead to better nutritional results after residence

at the centre.

Between March and August 1978, 85 newly admitted mothers were interviewed at Kiambu (24), Muranga (32) and Kirinyaga FLTC (29). They constitute roughly one third of the total of 273 admissions in Central Province during 1978. They form a representative sample of this larger group as the listing of social and economic characteristics in appendix A shows. Later on, in section 6, we will take a closer look at the characteristics of this group to gain a better insight into the aetiology of these cases. The women were interviewed during the first days at the centre, again shortly before they were discharged and a third time at their homes six months later if they could be traced. Regrettably, on a few occasions mothers (five altogether) were discharged from the centres before we were able to interview them for a second time. Of the remaining (80) women we located and interviewed 61 at their homes.

The number of mothers missed at discharge is small and they and their children are not different from the other cases. The other (19) women could not be located because all of them had moved away from their previous home, and their new places of residence were unknown. Detailed data on the social and economic background of these (19) cases at the time of admission to the centres are listed in appendix M, together with the anthropometric characteristics of their children. They are mostly women from young families. Although most of them reported that they were married at the time of their stay at the centres, six months later nearly all were in the process of separating from their husbands, which is why they had left their homes. (In quite a few cases this had already been apparent during the stay at the centre and, sometimes, this had even been an additional reason to admit the women to the centres). However, because the land is usually owned by the men, by leaving their husbands women risk becoming not only homeless but also landless. They must then find other means of existence but as this is no easy matter the regular provision of food for their children and themselves becomes uncertain. Evidently the same reasons why we were unable to find these women, may also influence the nutrition of their children. This has implications for the study design, i.e. the evaluation of the effects of the rehabilitation will perforce be limited to the 61 women

interviewed on all three occasions.

Such a design whereby the same subjects are examined before and after intervention is termed 'pretest-posttest design' and it is usual with such a design to employ a control group: a group that is not exposed to intervention or treatment. This makes it possible to observe whether any changes have occurred irrespective of the treatment and, if so, to measure their magnitude.

For this purpose, we selected as control group a sub-sample from the larger group studied in the NIRP survey and described in the introduction (pp.9;15-21). This survey was conducted in two areas in Muranga district and included 300 households.(15) The control group consists of every third household visited: 100 households altogether which in themselves form a representative rural sample. This group was revisited twice, the first time after six months, a second time after one year. The time periods during which the initial survey and the first revisit took place coincide with the periods of interviewing at the FLT centres and the home-visits (see table 6).

5.2. Indicators

In the introduction to this report we argued that evaluation should comprise more than a simple and direct assessment of end-results. In our opinion, the evaluation of nutrition intervention should not focus exclusively on the nutritional status of groups of children.(16) In addition to the nutritional status of children, the present study therefore also deals with knowledge, attitudes and behaviour of the mothers. The indicators employed to measure these features consist of a set of knowledge questions; a list of comparisons to measure food preferences; a recall of food intake during the previous day; and the nutritional status of the children concerned. A detailed description follows below.

These indicators were only drawn up after thorough preliminary studies covering general aspects of Kikuyu food habits, such as the foods presently in use, classification of foods and food preferences for children (Hoorweg & Niemeyer, 1980c). This entailed the compilation of a list of food names in the vernacular. It was established that Kikuyu food classification does not differ substantially from the customary

nutritional divisions of the Western world. It was also demonstrated that the method of paired comparisons is suitable for measuring maternal food preferences. Food preferences are remarkably similar throughout Kikuyu country: there is a high preference for legumes and some starchy foods while certain cereals are held in conspicuously low regard.

(a) The knowledge questions were identical to those employed in the NIRP surveys (the exact phrasings are listed in appendix E). The questions on the recognition and the causes of kwashiorkor and marasmus, the best age to stop breastfeeding, and the treatment of diarrhoea, are straightforward and need no further explanation. Nutrition teaching in Kenya generally pays much attention to weaning and the introduction of weaning foods. Hence the question about the age at which children can start eating five specific foods (Q.4). Four of these foods are weaning foods, and one - whole maize with beans - signals the later introduction to the adult diet. The answers concerning the four weaning foods may be combined in one score: the number of times the respondent mentions an early introduction age of 0-4 months. Another important aspect is how many times a day a child is fed, since in the case of small children it is better to feed them more than three times a day, or at least to give them some extras between the three main meals (Q.5). Finally, nutrition teaching in Kenya (as in other developing countries) puts much emphasis on the distinction between and the functions of three food groups: energy foods, body-building foods and protective foods (Q.8).

(b) The second indicator is provided by maternal food preferences as measured by the preference scale. This scale consists of a number of comparisons between two foods (the mother is asked 'which food would you prefer to give to a 2 year old child'). Kikuyu mothers generally have no difficulty in choosing between foods, whether or not these foods are drawn from the same or from different food groups, and their answers follow consistent patterns as shown in the preliminary studies. The preference scale consists of 16 comparisons between four high protein-high calorie foods on the one hand, and on the other hand eight foods that are either low in proteins or low in both proteins and calories.[17] Beans and eggs were compared successively with rice, finger millet, green bananas and cabbage; peas and meat were compared with maize flour, kale, Irish potato and oranges (the list of items is found

in appendix F). The 16 items are combined in a single preference score, in which one point is given each time a high protein-high calorie food is chosen. Since there are 16 comparisons, scores can theoretically vary between 0 and 16, although in practice scores lower than 5 occur only incidentally.

(c) The dietary recall concerning the previous day provides the third indicator. A detailed description and discussion of the method is given elsewhere (NIRPb). The mother was asked about the food and drink consumed by the child in the course of the previous day, starting with the first dish of the day and further in chronological sequence. She was requested to demonstrate the amounts consumed using standard household equipment. In the case of liquid dishes, consumed volumes were measured with water. Volumes of solid dishes were measured with dry maize. From these volumes the weight of the cooked dish and the subsequent raw ingredients were calculated either by means of the average recipe or from the actual proportions indicated by the respondent. The food table by Platt (1962) was used to calculate energy and nutrient content.[18]

(d) The final indicator comprises the anthropometry of the children and entailed recording weight, height and birthdate. Weights were measured in tenths of kilograms with Salter scales, model 235. The children were placed in a plastic harness which was hooked to the scale. Next, the scale with the child hanging from it was lifted in the air. Children were weighed naked except for a shirt; all weights were therefore corrected by subtraction of 150 grs. Weighing scales were gauged every week. Heights were measured with a collapsible length board featuring a fixed head-rest, a detachable foot-rest and a fixed tape measure.[19] Each child was placed on the board lying down with an assistant holding its head against the head-rest. The child's knees were pressed down and the foot-rest (which slid at a right angle to the tape measure) was pushed up against the child's heels. Birthdates were recorded to the day when possible. With some patience and probing it was possible to arrive at the exact date for the vast majority of the children. If the day of birth was not recollected, at least the month of birth was recorded. The results for each child were compared against the Harvard standards as listed

TABLE 6. INTERVIEWSCHEDULES FOR FLT-CASES AND CONTROL GROUP

	TIME 1	TIME 2 (2-3 weeks)	TIME 3 (6 months)	TIME 4 (12 months)
FTL- cases (N=61)	at admission (a)(b)(-)(d1)	at discharge (a)(b)(-)(d2)	at home (a)(b)(c)(d1)	xxx
Control group (N=100)	survey 1 (a)(b)(c)(d1)	xxx	survey 2 (-)(b)(c)(d2)	survey 3 (-)(-)(c)(d1)

(a) nutritional knowledge; (b) food preferences; (c) food consumption. 24hr-recall; (d) anthropometry: (d1) height & weight (d2) weight only.

in Jellife (1966) and three indices were computed: height-for-age (H-A), weight-for-height (W-H) and weight-for-age (W-A)[20].

As described earlier on, the group of FLT-women and the control group were seen on three occasions. For various reasons we did not collect all nutritional information mentioned above on each occasion, but limited the interviews to those indicators which we deemed of interest and that were feasible to collect.[21] The interview schedule for each group can be found in table 6. Before we turn to the results of these interviews, in section 7-10, we will first examine the characteristics of the FLT-women. For that purpose we will take a look at all 85 women interviewed at admission, including the 24 women that later dropped out of the study.

6. ADMISSION: THE AETIOLOGY OF MALNUTRITION IN CENTRAL PROVINCE

In discussions of the socio-economic background of malnutrition two factors are invariably mentioned: poverty and ignorance. Poverty, because it affects the mother's ability to meet the nutritional needs of their children, while ignorance, or insufficient knowledge about these needs, is thought to play a role on its own or in conjunction with poverty. As we have seen (p.23) many of the women admitted to the FLT centres in Central Province experience marital instability and poverty. Further comparison of the 85 women seen at admission with the women composing the control group confirms this. Detailed and comprehensive data are listed in appendix B, but the cardinal findings are presented in table 7 (p.32).

First, we may note that there are no noticeable differences in domestic stage of these families, household size, or number of children at different ages, nor is the age distribution of the FLT mothers at variance with that of the other group. On the other hand, their

TABLE 7.
SOCIAL-ECONOMIC CHARACTERISTICS OF FLT-CASES AND CONTROL GROUP[x]

	FLT cases N=85	CONTROL group N=100
1. Women aged 29 or younger	48%	41%
2. Women without formal education	59%	34%
3. Women who are not married (single,separated,divorced,widowed)	27%	8%
4. Women from 'young' families	26%	24%
5. Average number of children in household	4.5	4.8
6. Women from 'poor' households	67%	42%
7. Women without land	36%	0
8. Women who report that they are able to grow enough food to feed their families	25%	46%

x Detailed information is presented in appendix B.

TABLE 8. NUTRITIONAL KNOWLEDGE AND FOOD PREFERENCES OF FLT-CASES AND CONTROL GROUP[x]

	FLT cases N=85	CONTROL group N=100
1. Women who recognize kwashiorkor from verbal description	92%	98%
2. Women who mention poor quality or insufficient quantity of food as cause of kwashiorkor	67%	60%
3. Women who mention poor quality or insufficient quantity of food as cause of marasmus	55%	43%
4. Women mentioning an early age of introduction (0-4 m.) for two or more of the following dishes: ucuru; gitoero; mboco; ngima na mboga	68%	31%
5. Women who are of the opinion that a child needs extra's besides three meals a day	60%	41%
7. Women mentioning weaning age of 14 months or younger	33%	45%
Average number of choices for high-protein/ high-calorie foods (out of 16 comparisons)	12.3	10.4

x Detailed information is presented in appendix D.

marital situation is often different. Almost 30 per cent of the FLT women are not or no longer married and have to manage on their own, which is almost three times the incidence among the rural population.

