Non-farm employment in rural Kenya: micro-mechanisms influencing food and nutrition of farming households

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This thesis is dedicated to Professor A. A. Kielmann and Nandita Kielmann
To God be the glory

Abstract

Non-farm employment in rural Kenya: micro-mechanisms influencing food and nutrition of farming households

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Doctoral thesis, Department of Human Nutrition, Wageningen Agricultural University, Wageningen, Netherlands, 26th November 1996

The study reported here describes the links between non-farm employment and child nutritional status in rural coastal Kenya using a model adapted from an operational model commonly used in nutrition planning. Four studies were conducted in 1994 and 1995 in a community in Kwale district. Three of these studies were non-farm employment and subsistence food production, household income and food accessibility, and maternal employment and child care and house health environment. The findings of these three studies were used in the design of the fourth study which assessed the whole model.

Households which combined both NFE and agricultural sources of income had higher total incomes than those which depended on only one source. The relation between non-farm employment and nutritional status was weak. There was a positive relation between household income and the level of household food expenditure, which, in turn, was positively associated with long-term nutritional status of children. Higher energy intake was associated with food diversity and increased with income level. The sources of differences in food diversity within income groups were not sought. Household income and time spent in the non-farm activities per woman had no direct linear effects on the components of child care. However, income did affect housing quality, while time affected household sanitation/hygiene. Maternal employment had no effect on the components of child care and household-living conditions when controlling for the age of the youngest child, mother's education and household income. This is attributed to the fact that the mother had a lot of "spare time". Hence, this analysis suggests that non-farm employment can open an opportunity to provide for enhanced child's long-term nutritional status through the effect of total income on nutrient intake and through purchased goods that improve housing quality. Women's time in non-farm employment, although affecting house sanitation/hygiene, does not have to compromise the nutritional status of children. It is concluded that the framework used by households to allocate their resources of time and income is different from the framework used for programming and policy development. The role of non-economic factors in the difference between two frameworks is suggested as a focus for future research.

Contents

1

General Introduction

Poverty is the major cause of malnutrition in developing countries. The majority of those affected by poverty and malnutrition are smallholders in rural areas who also face other kinds of deprivation: ill health, inadequate water and sanitation, limited transport and the inability to participate in the society at large. Even if these deprivations were to be addressed at community level, rural farm-households would still need both physical and financial access to food, health, and individual care in order to realize improved nutritional conditions. It has been reported that agricultural growth alone would not be a sufficient and sustainable strategy to alleviate poverty and malnutrition in rural areas (von Braun, 1990a; von Braun *et al.*, 1991b).

Recent studies have shown that employment outside agriculture is increasingly becoming a necessary means of livelihood for rural households (Hoorweg, *et al.*, 1995; von Braun and Pandya-Lorch, 1991). Non-farm employment (NFE) is not only a source of cash income, which is vital for the acquisition of food, health and care needed for good nutrition, but it is also a means of diversifying sources of livelihood and of stabilizing consumption throughout the year (von Braun and Pandya-Lorch, 1991). Therefore, governmental and non-governmental organizations in developing countries are using strategies to increase opportunities for employment in the non-agricultural sector as a means of reaching health and nutrition objectives. However, doubts have recently been raised as to whether promoting better opportunities in non-farm employment (NFE) in developing countries really improves nutritional conditions. A number of studies have shown that increased income does not fully translate into improved food consumption (Shah, 1983; Behrman and Deolalikar, 1987; Bouis and Haddad, 1992), nor does it improve health and the nutritional situation of rural households to the extent expected (Kennedy, 1989; Mwadime, 1989). Despite these differences of opinion and the fact that resource generation strategies are widely receiving attention, relatively few studies have explored the linkages between household resource strategies and nutrition. In order to judge whether income-augmenting or related wage and employment policies are able to improve nutritional outcomes, it is important to investigate whether the pathways through which NFE is expected to influence nutritional status can, indeed, be empirically confirmed.

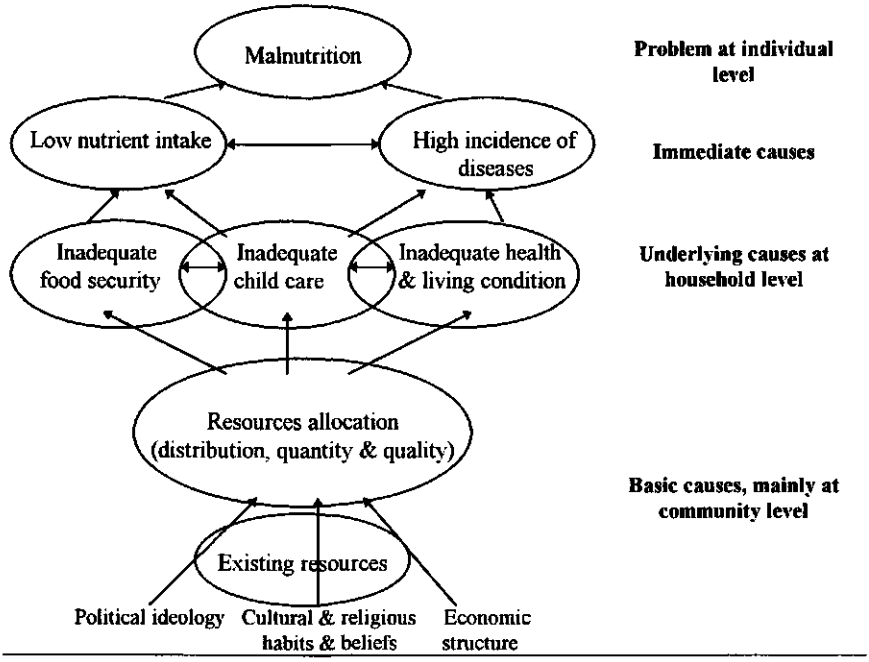
Establishing the links is not always easy. Complex relationships exist between the (many) factors involved and there are many others that may also obscure the relationships.

This study tries to explain these links in a rural community in sub-Saharan Africa. In this chapter the theoretical framework is developed, the study objectives are stated, the study area described and a summary of the study methods and materials is given.

Theoretical framework of the study

Causes of malnutrition

The study uses an adaptation of the framework used by the UNICEF Nutrition Strategy for the 1990s (UNICEF, 1990). The framework is used not only because it is theoretically sound but also because it is simple and widely used in nutrition planning and programme implementation (Frankenberger *et al.*, 1993; Kavishe and Mushi, 1993). Malnutrition and by inference low nutrition levels are outcomes of adverse conditions with immediate, underlying and basic causes (Figure 1.1).



