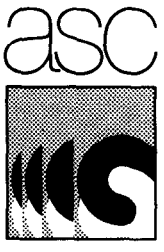
The impact of nutrition education at three health centres in Central Province, Kenya

Jan Hoorweg and Rudo Niemeijer

Research reports No. 10 / 1980



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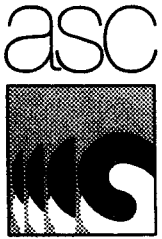

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CONTENTS

SUMMARY

This report contains an account of a study of the effects of nutrition education as given at three health centres in different ecological zones in Central Province, Kenya.* At each of these health centres, Nutrition Field Workers had been active for periods of several years; these Nutrition Field Workers are qualified nurses with special nutrition training, whose principal task is to partake in maternal and child health services and to give nutrition information to mothers with young children.

Two groups of mothers in similar social and economic situations were selected for interviewing: frequent and infrequent visitors. Any nutritional impact as a result of attendance at the MCH services should lead to better results among the frequent visitors. The two groups were compared on the following indicators: (a) nutritional knowledge; (b) maternal food preferences; (c) food consumption of the children during the previous day; (d) nutritional status of the children.

The effects of the educational effort are not impressive. Although frequent visitors appear to have more knowledge about the need to start supplementing a young child's diet at an early age, no significant differences were found to occur between the two groups in respect of either maternal preferences, or food consumption and nutritional status of the children.

A critical discussion of the present study and its limitations is presented in the conclusion. Some remarks are made concerning the supervision and organizational support of the Nutritional Field Workers and their role vis à vis other MCH personnel. It is recommended that the present attention for all mothers with young children be reconsidered and that more effective ways and means be developed to concentrate on children at risk.

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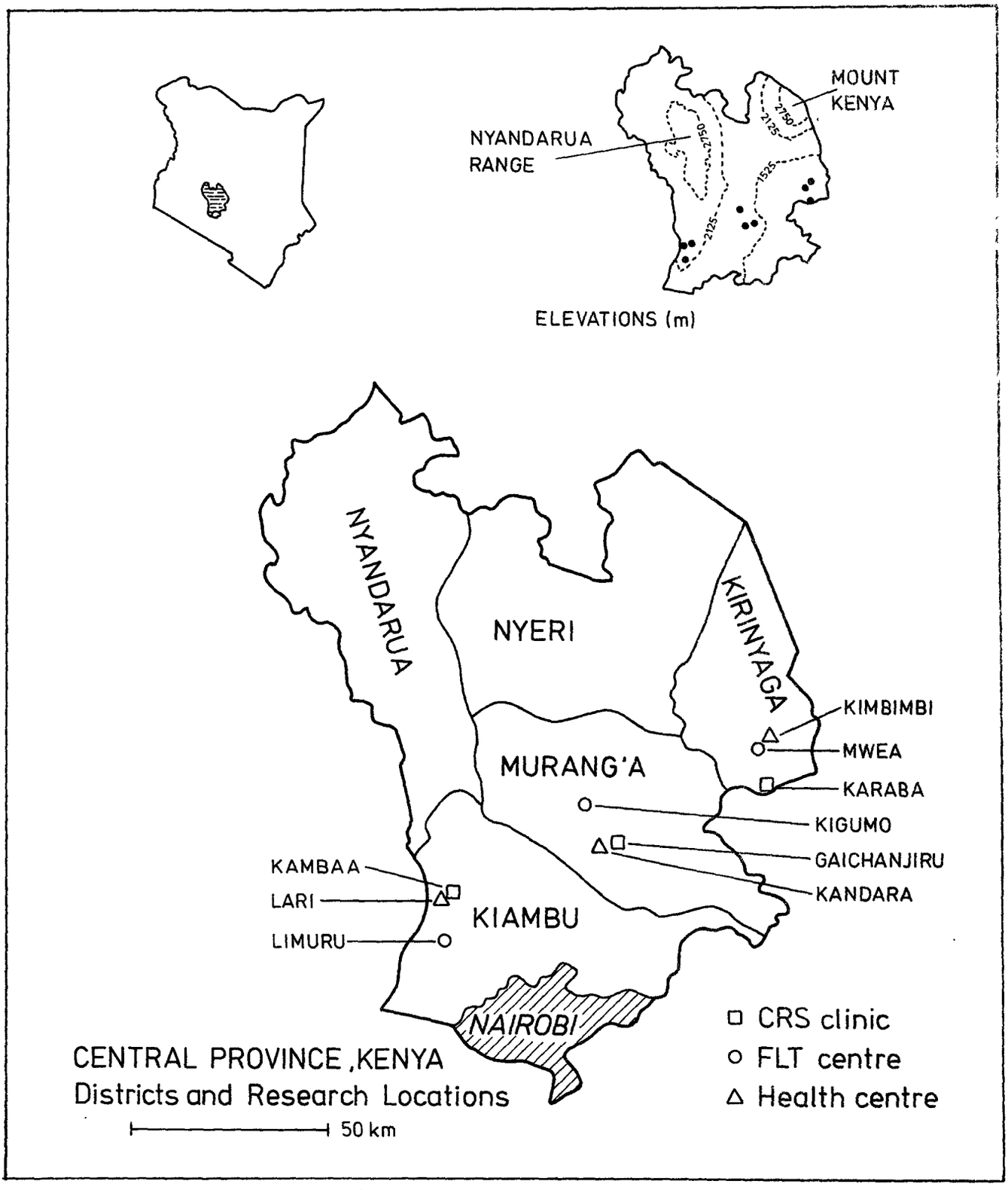
* This study of child nutrition in Kenya is part of a larger research undertaking: The Nutrition Intervention Research Project (NIRP). A working version of the present report was previously circulated as NIRP Report no. 13.


MOUNT KENYA
NYANDARUA RANGE
2750
2125
1525
ELEVATIONS (m)
NYANDARUA
NYERI
KIRINYAGA
MURANG'A
KIAMBU
NAIROBI
KIMBIMBI
MWEA
KARABA
KIGUMO
GAICHANJIRU
KANDARA
KAMBAA
LARI
LIMURU
CRS clinic
FLT centre
Health centre
CENTRAL PROVINCE, KENYA
Districts and Research Locations
50 km

1. INTRODUCTION

Protein-energy malnutrition among young children is one of the major nutritional problems in many developing countries. Compared to other African countries, the situation in Kenya is generally estimated to be relatively favourable in that there is probably enough food grown to provide for the population. There is, however, a considerable incidence of childhood malnutrition, and it has been reported that in certain areas up to 40% of the young children have very low weights (Blankhart, 1974; CBS, 1977). Malnutrition occurs frequently during the first years of life due to the special food requirements of the very young child and due to frequent infections. There is overwhelming evidence that, at this age, malnutrition results in the impairment of intellectual development (see Brozek, 1978). The chronic aspects of malnutrition in particular appear to be responsible for such impairment (Hoorweg and Stanfield, 1976).

For these reasons, nutrition intervention programmes aimed at improving diets in developing countries, are usually focussed on the small child and its mother. In Kenya, as in most African countries, different forms of intervention exist (PBFL, 1973). A primary 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, depending on the type of approach adopted, 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, schools, in-patient 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 the educational programmes in general 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 indeed 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. For a proper assessment of nutrition intervention programmes it is necessary to view results against the background of the specific social environment in which the programmes operate.

The need to evaluate existing nutrition intervention programmes is generally recognized (W.H.O., 1974). 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. The most ambitious aim of evaluative research is to create a basis for the development of strategies for selective nutrition intervention, i.e. to establish which types of nutrition intervention are most suited for specific sections of the population. However, to achieve this aim evaluation must comprise more than a simple and direct assessment of end-results and entail an assessment of 'process', i.e. an analysis of why and how the observed effects are achieved (Suchman, 1967). Consequently 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 until recently rarely been undertaken, although of late progress is being made in this direction (see Klein et al, 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.

Evaluation studies have been carried out concerning three programmes: Family Life Training Programme (Ministry of Social Services), Pre-Scnool 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. At these centres women with malnourished children are admitted for a three week course consisting primarily of nutrition and health education. Tnese FLTcentres have much in common with what are internationally known as Nutrition Rehabilitation Centres. The programme is aimed at malnourished children below five years of age but siblings are admitted as well. The Pre-School Health Programme (CRS) is a well-known, 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 surveys were conducted in Kigumo division, Muranga, in two areas situated at different altitudes. The preliminary 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 at the Family Life Training Centres and at the Pre-School Health Programme are published as companion reports to the present one.

This report is exclusively concerned with the impact of the nutritional activities undertaken at the Health Centres by the Nutrition Field Workers. Prior to the description of the NFW programme, and the method of evaluation, brief descriptions will be given of the three research areas and of some relevant aspects of Kikuyu society, food habits and the general nutritional status of Kikuyu children.