FLT cases also experience a serious lack of resources. Two-thirds of them belong to what we have defined as 'poor' households, which means that there is no income from regular employment or from sizeable commercial farming. Any money income in these households must be obtained from casual labour; an uncertain source of income depending on the varying demand for labour in different places. About 20 per cent of the FLT-women are part of the workforce living at large agricultural estates, and have been given accommodation at the premises, although they are still hired by the day.

About half the FLT-women have no land or less than an acre at their disposal, only 25 per cent report that they are able to grow enough food to feed their families and even fewer that they avail of milk or eggs from home production. This is all considerably below what is reported by the control group. In fact, the FLT-cases seem to have even fewer resources than the participants of another programme in our study, the Pre-School Health Programme, which is itself directed at 'needy' families (Hoorweg & Niemeyer,1980b:40).

It is sometimes argued that food shortages among the poor occur because they grow cashcrops on their small plots, thus impairing their own food production. Alternatively that they sell the food initially meant for their own consumption to raise a money income. By extension, this means that those households which are unable to keep a proper balance between available land and production for the market are the ones in which cases of malnutrition tend to occur.

While it is true that the FLT cases have, in general, less land than the control group it is not true that they use it disproportionately for cash farming, as shown in the two sets of tables in appendix C. These data show that the incidence of coffee cultivation in FLT-households, if anything, is less than that of households with comparable areas of land in the control group. The same applies to the sale of foodcrops. There is thus no indication that the FLT-women use their land injudiciously.

As far as the role of ignorance is concerned, it is true that the FLT-women are on the whole less educated. But it is doubtful

whether this has any implications for their knowledge about child feeding, a topic rarely dealt with in formal education. Further insight is gained from a second comparison with the control group, this time vis-a-vis the answers to the knowledge questions and the preference scale (table 8, page 32).

It is clear that the FLT-women are no less knowledgeable about child nutrition than their peers. This is the case with the questions concerning the recognition of malnutrition, the causes of kwashiorkor and marasmus, and the need to give children more than just three meals a day. The FLT-mothers are also more inclined to favour prolonged breastfeeding than the other women, but at the same time they also more often mention early ages at which certain dishes can be introduced in the child's diet. If anything, the FLT-women appear slightly better informed about various aspects of child nutrition than the control group, an observation which is supported by the fact that, on average, they show a greater preference for high-protein/ high-calorie foods, as their choices on the preferences scale indicate.

It is unlikely that these women have always had this relatively high level of knowledge and preferences. It is probably during the illness of the child that the mother's struggle with scarce resources and contacts with neighbours and various health personnel have made her very aware of the nutritional needs of the children. It is, of course, not clear what their knowledge was previously, but nothing in our findings indicates that the FLT women have less knowledge about child nutrition than other women not admitted to the centres.

The rate of FLT-women favouring early ages to introduce weaning foods is particularly high and occurs because many women mention that maize gruel and maize porridge with vegetables can be introduced before the age of 5 months (see Appendix D1: Q4). Further on in this report the data on food consumption will indeed show that the FLT-children are given relatively more flours and vegetables than other children; this has to do with the kinds of diets prepared in poor households.

In sum, we have learned that FLT cases are not characterized by a specific domestic stage or ignorance. Rather, many are not or no longer married and belong to the poorer section of the population. Which of these two factors comes first we do not know, but they tend to occur in combination. The absence of a husband usually

means extra work for the woman, while she also lacks an economic provider and protector of her economic interests. Lack of resources and a heavy work-load are probably the two major problems faced by this group of women.

What does this tell us about the causes of malnutrition in Central Province? Strictly speaking it is not well possible to draw conclusions from admission records because not all women with malnourished children visit the centres and selection therefore necessarily occurs. For example, one might argue that women who are poor but knowledgeable come to the centres, while those who are not poor but ignorant stay away. But this cannot explain the great differences in resources that were actually found. Furthermore, it may be mentioned that FLT women do not usually seek admission of their own accord. In Central Province over 80 per cent of the admissions are referred by personnel of the Ministry of Health and the Department of Social Services (Hoorweg & Niemeyer,1979:8).

The reader may further recall that the NIRP survey demonstrated that 40 per cent of the children in 'poor' households was mildly malnourished, while in 'affluent' households this percentage was less than 20 (see figure 1), which also indicates that malnutrition occurs mostly among the poor stratum of Kikuyu society.

Finally, it is also possible to take methodological prudence too far and it would go against all common sense not to accept that poverty and its concomitant, marital instability, play an important role in the aetiology of malnutrition in Central Province.

We may now turn to the effects of the rehabilitation. In section 7 we discuss the knowledge and preferences of the 61 mothers that were interviewed on three successive occasions. Food consumption and nutrional status are discussed in sections 8 and 9. Data are presented in full, either in the tables accompanying the text, or in the appendices.

TABLE 9. SUMMARY OF KNOWLEDGE RESULTS FOR FLT-MOTHERS INTERVIEWED ON DIFFERENT OCCASIONS (N=61)[x]

	ADMISSION	DISCHARGE	HOME-VISIT
1. Women who recognize kwashiorkor from verbal description	92%	95%	85%
2. Women who mention poor quality or insufficient quantity of food as cause of kwashiorkor	65%	71%	69%
3. Women who mention poor quality or insufficient quantity of food as cause of marasmus	59%	67%	59%
4. Women mentioning an early age of introduction (0-4 m.) for two or more of the following dishes: ucuru; gitoero; mboco; ngima na mboga	71%	60%	60%
7. Women mentioning weaning age of 14 months or younger	35%	40%	38%
8. Average percentage of mothers correctly classifying (7) foods into different food groups	-	76%	74%

x Detailed results are listed in appendix E.

TABLE 10. PREFERENCES OF FLT-MOTHERS AND MOTHERS IN THE CONTROL GROUP, INTERVIEWED ON DIFFERENT OCCASIONS

		TIME-1[x]	TIME-2[x]	TIME-3[x]
FLT-cases[xx] (N=61)	: Average number of choices for beans, peas, eggs and meat when compared with the four foods mentioned in parentheses:			
	BEANS - (rice/f.millet/banana/cabbage)	3.2	3.5	3.6
	PEAS - (maize fl./kale/I.potato/orange)	2.6	2.7	2.7
	EGG - (rice/f.millet/banana/cabbage)	3.5	3.7	3.5
	MEAT - (maize fl./kale/I.potato/orange)	3.2	3.2	3.3
FLT-cases (N=61)	: Total score: number of choices for the high-protein/high-calorie foods above[xxx]	12.5 (2.1)	13.1 (2.0)	13.1 (1.9)
CONTROL Group (N=100)	: Total score: number of choices for the high-protein/high-calorie food above[xxx]	10.4 (2.6)	-	11.5 (2.5)

x For FLT-cases : time-1=admission ; time-2=discharge; time-3=home-visit
For control group: time-1=first survey; .-.-.-.-.-.-.-.-, time-3=second survey
xx Detailed results for FLT-cases are listed in Appendix F
xxx Standard deviations in parentheses

7. NUTRITIONAL KNOWLEDGE AND PREFERENCES

Nutrition education in Africa may generally be expected to pay attention to the following: malnutrition and its causes, introduction of supplementary foods, weaning, quantitative and qualitative food requirements of the child and the foods that meet these requirements. These aspects are covered by the different knowledge questions already mentioned in the previous section, where it was shown that the FLT-mothers are not less knowledgeable than rural mothers in general.

As the summary of the knowledge results in table 9 shows, there is no substantial increase in knowledge after exposure to the teaching at the centres. Whatever small changes occur, they have largely disappeared after six months. This is the case for the questions concerning the recognition and causes of malnutrition and the preferred age to discontinue breastfeeding. Although there is a small increase in the preference score at discharge and after six months, the control group shows the same increase on the second interview (table 10). This indicates that the increase is the result of familiarity with the interview scale rather than the effect of the teaching.

The preference score of the FLT-mothers, however, remains higher than that of the control group i.e. the rural population in general. We have already pointed this out in the previous section, and suggested that recent experiences have made these mothers very aware of the nutritional needs of their children. The present results indicate that this awareness is not transient but lasts over the period of six months studied, and we are inclined to give the FLT-centres credit for this.

On the other hand, the nutritional knowledge of the FLT-mothers is not perfect either, considering the content of the teaching. The exact causes of malnutrition are still understood by half the women at most and the same is true of their understanding of the three food groups.[22] We mention, in particular, that about 40 per cent of the women still regard 3 meals a day sufficient for 2 year old children and do not find it necessary to give anything in between.

In sum, it appears that the effects of the teaching at the FLT-centres are, at best, minor.

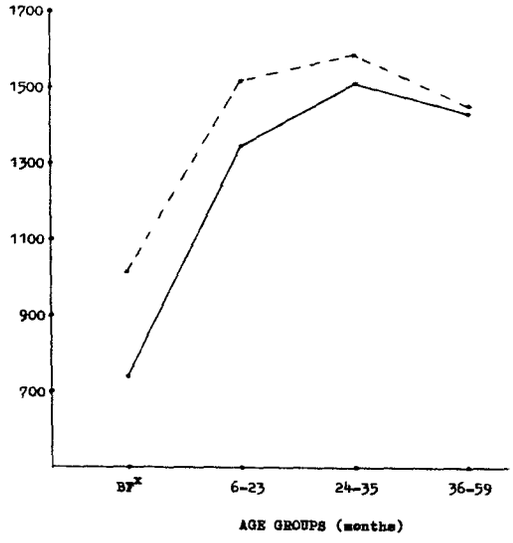
Figure 2. AVERAGE FOOD CONSUMPTION BY AGE GROUP[xx]

FLT-cases

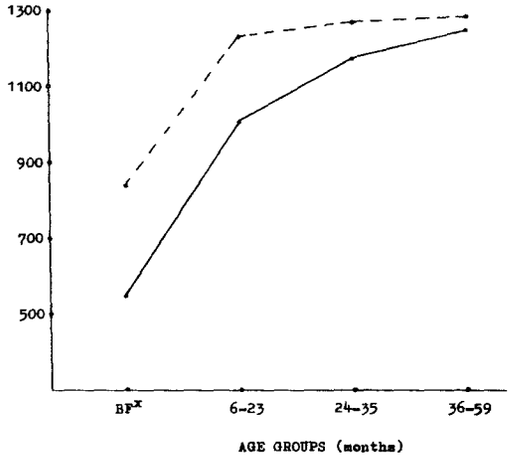
CONTROL group

x BF=Children,breastfed[23]
xx Detailed results are listed in Appendix G

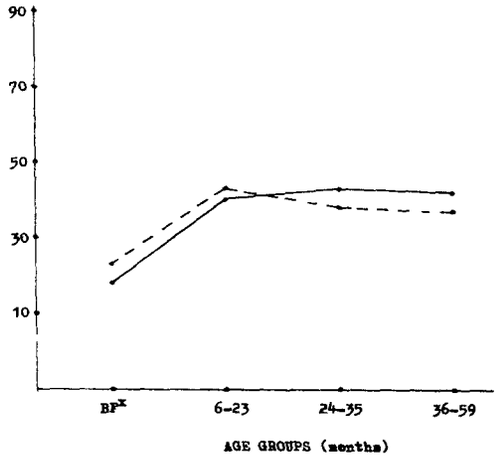
A. TOTAL FOOD CONSUMPTION (grammes)



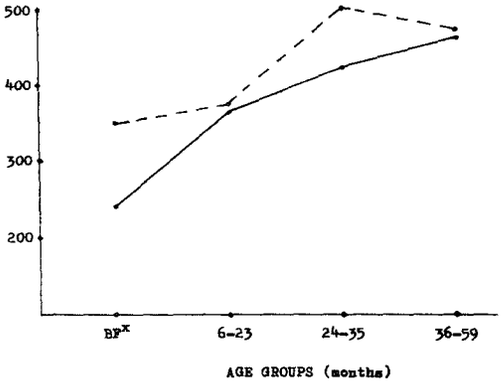
B. ENERGY INTAKE (Kcal.)