Adapted from UNICEF, 1990

Figure 1.1. Conceptual frame of the household and community causes of inadequate nutritional status

Inadequate dietary intake, a high frequency of disease and, most frequently, a combination of the two are the **immediate causes** of malnutrition. The **underlying factors** are grouped into three **clusters**: household food security, child care, and basic health care and healthy environment. Household food security is important for ensuring adequate food intake (in terms of quantity and quality) throughout the year for all household members. It is a function of physical and financial accessibility to food, and of the stability and sustainability of the source of food (Maxwell and Frankenberger, 1992). Access to health care and a healthy environment are necessary for ensuring that household members are protected from infections and receive prompt basic treatment when needed. Care is the system of behaviours and practices which permit the appropriate health and development of the child. The care cluster caters for the interaction and actual realization of the other two clusters. This is done through decisions made for the allocation and translation of available resources (income, land, labour, knowledge and time) in order to maximize the nutritional welfare of household members (Bennet, 1990;Engle, 1994). For instance, the right food ought to be acquired, cooked and fed to the children in the correct amounts, proportions and frequency. The child also needs parental care and to be taken to health facilities when necessary. Hence, the components of the three clusters interact through the care cluster, and none is adequate to assure nutritional security by itself. For this, as stated earlier, households need to combine access to available food, care and basic health care and living environment in a proper mix that allows the nutritional status of all household members (the biological manifestation of nutritional security) to be above the accepted minimum standards throughout the year. Non-farm employment is one of the potential means of enabling rural households to attain nutritional security.

Non-farm employment and nutrition

The possible effects of NFE on nutritional status can either be negative or positive, depending on the resultant substitution effects which normally tend to counteract each other (Franklin, 1985) and which are difficult to predict. On the one hand, NFE generates the income needed to increase the household purchasing power and assets (Figure 1.2). One the other hand, it shifts household time and labour to NFE which would have otherwise been used to "produce" essential subsistence "goods" and services (Ho, 1979; Engberg *et al.*, 1988). How these two opposing effects affect the clusters of food, health and care presumably depends on the household's preferences, productivity and skills within the given geographical and socio-economic environment.

Income from NFE can be used to improve the components of the food cluster. This can be done by purchasing food to improve the quantity or quality of food intake in the household. Because the other main source of food in rural areas is from home production, a household that is willing and able can spend some of the income on improving the production assets and inputs. The earnings can also improve the health cluster by having an improved house environment, a better source of water, by using

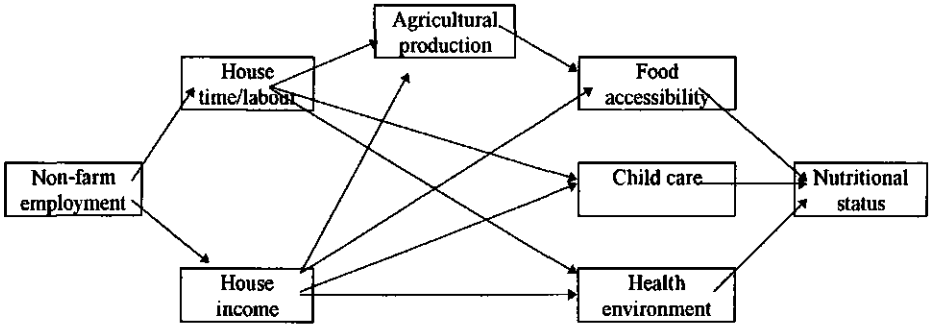


Figure 1.2. Association between non-farm employment and nutritional status

mosquito nets and screens, improving housing conditions, purchasing the soap needed to keep clean, investing in more efficient means of "production" like improved cooking stoves, owning a refrigerator, or having a wheelbarrow to collect firewood or water. The income also can increase financial accessibility to health care, especially in areas where public health systems demand "cost sharing". The child care cluster can indirectly benefit from higher income through the clusters of food and health, provided resources of these clusters assist in child caring. For instance, frequent feeding is more likely if a household has access to food, uses a more efficient stove and has a refrigerator.

Nevertheless, the time effect of NFE can have a negative effect on subsistence food production if labour is strained or if the household's preferences change against home production, which might increase reliance on purchased foods. The latter effect is more of a concern if the income from NFE is inadequate to meet all household food needs or if the one who controls the income is not concerned about adequate food for the household. NFE may also take so much of the household's time that health environment and child care are negatively affected. For instance, children may be weaned much earlier so as to give mothers more time for NFE, or the frequency of breast-feeding or feeding may be reduced, and the maintenance of good sanitation and the cleanliness of the child may be limited.

The magnitude and resultant direction of the two opposing effects on nutrition depend on (i) the nature of the NFE, i.e., where it is situated in relation to the rural home, flexibility in time use in the activity, and wage rates, (ii) the control of the resources from the activities (Kennedy, 1989), (iii) the presence of kin-members in the households who can help with child care and household chores (Engle, 1994) and, (iv) the stock of assets and technology the household has and the educational level of household members (Castro *et al.*, 1981; Smith *et al.*, 1983). Accessibility to basic and essential services like health, water and education are just as important in the relationship between NFE and child nutritional status (Strauss, 1990; Sahn, 1994).

Community-wide sanitation levels, ecological conditions, the knowledge and abilities of the household members, and household size and composition are all potential modifiers of this relationship (Heller and Drake, 1979; Tucker and Sanjur, 1988; Kennedy and Onian'go, 1991; Ruel *et al.*, 1992).

Therefore the actual effect of NFE on child nutritional status will depend on the geographical and socio-economic environment and can only be determined empirically. Systematic investigation of the mechanisms of how NFE impinges onto a child's nutritional status may help assess the potential effect of rural employment policies and programmes under different conditions.

Objectives and study questions

The objective of this study is to determine the relationships between non-farm employment of rural households on the one hand and food and nutrition on the other. The following research questions were formulated.

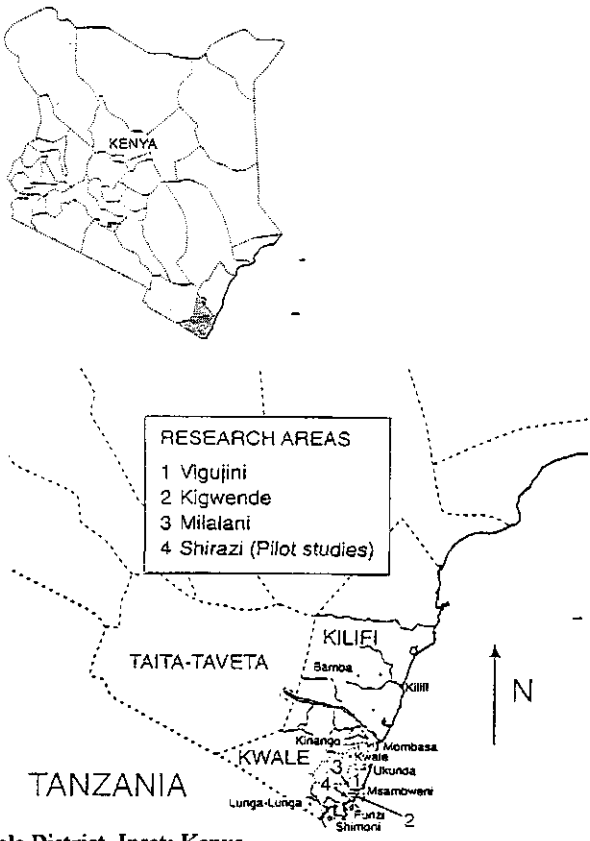
i. What consequences does engagement in non-farm employment have for agricultural food production in a rural community with high accessibility to non-farm employment?
ii. Does household income influence the level of food intake, and does this level of intake depend on the variety of food consumed?
iii. Does the participation in non-farm employment by women with pre-school children affect the components of child care and home-health-environment?
iv. Finally, as a test of the model shown in Figure 2, how does non-farm employment affect the clusters of food security, child-care and house living environment in the nutritional strategy framework, and how do these clusters relate to nutritional status?