2. THREE RESEARCH AREAS

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 people 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 midslopes 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

mch

Province are more orientated towards export crop production than farmers elsewhere in Kenya, smallholder agriculture in Central Province 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 above figures and all other information in this section are derived from a report by Meilink (1979) on smallholder farming in Central Province. This report was compiled specifically for the Nutrition Intervention Research Project with special reference to the research areas.)

The province is divided into five districts, Nyeri and Nyandarua to the north and Kiambu, Muranga and Kirinyaga (the three districts with which we are concerned) to the east and south (see map on page 4). The districts Kiambu, Muranga and Kirinyaga may be divided into several distinctly different ecological zones, on the basis of altitude, rainfall and vegetation(1). From high to low altitude these are the following.

(Zone I) Moorland, grassland and barren lands at high altitudes which are largely uninhabited and of no relevance to this research.

(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.(2)

One research area, with a Health Centre, a CRSclinic and a FLTcentre was selected in each of these three zones. The three research areas are situated 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. Population densities in the three areas in 1969 were 410, 390 and 107 per km^2 respectively.[4]

Not counting coffee and tea cultivation, there is little difference between smallholders in Kiambu and Muranga in terms of agricultural productivity and income. In Kirinyaga smallholders reap only half the value per acre under food crops. But, this is compensated by the fact that the average smallholder farm is larger than in the two other districts. The average holding in Kiambu is estimated at 1.8 acre, in Muranga at 2.3 acre and in Kirinyaga at 3.0 acre (Meilink, 1979: 27). The major differences between the research areas, however, are due to ecological factors, as evinced by the following brief descriptions of the areas.

The Limuru research area lies within Limuru division on the southern slopes of the Nyandarua range, at an altitude of over 2300 m. It extends from Limuru town to Lari and Kambaa[3] at a distance of 10-15 km to the north respectively (see map, p. 4). The area lies in ecological zone II, soils are rich, rainfall is high (c. 1400 mm), and agricultural potential is high. Unlike in the lower parts of the division, the important cash crops, tea and coffee, are not grown in the Limuru research area. The main food crops are maize and potatoes, and because of the altitude most food crops can only be harvested once a year. Important cash crops in 1977 were wattle and pyrethrum. Pears are another important fruit crop grown exclusively in this division and, as elsewhere in the district, incomes were supplemented by a variety of horticultural products: tomatoes, cabbages, plums, carrots, cauliflowers and onions. Milk production was another important source of income, over 2.5 million litres fetched the farmers about 1/- sh per litre in 1977.

Unlike the Limuru and Mwea research areas, each of which falls in a separate administrative division, the Kandara-Kigumo research area lies in two divisions both situated on the Eastern slopes of the Nyandarua range. The Kandara-Kigumo research area comprises the villages of Kigumo, Gaichanjiru and Kandara, at distances of 10-20 km from each other[3] and at middle altitude, between 1500 and 1700 metres. This area corresponds with ecological zone III with its rich fertile soils, c. 1150 mm of rainfall, and good agricultural land. The area is situated in the main coffee growing belt. Kandara alone grows 50 per cent of the district's

coffee and counts no less than 33 coffee factories. According to conservative estimates for the top year 1977, some 85 per cent of the smallholders growing coffee earned about 4,000 sh from this crop. A lesser cash crop is wattle. Major food crops are maize, beans and Irish potatoes, with bananas grown widely as an interplanted crop. At this altitude maize and other food crops are harvested twice a year; onions, cabbages and sweet potatoes are also widely grown. In both districts dairy co-operatives are absent or inadequately organized; milk production is consequently of little cash importance and is mostly used for home consumption.

The Mwea research area lies at the lower end of Mwea division in Kirinyaga district and is situated on the plains south of Mount Kenya and east of the Nyandarua range. This research area comprises the villages of Karaba, Wamumu and Kimbimbi[(3)], all three near the Mwea-Tebere Irrigation Scheme at 10 to 15 km from each other. The area lies at the lowest altitude of 1100-1200 m. with sparse rainfall, c. 900 mm on average. This is grass woodland (ecological zone IV), semi-arid, and far less fertile than the other two research areas. It is of low agricultural potential except for the irrigation area where rice is grown.

At present the Irrigation Scheme involves about 3,000 tenants and their families; a population of c. 20,000. The Scheme started in 1961, the tenants were given four acre plots and were settled in villages of about 80 households. Since then both cultivated area and yields have grown steadily. Presently there are 35 villages. By 1977 gross rice earnings were just over 1 million K£ and the average net income after deduction of loans, and water and ploughing fees was 7,200 sh. per tenant. In some of the villages tenants are given additional land to grow food crops for home consumption, but in most cases tenants have little or no opportunity to grow food crops and must therefore spend much of their income on food. The other smallholders in this low-potential area grow the usual food crops such as maize, beans and bananas, and try to derive an additional income from the cultivation of cotton and grams.

The major cash crop in the Kandara-Kigumo area is coffee; and in the Limuru area horticultural crops and dairying constitute the main source of cash income. As a consequence of the high coffee price of the last ten years, the middle area offered the best opportunities in terms of cash crop production; the upper Limuru area follows next, while the Mwea area offered the least opportunities in this respect. This is also evinced by the agricultural value per acre of the leading cash crops in the areas.

In 1977, in Kiambu, horticultural crops fetched about 2,025 shillings per acre; in Mwea, rice fetched 1,560 sh/acre and in Muranga, coffee 15,700 sh/acre[5] (Meilink, 1979: 28).

To sum up, the three research areas differ in two important aspects: first, the overall agricultural potential and, second, the proceeds from cash crop cultivation. The Limuru and Kandara-Kigumo area differ little in general potential although the Limuru area is probably slightly better off in this respect. In recent years the Kandara-Kigumo area has been favoured most as regards the income from cash crops. In both respects, the lower research area, Mwea, offers the least favourable environment.

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.

Kikuyu society has undergone a dramatic change since the beginning of this century. The age-group system was soon discontinued and the nuclear family became increasingly important. There has also been a shift towards individual landownership culminating in the land consolidation of 1955-65. Commercial farming on smallholdings has assumed great proportions. Social stratification has become much more prominent and is now an important factor in Kikuyu society. The reasons and mechanisms behind this transformation have been admirably described by Tignor (1976); land

reform has been studied by Sorrenson (1966). Contemporary daily life of the Kikuyu must be viewed against the background of these sweeping and profound social changes.

Today the residential pattern of Kikuyu in the rural areas is patri- or neolocal, sons marry and settle on the land of their fathers or acquire land elsewhere to strike out on their own. The most common residential situation is that land is occupied by one nuclear family, or divided between a father and his sons. Most people live in houses built with mud on a wooden frame, with a corrugated iron roof. In small houses the kitchen is often combined with a living room, but in the larger houses, it is usually a separate room or even a separate building. The clearing around the house is where guests are received and other activities take place. In cases where the land is shared by several households the houses are usually built close together in one large compound, although the households remain otherwise independent.

The vast majority of households consists of the nuclear family: man, wife and children.(6) In the Muranga survey which covered 300 households with children between the ages of 6 and 60 months, and from which most of the data in this section are derived, it was found that no less than 80% of the households were nuclear families. The average family size varied between 6 and 7 people. Nearly all the children lived with their parents.(7) The incidence of polygamy was low (NIRPa).

The Kikuyu in the rural areas earn their living in a variety of ways. The NIRP survey found that 45% of the husbands had regular employment or were self-employed, 45% did casual labour of some kind, while only 10% reported no gainful activity at all outside their farm. More than half the husbands worked as migrant labourers elsewhere and visited their homes with varying regularity. The vast majority of the population in Central Province 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 to the Nairobi agglomoration. Whenever they have land available, people grow foodcrops for their own consumption; 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.

Starting out from these two important factors, commercial farming and employment, it is possible to distinguish three socio-economic strata among the households 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: they have both resources at their disposal. 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. Although the size of the family is largely determined by its domestic stage, the number of children can still vary considerably. An important distinction must be drawn in this respect between pre-school children (0-5yrs), school age children (6-16 yrs) and grown-up children (17 yrs and over). 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. Tnis 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 five or six months. They are weaned to a diet which has a high milk content, and further comprises 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 whole maize, 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. The average weight-for-age

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.