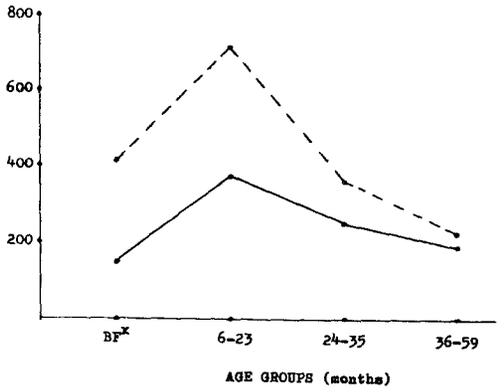
C. PROTEIN INTAKE (grammes)



D. SOLID FOODS (grammes raw matter)



E. MILK (grammes)



8. FOOD CONSUMPTION

Food consumption was assessed on only one occasion: the home visit. Interviews about food consumption at discharge or admission would have told us little about the dietary practices of the mothers in their home surroundings. At discharge interviews would have reflected the diets at the centres, and at admission the same would usually have been the case because mothers were not necessarily interviewed during the very first day at the centre. Even if they had been interviewed on that date, many of the children were at that time in serious condition, ill, and their food consumption was consequently affected. For these reasons, we only inquired after food consumption during the home-visit. In each household a dietary recall concerning the previous day was recorded for the child nearest to 2 years of age, irrespective of whether this child had been at the centre 6 months earlier, although this was usually the case. All children in this group are referred to as FLT-children and their age distribution can be found in Appendix G. Among the control group, the same procedure was adopted during the second survey (see table 6, p. 30) and these results will serve as a comparison. This means that the dietary data for the two groups were collected at the same time of the year. The average food consumption specified by food group and age group is given in Appendix G. A summary of results is graphically presented in Figure 2.

The food consumption of the FLT-children is quite different from that of the control children. First of all, total food consumption of the three youngest age groups is less, and the energy intake of these children falls considerably below that of the control children. Protein consumption, however, is very similar. Since the youngest age group is still on the breast and breastmilk consumption was not measured, the results for the two middle groups, aged 6-23 & 24-35 months, are the most informative. The energy intake of the first group (6-23 months) is much lower than that of the control group because of a lower milk consumption by the FLT-children. The (smaller) difference for the next group (24-35 months) is the result of a lower consumption of solid foods as well as milk.

TABLE 11. PERCENTAGE THAT INDIVIDUAL FOOD GROUPS CONTRIBUTE TO THE DAILY INTAKE (RAW MATTER) OF FLT-CHILDREN AND CONTROL CHILDREN[x]

	FLT-children N=41	CONTROL group N=48
Total consumption (grams raw matter)	711	937
Cereals	21%	14%
Roots and tubers	9%	24%
Legumes	6%	3%
Vegetables	15%	6%
Eggs & meats	1%	1%
Miscellaneous	2%	2%
Milk	43%	51%

x Comparison restricted to children, not breastfed, aged 6-35 months.

TABLE 12. TOTAL CONSUMPTION OF FLOURS AND LEAFY VEGETABLES OF FLT-CHILDREN AND CONTROL GROUP BY AGE

		BF	6-23 months	24-35 months	36-59 months
FLT-children :	grs	115	191	229	354
	%	30%	26%	33%	54%
Control group :	grs	70	134	157	157
	%	9%	12%	18%	22%

%=Percentage that these ingredients contribute to the total daily intake (raw matter, as listed in Appendix G).
BF=Children breastfed, see note 23.

The children in the FLT group do not only eat less, they also eat differently. Closer examination of the composition of the diet of the children in these two age groups demonstrates this convincingly (table 11). Percentagewise, the FLT-children consume relatively less milk and less roots and tubers, but eat relatively more cereals and vegetables. The latter finding is more or less as could be expected because in poor Kikuyu households flours with such vegetables as cabbage or kale, are frequently served.[24]

Already from a young age on FLT-children are given more flours and vegetables [25] than their peers (table 12). Among the control group these ingredients slowly increase their share of the daily intake from 10 to 20 per cent among the eldest group. Among the FLT-children, even the breastfed children consume relatively more flours and vegetables: 30% of their intake; and this percentage increases until half the amount of foods consumed by the elder children consists of flours and vegetables (although this last figure is based on interviews regarding 5 cases only).

Although the milk consumption of the FLT-children is less than that of the control group, the average amount reported for children, aged 6-35 months, nevertheless reaches 310 grs. Milk consumption depends on whether households have milk at their disposal from home production and since only 10% of the FLT-mothers were in that position, the reported figures may appear rather high. Among the control group, however, the same was found to be the case: children of that age range in households with no home production of milk reportedly consumed 380 grs. of milk [26], a similarly high figure as that of the FLT-children. Even if the milk consumption of FLT-children was somewhat exaggerated, it would only mean that the estimates for energy intake must be lowered even more, while protein consumption remains high.

In sum, FLT-children eat less than rural children in general and they eat differently. The type of diet which contains a lot of flours and vegetables is common among the poor Kikuyu, but its nutritional value is not particularly low, cereal flours have a high calorie as well as protein content. The amounts of food consumed, however, are low and the energy-intake of the FLT-children is generally below that of other rural children. The fact that protein intake appears suffi-

cient confirms that the limiting factor among the Kikuyu is not protein consumption but energy intake (Hoorweg, Niemeijer & Van Steenbergen, 1981; NIRPb). It is particularly the energy intake of children younger than 24 months of age that gives reason for concern.

We will now take a look at the nutritional progress of the children during their stay at the centre, and after they have returned to their homes.

9. NUTRITIONAL STATUS

9.1. Mortality

The 61 mothers who were interviewed at the centre and visited at their homes brought 165 children to the centres. Of these children 107 were in the age range of 6-59 months when admitted. One child died shortly after admission to the centre. This was a boy aged 17 months, one of a pair of twins, who were both admitted and were both very emaciated. Of the remaining 106 children, all but two were found present during the home-visit six months later. One of the absent children, who were both reported to be staying elsewhere, was a girl aged 11 months, who had been in quite poor condition when admitted (W-A: 67), and had not recovered well at the centre. The possibility cannot be exluded that this child had died. The other was a 35 months-old boy who had not been in particularly severe condition when admitted (W-A: 73) and who also showed recovery while at the centre. In Kenya, the mortality rate of children, aged 1-4 years, falls somewhere around 20 per 1000; or 1 per 100 over a period of six months. Clearly, with 1 or 2 deaths over the period of study, there occurs no unusual mortality among the FLT-children.

9.2. Examinations

The remaining 104 children were examined at admission, discharge and during the home-visit. Height and weight were recorded at admission and during the home-visit. At discharge only weight was recorded, because significant changes in height were not expected after the short stay at the centre. The average time period between the examinations at admission and discharge was 15 days, that between the latter and the home-visit 165 days, altogether a period of 180 days. In the case of 8 children the data were incompletely recorded on one of the three occassions. Obvious errors had further been made in the height measurements of 2 children. Omitting these 10 children leaves 94 children (from 58 families) for which the data of the three examinations are complete.

TABLE 13. CONDITION AT ADMISSION[x]

	AGE (Months) 6-11	12-23	24-35	36-59
Number of children	18	24	21	31
Average weight-for-height	86.6	85 7	90.5	91.0
Average height-for-age	93.0	89.0	85.2	87.6
Children falling below value . W-H(85)	33%	42%	24%	0%
id : H-A(90)	22%	58%	76%	68%

x Detailed results are listed in appendices H & J.

TABLE 14. RECOVERY DURING STAY AT THE CENTRE

	AGE (Months) 6-11	12-23	24-35	36-59
Grams/day gained	4 7	10 2	12.3	22.1
Children that show no weight increase between the two examiniations	39%	29%	29%	19%

The reader will recall that it is the policy of the centres to admit all young children the mother brings with her, because it is assumed that if one child is malnourished the condition of the other young children is likely to be poor as well, an assumption that has been confirmed by the facts (see table 3, p. 22). All 94 children were therefore included in the following analysis.[27] The detailed results concerning condition at admission, recovery at the centre, long-term gains and the comparison data pertaining to the control group are given in Appendix H & J, together with information on the exact periods of observation.

9.3. Condition at admission

The age distribution of the 94 children can be found in table 13 which also lists various nutritional characteristics: average height-for-age and average weight-for-height and the percentage of children falling below the values of H-A(90) and W-H(85). In the younger age groups there are more children with low W-H, while in the older age groups more children have a low H-A. Children with both a low H-A and a low W-H, i.e. those who may be considered malnourished according to a Waterlow (1976) type classification are fewer: 6%; 29%; 19%; and 0% in the four respective age groups. In all, the group of 1-yr olds has the most cases that are seriously affected.