Study area and population

The research was carried out in Kwale District in Coast Province of Kenya (Map). Msambweni, one of the 4 divisions in the District, was chosen as the study area for the following reasons.

i. Msambweni is served by good roads to the major coastal urban areas and to the tourist hotels which provide opportunities for non-farm employment. The nearness to sources of employment allows households access to NFE while living in their rural homes. Because of the variety in forms of NFE opportunities, comparison of different kinds of employment are possible.
ii. At the time of the study access to land was not a major problem in Msambweni. In addition, the area has medium agricultural productivity. Thus, it was expected that engagement in non-farm activities would not be driven very much by any

differentials in structural assets like land, nor by ecologically determined low production levels, so that the study population could be considered to be fairly homogenous in these respects.



Map of the research area in Kwale District. Inset: Kenya

iii. The communities have relatively good physical infrastructure, i.e. roads, transport, accessibility to health services (district hospital and health centres accessible within 60 minutes walk), water provision (taps and bore-holes within 30 minutes' walk), and primary schools and trading centres within easy reach. The effects of accessibility to basic services that may otherwise affect children's nutritional status and obscure the relationships between non-farm employment and nutrition were thus expected to be relatively weak in that area.

iv. The people in the area are mainly of the same culture, tribe and religion. Since all households had the same characteristics in that respect, as well as in the other factors given above (from 1 to 3), it was assumed that they were controlled for in this way. This meant that relationships relevant to the study were not marred by their influence.

Kwale District has a monsoon type of climate, i.e. it is hot and dry for most of the year, with bimodal rainfall. The *masika mwaka* cropping season starts in February and lasts till July. It includes the long rains (between early April and late May) and the *vuli* cropping season that starts in September and end in January, and takes advantage of the short rains (between the end of September to end of November). The short rains are unreliable and most agricultural activities are concentrated in the *masika-mwaka* period. Few households cultivate during the *vuli* season.

Msambweni lies within the so-called coastal strip (a geographical area extending 12 nautical miles inland). The area is occupied mainly by people of the Digo tribe, and most are Muslims. The literacy rate is low, 44% compared to the national average of 72%. The Digo have strong social networks and support systems. Extended families are the norm, with relatives moving in to help, especially in times of need. They usually settle in villages close to roads or trading centres, with their homesteads surrounded by coconut palms and cashew tree crops. Most households have access to land through inheritance, through communal clan land or they borrow it from relatives. The baseline data indicated that the average land size per family is 5 acres (ranging from 0.8 to 51 acres). Of this land, 86% is put to agricultural use, of which 59% is under tree crops and 27% is planted with food crops. Cultivated areas per household under food crops are small (1.5 acres per household or 0.35 acres per adult equivalent). Coconut, cashew-nuts and fruits are the main trees and cash crops, while maize, cassava, cow-peas and rice are the main food crops. Rice is mainly planted on irrigated pieces of land of the defunct Ramisi sugar factory. Large livestock are rarely kept. Fishing, both for food and income is done mainly by adult men. The production of the food crops is entirely for home consumption and, except for cassava, the yields are usually too low to last throughout the entire "consumption year". Cassava is grown by almost all households (92%) either next to the houses or in the main fields which are normally a few kilometres away.

In Msambweni, various community development programmes were initiated by governmental and non-governmental organisations. Most of these aimed at improving health and nutrition in the community (GOK, n.d). Among them were water and sanitation, immunization, community health (e.g. community-based growth monitoring, mobile clinics, community health workers) and agricultural extension programmes. Others were mainly aimed at general development, like schools and markets, rural electrification, tarmac roads and a fish processing plant. The study community is therefore among the best, in terms of public amenities, in the district. There is no information available on whether there are social factors that do produce differential use of these amenities by different households.

Non-farm employment in Msambweni

An earlier study indicated that more than 76% of the households at a nearby location had at least one NFE activity (Hoorweg *et al.*, 1995). Most of these activities were done by men. Women were typically involved in those NFE activities which can

be performed in their homes or in near markets. For instance, women sold processed foodstuffs (like fish, biscuits, fried cassava, doughnuts and bread), or made and sold handicraft products and ran "beauty shops". These activities only took a few hours per day, but were low paying. The men were usually engaged in higher paying jobs like fishing, carpentry and masonry, formal businesses and trading, service delivery and "beach-jobs" and wage employment in the government or private sector. Hoorweg and others (1995) found that approximately 50% of those employed in a nearby location worked close to their homes and managed to commute daily to their places of work. In the same study it was found that the type of NFE strongly determined the level of earning. Casual work earned an income which was only a third of what self-employed earned and a quarter of what the regular workers earned.

More than 80% of the income in the study location was earned from NFE. Higher incomes in this community were realized through NFE, which mostly determines the household's means of existence. Households with low income (70%) tended to depend more on agricultural income than richer households (28%). Conversely, richer households tended to have a higher share of their income from NFE, which means that their income was mainly in cash form. This was in contrast to poorer households whose income was mainly in the form of farm produce. However, surprisingly, richer households still had a higher value of agricultural produce in absolute terms than poorer households. Because of the existing employment opportunities available to households in the location, Hoorweg and others presumed that the high returns for labour in the district tended to draw people away from agriculture. The neglect of agriculture by people in the district was also pointed out by Oosten (1989).

Food and nutritional status

Studies carried-out in 1985/6 estimated that households in a nearby location consumed on average 2612 kcal/cu (Hoorweg *et al.*, 1995). More than 83% of the energy accessible to the households was from purchased sources. The study reports a level of subsistence production of only 36%, with up to 68% of the households producing insufficient food crops (excluding fish) to meet their respective "energy requirements". This was surprising as all study households owned at least one acre of land.

The latest national survey estimates a stunting rate of 40% and a wasting rate of 2.4% among children 6-59 months in the district (GOK, 1995). Over the past 10 years, the levels of stunting have consistently been the highest in the country (CBS, 1991; KDHS, 1994, GOK, 1995). The study of 1985/86 estimated a stunting rate of 36% (<90% of ref. height/age median) and a wasting rate of 6.5%. An analysis of the relation between malnutrition and income found "no clear relationship". However, children in the high-income households showed the least degree of seasonality both in weight and height growth, compared with children in low-income households (Hoorweg *et al.*, 1995).

Summary of study materials and methods

Selection of study areas and material development

Msambweni location has approximately 12,000 households settled in 5 sub-locations: Funzi (an island), Kigwende, Milalani, Vigujini and Shirazi. Funzi island was excluded from the study for logistical reasons. From the other 4 sub-locations, Shirazi was chosen randomly as the "practice or pre-testing" area. The other three sub-locations, Milalani, Vigujini and Kigwende were used as the study sub-locations and the samples were drawn from villages in these areas.