(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 higher in the CBS survey. This is probably due to the wider range of ecological conditions from which the

latter survey sampled, while the NIRP survey was restricted to two locations about 25 km from each other with an altitude difference of 200-250 m. 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 - farmsize, 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, that households which cultivate agricultural products for sale had a lower incidence of malnutrition, was confirmed by our own survey. More attention will be paid here to the results of the latter survey, not because they are intrinsically more important, but because they determine the framework for the analysis of the present evaluative studies. The major findings follow below, and are graphically presented in figures 1 & 2. (9)

(-) 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.

mch/crs/flt

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

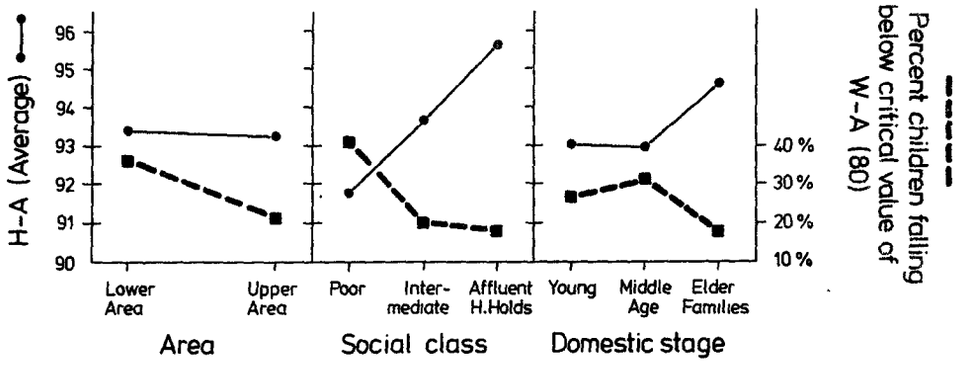
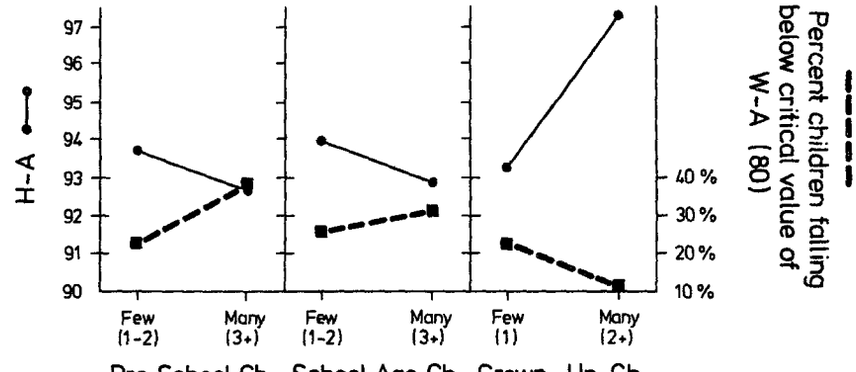


Figure 2.
Summary of anthropometric results by number of children in different age groups present in the household. n=300. (NIRPa)



(-) 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 nutritional status of young children is also related to the number of other children present in the household (figure 2). There is a negative correlation between on the one hand the number of pre-school and school age children, and on the other hand the average H-A and the percentage of children falling below W-A(80). Put more simply, the greater the number of pre-school children and the number of school age children in the family, the poorer the nutritional status of the younger child. This is probably the combined effect of a greater drain on food resources and a larger amount of domestic work for the mother who can pay less attention to the younger children. The number of grown-up children, on the other hand, is positively related to the nutritional status of the young child. This indicates that it is the presence of several grown-up children in 'elder' families that positively influences the status of the young child.

4. NUTRITION FIELD WORKERS AND MCH SERVICES

The Nutrition Field Worker Programme of the Ministry of Health has been in operation for more than a decade. Nutrition Field Workers are enrolled nurses who have followed a six-month nutrition course at Karen College, Nairobi. The Kenyan government has stated as objective that the number of 400 Nutrition Field Workers should be reached by 1983 (MoEPCA, 1979:134). In 1978 there were about 160 stationed throughout the country, evenly distributed over the seven provinces, with the exception of North-Eastern province where only five workers were active. Roughly two-thirds of the field workers are stationed at hospitals and about one-third at health centres. They are responsible to the District Medical Officers and the Provincial Nutritionists who receive monthly reports of their activities. The NFWprogramme receives assistance from UNICEF. Some years ago a consultant for this organisation compiled a report on the programme, mainly based on interviews with field workers and their superiors. The author estimated that the field

workers reach an average of about 2500 families per year. The potential effectiveness of the programme was, in her opinion, limited because of the nature of malnutrition in Kenya. She also pointed out that the effectiveness of the programme was limited by administrative difficulties concerning the deployment of personnel and the lack of transport (Campbell, 1975:45).

The principal task of the Nutrition Field Workers is to partake in maternal and child health (MCH) services. They are expected to see the children that are brought to the clinic, to check their weights and nutritional status in general, to identify malnourished children for special attention, to give nutritional advice to mothers and, finally, to give some nutrition teaching to the group of mothers at large, mostly in the form of a lecture-cum-demonstration. This kind of work is not restricted to the hospital or health centre where they are stationed; on certain days of the week they may function as member of the MCH team at a health centre where no Nutrition Field worker is stationed, or as member of a mobile MCH team. A second task of the field workers is to pay regular visits to homes in the area in order to follow the progress of previous cases of malnutrition, other borderline cases and children at risk. A third duty, which falls outside the scope of our research, is to keep an eye on the kitchen of the hospital or health centre (if a kitchen is present there) and check on cleanliness, menus and special diets.

In practice, the Nutrition Field Workers have a lot of freedom to arrange their own activities and as a result their work shows considerable individual variation. Some of them perform mainly general MCH activities such as immunisation. Often they work very hard but have little time left for their nutritional duties, although in a good team other team members will take over some of this work. Other field workers, however, insist on their specific role, sometimes disappointing the other members of the MCH team who may have different expectations of them. In that kind of situation the Nutrition Field Worker soon becomes isolated, in which case she also cannot function optimally. The general impression is that the activities of the field workers and other MCH personnel overlap to a considerable extent but that there are also important individual differences in this respect.

It is also our impression that the "lecture-cum-demonstration", which is often presented as the showpiece of the fieldworkers' activities is not in fact a very frequent occurrence. As regards home-visiting, the little we saw of this raised doubts as to the actual coverage and effectiveness of these visits. Some field workers make a serious effort but the results are often disappointing, also because of the eternal transportation problems.

Whatever form the individual field worker gives to her work, her activities among the population can only be expected to have nutritional effects after a long period of time, to be measured in years rather than months. Unfortunately, the turn-over rate among individual field workers is high; many of them are married or wish to get married and they tend to follow their (future)husbands.

These considerations led to the decision that our evaluation should not concentrate on the activities of individual field workers but that it should focus on the MCH services as a whole. The activities at three clinics were studied; at each of them Nutrition Field Workers had been active for a number of years and each was situated in a rural area. The location in rural areas followed from the project as a whole, and meant that we had to choose from health centres rather than from the outpatient wards of hospitals, since most hospitals are situated near towns (About half the 25 field workers in Central Province did work at health centres at the time). Further criteria for the selection of research localities, were the ecological area (as outlined above) and the presence of a FLTcentre and a CRSclinic in the vicinity.

The health centres in Lari, Kandara and Kimbimbi were finally selected. Nutrition Field Workers had been stationed for over five years at the two latter centres. In Lari the field workers of a nearby health centre had been active for years, visiting once a week. The MCH services in Kandara had long been integrated, in Lari this had happened more recently, while in Kimbimbi there was no integration of these services yet.

Patient administration at the health centres was minimal: no records are kept of individual mothers or their children. Very little information was therefore available regarding attendance and social circumstances

of mothers visiting the MCH services. In addition to the evaluation study which was conducted among a selected and relatively small group of subjects, data were therefore also collected concerning the general characteristics of the mothers visiting the three clinics. These data will be presented separately; the present report is limited to the evaluation study, conducted in November and December 1978.

5. METHOD

In the introduction to this report we have argued that evaluation should consist of more than a simple and direct assessment of end-results. In our opinion, the evaluation of nutrition intervention should not only focus on the nutritional status of groups of children[10]. A more elaborate argumentation on this can be found in Hoorweg & McDowell, 1979. In addition to the nutrional status of children, the present study also deals with knowledge, attitudes and behaviour of the mothers. The respective indicators are described below. Two groups of subjects were selected, frequent and infrequent visitors. The reasons for and the manner of this selection are given below. The comparison between these two groups of visitors constitutes the evaluation as such. Any nutritional impact of the MCH services should lead to better results among the frequent visitors.

In the introduction we have also argued that detailed attention should be given to the possibility that certain social factors are related to the results of the programmes. In that case, certain groups of visitors benefit more from their visits than others. The identification of these groups would be an important step on the way towards selective intervention. In the previous sections we have already pointed out which particular factors, in our view, require examination: ecological area, social stratification and family organisation.

5.1. Design

Evaluation of intervention programmes requires that criteria be measured before and after intervention in such a way that differences between

the two conditions can be ascribed to the intervention. Nutritional effects of MCH attendance cannot be expected over a short period of time and the limited time-span of the present studies did not permit coverage of long periods. It was not possible to interview the same mother 'before' she started visiting MCH services and 'after' she had attended for a long period. In other words, the so-called 'pre-test-posttest' design was not practicable, and other designs had to be considered, including some quasi-experimental ones. The suitability of different designs for the evaluation of nutrition intervention programmes has been discussed elsewhere (Hoorweg & McDowell, 1979). Virtually all these designs are based on the comparison of different groups of subjects.