9.4. Progress of children in different age groups

Recovery at the centre

Table 14 lists the average grams/day gained by children in different age groups, together with the percentage of children that do not show any weight increase at all, while at the centre. It is evident that the youngest children show the least recovery. The average weight gain of the eldest group is about five times that of the youngest children and older children less often show no weight increase. This finding must be seen in the perspective that young children, in general, gain more weight than older children. It must also be placed against the fact that the two youngest age groups are in poorest condition as regards

Figure 3.
AVERAGE LONG-TERM WEIGHT GAINS BY AGE GROUP

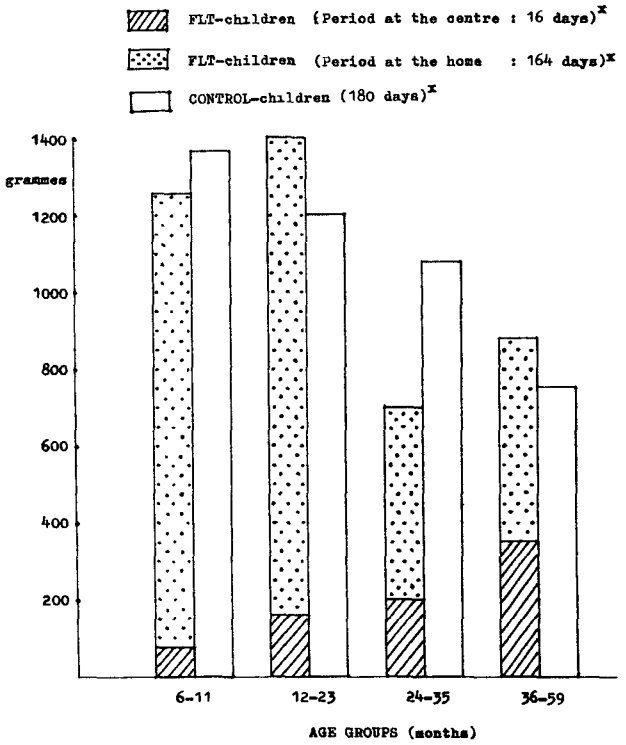
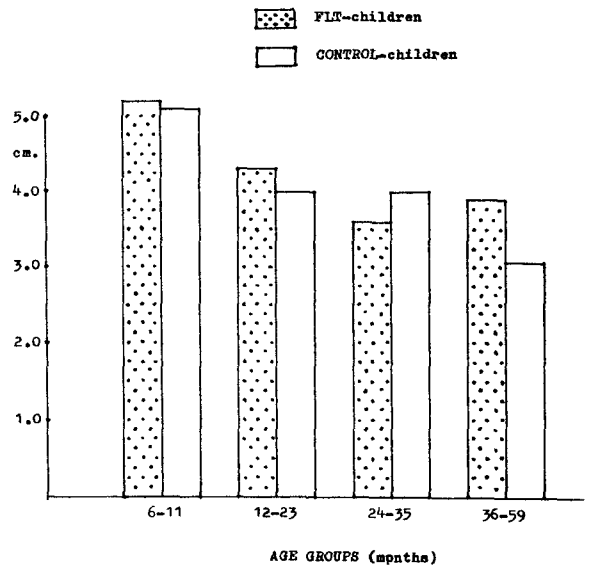


Figure 4.
AVERAGE LONG-TERM HEIGHT GAINS BY AGE GROUP
(180 days x)



x Computed from rates listed in Appendix J.

weight-for-height. The very youngest children (below 12 months), in fact, gain so little weight at the centres that their daily growth rate is even lower than the normal growth rate found among children of the same age in the control group. Most of the FLT-children in the youngest group are still on the breast and the findings indicate that the treatment of these children at the centres should be improved.

Long-term weight gain

Figure 3 presents the weight gains of the FLT-children at the centre and at their homes afterwards, together with the weight gains of the children in the control group over the same period. Other than is the case with recovery at the centre, the weight gains at home are largest for the younger children. In fact, as the graph shows, the weight gain after discharge of the youngest groups is more than twice that of the older children - much more than could be expected on the basis of the age differences between the groups.

However, taking the weight increase at the centre and at the home together, it appears that the gains of the FLT-children in three of the four age groups are not different from that of their peers in the control group. Only the children, aged 24-35 months, remain behind and the difference with the control children is considerable: almost 400 grs.(28)

Long-term height gain

Figure 4 presents height growth over the total period between admission and home-visit. The height gains of the two youngest groups of FLT children are similar to those of the control children. The height gains of the two older groups of children show a different pattern: the 2-yr olds grow less than the control group (although this difference is not statistically significant), the 3&4-yr olds, on the other hand, show greater height gains than the control group.(29) Why this should be so we can only guess, but it is plausible to relate this to the fact that this latter group comprises many stunted children who were otherwise in stable condition at admission and that the children received a considerable weight boost during their stay

TABLE 15. PROGRESS BY WEIGHT-FOR-HEIGHT AT ADMISSION[x]

	N	Grs/day at centre	Grs/day total period	Cm/year total period
W-H (<85)	21	13.1 (+6.3)	8.3 (+1.5)	8.0 (-0.8)
W-H (≥85)	73	13.7 (+8.1)	5.1 (-0.5)	8.7 (+1.0)

x The figures in parentheses present the deviation of the observed values from the values expected for groups of the same age composition, see note 30.

at the centres.

This, in turn, raises questions about the growth of the wasted children and we will take a closer look at this in the next section.

9.5. Progress of children with low weight-for-height

The analysis until now included all children admitted to the centres and covered both severely malnourished children as well as children in less severe condition, of which there are quite a number. The question may be asked how the most severely affected children, in particular, react to the regimen at the centre. Their condition may be such that improvement does not immediately result in weight increase. When children are suffering from infections these must first be brought under control, and children with oedema even lose weight before they can start to gain. Nevertheless, the centres are aimed specifically at the rehabilitation of severely malnourished children and one would hope that in the long-run these children benefit the most.

As mentioned earlier on, the momentary status of the child is particularly reflected by its weight-for-height condition. Low W-H is generally taken to indicate an acute condition urgently requiring improvement. If such children are to improve they must show a relatively greater gain in weight than in height.

Table 15 lists the growth rates of the children whose weights fell below W-H(85), together with the rates of the other children who were not wasted and that may serve as comparison. Also included are figures to show how much larger or smaller the observed growth rates are than could be expected for groups of similar age composition, as established from the rates found among the control children.(30)

As we have seen, the growth rate during the stay at the centres is generally above that which could be expected according to the observations among the control children. But the differences in weight gain occurring between wasted and other FLT-children are very small: in the order of 2 grs. a day (or only 40 grs. over the usual period of residence).

The figures for long-term progress show that some improvement in weight-for-height condition does indeed occur. The weight gains of the wasted children are slightly above the expected rate while their height gains fall slightly below the expected rate. Although the differences are small, when taken together and compared with the other children exposed to the treatment at the centres, the trend is statistically significant: an encouraging finding.[31, 32] (An example: An imaginary child aged 24 months with H-A(90) and W-H(85), growing at the observed rates of 8.3 grams/day and 8.0 cm/year, has after six months reached H-A(90) and W-H(91). A child of the same age with H-A(85) and W-H(80) would reach H-A(85) and W-H(87) after six months if growing at these rates).

Although as a group the wasted children show progress in terms of weight-for-height this does not mean that each individual child shows improvement. Since we are dealing here with children in conditions of acute distress, it is necessary to examine them in detail. There were 21 children whose W-H fell below 85. Of these 21 children, 8 showed a lower daily weight increase at the centre than control children of the same age. In respect of long-term weight gain there were 7 children with lower weight increase during that period than control children of the same age. These 7 children, with one exception, had not reacted well at the centres either: 6 children had neither satisfactory gains at the centres, nor over the longer period of 6 months. Apparently, among wasted children lack of weight gain while at the centre strongly predicts lack of long-term progress.[33]

9.6. Conclusion

While at the centre, the weight gains of the youngest children are far from impressive, and a fair number of the younger children do not show any weight increase at all during their stay. Nevertheless, over the next half year, the mortality rate is no higher than usual while the children, by and large, grow like other rural Kikuyu children of the same age. There is furthermore some indication of compensation in weight-for-height among wasted children.

Whether this long-term progress is actually an achievement of

the rehabilitation at the Family Life Training Centres remains to be seen. To answer that question conclusively the present group of control children is not really adequate, since it should have included a corresponding number of wasted and stunted children.

Elsewhere we have reported on the progress of some severely malnourished children who started to participate in the PSH-programme, and who were seen at least once a month. These children were older than 24 months and had an average W-A of 70 when first seen. After a period of 6-11 months their average W-A had increased to 76. (Hoorweg & Niemeyer,1980b:38). The W-A improvement of the imaginary FLT-child introduced in the previous section (Age (24 months); H-A(90); W-H(85)) would be of a similar order, from 73 to 78.

Again, we do not know exactly to what extent the present growth rates must be attributed to the rehabilitation at the centres. But the data do give an answer to the more simple question of how the malnourished children fare after discharge from the centre. The answer is twofold: as a group the children show the same weight and height growth as other rural Kikuyu children, while the subgroup of children with low weight-for-height succeeds in improving its condition. At the same time there are a number of wasted children who do not show any long-term improvement and who can be identified by their lack of weight gain while at the centre. These children should be given extra attention in the future.

10. THE INTERACTION OF REHABILITATION WITH ECOLOGICAL AREA, SOCIAL CLASS AND DOMESTIC STAGE

The first aim of the present study is to establish the effects of rehabilitation at the centres. A further question is where or in which cases rehabilitation is most effective. This means exploring

the relations with the variables described in the introductory sections: ecological area, social class and domestic stage.[34] Such analysis may, for example, examine the relation between the social class of the women and their nutritional knowledge, but it should focus in particular on the question whether women from a particular background show greater knowledge gains than other women.

It must be pointed out, though, that such an analysis is fraught with complications because we are dealing with a selected group, namely that of mothers with malnourished children. While we have found certain relations between nutritional status on the one hand and ecological area, social class and domestic stage on the other (figure 1, p. 18), it is doubtful whether the same relations will hold among the FLT-cases. For example, although in general fewer children from intermediate or affluent households fall victim to malnutrition, we are here dealing with several malnourished children from such households where certain negative circumstances must apparently have prevailed.

A summary of results is presented in the appendices. The summary of nutritional knowledge and preferences is found in appendix K, the summary of anthropometry in appendix L. No breakdown is given for the food consumption data because these were only collected once, during the home-visit.

10.1 Knowledge and preferences

The summary in appendix K consists of the questions concerning the introduction of weaning foods, the preferred age of weaning and the classification in food groups, together with the preference score. The results at admission and at the home-visit are listed, firstly, for three areas, next for two social classes and, finally, for two domestic stages.[35] We will first examine the data with an eye to systematic differences that exist between these various subgroups at the time of admission.

The most noticeable differences occur between areas. The women at the centre in the lower area are more inclined than the women in the upper areas to favour prolonged breastfeeding and less inclined to favour early introduction of weaning foods. This pattern of responses could indicate that they are less nutritionally know-

ledgeable than the women in the upper areas. But this is not confirmed by their average preference score, which falls between that of the middle and upper areas.

No noteworthy differences further occur, at admission, between women from different social classes or domestic stages.