At the request of the local chief and the District Officer, a research committee was set up consisting of 4 elders (one from each of the sub-locations), 2 elderly women of 50-60 years of age, 3 community health workers, the District Nutritionist, a public-health officer and the principle researcher. All the members were resident in the study area except the District Nutritionist. The team monitored the survey including the content of the research tools (questionnaires), complaints in the community, suggestions on the best ways of collecting different data sets, organization of focus groups and in-depth surveys. Nine research assistants and two postgraduate students from the Applied Nutrition Programme of the University of Nairobi were recruited and trained (over a period of 4 weeks) on the different modules and techniques used in the survey. The training was provided by the principle researcher with assistance from the District Nutritionist, the public health officer, agriculture extension officers and a staff member from the Statistics Department in Kwale. Training was conducted on how to estimate sizes and amounts of certain parameters (i.e., estimation of land sizes, ages of adults using local events, amounts of harvested farm products, wages from NFE). Simple calculations (expenditures on food in a day, time spent on various activities, conversion of units) were also done during the training sessions.

Before the main studies and as part of the training of the assistants, "pilot-studies" were carried out. The findings of these "pilot-studies" were also used to assess the validity of responses from the questionnaires during the study. There were three "pilot-studies". (1) Physical measurement were made of the sizes of land under cultivation in a sub-sample for 31 households. (2) Estimation of income earnings (the maximum and minimum) from different occupations was provided by groups of 5-8 key-informants from each of 13 main employment categories. These findings were used to cross-check the validity of the income earnings provided by the respondents. (3) Estimations were made of the harvests from rice fields of various sizes, the productivity of trees like cassava, coconut, mango, orange and cashew-nut. These were later used to verify the estimates of harvests and income from sales of farm produce.

Although an intensive training was held in the beginning of the study, retraining sessions of three to four days were held before each sub-study. In-depth group discussions were also held before each sub-study to elicit qualitative information

related to the coming sub-study. Questionnaires were modified during the training sessions and after the in-depth group discussions with community members.

Study design and methods

A baseline survey was carried out between August and September 1994 in order to collect background data on household demography, socio-economic and farm characteristics, and on non-farm employment. Households were selected randomly from the three study sub-locations. The sample participating in the baseline survey provided the sampling frame for the other studies.

Four studies were carried out. The first three were to assess the different parts of the model (Figure 1.2) and also to provide the content of the components later tested by the fourth study. Since other studies had been done in nearby areas a few years earlier (Hoorweg *et al.*, 1995), the studies were purposively designed to answer questions that had not been covered by the previous studies. The contents of the different data sets included in this study are presented in Table 1.1. The timing of the studies was such as to allow maximum variation of the situation under investigation. For instance, the study on "non-farm employment and agricultural production" was done during April and May, a busy agricultural period. Components of the first three studies were used in the final study to do an overall test of the model in Figure 1.2. The samples for the four studies were independently selected from the whole or part of the 517 households whose baseline information was collected. There was, however, an overlap in some studies, with some households appearing in more than one of the study.

Table 1.2 shows that there were no major differences in the main sample characteristics of the four studies. The household food accessibility study (Study I) and the agricultural production study (Study III) included slightly more employed households than the other two studies. This was because the choice of the samples for these two studies included all households while studies II and IV were based on the child-age criteria, i.e., only households with children within specific age group were included in the sampling frame.

Table 1.1. Contents and explanation of the data-sets used in the study

Data set (content)	Frequency of data collection	Sample size & selection criteria	Period data collected
Baseline survey Demographic data, household characteristics, income estimation, ownership of assets, time allocation in non-farm employment, 7 day food expenditure recall, 24 hr. food frequency and ingredient amounts, anthropometric measures of all household members	1 time survey	530 households. 517 with complete data used for further sampling	August-Sept. 1994
Study I. Non-farm employment and food expenditure and consumption Food expenditure, household food from other sources (source, amounts and value). 24 hr. recall of all food items consumed (type, amount and source). Sex, age distribution of those consuming the food in house.	Weekly for 2 months.	210 house-holds randomly selected from 517 "base-line" households.	Mid. Oct. to Mid. Dec. 1994.
Study II. Maternal factors in child care and house living environment *Time allocation on child care* activities by female members of the household, monitoring the child and house & compound cleanliness status. Monitoring hygiene situation with a check list (8 visits per household). Maternal time allocation in non-farm activities. Expenditure on study child. Child care patterns and housing conditions.	For 4 days per house-hold in a period of 2 months	190 randomly selected from 304 households with a child below 36 months.	January to March 1995.
Study III. NFE and factors in agricultural production Time allocation in farm labour activities by all household members 10 years and older, sick days not able to go to farm. Time allocation in NFE monthly investment in agricultural inputs (fertilizers, pesticides, hired labour, seeds). Estimation of farm production level of e.g., staple foods, livestock, and estimation of land use.	Recall every 2 weeks for 3 months. 1 time	185 households selected randomly from households participating in baseline survey.	Mid March-mid-May 1995
Study IV. Links between NFE and nutritional status Selected components of child care, farm production, and the food consumption and food expenditure questionnaires were synthesised into one questionnaire. Anthropometric measurements (weight, heights) of all children below 60 months in the 180 households participating in sub-study IV. The sampling was done in Aug. 1994 for anthropometric data but the household questionnaire survey was conducted in April to June 1995.	1 time 6 times	180 households selected from 391 with a child less than 5 years	End April/June 1995 Sept. & Dec. 1994, Jan., Mar., May, and July 1995

Table 1.2. Selected characteristics of samples for the four studies reported in the thesis

Characteristics	Study I	Study II	Study III	Study IV
Number households	194	186	178	178
Household size	8.1 (3.2)	8.2 (3.6)	7.5 (3.5)	7.7 (3.2)
Number consumer units	5.4 (2.4)	6.0 (2.5)	5.9 (2.0)	5.1 (1.8)
Head is male	76	80	79	81
% with an under-five child	79	100	74	100
Number people in NFE	2.2 (1.5)	?	1.6 (1.0)	1.8 (1.1)
Household income Kshs/CU	1150 (613)	997 (647)	1107 (537)	1046 (511)

Figures in parentheses are the sample standard deviations. NFE =Non-farm employment.
? = Information not collected in the survey period. Kshs =Kenya shillings. CU =Consumer units.
Study I =NFE and food expenditure and consumption. Study II = Maternal factors in child care and living environment. Study III = NFE and factors of agricultural production. Study IV= Links between NFE and nutritional status.

Definition of terms

A number of sessions were held with selected community members to synchronize the understanding of various terms as used in the study. While the definitions of specific terms are presented in the relevant chapters, the general ones (i.e., those that do not differ from those in literature) are given here.

Household - a group of people (related or not) living together, working as a team under the leadership of someone who is normally is related to the others either through kinship or marriage. The members contribute to the household's subsistence and maintenance and also share most resources (food and money) produced within the household. Members of the households need not be the same ones every time. They may or may not combine all the proceeds from their NFE or they may or may not participate in all household activities, such as cultivation. This study assumes that a household is a decision-making unit. This is because the division of labour in the household shows a high interdependence between household members.

Household head - the person in the household who is "responsible for the household" and who represents the household on important community or social issues. Household members point to him as the person who makes most decisions and on whom they depend for their day to day livelihood.