Two types of comparison, first of all, require consideration; that between areas with and without health centres, and that between mothers with and without contact with MCH services. It should be remembered, however, that most people in Central Province live within travelling distance of various health facilities and that it would be unrealistic to look for an area where mothers have never attended MCH services. It would be equally unrealistic to look for individual mothers who have never visited MCH services; immunisation rates are high, and people go to great lengths to obtain treatment for ill children. (Mothers with newborn, first children are, in fact, such a group but do not offer a suitable comparison group for other reasons[11]). Nevertheless, people differ in their exposure to MCH services and a comparison of infrequent and frequent visitors would, to all intents and purposes, also represent a meaningful evaluation.

The next problem then, was how to distinguish between frequent and infrequent visitors. They could not be selected from existing records. Weight charts were not handed out, neither were other records kept of the number of visits of a particular child or its mother. One could, of course, simply ask mothers how often they have attended over a previous period of time and subsequently divide them into infrequent and frequent visitors. This procedure, however, is inadequate because there must be a reason why the frequent visitors attend more often, e.g. a higher level of education or greater individual motivation and such differences could in themselves influence the comparison be-

tween the groups. A 'neutral' reason for the difference in frequency of visits is therefore required.

It is fairly well established that attendance at MCH services depends to a high degree on the distance, or rather the time, people have to travel in order to reach the health centre. Long travelling times offer an understandable reason for infrequent attendance. Moreover, this reason should not in itself influence the comparison between infrequent and frequent visitors.

In view of these considerations the two following groups were selected for comparison: frequent attenders, living nearby and infrequent attenders, living far-away. The first group comprises mothers who reported that they travelled less than an hour and had visited 4 times or more over the past six months. They are the 'frequent visitors': 25 in Lari, 40 in Kandara, and 26 in Kimbimbi. The second group comprises mothers who reported that they had travelled an hour or more and had visited 3 times or less over the past half year. They will be referred to as 'infrequent visitors': 24 in Lari, 32 in Kandara, and 27 in Kimbimbi (In Kandara the criteria were slightly different[12]). The selected mothers were interviewed during their visit to the MCH services and in cases where they were accompanied by more than one child, the child nearest to 2 years of age was selected as index child. Not included were women who reported that they usually attended at another health facility, because this posed an unacceptable interference with

Table 2. Attendance characteristics of infrequent and frequent visitors

		INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Type of service visited	child welfare	88%	89%
	ante/post natal	4%	1%
	other	8%	10%
Attendance at other health facilities	no	78%	74%
	sometimes	22%	26%
Distance between home village and health centre	0.0 - 4.9 km*	56%	70%
	5.0 - 9.9 km	21%	18%
	10.0+ km	24%	11%
Type of transport	walking	61%	73%
	public transport	39%	27%
Transport costs	not applicable	61%	73%
	1.0 sh. or less	6%	16%
	1.1 - 2.0 sh.	20%	11%
	2.1 sh. or more	12%	-
Average number of children accompanying respondent		1.1	1.2

* This distance was calculated from maps (1:50,000) of the areas as the straight line between the health centre and the centre of the home village.

the design. Also excluded from the study were non-Kikuyu and the very few men who brought children to the MCH clinics. Furthermore the general criterion of the project applied: only mothers attending with children between the ages of six and fifty-nine months were included.

The above design is, in effect, a variant of the 'posttest-only' control group design. A crucial requirement for this particular design is that there must be no other differences, e.g. of a social or other nature between the mothers in these two groups. In the present case it is assumed that the two groups differ in frequency of visits only because of the distance they must travel, i.e. that there are no other social or economic differences between them. The latter, however, requires confirmation.

Table 2 lists the attendance characteristics of the respondents. The differences between the two groups follow quite logically from the selection procedure. The frequent visitors live nearer to the health centres and use public transport less often. The social and economic characteristics of the respondents are listed in tables 3 and 4. There are no significant differences between the two groups of visitors in respect of marital status and age; about 80% of the women are married, about 70% are younger than 30. There are also no differences in educational level, size of the smallholding and social stratification (The strata distinguished in the present study are not quite identical to those in the survey, but comparable[13]).

Table 3. Social and economic characteristics of infrequent and frequent visitors and their families

		INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Marital status	single	12%	17%
	married	86%	76%
	sep./divorced	1%	6%
	widowed	1%	2%
Age	19yrs and younger	13%	9%
	20 - 29 yrs	59%	57%
	30 - 49 yrs	25%	34%
	50yrs and older	2%	-
Education	none	39%	35%
	primary 1-4	19%	15%
	primary 5-7(8)	39%	43%
	secondary sch.	4%	7%
Size, smallholding	no land	22%	25%
	0.1 - 0.9 acres	11%	11%
	1.0 - 2.9 acres	38%	35%
	3.0 acres and more	30%	29%
Social class	poor households	61%	63%
	intermediate h.holds	33%	28%
	affluent h.holds	6%	10%

Table 4. Type of residence, domestic stage and family composition of infrequent and frequent visitors and their families

		INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Type of residence	smallholding, shared	57%	50%
	smallholding, independent	21%	25%
	not on smallholding	22%	25%
Domestic stage	young families	46%	37%
	middle-age families	42%	51%
	elder families	12%	12%
Average number of children:			
pre-school children (0- 5 yrs)		2.2	2.2
school age children (6-16 yrs)		1.1	1.6
grown-up children (17yrs and older)		0.2	0.2

Type of residence, domestic stage and household composition also show no systematic differences. About 25% of the households do not live on smallholdings, 25% live on independent smallholdings, and the rest share the holding on which they reside with other households. Both groups comprise about 40% young families and about 10% elder families. Finally, table 5 provides information on the index children. About 70% of these children are under two year of age, and the same percentage visits in connection with some health complaint[14]. Very few children are not brought in by their mother.

The above data do not indicate any important social or economic differences between the frequent and infrequent visitors. It may therefore be assumed that differences in travel time are the major cause of the varying attendance and that comparison of these two groups constitutes an acceptable design for the present evaluation purposes.

5.2. Indicators

The indicators employed in the present study consist of a number of

Table 5
Characteristics of the index children in the two comparison groups

		INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Sex	male	50%	46%
	female	50%	54%
Age	6 - 11 months	31%	30%
	12- 23 months	39%	37%
	24- 35 months	13%	20%
	36- 47 months	7%	10%
	48- 59 months	10%	3%
Accompanying adult	mother	94%	99%
	other	6%	1%
Reason for visit	complaint, new	55%	55%
	complaint, old	10%	16%
	immunization	24%	12%
	other	11%	17%

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knowledge questions; a list of comparisons to measure food preferences; a recall of food intake during the previous day; and finally the nutritional status of the children concerned. It should be mentioned that these indicators were only drawn up after thorough preliminary studies which covered general aspects of Kikuyu food habits, such as the foods presently in use, the classification of foods and food preferences for children (Hoorweg & Niemeyer, 1980). This entailed drawing up a list of food names in the vernacular. It was established that Kikuyu food classification does not differ substantially from the customary nutritional division 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 in different parts of Kikuyu country: there is a high preference for legumes and some starchy foods while certain cereals are held in conspicuously low regard. The indicators that were eventually employed are described below.

(a) The knowledge questions in the present study were selected from a longer list of questions used in the nutrition surveys. The exact phrasings are listed in appendix A. The questions relating to the cause of marasmus, the best age to stop breastfeeding and the treatment of diarrhoea are straightforward and need no further explanation. Since nutrition teaching in Kenya generally pays much attention to weaning and the introduction of weaning foods, a question was included concerning the age at which children can start to eat different foods. This question consisted of five subquestions, four concerned with weaning foods, and one (concerning githeri, the dish of whole maize with beans) covering introduction to the adult diet. The four answers given for the weaning foods may be combined in one score: the number of times the respondent mentions an early introduction age of 0-4 months.

(b) The second indicator by which effects are ascertained comprises 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, as was shown in the preliminary studies (Hoorweg &

Niemeyer, 1980). It was also demonstrated in these studies that the answers exhibit consistent patterns and that these paired-comparison scales in general have a satisfactory reliability. The preference scale used in the subsequent project studies consisted of 24 comparisons between foods that differ to greater or lesser extent in nutritional value. Because the analysis of the full scale is rather complex and as yet un-completed, a reduced scale has been utilized for the present report. This scale comprises 16 comparisons between four high protein-high calorie foods on the one hand, and on the other eight foods that are either low in proteins or low in proteins as well as calories. 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 B). The sixteen 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 the actual range was from 4 to 16. The reliability coefficient of this scale as computed for the group of 300 mothers in the survey was .71 (Spearman-Brown).