Next, we need to examine whether any differences occur in knowledge gains. Although wide variations occur between the gains made on individual questions in different subgroups, we have not been able to establish any statistically significant differences in gains. Neither do any recognisable, general trends occur, with one possible exception. The results of the teaching at the centre in the middle area appear less positive than in the other centres. The preference score shows a slight decrease at the occasion of the home-visit, more women mention an early weaning age, but fewer mention early ages to introduce weaning foods. This might, possibly, suggest that the women at this centre became slightly confused by this educational experience. The women at the middle centre also give the fewest correct answers concerning the classification into food groups. Although the differences are small and, as stated, not statistically significant they fit in with the fact that at the time of study this centre experienced serious staff problems which may have had been detrimental to the quality of the teaching (Githinji, 1978). The main finding, however, is that women from different social or economic background do not react differently to the teaching at the centres.

10.2. Nutritional status

The summary in appendix L gives the percentages of children falling below the critical values of H-A and W-H, long-term weight gain and long-term height gain.

Area

The condition of the children admitted to the three respective centres differs considerably, particularly in respect of weight-for-height. The centre in the middle area has to deal with many serious cases while the children in the upper centre are least afflicted.[36]

flt

There are only small, and statistically insignificant, differences to be observed as regards the weight gains achieved during the stay at the centres.

The findings in respect of long-term progress are as could be expected from this: the children at the centre in the middle area gain relatively more weight and relatively less height. This is consistent with the presence of many wasted children at this centre who improve their condition in this way.

Social class

There is little or no difference between the condition of children from 'poor' and 'intermediate' households. There is also no significant difference between the two groups as regards long-term weight gain and height gain. The children from intermediate households which, according to our classification, have more resources do not progress any better than children from poor households. This finding is not without importance. Whereas in the general population children from intermediate and affluent households do better than children from poor households this is not the case with the FLT-children during the period under study. This means that, if the home environment is taken into account as a factor at discharge, one has to look deeper into the personal circumstances than general social and economic categories.

Domestic stage

The results for different domestic stages are less clear. Among the children from older families we find slightly more stunted children and among the young families slightly more wasted children. The recovery pattern of the children is in keeping with this, with the children in the young families gaining relatively more weight and relatively less height. Since, the one group of children gains more weight over the period of six months, and the other group grows more in height it is not possible to say which of the two domestic stages offers a more favourable environment for recovery. There is certainly

no explicit difference to be observed between children from families at different domestic stages.

11. CONCLUSION

Any evaluation has two major components: design and indicators. The present study used a 'pretest-posttest' design: women and children were studied before and after the intervention, together with a control group examined twice over the same period of time. In some aspects the design was, however, realised only imperfectly, partly by force of circumstances, partly as the result of deliberate decisions on our part. Firstly, the control group differed from the FLT-cases as regards socio-economic characteristics and in respect of nutritional status of the children. On the one hand this gives a good insight in the background of the FLT-cases, on the other hand it hampers comparison between the two groups. This imperfection could hardly be avoided because it is, after all, not possible to select certain malnourished children as a control group, and leave them without further treatment. Secondly, among the FLT-group there occurred a high rate of attrition, of about 25 per cent: cases that could afterwards not be located at their homes. This, in itself, is not an inordinately high rate, others have had to cope with attrition rates as high as 60 per cent (Gachuhi et al, 1972: 6). Nevertheless this means that for an important group of cases we could not assess the effects of the rehabilitation. Thirdly, the design was not fully implemented because food consumption was recorded only once among the FLT-cases and knowledge questions were asked only once from the control group.

With respect to the indicators employed and the confidence that can be placed in them, the following remarks may suffice. Although the

knowledge questions require some further internal analysis they are, on the whole, straightforward. The preliminary research into measuring food preferences by means of paired comparisons has been mentioned (Hoorweg & Niemeyer,1980c). The one-day dietary recall is generally regarded as a useful instrument to assess the mean food intake of groups of children (Garn,Larkin & Cole,1978). The anthropometric measurements need no further comment: they are commonly used to assess the nutritional status of children.

The first finding is that the women at FLT centres have two major characteristics: poverty and marital instability, factors that may reinforce each other. Lack of resources and a heavy workload are probably the two major problems faced by these women. There is also a group of mostly young women who are on the point of leaving their husbands and who appear to use the centres as a temporary haven. It was furthermore established that the nutritional knowledge of the FLT-women was not any less than that of other rural Kikuyu women while their preference score was also very similar. This contradicts the idea that ignorance is an important factor in malnutrition, at least as far as Central Province is concerned. Since the knowledge of these women was not particularly deficient at the time of admission, it is not surprising that the effect of the teaching at the centres was, at best, minor. Nonetheless, it must be pointed out that their nutritional knowledge was not perfect either. We wish to point, in particular, to the finding that after intervention almost half the women were still not aware of the need to feed small children more than three times a day. Poskitt (1979) has pointed at the difficulty of getting Kikuyu children to eat sufficient amounts to meet requirements, and she emphasized that the teaching at the FLT-centres should pay more attention to weaning foods and to the quantities of food that children require.

No attempt was made in this study to establish whether and how dietary habits of the mothers are influenced by their contact with the centres. Two facts emerge from the comparison of the food consumption of FLT-children and control children. Firstly, that the FLT-children were on the typical diet of the poor Kikuyu households: they eat more

flours with green vegetables. Secondly that the energy intake of the FLT-children on the occasion of the home-visit six months later fell below that of other rural Kikuyu children and that, in particular, the intake of children under 24 months, gave reason for concern.

While at the centres, the weight gains of the youngest children were small and a fair number of them did not show any weight increase at all during their stay. Young children who are admitted should be more closely monitored and their feeding should be improved and carefully supervised by the staff as was already recommended by Poskitt (1979:30). Nevertheless, only one child is known to have died and during the next six months the FLT-children did grow largely like other rural Kikuyu children of the same age and there was some indication of compensation in weight-for-height among wasted children.

There were, however, several wasted children that did not show satisfactory long-term progress; these children had not shown weight recovery at the centre either. Wasted children that do not satisfactorily increase weight during their stay at the centres should therefore be given extra attention which might mean keeping them longer at the centre, or else, referral to hospital for further investigation. It was further found that the subsequent progress of children from poor households was not any less than that of children from other households. If social background is taken into account as a factor at discharge, the personal circumstances of the cases must be carefully and individually appraised.

The Family Life Training Programme has from its very beginning had an inherent dilemma, whether to be a programme for family education first or whether to give the treatment of malnourished children priority. Up to now the policy has been to try to combine the two, while in practice the centres also play a third role, namely that of temporary haven for mothers with marital problems. But in doing so the programme runs the risk of not being sucessful either way. This, at least, appears to be what is happening in the centres in Central Province. The causes for this are not far to seek. On the one hand, the educational facilities at the centres are meagre: the staff have

in general received little training and the educational materials are poor and sometimes inappropriate (AMREF, 1980:1). On the other hand the nutritional regimen and the medical supervision also leave room for improvement (Poskitt,1979:24, 27; Howie, n.d.). In the light of this it is advisable that a more explicit choice be made as regards the foremost objective of the programme: whether family education, rehabilitation of malnourished children or social assistance. Since the needs of these women are not primarily educational, but rather of a medical and social nature we advise that the centres concentrate more on the latter aspects. This means concentrating on treatment first and providing whatever assistance is possible. The educational facilities can be adapted and improved in the light of this.

More attention should be given to the feeding and treatment of the children while at the centres, in particular the very young children. This means closer supervision to ensure that children are given diets appropriate to their age and are fed sufficient quantities. The weights of the children should be monitored carefully and the children who fail to improve given special attention. Better medical treatment and supervision should be procured and it is advisable that routine treatment for malaria and worms be given as recommended by Poskitt (1979: 25). Closer medical supervision could be provided by appointing regional field supervisors with the necessary medical training or by seeking closer co-operation with the Ministry of Health.

It must also be pointed out that attendance at the three centres is relatively low, both as regards the capacity of the centres itself and the number of potential cases. One reason for this must be that the centres are situated at distances between 20 and 40 kilometers away from district medical headquarters; Muranga FLTC is particularly remote.[37] Another reason is that at least two centres are situated in fertile areas where the incidence of malnutrition is unlikely to be high. Relocation of one or more centres, difficult as this may be, might therefore be worth considering.

As regards further social assistance the following can be mentioned. We have already pointed at the relatively large group of women with marital problems who use the centre as a temporary refuge. At present these cases can only be admitted if their children are in sufficiently poor condition. We venture to suggest that such women and their children should be admitted to the centres as a category in its own right, also as a preventive measure. We are aware that this would create institutional problems: how to select genuine cases that need help, what period to allow them to reside at the centres, not to mention the daily allowances needed to feed these cases (the funds now being provided by UNICEF are meant for cases of malnutrition only). Although an influx of such cases might not particularly improve the local reputation of the centres, it would be a possible way of making full use of the available facilities, and these women are, without doubt, often in desperate circumstances.

Assistance after discharge from the centres is a different matter. Given the difficult economic and domestic circumstances of many of these women and the problems they face to provide for their children, many of them potentially need long-term assistance. Such assistance is best realised through co-operation with other services and programmes rather than by means of follow-up by the staff of the FLT-centres.(38) It would, for example, be an excellent solution if FLT-women could join the supplementation programme of Catholic Relief Services, reported on elsewhere (Hoorweg & Niemeyer,1980b). This will not always be possible, either because there are no such PSH-clinics near the mother's home, or because there are no places available on short notice at the local PSH-clincs. Follow-up by FLT-staff could serve to help find the necessary assistance for the former cases.

All this, of course, touches on the problem of rural poverty that so often underlies malnutrition in Central Province. Rural poverty knows many individual forms. We have paid special attention to the lack of resources and the difficult position of non-married women. At the same time, rural poverty has a number of other characteristics such as individual physical weakness and vulnerability to contingencies.(39) Rehabilitation at FLT-centres does, of course, not offer a fundamental

solution to these problems. Nonetheless, the centres can play a useful role in treating malnutrition among the first victims of poverty, young children, and can temporarily alleviate the pressure on individual mothers.

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)) x 100%
   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
   As regards the three research areas the following averages have been used in the calculations:
   Limuru research area: rainfall 1400 mm; altitude 2350 m.
   Kandara-Kigumo area: rainfall 1150 mm; altitude 1600 m.
   Mwea research area: rainfall 900 mm; altitude 1150 m.
   This results in the following:
   Limuru research area: relative moisture 89%; ecological zone II.
   Kandara-Kigumo area: relative moisture 62%; ecological zone III.
   Mwea research area: relative moisture 45%; ecological zone IV.

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 nine clinics and centres studied are located in the following towns and villages:
   - Kiambu district: Limuru (Family Life Training Centre), Kambaa (Pre-School Health Clinic), Lari (Health Centre), all three in Limuru division.
   - Muranga district: Kigumo (FLTC), Gaichanjiru (PSH), Kandara (HC), situated in the middle and lower parts of Kigumo and Kandara divisions.
   - Kirinyaga district: Mwea (FLTC), Karaba (PSH), Kimbimbi (HC), all in Mwea division. The FLT centre in this district is usually referred to as situated in Mwea, without reference to the village Wamumu, a practice to which we conform.