Non-farm employment - an activity, other than in the household's farm, in which some time is spend working (other than the usual home chores) and money is earned or some other economic reward is gained. Earnings from investments, pensions, remittances and gifts are not considered as non-farm employment.

Outline of the thesis

Chapter 2 provides an overview of the literature on the relationships between non-farm employment and nutritional status in sub-Saharan Africa. **Chapter 3** is concerned with whether non-farm employment by farming household affects labour and capital allocation in farming. The chapter also provides an investigation on the effects of non-farm employment on subsistence farm production. **Chapter 4** examines the hypothesis that households with increased income are likely to increase their food intake but also change the choice of foods consumed. The question is whether these changes are associated with energy intake. **Chapter 5** investigates maternal factors in child care and living environment, and specifically whether maternal occupation is an important factor. **Chapter 6** presents the findings of the investigation on the potential links between non-farm employment and child nutritional status using a modelling technique. Finally, **Chapter 7** discusses the findings of the various studies, including their implications for action in policy, programming and research.

2

Can non-farm employment alleviate childhood malnutrition in rural sub-Saharan Africa?

R. K. N. Mwadime

Abstract

The role of non-farm employment on childhood nutrition in rural areas of sub-Saharan Africa are examined on the basis of different data sources which have recently been published. Specific regional phenomena are identified and their potential effect on nutrition commented upon, particularly the importance of "migrants and remittances" and the tendency for households to obtain their living in both agriculture and non-farm employment. Where agricultural income is low, the dependence on non-farm income is high and a major source of livelihood. Non-farm employment is able to improve nutrition through the food security pathway, the income increasing the quantity and variety of food consumed in the households and enabling them to stabilize their consumption throughout the year. However, the positive effects of income on nutritional status are weak where the health and child care conditions are very poor. Maternal employment has negative effects on nutritional status only if there are no adequate substitute caretakers or if the activities are not compatible with child care. However, the migration of male household members, accompanied by limited financial support from the migrants, and the declining social networks in rural areas have increased the workload of rural women. This has had detrimental effect on child care, health environment and, in turn, on the nutritional status of children in the region. There is no evidence that the rural informal sector has negative effect on child care, on house living conditions or on children's nutritional status. Social, cultural and traditional patterns are likely to mediate the relation between employment and nutrition. There are no studies that have investigated the contribution of socio-cultural factors to the modulating of factors in the relation between non-farm employment and nutrition, and in child care, health environment and food security.

Key words: Non-farm employment, nutritional status, rural, sub-Saharan Africa.

Introduction

Throughout the 1980s and during the first quarter of this decade, the rates of malnutrition in most countries in sub-Saharan Africa either remained the same or increased (ACC/SCN, 1992; ACC/SCN, 1994; Kavishe and Mwadime, 1995). These trends reflected the inability of households to realize stable means for

acquiring adequate food, basic health and individual care; a factor attributed to poor performance in the primary production sectors and the general economy, and impoverishment. Unless the resource base of rural households is increased and made stable, the alleviation of malnutrition in sub-Saharan Africa will continue to be unfeasible.

Agricultural growth alone will not be able to do this (Delgado and Mellor, 1984; von Braun, 1990a). Differentiation of income sources to include non-farm employment has been shown to be an effective strategy for generating the resources and assets needed to reduce poverty in rural areas and increase and smooth consumption (ILO, 1988; von Braun and Pandya-Lorch, 1991; von Braun *et al.*, 1991b). Households that combine agricultural subsistence production and participation in non-farm employment (NFE) are better placed to provide food security for their members than those relying heavily on agriculture. This need for income diversification outside agriculture is driven by the increasing demand for land (caused by high population growth), declining soil quality and an unreliable climatic.

Those promoting NFE as a strategy for improving household resources and the health and nutritional situation in rural areas expect that income from waged labour can be used to improve the nutritional situation. It is assumed that the income can increase and stabilize household food consumption (either through improved agricultural production or through purchased food sources) and improve health and care environment. While income improvements in themselves are desirable, studies have shown that they do not necessarily improve the nutritional situation. Even when the income elasticity is large (as is the case in very poor homes), it does not always translate into a significantly improved nutritional status of the vulnerable household members, at least not in the short-term (Kennedy, 1989; Bouis and Haddad, 1992). Other factors operating within the home like the distribution and control of resources, and time allocation, and the general community impoverishment like accessibility to water, sanitation, health and basic education need to be addressed if income is to have any impact on the nutritional situation.

As governmental and non-governmental organizations increasingly use income-augmenting and related employment policies and programmes to alleviate poverty, there is a need to marshal the evidence for the use of non-farm employment as a potential means of improving nutrition in rural sub-Saharan Africa. This chapter gives an evaluation of the potential effect of non-farm employment, as a strategy, on the child nutritional conditions in sub-Saharan Africa. Both existing literature and available secondary data have been used. The hypothesis is that employment improves household income, which in turn enables the family to access, or take action to secure food, health and care that are favourable to an improvement in nutrition. However, because of the trade-offs facing households in the allocation of its resources (human, financial and time), the

effects of additional income on nutrition may be weakened. This chapter draws attention to major elements affecting nutrition in the region which are unlikely to be affected by economic benefits accruing from non-farm employment. It also points out areas where policy formulation is needed.

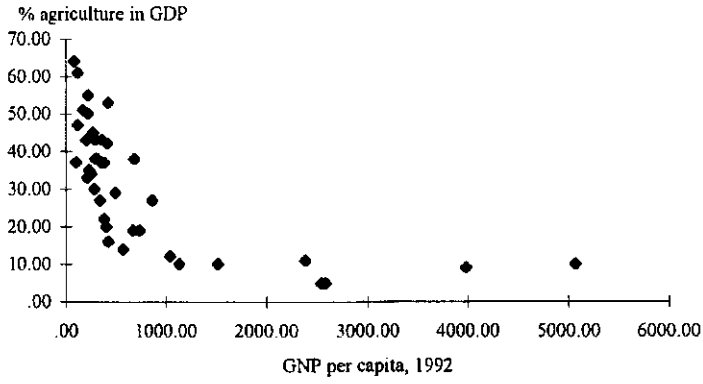
The chapter is arranged as follows: the characteristics of rural employment in the region are first presented, the theoretical framework used in the following sections is described, then the overall effects of employment on nutritional status of children in the region is given and next the assessment of the effects of non-farm employment on food security, child care and health environment are provided. Finally, a summary of the chapter is made.

Characteristics of non-farm employment in sub-Saharan Africa

Estimates from the *UNDP Human Development Report* (1994) indicate that 40% of the population in sub-Saharan countries were in the labour force in 1992. Since over 69% of the population in the region at that time lived in rural areas, a large proportion of the labour force was absorbed into the agricultural sector. Women constituted about 38% of the labour force (Table 2.1). Most women[1] in the countries with large female labour participation were involved in the agricultural sector which is, in general, more energy intensive than non-farm activities.