(c) The dietary recall concerning the previous day for the index children 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 equipments. 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. Results will be presented in two ways, first the amounts of individual food groups consumed (raw matter) and second the total intake of proteins and calories. (15)

(d) The final indicator comprises anthropometry and entailed recording weight, height and birthdate of each index child. Unlike the interviews, which were conducted by the assistants, all anthropometric measurements

were taken by either one of the present authors. 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 or light jersey; all weights were therefore corrected by subtraction of 150 gr. Weighing scales were gauged every week. Heights were measured with a collapsible length board which featured a fixed head-rest, a detachable foot-rest and a fixed tape measure.[16] Each child was placed on the board 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 in Jelliffe (1966) and three indices were computed. Height-for-age (H-A) expresses the height of the child as a percentage of the standard height expected for the age of the child. 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 overall 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 also applies in respect of the measurement of the effect of nutrition intervention.

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6. RESULTS

The first question to be resolved is: are there any differences on the respective indicators between the frequent and infrequent visitors? Where such differences are found, they are assumed to arise from the contact with the health centre. For this comparison the data are presented in full, either in the tables in the text or in the appendices A-D. In the course of our further analysis we attempt to answer the question whether there are specific groups that benefit most from frequent visits to the health centre or, conversely, groups that benefit particularly little. For that purpose, data are broken down according to area, social class and domestic stage. In view of the quantity of data involved the latter results are not presented in full but summarized in appendices E-G.

6.1. Effects of frequent attendance on knowledge and preferences

The individual knowledge questions, the individual comparisons of the preference scale and the item percentages are listed in appendices A and B. Table 6 gives a summary of the knowledge results. Both groups contain a high percentage of women that mention food in connection with the occurrence of marasmus. Quite a large group of women refers to illness and diarrhoea as a cause, answers which are, of course, also quite acceptable. There is only a small minority of women with poor knowledge who had no answer ready. However, there was no difference in this respect between the frequent visitors and infrequent visitors. Given the general awareness of the causes of marasmus, it would be unrealistic to expect a significant difference between the two groups.

In general, it is fair to state that nutrition teaching in Kenya pays particular attention to weaning and the introduction of weaning foods. In this respect there are, indeed, differences between the two groups. The frequent visitors generally mention earlier ages at which gruel and mashed bananas with potatoes can be given to a child, as well as earlier ages at which beans and porridge with vegetables can be introduced. The introduction of solid foods at a fairly early age is, of course, quite in line with the general content of most nutrition

Table 6. Summary of knowledge results by frequency of visits*

		INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
1. Percentage of women who are not able to mention any cause of marasmus.		15%	20%
2a. Percentage of women mentioning an early age at which children can start eating:	ucuru (4 m. & younger)	51%	58%
	gitoero (id.)	27%	39%
	mboco (id.)	17%	28%
	ngima na mboga (id.)	10%	19%
	githeri (20 m. & younger)	17%	12%
2b. Percentage of women mentioning an early age of introduction (0-4 m.) for two or more of the following foods: ucuru; gitoero; mboco; ngima na mboga.		27%	40%
3. Percentage of women mentioning weaning age of 20 months or younger.		62%	77%
4. Percentage of women who mention water with salt and/or sugar as treatment for diarrhoea.		25%	30%

* Detailed results are listed in appendix A.

teaching. The combined answers for these four foods (table 6: Q.2b), show significant differences between the two groups.(17) We interpret this as an effect of frequent contact with the MCH services. At the same time, the frequent visitors are less inclined to continue breast feeding for longer than 21 months, which is also a significant difference.(18) However, this only concerns very long periods of breast feeding; the number of women in both groups who wean early and very early, i.e. at less than 14 months or even 8 months, is the same. Among the frequent attenders more women consider 15-20 months an appropriate age for weaning. Since the benefits of prolonged breastfeeding after 1½-2 years are doubtful there is no reason to regard this as a negative finding. On the contrary, it may also reflect a greater awareness of the nutritional needs of small children. Among the frequent visitors, slightly more mothers found it advisable to wait a little longer before introducing children to the adult diet of whole maize with beans. Although this is not a significant difference it confirms the finding that frequent visitors have more knowledge of the need to start supplementing a young child's diet at an early age and the need to keep it on its own kind of diet for a relatively long time.

Finally, quite a high percentage of women mention water with sugar and/or salt in connection with the last question regarding the treatment of diarrhoea. Since this is not a traditional Kikuyu cure this is certainly a positive finding but the difference between frequent and

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Table 7.
Preferences by frequency of visits: Average number of choices for beans, peas, eggs and meat when compared with the four foods mentioned in parentheses*

	INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Average number of choices, out of 16 comparisons, for high-protein, high-calorie foods (standard deviation in parentheses)	11.5 (2.4)	11.5 (2.9)
BEANS - (rice/f.millet/banana/cabbage)	3.3	3.4
PEAS - (maize fl./kale/I.potato/orange)	2.2	2.2
EGGS - (rice/f.millet/banana/cabbage)	3.4	3.25
MEAT - (maize fl./kale/I.potato/orange)	2.6	2.65

* Detailed results are listed in appendix B.

infrequent visitors is quite small and not significant. It is therefore most likely that the diffusion of knowledge about this kind of treatment has been of a more general nature.

No effects, at all, were found on the level of attitudes, as measured by means of the preferences of mothers for foods to be given to 2-year-olds. The average number of choices for the highly nutritious foods included in this scale (beans, peas, eggs, and meat) is quite high: 11.5 out of 16. However, no differences were found to exist between the frequent and infrequent visitors in this respect (table 7). Detailed examination of the individual high protein-high calorie foods also failed to reveal any differences between the two groups. There are no indications that the activities at the health centres have an impact on the food preferences of the frequent visitors.

Although the centres seem to succeed in making mothers more aware of the need to introduce supplementary foods at an early age, they do not succeed in improving the preferences of these mothers.

6.2. Effects of frequent attendance on children's diets

Food intake for the previous day was recorded by means of the 24 hr dietary recall method. Table 8 lists the overall results: total food consumption together with energy and protein intake. A breakdown by foodgroups is given in appendix C. The average age of the index children in the two groups was 21 and 20 months respectively.

The total quantity of food and drink consumed during the previous day is much the same for the two groups, as are the energy and protein intake. Milk consumption by the children of frequent visitors is quite

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high, about 275 grams, but it is nearly the same for the children of infrequent visitors. Average consumption of solid foods is 300 grams raw matter; over 80 per cent of this consisting of roots and tubers, cereals, and vegetables. The reported consumption of grain legumes is about 15 grs, that of eggs and meat about 10 grs, and that of fat about 5 grs. All these figures are much the same in the two groups. There is not the slightest suggestion of differences in food intake between the children in the two groups. Indeed, results are remarkably similar considering the large standard deviations.(19)

The total quantity of food and drink consumed is, on average, only 1100 grams, i.e. considerably less than the corresponding consumption figures recorded for the general child population studied in the survey (NIRPb). The children visiting the health centres, however, tend to be younger than the survey children and, more importantly, two-thirds of the children studied at the health centres were, in fact, attending because of some health complaint. Many of these children were, to a greater of lesser degree, unwell, and had therefore eaten little or nothing the previous day. Figure 3 shows that the increase of total food consumption and energy intake with age is much steeper among the MCH visitors than among the survey children. This suggests that the food intake of the youngest children decreases most during their respective illnesses. Perhaps this is related to a particular nature of illnesses among the youngest children, perhaps to a particular reaction to illness among children at that age.

This last finding interferes to some extent with the comparison between the groups of frequent and infrequent visitors; it would there-

Table 8.
Summary of food intake*: Averages and standard deviations()

	INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Total amount of food and drink consumed (grs.)	1076 (543)	1055 (537)
Energy intake (Kcal.)	761 (423)	735 (407)
Protein intake (grs.)	26 (16)	25 (16)

* Detailed results for individual food groups are presented in appendix C.

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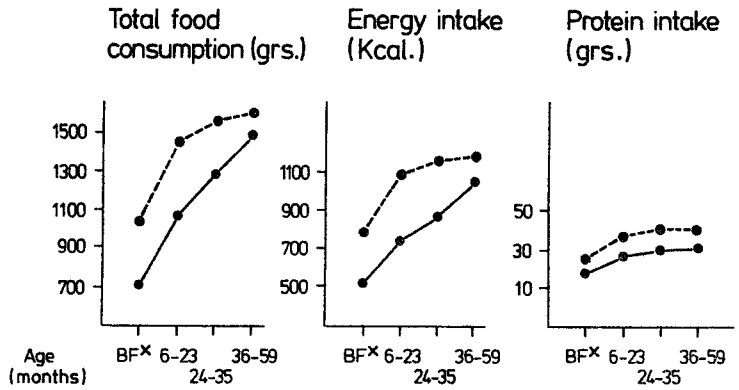
Figure 3.
Average food intake by age group for index children and general child population (NIRPb).



●——● frequent and infrequent visitors combined (n=53; 66; 29; & 25 for the respective age groups).
●---● NIRP survey
× BF=children, breastfed (see note 20).