4. These densities were calculated from the 1969 Census (MoFEP, 1970) and combine the results for the administrative locations in which the respective programmes are situated. For the Limuru research area this means the Lari and Limuru locations; for the Kandara-Kigumo area the Kandara, Gaichanjiru and Kigumo locations; and for the Mwea area the locations of Tebere, Murunduku and Mutithi.

5. The term "household" or "family" as used in this report refers to the domestic unit living under one roof. Since this domestic unit nearly always consists of a nuclear family, no distinction is made between "household" and "family", unless otherwise indicated. For the sake of convenience, however, the term "household" is used mostly in connection with the economic position of the domestic unit, as in 'poor households'. The term "family" is mostly used in connection with the domestic cycle and the composition of the domestic unit, as in 'young families'. When reference is made to several, related (nuclear) families sharing a compound, the term 'extended family' is used.

6. Very few children do not live with their parents, and in Central Provinc less than 3% of the children are brought to the FLT-centres by someone other than their mother (Hoorweg & Niemeijer,1979:10). All female guardians of children and all women bringing children to the centres are therefore referred to as 'mothers'.

7. By Kenyan standards, the divorce rate among the Kikuyu is of an average level. A recent, national survey found that among Kikuyu women who had first married during the last ten years, the marriage had been dissolved in 11% of the cases. Among the national population this figure was 11% as well, while rates for different ethnic groups varried from 3% (Kalenj to 20% (Kambaa) and 22% (Mijikenda) (CBS,1980:79).
This survey also found that the Kikuyu have by far the lowest incidence of polygamy in the country (CBS,1980:81).

8. A complete list of foods in use among the Kikuyu, with their names in Kikuyu, has been presented elsewhere (Hoorweg & Niemeyer,1980c).

9. In the second child nutrition survey by CBS during 1978-1979, the percentage of children in Central Province falling below critical values were much smaller than those found during the first survey: 23% of the children below W-A (80); 22% below H-A(90) and 20% below W-H(90). (CBS,n.d.: p.40,41,43). See also Blankhart (1974).

10. These results are based on the findings regarding one child per household, namely the index child, for which purpose the child nearest to 2 years of age was selected.

11. Although there is considerable variation in the manner of operation of nutrition rehabilitation centres in different countries, they share certain defining characteristics. These include that (a) they are intended for selected undernourished or malnourished children; (b) they operate primarily through teaching the mother how best to feed, and thereby rehabilitate, her child; (c) they operate at a low-cost, low-technology level commonly as residential centres or day-care centres where mothers and children attend daily for several hours; and (d) they aim at extending their teaching into the community (Hoorweg & McDowell,1979:35). See also Bengoa (1964,1967), Beghin (1970), Beaudry-Darismé & Latham (1973).

12. If improvement is not satisfactory after three weeks, mother and child may stay longer.

13. Table 2 also illustrates that home-visits are few and do not constitute a major activity. It should further be borne in mind that the figures in all probability indicate the number of home-visits, not the number of homes visited.

14. The total number of cottages/rooms at the three centres is 32, and the average period of residence is about 3 weeks. If the centres are open 11 months a year, and only one mother is accommodated per cottage (although more is possible), 384 women could be admitted per year. The actual number in 1978 was 273.
As regards the number of potential cases: the total population of the three districts was estimated to be 1,500,000 in 1978 (CBS, 1972:3), of which 10-11% children between the ages of 12-48 months, or 150.000 children.

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According to the findings of CBS (1977) and ourselves (NIRPb), 1% of the children in this age range have a W-A below 60% and are severely malnourished. This would mean 1500 children. Since this is the number at any one time, the total number per year should be higher. During 1978 the total number of children admitted in such severe condition was less than 135 (Hoorweg & Niemeijer,1979:6,24,30). Even when assuming that the FLT-centres serve only the divisions in which they are situated, the rate of admissions could still be higher (Total estimated population of Limuru, Kigumo and Mwea divisions: 302.000; Children, aged 12-48 months: 30.000; Estimated number of children with W-A < 60, at any one time: 300).

15. The two survey areas are both located in Kigumo Division but at different altitudes. The upper area, Kiiriangoro, is fertile with a high agricultural potential. The lower area, Kagurumo, is less fertile, bordering the ecological zone where agricultural potential becomes marginal. The two areas differ considerably in population density, the upper area having about twice the density of the lower area. The population is almost exclusively Kikuyu.
Sampling was based on the holdings in the areas as registered at the land office. All holdings where households with child(ren) in the age range of 6-59 months resided were included in the survey. From each holding one household with child(ren) in this age range was selected, except when four or more such households were present, in which case more than one was selected. In each area a total of 150 households was included in the survey. The 300 households visited represented a total of 439 eligible households residing on 284 holdings. Since certain households represent the other households on the same holding that were not visited, all data were weighted accordingly to obtain estimates for the total population (NIRPa).

16. In cases when one child is regularly examined we prefer the term 'case-monitoring'.

17. The full preference scale comprises 24 comparisons but the analysis of this full scale is rather complex and as yet not completed, reason why a reduced scale of 16 items has been utilized in the present report. The reliability coefficient of this reduced scale, as computed for the group of 300 respondents in the NIRP survey was .71 (Spearman-Brown).

18. The recall method is discussed in more detail in the forthcoming report on the survey results (NIRPb) which will also contain a comprehensive discussion on the reliability of this method when compared with nutritional observations.

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

20. 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. If a child is small its weight may be expected to be correspondingly lower. To allow for this, the second index, weight-for-height (W-H), converts the weight of the child into a percentage of the standard weight expected for its height. Finally, weight-for-age (W-A), 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

three indices reflect different, but not altogether unrelated aspects of nutritional status.
Height-for-age indicates degree of stunting and, since this can only occur over time, this index reflects the nutritional history of the child. Weight-for-height is subject to greater fluctuations and is generally regarded as reflecting the momentary status of the child. Weight-for-age, which combines the two previous indices, is a useful, overall index of nutritional status. Since height-for-age reflects the outcome of the growth process it is the most significant of the three indices for the study of relations between social variables and nutritional status. The same obviously applies to the measurement of the long-term effects of nutrition intervention.

21. Food consumption of the FLT-children was assessed on only one occasion: the home visit. Interviews at admission and discharge would have told us little about the usual diets (see p. 39)
The heights of the FLT-children were not measured on discharge, because significant changes in height were not expected after the short stay at the centre.
Among the control group, the knowledge questions were not asked again after the initial survey; no good reasons could be given to the respondents for a repeated inquiry on this.
On the occasion of the first revisit to the control group height was not recorded because the authors, who always personally measured length, were not in a position to visit each household again. Heights were, however, measured during the second revisit which makes it still possible to calcute growth rates over the period of study. (table 6).

22. The reader must keep in mind that the percentage of mothers who will, by chance, give correct answers is as high as 50% per cent.

23. All children still being breastfed are included in the group BF, irrespective of age. The average age of the children in this group is lower than that of the next group, which comprises the children between 6-23 months who are no longer on the breast.

24. Further analysis of the recall data of the control group confirms that in 'poor' households, flours with leafy vegetables constitute a greater part of the diet of young children than in other families:

Consumption of Flours and Leafy Vegetables[25]
of Control Children by Social Class and Age Group

		BF	6-23 months	24-35 months	36-59 months
Children from 'poor' h.holds	: grs	086	126	217	241
	%	10%	15%	30%	31%
Children from 'intermediate' & 'affluent' h.holds	: grs	059	138	106	106
	%	8%	12%	11%	16%

% =Percentage that these ingredients contribute to the total daily intake (raw matter)
BF=Children breastfed, see note 23

25. The percentages listed in table 12 and note 24 were calculated by adding all cereals in flour form (excluding for example, maize kernel and rice) and all light, medium and dark leafy vegetables; and expressing the ensuing total as a percentage of the total daily intake (raw matter).

26. Among the control group the milk consumption of children, aged 6-35 months (not including the breastfed group), whose mothers reported that they had milk available was 554 grs, on average, while this was 380 grs in households that reported otherwise.

27. An alternative would have been to include only one child of one mother in the analysis, the most severely malnourished child, as we have done on another occasion (Hoorweg & Niemeijer, 1979). However, it is often difficult to decide which of 2 (or more) children is in the more severe condition. Of the 35 cases where mothers brought more than one child to the centre, in only 15 cases a single child was lowest on all three indices H-A, W-H and W-A. In the other 20 cases different siblings occupied the lowest position on different indicators.

28. Age group: 24-35 months;
FLT vs Control group;
t=1.96, df=53, p=.05.

29. Age group: 24-35 months;
FLT vs Control group;
t=0.95, df=53, p=.34.

Age group: 36-59 months;
FLT vs Control group;
t=2.35, df=98, p=.02.

30. Estimated rates were computed as follows below. The age distribution of wasted and not-wasted (FLT) children was the following:

age group	6-11m.	12-23m.	24-35m.	36-59m.
W-H (< 85)	N= 6	N=10	N= 5	N= 0
	(a1)	(a2)	(a3)	(a4)
W-H (> 85)	N=12	N=14	N=16	N=31

The growth rates of the control children used in the calculations are listed in Appendix J and are:

age group	6-11m.	12-23m.	24-35m.	36-59m.
grams/day	7.6	6.7	6.0	4.2
	(b1)	(b2)	(b3)	(b4)
cm/year	10.4	8.2	8.1	6.2

Expected growth rates (grams/day & cm/year) for the two groups of FLT-children (W-H (< 85) & W-H (> 85)) were computed according to the formula:

$$\frac{a1xb1 + a2xb2 + a3xb3 + a4xb4}{a1+a2+a3+a4}$$

These computations resulted in the following expected values:

	grams/day	cm/year
W-H (< 85)	6.8	8.8
W-H (> 85)	5.6	7.7

31. Multivariate analysis of variance of the combined weight and height gains of the two groups resulted in a Hotelling-Lawley trace of 0.145 (F=6.6, df=2/91, p.<.002)

32. There is a statistical danger in this analysis: that the observed effect results from regression to the mean. For that reason we have also calculated rates adjusted for such an effect. This was done by also dividing the control children in two groups: children with W-H (<90) and W-H (≥90), and using the growth rates of these subgroups to calculate expected values for the two groups of FLT-children. Although such a correction has the effect of slightly reducing the deviations from expected values listed in table 15, the trend as observed in the text still remains.

33. The complete information on the progress of the 21 children with low W-H, compared with the growth rate of the control children in corresponding age groups (listed in Appendix J), is as follows:

	Weight gain over period of 6	
	below rate	above r
Weight gain at centre, below age rate (N= 8)	6	2
Weight gain at centre, above age rate (N=13)	1	12
Total number of cases (N=21)		

Regarding the wasted children, it is clear that recovery at the centre is an excellent predictor of long-term progress; among the present 21 cases only 3 errors occur.