The importance of NFE in rural areas is steadily growing (Kilby and Liedholm, 1986; Hoorweg *et al.*, 1995). In 1992, industry and service sectors absorbed close to 30% of the labour force, most of which was in urban areas (Table 2.1). According to plausible estimates, non-farm sources contributed 45% to 59% of rural income in developing countries; 53% in rural Africa (von Braun and Pandya-Lorch, 1991). In north-west Rwanda, for instance, non-farm income represented 58% of total income (von Braun and Wiegand-Jahn, 1991), while in south-west and coastal Kenya it contributed 46% and 70% of household income respectively (Kennedy, 1989; Foeken *et al.*, 1989). In an area of high agricultural production in Burkina Faso, it contributed 17% (Readon and Malton, 1989). Time allocation studies in the region indicate that 15%-40% of the total family working hours were devoted to non-farm income generating activities (McSweeney, 1979; Tripp, 1982; Tshibaka, 1992; Liere, 1993). However, only 7 out of the 38 countries studied had more than 50% of their labour force engaged in non-farm activities. Generally, countries with a high GNP per capita also have high rates of labour force in industry and services. A higher annual GNP per capita is also associated with a declined share of the agricultural sector in the gross national product (Figure 2.1).

[1] At least 26% in Burundi and 22% in Rwanda compared to only 5% in Lesotho, a country with a similar labour force rate but with less labour in the agricultural sector (computed from Table 2.1).



Source of data: UNICEF, 1994; UNDP, 1994.

Figure 2.1. National GNP (per capita) and share of agriculture in the GDP in sub-Saharan Africa

Community surveys in south-west Kenya and northern Rwanda also showed that the non-farm income share rose with total income while at the same time the share of agricultural income declined. Where agricultural incomes were relatively high, wage incomes tended to be low, but where agricultural income was low, wage incomes were high. However, it is common that households with large wage income maintain a high level of subsistence food production in absolute terms. This is only possible if factors of production like labour, land and capital are not affected or are improved (in amount or in quality) in the process of generating non-farm income.

Most non-farm employment opportunities are found in urban areas[2]. Long distances combined with poor infrastructure connecting rural and urban areas means that most potential employees in rural areas have to migrate to the towns. This has produced high rates of households headed by women in rural area, since it is men who normally migrate to urban areas[3]. In the past, African migrants have had a close financial relationship with their rural homes, sending money back to them. Studies and reports from the region indicate that between 35% and 80% of the households depend on migrant labour (Anderson and Leiserson, 1980; Heyer, 1990; Gustafsson and Makonnen, 1993). Transfers and remittances are more important to households in agriculturally marginal areas. Migration is inevitable in these areas as there are fewer opportunities for generating income locally.

[2] Definitions of urban areas vary dramatically across the countries. In most places, however, it depends on the function rather than the size. For instance, in most east African countries it is defined as an area that exists to service an agricultural hinterland.

[3] The term frequently found in literature is "divided households", implying households that obtain their living in both agriculture (some members remaining in their rural homes to farm) and the urban employment (some members migrating to work).

Furthermore, the infrastructures connecting these households to areas with more non-farm opportunities are too poor for households to commute daily.

However, the ongoing economic crisis in countries in the region has had a marked effect on the labour market. As a consequence of economic hardships and the implementation of the structural adjustment programmes (SAPs) in the last decade, between 20% and 40% of the work force in the formal sector has been laid off (von Braun, 1990a; Kavishe and Mwadime, 1995). Changes in economic structures like rising transportation costs and living costs in urban areas result in increased duration of migration, leading to declined links between the urbanites and their rural homes. Previously, migration was for shorter duration which meant that migrants had to invest in their farms to which they had to return soon. However, migration is now long-term which, together with retrenchment and under-employment, has resulted in a decline in the volume of remittances. This could lead to a new threat to the levels of financial resources in rural areas because, until recently, remittances served as a buffer to life threatening stresses in rural areas in the region (Collier and Lal, 1984; Fleuret, 1992; Foeken and Tellegen, 1994).

In rural sub-Saharan Africa, small enterprises provide the primary source of employment for most rural households. By the end of the last decade, between 3% and 60% of the labour force was dependent on small enterprises (Okafor, 1983; Haggblade *et al.*, 1989; Livingstone, 1991). However, there is a large variation in the type and amount of earnings within and between countries. The different types of income sources are dynamic over time, adjusting depending on the economic situation and performance of other potential income sources. The most common are the distinct seasonal rhythms that characterize NFE, with non-agricultural activities reaching their peak in the dry season immediately after harvest (Foeken and Tellegen, 1994). For example, when cereal production declines, as a result of either poor prices or poor weather, rural incomes also decrease dramatically and people turn to NFE (Puetz and von Braun, 1991). In summary, often the diversity of the income sources (including NFE) and its form (whether in-kind or cash) differ between countries and within countries. The differences are related to the degree of economic and structural linkages, the degree of integration into the market economy, the nature of "social security" systems and the ability of the households to bear risks (von Braun and Pandya-Lorch, 1991). Other household factors such as land ownership and the available labour, and external factors like agro-ecological conditions and employment opportunities in the locality also determine the extent of engagement in NFE.

Another feature of the non-farm economic activities in the region is the increased involvement of women over the past two decades. The migration of men and the growing need for income have driven women to increase their participation in NFE as a means of raising the cash income needed in the households (Jiggins, 1989). Rural women tend to seek employment as seasonal casual workers or in the

informal sector. Their NFE activities are characterized by a few market hours a day and with lower cash incomes than men's (Tellegen, 1995; Cherop, 1996). The NFE activities engaged in by women, like handicraft and food processing, tend to take place in or close to their homes. This enables them to be combined with other household chores. Moreover, in contrast to urban women, rural women take their children with them to the market places as most of their NFE activities tend to be compatible with child care. A few activities like charcoal burning and beer brewing may, however, not be healthy for accompanying children.

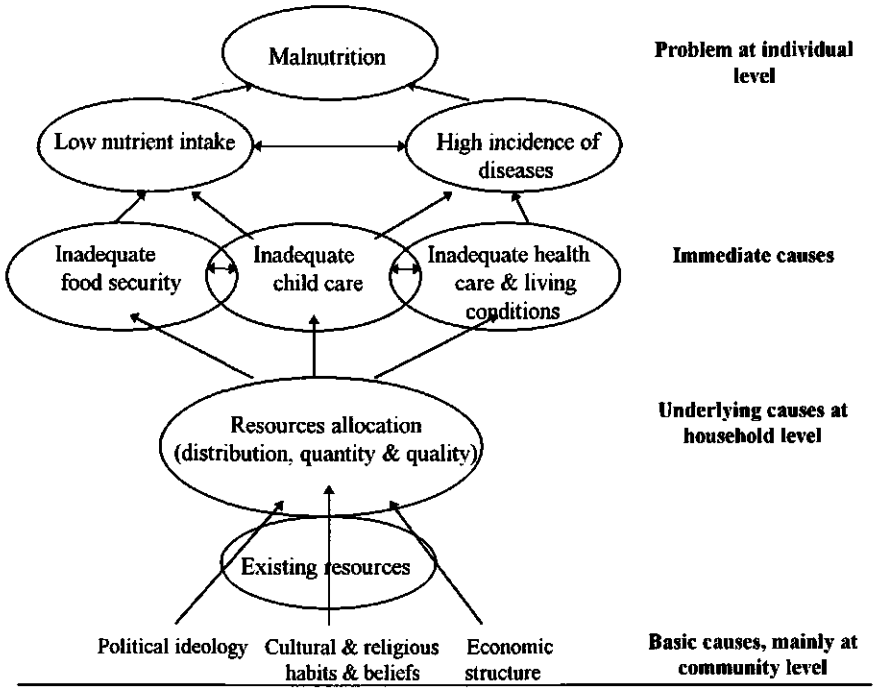
Some NFE activities that rural women may be involved in can be very time consuming. For instance, common NFE activities among rural women like beer brewing and the marketing of processed farm produce involve extremely heavy labour and energy inputs. On average, brewing or sunflower oil extraction requires two to three times the labour and time inputs required for domestic purposes i.e., in terms of collecting firewood and water (Holmboe-Ottesen *et al.*, 1989). Moreover, some non-farm activities popular among women use resources produced in the households. For instance, beer is made from the maize, bananas and/or millet produced in the households. This can be at the cost of the household food security. Only when the activities do not involve the use of household supplies or strenuous labour can they add to the household food security and health.