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fore be preferable to restrict the comparison to children of 36 months and older because these children show no reduction in food intake. However, the small number of subjects in this age group (25) does not justify this. On the other hand, the average age and age distribution of the two groups of children are the same (table 5) and even when the children in both groups are eating less because they are ill, the children of the frequent visitors could still eat differently. But this proved not to be the case, nor is there any difference in calorie and protein content of the food that is consumed. The conclusion must be that the diets of the children of frequent visitors show no sign of having been influenced by the contact with the MCH services.

6.3. Effect of frequent attendance on nutritional status

The findings concerning nutritional status do not deviate from the results for maternal preferences and food intake. The average W-A, H-A

and W-H, are not noticeably better for the children of the frequent visitors (table 9). As regards average H-A, the most important indicator, the two groups are virtually identical. The percentages of children that fall below certain critical values are not lower among the frequent visitors: there is no indication of a positive effect of frequent attendance at the health centres (see also appendix D).

Comparison of the anthropometric results of the two groups of visitors with the survey results (already mentioned in table 1 but again listed in table 9) produces a curious and not altogether uninteresting finding. What stands out, first, is that 40 per cent of the visiting index children had a weight-for-height of less than 90, which is almost twice the percentage found among the children in the survey. Second, an almost reverse finding, namely that the height-for-age of the children visiting the health centre is slightly higher than among the survey children. The first finding is, of course, perfectly understandable. As already mentioned, many of these children attend because of some ailment from which they must have suffered for some time, resulting in losses of weight, which is exactly what we find. That H-A is slightly better among the children visiting the health centres than among the survey children is less easily explained. Although this is not a large difference, it is nevertheless statistically significant.[21] Possibly the cause lies in the different age range of children in the two studies; in the survey all children between the ages of 6 months and 5 years were included, the present study is concerned with a younger group of children (see table 5). Another possible reason could be that the visitors at the health centres in some way form a positive selection from

Table 9. Summary of anthropometry by frequency of visits

		INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91	NIRP(b) SURVEY N=508
Averages (and standard deviations)	weight-for-age	85.3 (11.6)	85.1 (12.9)	85.6 (10.2)
	height-for-age	95.0 (5.6)	95.1 (5.1)	93.3 (4.5)
	weight-for-height	93.3 (9.0)	92.6 (9.9)	95.6 (8.0)
Percent children falling below critical value of:	W-A (80)*	30%	37%	28%
	H-A (90)	12%	16%	21%
	W-H (90)	40%	41%	22%

* Detailed distributions are listed in appendix D.

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Table 10. Nutritional status by frequency of visits

		INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Malnourished children	(a)	9%	10%
Stunted children	(b)	4%	7%
Wasted children	(c)	32%	31%
Children in satisfactory cond.	(d)	56%	53%

(a) height-for-age & weight-for-height $<$ 90
(b) height-for-age $<$ 90; weight-for-height $>$ 90
(c) height-for-age $>$ 90; weight-for-height $<$ 90
(d) height-for-age & weight-for-height $>$ 90

the general population. Further analysis of this and other related material, is needed, in particular the results of a separate study of attendance at the health centres. What seems quite clear, however, is that the higher H-A is not a result of contact with the health centre, this must be concluded from the fact that there are no differences between frequent and infrequent attenders.

Waterlow (1976) has suggested that nutritional status is best judged by combining H-A and W-H to distinguish between four groups of children as in table 10. About ten per cent of the children in the present study can be regarded as malnourished; they show a combination of long standing undernutrition as evinced by the stunting of H-A, together with acute malnutrition as shown by their low W-H. A further five per cent of the children show evidence of stunting. That more than thirty per cent of the children had a low W-H has already been pointed out. What is more important is that the data again do not reveal any differences between frequent and infrequent visitors.

6.4. Interaction with ecological area, social class and domestic stage

Although the chief aim of the present study was to establish the effect of contact with the MCH services, it was also important to establish which groups of visitors were most likely to benefit from this contact, i.e. to establish under what circumstances the effects of this kind of intervention are most beneficial. The circumstances to be considered, in this context, are ecological area, social class and domestic stage.

Such an analysis should not only focus on the relation of these three factors with the various indicators but also and especially on possible interactions, i.e. identify the conditions under which the favourable effects among the frequent visitors are greatest.

Since, we have not been able to establish any pervasive effects, other than some increase in knowledge, among the frequent attenders, it is unlikely that such further analysis will produce important insights.[22] The absence of general effects also means that we have few leads to follow up and that we must look for patterns of interaction rather than individual, isolated findings. However, for the sake of completeness and also for future reference, a summary of the results for infrequent and frequent visitors is given by area, class and domestic stage. Each summary comprises the following: (a) the knowledge questions concerning the introduction of weaning foods and the treatment of diarrhoea; (b) the preference score; (c) the total quantity of food and drink consumed during the previous day together with energy intake and protein consumption; (d) the average W-A, H-A and W-H as well as the percentages of children falling below critical values.

In respect of ecological area, the only evidence of interaction is shown by the results of the knowledge questions (appendix E). In the higher area the difference between infrequent and frequent visitors is 10-20 per cent greater than in the other areas. There is at least a strong suggestion that in the higher area knowledge increases more as a result of frequent contact with the MCH services. The absolute knowledge level in the higher area, however, is not different from that of the frequent visitors in the lower area. Although the frequent visitors in the higher area, contrary to the frequent visitors in the other areas, also show an increase in preference score, this difference is small and does not come anywhere near reaching statistical significance. No interaction appears to exist in respect of diets and nutritional status. Despite the fact that knowledge increase is greatest among the frequent visitors in the higher area, this group of visitors, at the same time, has the largest percentage of children below H-A(90) and W-A(80). This does not suggest that this group of children benefits particularly much from the nutritional activities at the MCH services in this area.

Interpretation of the data concerning social class (appendix F) is slightly complicated by the fact that there are so few affluent households: 5 among the infrequent and 9 among the frequent visitors. In all, there are no indications that the mothers and children from intermediate and affluent households are able to benefit more than others from their contact with the MCH services. The children in poor households have a lower nutritional status than the children from intermediate and affluent households but as far as the two latter groups of children are concerned there are still no significant differences between infrequent and frequent visitors nor are there significant differences as regards food intake and preferences. Finally, the differences in knowledge increases are slight and it seems justified to disregard them.

In respect of domestic stage we are confronted with relatively few elder families. Although the young families show the poorest results in respect of food intake and anthropometry, the middle age and elder families show no improvement with frequent contact with the MCH services (appendix G). Neither height-for-age, energy intake nor food preferences appear to improve after frequent attendance among the latter families. However, as in the case of ecological area, the knowledge results point to some interaction between attendance and domestic stage. Among the frequent visitors, the middle age and elder families show more improvement than the young families. Of course, the older the mother the more practical experience she has had with child diarrhoea and with weaning and the more frequently in general, she has consulted the MCH services. In a sense this confirms that knowledge levels are somewhat improved by long-term contact with the MCH services. But at the same time it underlines the absence of an effect with regard to maternal preferences, food intake and the nutritional status of the children.

7. CONCLUSION

On the whole, the MCH services appear to have little or no impact on the whole range of nutritional attitudes of mothers, their behaviour and the nutritional status of children. It is only on the level of nutritional knowledge that some differences between the two groups exist that

can be credited to frequent contact with the MCH services. The general lack of effect is nevertheless disappointing. And it is not as if there is no need for nutritional improvement: thirty five per cent of the children attending had a weight-for-age under 80, while ten per cent of the children were malnourished according to stricter standards.

Such a lack of positive effects makes it imperative that we subject the present study to a critical re-appraisal to establish whether the disappointing findings may possibly be attributed to faulty design or method. Although our specific aim was to study the Nutrition Field Workers, their activities are organized in such a way that it was necessary to define the object of our research in more general terms, i.e. to study the effect of all nutrition information given at those MCH services where field workers are active. Although in this way no distinction is made between the nutritional influence of Nutrition Field Workers and other MCH workers, this is acceptable because, as stated, in practice the activities of the field workers and other MCH personnel overlap considerably.

Any evaluation knows two major components: design and indicators. With respect to the latter, the following remarks may suffice. Although the knowledge questions require some further internal analysis, they are straightforward om the whole. The preliminary research into maternal food preferences has already been mentioned (Hoorweg & Niemeyer, 1980a). The 24 hr dietary recall as a method of measuring food intake has certain limitations but it is a useful instrument for assessing the mean food intake of different groups of children (Garn, Larkin & Cole, 1978; NIRPb). The anthropometric measures need no further argument here, they are generally used to assess the nutritional status of children.