34. As a check, the relations between the formal education of the mother and the effects of the rehabilitation were also explored. No significant trends were discovered.

35. Because of the small number of cases from elder families and affluent households these were combined with the nearest category.

36. This has also to do with the fact that at the centre in the upper area each mother is, on average, accompanied by 3 children, whereas this is 2.3 and 2.5 respectively in the two other centres (see table 5, page 24)

37. Another reason for the low attendance that is often mentioned by FLT-staff is that the centres carry the stigma of poor relief. But this seems a circular argument. The centres do indeed mostly cater for poor families as we have shown, yet this can not really be accepted as a reason why other poor families stay away.

38. Follow-up in which former cases are regularly visited by programme staff would require transport facilities that are not only absent but also notoriously unreliable in the rural areas, and would be extremely time consuming. Such follow-up can only be incidental and is best used for the purpose mentioned in the text, that is to help former cases find links with other agencies that can provide help.

39. Chambers (1980) also mentions powerlessness and isolation as characteristics of rural poverty. He emphasizes in particular that the rural poor are usually least reached by various services.

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APPENDIX A. CHARACTERISTICS OF FLT-ADMISSIONS IN CENTRAL PROVINCE DURING 1978 AND OF THE CASES STUDIED AT ADMISSION[x]

			All admissions during 1978[xx] N=273	Cases, studi at admissio N=85
Characteristics mother	Education:	none	62%	58%
		standard 1-4	17%	25%
		standard 5-7(8)	21%	17%
		secondary	0	0
	Gravidity:	pregnant	17%	20%
		not-pregnant	83%	80%
	Marital status:	single	9%	5%
		married	62%	72%
		separated/ divorced/ widowed	29%	23%
	Income from labour:	none	33%	29%
		casual labour	59%	64%
		regular employment	9%	7%
Characteristics family/household	Household size:	Average number of:		
		adults	2.4	2.6
		children	4.4	4.7
		total	6.8	7.3
	Size, small-holding:	no land	43%	40%
		1 acre or less	19%	21%
		more than 1 acre	16%	12%
		more than 3 acres	22%	27%
Characteristics children	Average no. of children admitted with one mother		2.5	2.6
	Age index child:	xx-12 months	29%	40%
		13-24 months	37%	39%
		25-36 months	16%	13%
		37-60 months	10%	4%
		60-xx months	9%	4%
	Weight-for-age (index children below 60 months of age only)			
		xx-59%	28%	25%
		60-79%	46%	39%
		80-xx	26%	36%

x All data as recorded in the clinic records
xx Source: Hoorweg & Niemeyer, 1979

APPENDIX B. SOCIO-ECONOMIC CHARACTERISTICS OF FLT-CASES AND CONTROL GROUP

			FLT cases N=85	CONTROL group[x] N=100
Characteristics mother	Age:	19yrs and younger	2%	5%
		20-29yrs	46%	36%
		30-49yrs	50%	57%
		50yrs and older	1%	2%
	Education:	none	59%	34%
		standard 1-4	26%	34%
		standard 5-7(8)	15%	25%
		secondary	0	8%
	Marital status :	single	8%	1%
		married,monog.	62%	90%
		married,polyg.	11%	2%
		sep./divorced	15%	2%
		widowed	4%	5%
Characteristics family/household	Domestic stage :	young fam.	26%	24%
		middle-age fam.	65%	55%
		elder fam.	9%	21%
	Average number of children:			
	pre-school children (0- 5yrs)		2.4	2.2
	school-age children (6-16yrs)		2.0	2.3
	grown-up children (17yrs & older)		0.1	0.3
	Average household size		6.7	6.9
	Social class :	poor households	67%	42%
		intermediate h.holds	28%	35%
		affluent h.holds	5%	23%
	Size, small-holding:	no land	36%	0
		0.1-0.9 acres	13%	31%
		1.0-2.9 acres	24%	52%
		3.0 acres and more	27%	16%
	Percent women who report that they are able to grow enough food to feed their families		25%	46%
	Percent women who report that they have milk at their disposal (home production)		12%	61%
	Percentage of women who report that they have eggs at their disposal (home production)		21%	68%

x Weighted results

Differences between the two groups as regards age mother, domestic stage, number of children and household size are not significant. The two groups differ significantly on all other variables (chi-square test).

APPENDIX C. FARMSIZE AND THE INCIDENCE OF CASH-CROP CULTIVATION AND SALE OF FOOD CROPS

		N	CULTIVATE cash-crops		SELL food crops[xx]	
			yes	no	yes	no
FLT-CASES	no land	30	-	-	-	-
	0.1-0.9 acres	11	0%	100%	9%	91%
	1.0-2.9 acres	20	30%	70%	40%	60%
	3.0-xxx acres	22	41%	59%	39%	61%
CONTROL GROUP[x]	no land	0	-	-	-	-
	0.1-0.9 acres	31	30%	70%	19%	81%
	1.0-2.9 acres	53	48%	52%	36%	64%
	3.0-xxx acres	16	79%	21%	57%	43%

x Weighted results

xx Sell food crops, either occasionally or regularly

APPENDIX D1.
KNOWLEDGE QUESTIONNAIRE: RESULTS FOR FLT-CASES AND CONTROL GROUP

			FLT cases N=85	CONTROL group[a] N=100
1. When a child has a swollen body, red or grey hair and is miserable; what disease does it suffer from?		kwashiorkor/higo[x]	92%	98%
		other answers	4%	2%
		don't know	5%	0
2. What causes higo?		food: poor quality	49%	42%
		food: insufficient quantity	18%	18%
		other answers	27%	39%
		don't know	6%	1%
3. What causes kuhoma?[xx]		food: poor quality	33%	16%
		food: insufficient quantity	22%	27%
		other answers	27%	48%
		don't know	18%	9%
4. At what age can a child start to eat the following dishes?	(a) ucuru[xxx]	0 - 4 months	80%	35%
		5 - 9 months	15%	52%
		10+ months	5%	13%
	(b) gitoero	0 - 4 months	58%	40%
		5 - 9 months	35%	56%
		10+ months	7%	4%
	(c) mboco	0 - 4 months	38%	18%
		5 - 9 months	45%	53%
		10+ months	18%	29%
	(d) ngima na mboga	0 - 4 months	38%	8%
		5 - 9 months	37%	50%
		10+ months	25%	42%
	(e) githeri	0 -20 months	19%	13%
		21 -29 months	36%	40%
		30+ months	45%	48%
5a. When a child of 2 years eats three meals a day (breakfast, lunch, dinner); is that enough or does it need anything else?		enough	31%	57%
		needs extra's	60%	41%
		don't know	10%	2%

a Weighted results
x The Kikuyu word higo literally means kidneys but also stands for kwashiorkor.
xx kuhoma = the Kikuyu concept closest to marasmus: a condition in which a child does not grow well and has thin arms and legs.
xxx ucuru = maize gruel; gitoero = mashed bananas and Irish potatoes; mboco = beans; ngima na mboga = maize porridge with vegetables; githeri = whole maize and beans.

APPENDIX D1, KNOWLEDGE QUESTIONNAIRE; CONTINUED

		FLT cases N=85	CONTROL group N=100
5b. If answer: needs extra's. What is needed? (more than one answer allowed)	mention milk/ucuru	38%	22%
	mention eggs	13%	11%
	mention fruits	8%	21%
	mention other foods	12%	7%
6. When a child suffers from kuharuo (=diarrhoea) what foods or drinks should you give?	water, plain	39%	40%
	water, with sugar and/or salt	12%	42%
	other answers	49%	19%
7. What is the best age at which to stop breastfeeding a child?	0 - 9 months	7%	12%
	10 -14 months	26%	33%
	15 -20 months	32%	41%
	21+ months	35%	14%

APPENDIX D2, FOOD PREFERENCES: IDEM

Average number of choices for beans, peas, eggs and meat when compared with the four foods mentioned in parentheses:		
BEANS - (rice/f.millet/banana/cabbage)	3.2	3.5
PEAS - (maize fl./kale/I.potato/orange)	2.5	1.6
EGGS - (rice/f. millet/banana/cabbage)	3.5	3.3
MEAT - (maize fl./kale/I.potato/orange)	3.1	1.9
Total score: number of choices for the high-protein/high-calorie foods above.	12.3	10.4
(standard deviation in parentheses)	(2.3)	(2.6)

APPENDIX E.

KNOWLEDGE QUESTIONNAIRE: RESULTS FOR FLT-CASES INTERVIEWED ON DIFFERENT OCCASIO

		ADMIS-SION	DIS-CHARGE
1. When a child has a swollen body, red or grey hair and is miserable; what disease does it suffer from?	kwashiorkor/higo[x]	92%	95%
	other answers	2%	2%
	don't know	7%	3%
2. What causes higo?	food: poor quality	49%	53%
	food: insufficient quantity	16%	18%
	other answers	28%	25%
	don't know	7%	5%
3. What causes kuhoma?[x]	food: poor quality	34%	39%
	food: insufficient quantity	25%	28%
	other answers	25%	18%
	don't know	16%	15%
4. At what age can a child start to eat the following dishes? (a) ucuru[x]	0 - 4 months	82%	73%
	5 - 9 months	15%	20%
	10+ months	3%	7%
(b) gitoero	0 - 4 months	57%	57%
	5 - 9 months	36%	23%
	10+ months	7%	20%
(c) mboco	0 - 4 months	41%	37%
	5 - 9 months	41%	37%
	10+ months	18%	27%
(d) ngima na mboga	0 - 4 months	44%	35%
	5 - 9 months	34%	35%
	10+ months	21%	30%
(e) githeri	0 -20 months	20%	12%
	21 -29 months	38%	25%
	30+ months	43%	63%
5a. When a child of 2 years eats three meals a day (breakfast, lunch, dinner); is that enough or does it need anything else?	enough	26%	39%
	needs extra's	67%	61%
	don't know	7%	-

x See legend with appendix D.