To sum-up, this section has shown that non-farm employment in sub-Saharan Africa has increased incomes in rural areas, but has also meant that most men have to migrate to find employment. While in the past this migration was for short periods, over the years this has tended to be for longer periods and to be further away from the rural homes. This has weakened the links between migrants and rural households. In addition, women have also increasingly become involved in non-farm activities, most of which are in the agricultural sector, and are seasonal, low paying and sometimes energy and labour intensive.

Non-farm employment and childhood nutritional status

Theoretical framework

In a framework introduced by UNICEF (Figure 2.2), that has gained ground among development agencies and government institutions, malnutrition and, by inference, poor nutrition is presented as an outcome of adverse conditions with immediate, underlying, and basic causes (UNICEF, 1990). Inadequate dietary intake, a high frequency of diseases, and generally an interaction between the two are the **immediate causes**. The **underlying factors** are grouped into three clusters: access to household food security, individual care, and basic health care



Adapted from UNICEF, 1990.

Figure 2.2. Conceptual framework of the causes of inadequate nutritional status

and a healthy environment. The three clusters interact through the care cluster, and none is adequate to assure nutritional security[4] by itself.

Households unable to generate an adequate mix of commodities in these three categories suffer from malnutrition. The underlying factors are the product of a number of **basic causes** related to the control and management of the available resources, the accessibility of existing infrastructures, the effects of existing policies, social-cultural norms, and the whole "ecosystem" the household is part of. Access to resources by rural households is a prerequisite for realizing levels of the three clusters that can produce acceptable nutritional status.

Relation between employment, income, time and nutritional condition

Engagement in non-farm activities (NFE) affects the level of resources (time and money) in the household and the way they are distributed among different needs. The contribution of non-farm wages on household income depends on the levels

[4] *Nutritional security* is defined as the optimal use of the food, care and health that is accessible to the household so has to ensure that household members have a stable and sustainable nutritional condition throughout the year.

and stability of income from other sources, particularly from agricultural production. In marginal areas and/or in times of agricultural stress, non-farm sources contribute significantly to household income.

NFE can impact nutritional status through the effect of the time in NFE and the earned income on the clusters of household food security, child care or that of health environment. The impact can be a positive one if the earned income is used to ameliorate any or all of the three underlying "clusters". It can be a negative one if there is a time shift from production of household goods[5] to non-farm employment activities. In the positive sense, the income from NFE can be used to purchase market goods, thus saving home produced food which would otherwise be sold for domestic consumption (Hazell and Röell, 1983). The income can also be invested into subsistence production, thus improving food security. For example, in agriculture, agricultural inputs like fertilisers, pesticides, hired labour, tools, livestock, more land, and improved storage facilities can be purchased. This is more useful in communities where accessibility to farming inputs has been limited by lack of financial resources. Alternatively, households, especially those with agricultural surpluses may save some of their income, or they may use it to create asset-stocks for lean periods, or to invest in technologies that increase home or market productivity. Examples include investment for improving housing conditions, acquiring safer water and cooking stoves, or creating capital for a business (Castro *et al.*, 1981). What a household does with its additional income depend on factors like the preferences of the person earning or controlling the income and the "household's stock" of the components of the other two clusters. Women use most of their income on immediate household needs like food, health and care (Kennedy and Cogill, 1987; Tripp, 1981). This is because cultural patterns assign the primary responsibility for care to mothers. However, men use it to invest in future productivity, health or consumption, by purchasing items that need relatively large sums of money (Jones, 1983; Mwadime, 1989).

Participation in NFE, however, implies a shift of household labour from subsistence and home activities to non-farm activities. This can have a negative effect on one or all of the three underlying clusters of malnutrition. However, sometimes a shift in family labour may not cause concern if the employment is compatible with home production activities, or if extended families and social support networks exist. Another exception is if the earned income is used to pay for labour for subsistence agricultural productions, for substitute child care or for purchasing more efficient technology. Nevertheless, where possible, more of the household members engage in non-farm employment and work longer if the wage levels are favourable. Since home production activities are time intensive, employed members will normally do fewer of them, and because of the income

[5] Home production activities include subsistence agriculture and all forms of household work carried out on the farm by family members to ensure their survival.

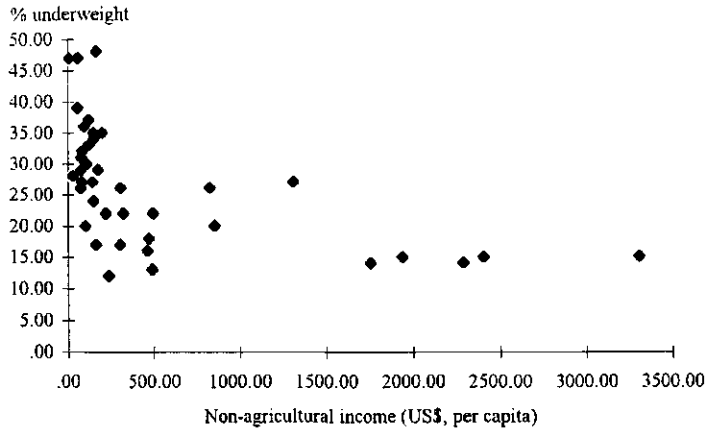
effect, probably even have more leisure (Ho, 1979; Popkin and Solon, 1976; Rubin, 1990). Moreover, most home production activities are determined within an informal system of rules governing tasks in social relationships. Men are not likely to substitute their time for that of women in certain home activities. For instance, in most African settings, women are responsible for the care of children. This forces them to spend more time in home work than men. Even when women spend the same amount of time in NFE as men, they still carry out more household work than their male counterparts who specialize more on non-farm activities (King and Evenson, 1983; Wandel and Holmboe-Ottesen, 1988; Holmboe-Ottesen and Wandel, 1991). This does not mean that the time allocated to activities by individual household members does not change over time. It does, depending on the circumstances. For example, if a household member traditionally responsible feeding the family cannot do so for one reason or another, other members will surely help. However, the rate of substitution of time between individuals and among activities has implications for the household productivity and the work-load of other household members. In the process of substitution, the quality and quantity of time input in the different home production activities may be affected. For instance, the process might affect outputs such as utilization of health services, household health condition (hygiene, sanitation, water, firewood, food processing), availability of home grown foods, the quality of child care and food preparation. The impact of engagement in NFE on the nutritional condition of the children will hence depend on local situations. If the "time aspect" of the household is not affected, NFE is likely to be advantageous to household health and nutrition.