The design of the present study consists of a comparison between frequent and infrequent visitors to the MCH services. This comparison could theoretically add spurious differences to any effects resulting from the nutritional activities. We have tried to counteract this by selecting for comparison on the one hand women who had attended a number of times over the past half year and who also lived nearby (which facilitated their access to the health centres) and on the other hand women living further away, who had visited less often over the past six months. There is good reason to believe that this selection has achieved its aim and that comparable groups have been studied that differ only in respect of

frequency of attendances. If not, if the groups also differ in other respects, one would first of all expect the results of the group of frequent visitors to be favourably influenced as a result of such an error in the design. This would weaken the significance of positive findings but it would not accord with the absence of differences that is, by and large, found in the present case. On the other hand, we must also consider the possibility that the two selected groups did, in fact, not differ in their contact with the MCH services, in which case they would not offer fair comparison. This, however, is also unlikely because it is well established that distance, i.e. travelling time, influences the frequency of attendance. Also, we do, after all, find some differences in nutritional knowledge between the frequent and infrequent visitors, a result of the nutrition information that is given.

Admittedly, the comparison is rather weak in the sense that groups might have been selected that differ more in their contact with the MCH services than the present groups. For instance, we could have asked the staff to point out the real habitués among the mothers but this could have produced an artificially positive impression of the effects achieved. The way in which the present groups were selected accords with the way the MCH services operate, i.e. they are aimed at the general population of mothers with little knowledge of individual cases. In that sense the present design is a true reflection of the current way in which nutrition information is given. And since we are interested to know what is really achieved, not what might be achieved in certain favourable circumstances, we are satisfied that the present design is adequate.

The limitations of the present study are rather self evident but they must be mentioned explicity. First, the present evaluation does not cover the nutritional effects of other aspects of MCH services such as immunisation and medical treatment. The effects of these particular services fall outside the scope of this design. Second, the design of the study does not make it possible to asses nutritional improvements that have occurred among the population as a whole, over the years. Neither does it allow any judgment on the effects of occasional home-visits and/or monitoring of malnourished children by the Nutrition Field Workers. What we did evaluate is the benefit

people derive from the nutrition education which is given at these MCH services.

With respect to our finding that these benefits are meagre we wish to point at the following. The activities of the Nutrition Field Workers are diffuse. We have already mentioned that some of them function mainly in other MCH duties while other field workers who insist on their specific role find themselves isolated. But even when concentrating on their nutritional duties, they are faced with considerable difficulties. Those who venture outside their base, the health centre, waste a disproportionate amount of time on travelling. At the health centre itself their contact with individual mothers is usually limited while the task of group teaching is often left undone. Mention should be made here of the fact that the position of the field workers is administratively different from that of the other MCH personnel: they do not fall under the same system of supervision but are directly responsible to the District Medical Officer. This means on the one hand that they lack close supervision, on the other hand that on occasion they may lack sufficient backing. We feel that there is considerable room for improvement in both supervision and organizational support.

Another aspect that requires consideration is the unspoken assumption behind the activities of the Nutrition Field Workers that by providing nutrition information they should be able to influence the general population of mothers. That this expectation is not met seems, in hindsight, not surprising. When lecturing at the health centre, the field worker addresses a group of mothers whose individual needs she does not know. When dealing with the mothers individually she is usually hampered by a lack of information because no records of individual cases are kept.

In view of the above we may venture two suggestions. First, that the goal of improving nutrition among children of all mothers should be reconsidered. An alternative would be to focus activities on groups at risk. In Central Province these women should be sought among poor households and among young and middle age families with many children (see pp. 19-21). The present system of home-visiting, apart from the fact that it is extremely time-consuming, cannot be deemed adequate for this purpose and other ways and means should be found to reach groups needing special attention. Second, if such a

reorientation of the programme is ever considered, it it also necessary to introduce some kind of record system for the cases at risk and other cases that merit special attention. At least, weight charts should be introduced, which can be left in the keep of the mother. At the time of our studies such charts were no longer in use. For evaluation and other purposes it might also be useful to collect more data on these cases (including the height of children) much as is done at the Family Life Training Centres. Some field workers have been given permission to start CRS clinics and this recent collaboration between the government health facilities and Catholic Relief Services must be greeted positively. This is a favourable development, not only because it allows attention for individual cases but also because the CRS programme does have measurable effects (reported elsewhere, see Hoorweg & Niemeyer, 1980b).

The present report is intended as a straightforward overview of findings. Further suggestions and comments will have to await further comparisons with the findings of the studies at the other programmes and of the surveys. We wish, however, to make one final remark. The cause for the lack of demonstrable effects should not be sought in individuals or particular circumstances, but rather in the enormity of the task facing the Nutrition Field Workers. In most developing countries the discrepancy between health needs and health resources is great and this is not different in Kenya in the case of child nutrition. That, however, should make it all the more imperative to use the available resources, in this case the field workers, as effective as possible.

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.

3. The nine clinics c.q. centres studied are located in the following towns and villages:
   - Kiambu district: Limuru (Family Life Training Centre), Kambaa (Catholic Relief Services), Lari (Health Centre), all three in Limuru division.
   - Muranga district: Kigumo (FLTC), Gaichanjiru (CRS), Kandara (HC), situated in the middle and lower parts of Kigumo and Kandara divisions.
   - Kirinyaga district: Mwea (FLTC), Karaba (CRS), 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 last figure, 15,700 sh/acre, shoud be seen in perspective. Most smallholders growing coffee have only a small plot with this crop, which requires considerable investment and a long fruition time. Few grow more than half an acre of coffee and because cultivation methods are often less than optimal their harvests are usually modest. Meilink estimated that in the top year, 1977, some 85% of the coffee-growing smallholders in Muranga earned an average of only 4,000 Sh from this crop (1979:23).

6. 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

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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.

7. Very few children do not live with their parents, and less than 5% of the children are brought to the health centre by someone other than their mother, as will be seen later in the report. All female guardians of children and all women bringing children to the health centres are therefore referred to as 'mothers'.

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

9. 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.

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

11. To mention only one thing: mothers with only one infant, differ from many other visitors in respect of the domestic stage of their family, a factor which, we know, is related to the nutritional status of small children.

12. In Kandara infrequent visitors were women who had attended 4 times or less during the previous six months and who had to travel for more than an hour. Frequent visitors were women who had attended 5 times or more during the previous six months and who had to travel an hour or less. The difference in selection criteria between the centres came about because the initial requirements were formulated on the basis of our experiences in Kandara, the first centre to be studied. It turned out that if the Kandara requirements were used at the other centres this would reduce the number of available subjects drastically. The requirements in Lari and Kimbimbi were therefore slightly modified prior to starting the data collection at these centres.

13. By force of circumstance, there was less time available for individual interviews at the health centres than at the CRS clinics and FLT centres and during the surveys. This meant that only a shortened socio-economic questionnaire could be used. At the time when the shortened version was decided upon, the survey results had not yet been analyzed and it was not yet known which variables, employment and cash farming, could best be used to distinguish between social strata. Unfortunately these two aspects were not adequately covered in the shortened questionnaire. The social stratification in the present study is therefore based on two related variables: educational level and farmsize. A high educational level (compared to other women of the same age) and a large farm (compared to other households in the same ecological area) were taken to indicate a higher social class. In this manner three classes are again distinguished: poor (small or medium farmsize and low education); intermediate (large farm but low education, or small farm but high education); and affluent (large or medium farm, high education). There is a reasonable agreement between this manner of distinction and the manner of dis-

tinction in the survey (NIRPa). When both manners of distinguishing social class were tried on the survey households, 55 per cent of the cases were allocated to exactly the same class, while the coefficient of agreement, Gamma, was .60.

14. One possible objection to the present design is that mothers who had frequently attended over the previous half year, had probably done so because their child suffered from a persistent complaint. In that case their selection as frequent attenders is the result of illness, not of a certain attendance pattern. This objection is not confirmed by the data. The number of mothers re-attending because of an old complaint of the child is not significantly different in the two groups (table 5).

15. 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.

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

17. For reasons of convenience the summary table presents the percentage of women, 27% and 40% respectively, who mention an early age of introduction for 2 or more foods, $X^2=3.55$; $p=.06$. The more exact figure is the average number of foods mentioned for early introduction, which is 1.0 and 1.4 in the respective groups (standard deviations 1.15 and 1.30), $F=4.22$; $p<.05$.

18. $X^2=4.91$; $p<.05$.

19. The high standard deviations in food quantities are the result of the fairly wide age range of the children and also of the manner of calculation: certain children did not consume certain foods, and their consumption was recorded as 0.

20. All children still being breastfed are included in the group BF, irrespective of age. The average age of the children in this group is still much lower than that of the next group, which comprises the children between 6-23 months.

21. $t=3.67$; $p<.01$

22. If a substantial subgroup among the frequent visitors would show significant effects, the remaining groups of frequent visitors would necessarily have to show the opposite, i.e. negative, effect. The total group, after all, shows no effect. Although theoretically possible it is unlikely that the effect of contact with the MCH services would be positive in say, one half of the cases and not only absent, but negative among the other half of the cases.

23. It may be wondered why it is that the knowledge on such concrete matters as the introduction of weaning foods and the treatment of diarrhoea is most influenced. These are typically the kinds of topics discussed individually, which could suggest that individual consultation when the need arises is a more favourable setting than lectures-cum-demonstrations.