APPENDIX E. KNOWLEDGE QUESTIONNAIRE; CONTINUED

		ADMIS-SION	DIS-CHARGE	
5b. If answer: needs extra's What is needed? (more than one answer allowed)	mention milk/ucuru	44%	43%	
	mention eggs	13%	8%	
	mention other foods	20%	18%	
6. When a child suffers from kuharuo (=diarrhoea) what foods or drinks should you give?	water, plain	39%	54%	
	water, with sugar and/or salt	15%	13%	
	other answers	46%	33%	
7. What is the best age at which to stop breastfeeding a child?	0 - 9 months	10%	12%	
	10 -14 months	25%	28%	
	15 -20 months	33%	22%	
	21+ months	33%	38%	
8. Have you ever heard of the three food groups: body-building foods (gwaka miri) protective foods (kugitira mwiri) and energy foods (kuhe hinya)?	yes	-	100%	
	no	-	-	
8 b. Is maize flour a body-building or energy fd?		-	78%	
c. cabbage, body-building or protective fd?		-	75%	
d. milk, protective or body-building fd?		-	83%	
e. fruits, body-building or protective fd?		-	68%	
f. Irish potatoes, energy or protective fd?		-	83%	
g. beans, energy or body-building fd?		-	82%	
h. green leaves, protective or body-building fd?		-	62%	

(The answer percentages given are the percentage of women choosing the correct, underlined alternative)

flt

APPENDIX F.

PREFERENCE SCALE: RESULTS FOR FLT-CASES INTERVIEWED ON DIFFERENT OCCASIONS (N=61) (Listed are the proportions of respondents choosing the first of the two foods mentioned; for example, at the time of admission 97% of the women preferred beans over rice)

	ADMISSION	DISCHARGE	HOME-VISIT
Beans-Rice	.97	.98	.97
Beans-Finger millet	.64	.77	.82
Beans-Green banana	.92	.92	.90
Beans-Cabbage	.67	.80	.88
Peas-Maize flour	.84	.92	.83
Peas-Kale	.46	.39	.55
Peas-Irish potato	.80	.85	.78
Peas-Orange	.49	.57	.60
Eggs-Rice	.97	.95	.92
Eggs-Finger millet	.89	.93	.88
Eggs-Green banana	.75	.89	.93
Eggs-Cabbage	.92	.89	.82
Meat-Maize flour	.87	.95	.92
Meat-Kale	.69	.64	.67
Meat-Irish potato	.87	.92	.92
Meat-Orange	.77	.69	.80

APPENDIX G. DIETARY RECALL: AVERAGE FOOD CONSUMPTION IN GRAMS OF FLT-CASES AND CONTROL GROUP BY AGE (STANDARD DEVIATIONS IN PARENTHESES)

	FLT-CASES					CONTROL GROUP[x]			
	BF[xx] N=14	06-23 N=20	24-35 N=22	36-59 N=5	Age (months)	BF N=15	06-23 N=17	24-35 N=31	36-59 N=29
Cereals	81	122	174	250		63	116	135	176
Roots & tubers	87	90	42	0		240	160	256	164
Grain legumes	8	37	47	19		5	14	39	40
Vegetables	57	99	115	176		36	50	56	63
Fruits	0	1	14	0		0	1	0	0
Eggs & meats	4	13	4	6		0	18	0	5
Fat	2	5	7	7		4	5	4	7
Sugar	1	2	6	8		0	9	15	20
Miscell. solid foods	0	0	0	0		0	0	0	0
Subtotal: Solid foods	239	367	424	466		348	373	505	474
()	(149)	(225)	(189)	(90)		(180)	(128)	(214)	(172)
Milk:	150	373	250	190		416	717	362	223
()	(175)	(231)	(212)	(143)		(268)	(505)	(250)	(148)
Subtotal: Raw matter	389	740	685	656		764	1091	867	698
()	(271)	(322)	(316)	(122)		(333)	(452)	(310)	(232)
Cooking water	349	607	826	774		253	425	716	752
Total consumed (grs.)	738	1347	1511	1430		1016	1515	1583	1450
()	(343)	(534)	(496)	(568)		(409)	(347)	(312)	(316)
Energy intake (Kcal.)	547	1004	1177	1249		839	1231	1271	1283
()	(266)	(377)	(416)	(423)		(367)	(360)	(329)	(342)
Protein consumption (grs.)	18	40	43	42		23	43	38	37
()	(10)	(19)	(22)	(14)		(13)	(18)	(12)	(13)

x Weighted results

xx BF= children breastfed; see note 23.

APPENDIX H. DISTRIBUTIONS OF ANTHROPOMETRY OF FLT-CASES AT ADMISSION AND OF CHILDREN IN THE CONTROL GROUP ON OCCASION OF THE FIRST SURVEY

		FLT-cases N=94	CONTROL Group[x] N=147
Weight-for-age	-59	14%	-
	60-69	22%	2%
	70-79	34%	31%
	80-89	18%	35%
	90-99	10%	23%
	100-109	2%	6%
	110+	-	3%
Height-for-age	-79	9%	-
	80-84	20%	4%
	85-89	30%	17%
	90-94	24%	44%
	95-99	13%	27%
	100-104	4%	8%
	105+	-	-
Weight-for-height	-69	1%	-
	70-79	13%	1%
	(80-84)	9%)	3%)
	85-89	23%	13%
	90-99	43%	51%
	100-109	11%	26%
	110+	1%	5%

x Weighted results

PPENDIX J. ANTHROPOMETRIC RESULTS OF FLT-CASES AND CONTROL GROUP BY AGE: CONDITION AT ADMISSION, GAINS AT THE FLT-CENTRES & LONG-TERM GAINS (STANDARD DEVIATIONS IN PARENTHESES)

	FLT-CASES				Age (months)	CONTROL GROUP[x]				
	6-11	12-23	24-35	36-59		6-11	12-23	24-35	36-59	
verage age at admission (months)	8.5	16.9	28.5	45.4		9.0	17.7	28.2	47.8	Average age at first examination
verage number of days between the two examinations at the centre.	15.4	15.4	17.2	15.6		-	-	-	-	
verage number of days between admission and home-visit	177	183	189	176		190	210	208	208	Number of days between first and second examination
verage W-A at admission	73.0	70.0	71.5	76.2		91.5	86.2	86.8	84.8	W-A at first examination
verage H-A at admission	93.0	89.0	85.2	87.6		96.4	93.3	92.2	93.0	H-A at first examination
verage W-H at admission	86.6	85.7	90.5	91.0		99.4	95.9	97.5	95.8	W-H at first examination
rams/day gained during stay at the centre	4.7	10.2	12.3	22.1		-	-	-	-	
rams/day gained between dmission and home-visit	7.0 (3.2)	7.8 (3.6)	3.9 (4.9)	4.9 (5.3)		7.6 (1.5)	6.7 (3.4)	6.0 (2.9)	4.2 (3.1)	Grams/day gained between first and second examination
te of growth (cm/year) etween admission nd home-visit	10.6 (5.0)	8.8 (3.8)	7.3 (3.1)	7.9 (3.8)		10.4 (1.1)	8.2 (3.1)	8.1 (3.3)	6.2 (1.7)	Rate of growth (cm/year) between first and third examination[xx]
mber of children	N=18	N=24	N=21	N=31		N=11	N=33	N=33	N=69	

Weighted results

The children in the control group were re-examined after half a year, and a third time, after a full year.

Height was re-measured on the latter occasion only (see table 6).

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PENDIX K. SUMMARY OF KNOWLEDGE AND PREFERENCES OF FLT-CASES BY AREA, BY SOCIAL CLASS AND BY DOMESTIC STAGE
(RESULTS AT ADMISSION AND HOME-VISIT)

	RESULTS BY AREA						RESULTS BY SOCIAL CLASS				RESULTS BY DOMESTIC STAGE			
	LOWER AREA[x]		MIDDLE A.		UPPER AREA		POOR H.H.		INTERM. HH[xx]		YOUNG FAMS		M-AGE FS.[xxx]	
	Adm	H-V	Adm	H-V	Adm	H-V	Adm	H-V	Adm	H-V	Adm	H-V	Adm	H-V
. Women mentioning an early age of introction (0-4 months) for two or more of the llowing dishes: ucuru; gitoero; mboco; ima na mboga	61%	55%	68%	47%	84%	79%	73%	67%	67%	48%	75%	55%	69%	61%
. Women mentioning a weaning age 14 months or younger.	17%	27%	32%	42%	58%	47%	38%	36%	29%	43%	17%	36%	39%	39%
. Average percentage of mothers correctly assifying (7) foods into different od groups.	-	73%	-	71%	-	77%	-	73%	-	75%	-	77%	-	73%
eferences: Average number of choices r high-protein/high calorie foods ut of 16 comparisons)	12.5	13.6	12.1	11.7	12.9	14.1	12.4	13.0	12.8	13.6	12.8	13.4	12.5	13.1
nber of women	N=23		N=19		N=19		N=40		N=21		N=12		N=49	

) Adm=Admissions; H-V=Home-Visit (xx) Includes 4 'affluent' HouseHolds (xxx) Includes 7 'elder' Families

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APPENDIX L. SUMMARY OF ANTHROPOMETRIC RESULTS OF FLT-CASES BY AREA, BY SOCIAL CLASS AND BY DOMESTIC STAGE (STANDARD DEVIATIONS IN PARENTHESES)

	RESULTS BY AREA			RESULTS BY SOCIAL CLASS		RESULTS B DOMESTIC ST	
	Lower	Middle	Upper	Poor	Interm[x]	Young	M-Ag
1. Children falling below critical value of H-A(90)	65%	63%	50%	60%	56%	47%	61%
2. Children falling below critical value of W-H(85)[xxx]	16%	41%	14%	21%	25%	26%	21%
3. Grams/day gained at the centre	12.6	12.6	15.1	-	-	-	-
4. Grams/day gained between admission and home-visit	5.3 (4.3)	6.9 (4.9)	5.5 (4.8)	6.0 (4.4)	5.5 (5.2)	7.5 (4.3)	5.4 (4.7
5. Cm/year gained between admission and home-visit	9.1 (4.4)	7.9 (4.0)	8.4 (3.8)	8.9 (4.2)	7.8 (3.7)	7.4 (3.1)	8.8 (4.2
Number of children	N=31	N=27	N=36	N=62	N=32	N=19	N=7

x Includes 4 children from 'affluent' households

xx Includes 10 children from 'elder' families

xxx Differences by area : $X^2=6.96$; df=2; $p < .05$.

APPENDIX M. CHARACTERISTICS OF CASES NOT LOCATED AFTER DISCHARGE

A. Socio-Economic characteristics of the mothers (N=19)

1. Women aged 29 or younger	58%
2. Women without formal education	63%
3. Women who are not married (single, separated, divorced, widowed)	21%
4. Women from 'young' families	47%
5. Average number of children in household (pre-school; school-age & grown-up children)	3.9
6. Women from 'poor' households	74%
7. Women without land	21%
8. Women who report that they are able to grow enough food to feed their families	17%

B. Anthropometric characteristics of the children (N=29)

Age:	6-23 months	24-59 months
1. Number of children	14	15
2. Average weight-for-height	85.8	91.1
3. Average height-for-age	88.5	85.8
4. Children falling below		
value: W-H(85)	54%	13%
5. idem : H-A(90)	39%	80%
6. Grams/day gained at the centre	6.6	19.4

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