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Appendix A.
KNOWLEDGE QUESTIONNAIRE: RESULTS BY FREQUENCY OF VISITS

			INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
1. What causes kuhoma?*		food: poor quality	29%	31%
		food: insufficient quantity	30%	17%
		other answers	26%	33%
		don't know	15%	20%
2. At what age can a child start to eat the following foods?	a) ucuru**	0 - 4 months	51%	58%
		5 - 9 months	40%	36%
		10+ months	9%	7%
	b) gitoero	0 - 4 months	27%	39%
		5 - 9 months	55%	44%
		10+ months	18%	17%
	c) mboco	0 - 4 months	17%	28%
		5 - 9 months	54%	50%
		10+ months	29%	22%
	d) ngima na mboga	0 - 4 months	10%	19%
		5 - 9 months	51%	38%
		10+ months	39%	43%
	e) githeri	0 -20 months	17%	12%
		21 -29 months	29%	28%
		30+ months	54%	60%
3. What is the best age at which to stop breast-feeding a child?		0 - 9 months	6%	7%
		10 -14 months	29%	32%
		15 -20 months	28%	38%
		21+ months	37%	23%
4. When a child suffers from kuharuo (=diarrhoea) what foods or drinks should you give?		water, plain	43%	41%
		water, with sugar and/or salt	25%	30%
		other answers	31%	30%

* kuhoma = the Kikuyu concept closest to marasmus: a condition in which a child does not grow well and has thin arms and legs.
** ucuru = maize gruel; gitoero=mashed bananas and Irish potatoes; mboco=beans; ngima na mboga=maize porridge with vegetables; githeri= whole maize and beans.

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Appendix B
PREFERENCE SCALE: RESULTS FOR PAIRED COMPARISONS BY FREQUENCY OF VISITS
(Proportions of respondents choosing the first of the two foods mentioned; for example, 90% of the infrequent visitors preferred beans over rice)

	INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Beans-Rice	.90	.90
Beans-Finger millet	.72	.81
Beans-Green banana	.88	.86
Beans-Cabbage	.83	.80
Peas-Maize flour	.60	.67
Peas-Kale	.42	.36
Peas-Irish potato	.76	.76
Peas-Orange	.39	.39
Eggs-Rice	.92	.89
Eggs-Finger millet	.86	.83
Eggs-Green banana	.82	.71
Eggs-Cabbage	.82	.82
Meat-Maize flour	.77	.76
Meat-Kale	.43	.58
Meat-Irish potato	.88	.73
Meat-Orange	.48	.58

Appendix C. DIETARY RECALL: AVERAGE CONSUMPTION OF FOOD GROUPS BY FREQUENCY OF VISITS (GRS).

	AVERAGES		STANDARD DEVIATIONS	
	INFREQUENT VISITORS(a) N=83	FREQUENT VISITORS(b) N=91	(a)	(b)
Cereals	77	70	85	77
Roots & tubers	134	116	161	128
Grain legumes	16	14	39	37
Vegetables	70	77	98	92
Fruits	7	3	46	19
Eggs & meats	9	12	20	24
Fat	5	4	4	5
Sugar	8	8	16	15
Miscell. solid foods	8	10	32	33
Subtotal: Solid foods	332	313	211	184
Milk	268	278	211	239
Subtotal: Raw matter	600	591	289	298
Cooking water	476	464	-	-
Total consumed	1076	1055	543	537

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Appendix D
ANTHROPOMETRY: DISTRIBUTIONS BY FREQUENCY OF VISITS

		INFREQUENT VISITORS N=83	FREQUENT VISITORS N=91
Weight-for-age	-59	-	2%
	60-69	7%	6%
	70-79	23%	30%
	80-89	39%	29%
	90-99	21%	23%
	100-109	7%	9%
	110+	4%	2%
Height-for-age	-79	1%	1%
	80-84	3%	1%
	85-89	9%	14%
	90-94	43%	30%
	95-99	28%	38%
	100-104	13%	12%
	105+	4%	3%
Weight-for-height	-69	-	1%
	70-79	5%	2%
	80-84	13%	20%
	85-89	22%	18%
	90-99	37%	43%
	100-109	20%	12%
	110+	4%	4%

Appendix E.
SUMMARY OF RESULTS BY AREA BY FREQUENCY OF VISITS

	LOWER AREA		MIDDLE AREA		UPPER AREA	
	Infr.V N=27	Freq.V N=26	Infr.V N=32	Freq.V N=40	Infr.V N=24	Freq.V N=25
KNOWLEDGE						
Q1. Percentage of women mentioning an early age of introduction (0-4 months) for two or more of the following dishes: ucuru; gitoero; mboco; ngima na mboga	35%	46%	28%	33%	17%	46%
Q2. Percent women mentioning water with salt and/or sugar as diet in the case of diarrhoea	30%	35%	22%	20%	25%	40%
PREFERENCES						
The average number of choices, out of 16 comparisons, for high protein-high calorie foods	11.5	11.6	12.1	11.4	10.7	11.4
DIETARY RECALL: AVERAGES						
Total amount of food and drink consumed (grs.)	1047	1075	1115	1072	1058	1006
Energy intake (Kcal.)	736	704	797	773	743	707
Protein intake (grs.)	23	24	29	26	25	26
ANTHROPOMETRY						
Average W-A	82.3	83.4	86.9	87.5	86.5	83.1
H-A	94.1	95.3	95.9	95.5	94.8	94.5
W-H	91.6	91.1	92.9	93.8	95.9	92.3
Percent children W-A(80)	33%	35%	31%	33%	25%	48%
falling below critical H-A(90)	15%	19%	16%	13%	8%	20%
value of: W-H(90)	52%	54%	41%	33%	25%	40%

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Appendix F.
SUMMARY OF RESULTS BY SOCIAL CLASS BY FREQUENCY OF VISITS

		POOR H.HOLDS		INTERMEDIATE HH.		AFFLUENT HH.	
		Infr.V N=51	Freq.V N=57	Infr.V N=27	Freq.V N=25	Infr.V N=5	Freq.V N=9
KNOWLEDGE							
Q1. Percentage of women mentioning an early age of introduction (0-4 months) for two or more of the following dishes: ucuru; gitoero; mboco; ngima na mboga		32%	43%	22%	40%	0%	22%
Q2. Percent women mentioning water with salt and/or sugar as diet in the case of diarrhoea		29%	23%	22%	40%	0%	44%
PREFERENCES							
The average number of choices, out of 16 comparisons, for high protein-high calorie foods		11.5	11.5	11.3	10.8	12.8	11.3
DIETARY RECALL: AVERAGES							
Total amount of food and drink consumed (grs.)		1069	1074	1084	976	1107	1151
Energy intake (Kcal.)		739	735	812	693	718	858
Protein intake (grs.)		25	26	27	22	27	29
ANTHROPOMETRY							
Average	W-A	84.7	83.6	86.3	87.8	85.8	87.7
	H-A	94.4	94.1	95.9	97.4	96.5	95.8
	W-H	94.2	92.6	92.4	92.4	90.0	93.4
Percent children	W-A(80)	25%	42%	33%	28%	60%	33%
falling below critical	H-A(90)	12%	25%	15%	4%	0%	0%
value of:	W-H(90)	36%	46%	44%	28%	60%	44%

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Appendix G.
SUMMARY OF RESULTS BY DOMESTIC STAGE BY FREQUENCY OF VISITS

	YOUNG FAMILIES		MIDDLE-AGE FAM.		ELDER FAM.	
	Infr.V N=38	Freq.V N=34	Infr.V N=35	Freq.V N=46	Infr.V N=10	Freq.V N=11
KNOWLEDGE						
Q1. Percentage of women mentioning an early age of introduction (0-4 months) for two or more of the following dishes: ucuru; gitoero; mboco; ngima na mboga	34%	39%	15%	37%	40%	55%
Q2. Percent women mentioning water with salt and/or sugar as diet in the case of diarrhoea	26%	18%	29%	39%	10%	27%
PREFERENCES						
The average number of choices, out of 16 comparisons, for high protein-high calorie foods	11.7	11.3	11.2	11.4	11.7	10.8
DIETARY RECALL: AVERAGES						
Total amount of food and drink consumed (grs.)	1009	1075	1149	979	1077	1303
Energy intake (Kcal.)	732	771	790	674	772	878
Protein intake (grs.)	25	26	26	23	28	31
ANTHROPOMETRY						
Average W-A	85.6	83.4	85.1	86.4	84.6	85.1
H-A	94.3	94.4	95.3	95.6	96.4	95.6
W-H	95.4	92.9	91.9	92.7	90.6	91.4
Percent children W-A(80)	26%	32%	34%	39%	30%	45%
falling below critical H-A(90)	11%	24%	15%	15%	10%	0%
value of: W-H(90)	34%	38%	47%	39%	40%	55%

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