Employment and nutritional status in sub-Saharan Africa

This section makes an assessment of the relation between NFE and nutritional status of children, on the basis of the existing information. First, the relation between the level of income and nutritional status is discussed, then the association between the degree of reliance on NFE for household income with nutritional status is expounded and, finally, the effect of women participation in NFE on nutritional status is reviewed.

Income level and nutritional status

An analysis of national data from sub-Saharan Africa indicates that at low income levels, a close relation exists between income and the prevalence of under-weight (Figure 2.3). Countries with high income from non-farm sources have a low prevalence of under-weight of children.



Source of data: UNICEF, 1994; UNDP, 1994.

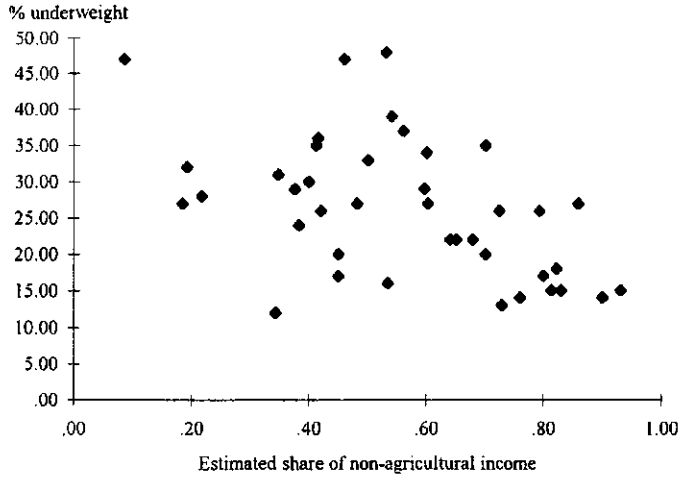
Figure 2.3. Non-agricultural income and underweight in sub-Saharan Africa, 1992

This relation is even more clear in those countries with an income of less than US$ 1000 per capita. However, the variability is large and there is an indication that the prevalence of under-weight children does not fall below 10%, even at high income levels. This may imply that national income only reduces some, but not all, malnutrition in the country. This is related not only to an unequal distribution of income, but also to factors unconnected with the income that might be causing the additional malnutrition. Thus, unless other structural and sectoral changes are also undertaken, an increase in absolute level of income in rural areas might have only limited effects in alleviating malnutrition in the region.

The relation between household income level and child nutritional status is even more unclear from findings of community surveys in the region. In Rwanda for instance, a study found that the household's level of expenditure (a more permanent proxy of income) had a positive correlation with nutritional status (von Braun *et al.*, 1991a). The relation between income and nutritional status was, however, clear only for the severely malnourished (weight-for-age) category. Differences in the mild and moderate malnourished were less marked. Households with severely malnourished children had an average total income per capita 14% lower than households with well-nourished children. The relation between the level of income and nutritional status is even less clear when taken on a continuous scale. Three studies in Kenya were unable to show significant positive effects of household income on child nutritional status (Korte, 1969; Kennedy, 1989; Hoorweg *et al.*, 1995). Lack of impact of household income on child nutritional status in the region has been associated with the lack of joint promotion of health and sanitation in the event of increased incomes.

Share of income from non-farm employment and nutritional status

The relation between the source of income (i.e., share of income NFE) and nutritional status is even more unclear. Figure 2.4 shows on a scatter graph the aggregate relation between estimates of the share of rural income from non-farm sources and the occurrence of under-weight at national level. Although the relationship is not clear, countries with a high share of income from non-agricultural sources seem have low malnutrition. Countries with an intermediate share of income from either source are more likely to have a higher prevalence of malnutrition.



Source of data: UNICEF, 1994; UNDP, 1994.

Figure 2.4. Share of non-agricultural income and malnutrition in sub-Saharan Africa, 1992

By contrast, community surveys indicate that the relation between nutritional status and the degree of reliance on non-farm activities represents a U-shaped curve. In some studies, the direction of the relation between the degree of reliance on NFE and nutritional status was dependent on the level of household income (Puetz and von Braun, 1991). In Rwanda for instance, there was a decline in the proportion of households with malnourished children (less than 90% weight-for-age standard) as the proportion of income from non-farm sources increased. However, once the share of non-farm income exceeded 30%, the proportion of households with malnourished children increased (von Braun *et al.*, 1991a). A study in Tanzania indicated that at low household income levels, the nutritional status of children from households involved in subsistence farming were, on average, better than those from poor households that were also involved in cash crop production or waged labour (non-farm) activities.

However, at high income levels, increased income from cash crop production was associated with a decreased incidence of malnutrition so that the nutritional status of children among the well-to-do labourers and cash crop producers was better (Jakobsen, 1978).

This U-shape of the relation between the share of household income from waged sources and the nutritional status that has been shown in community surveys is associated with the level of income and the gender control of resources, and with the kind of income and flow of income at varying cash-income levels. For instance, in most communities, households which depend mainly on farm production for their livelihood are at high risk of being in the poorest category, as wage income is an important determinant of household's income level (Hoorweg *et al.*, 1995). These households have not only little diversity in income sources, but also little diversity in the food consumed. Households in the middle of the distribution are likely to have more differentiated income sources. Women will mostly control farm resources, while men control the cash resources. A differentiated income (combining NFE and farm produce) and control of resources by women seems to favour nutritional status of children in the region. Rural households with relatively high shares of income from NFE are likely to be those that lack the assets for agricultural production and have become engaged in NFE for their livelihood. Normally, the level of income is low and under the control of men as they are the ones who easily engage in NFE. The participation in NFE by men in the region has not been found to have significant effect on the child's nutritional status (Brown *et al.*, 1994; Vella *et al.*, 1995). And the low limited access and control of household resources by women has been associated with malnutrition, even in high income households (Castle, 1995; Kennedy, 1989; Tripp, 1981).

Women's employment and nutritional status in rural areas

Women's participation in NFE may have positive or negative effects on child nutrition. On the one hand, it may augment the total amount of food procured, while on other, it may give women less time for child care. Tripp (1981) found in a study in Ghana that although the marketing activities of either parent made a contribution to the child's nutrition, it was the income from the mother's NFE which had the most significant impact on the nutritional status of the child. This, as Tripp predicted, might be associated with the fact that the woman allocated more resources to the benefit of the child's health and food intake. Employed mothers tended to have more animal protein rich foods and fruits and vegetables in their diets (Cherop, 1996). The analysis did not, however, control for the effects of total household income. On the other hand, maternal employment may have negative effects on child nutritional status if the care component is negatively affected. But there is no documentation for this in the region. Where such an analysis has been done, no attributable effects of NFE on child nutritional status has been found. In a Tanzania study, for instance, although the mothers' workloads reduced the time they spent on cooking and on feeding children

(especially the frequency), no conclusive negative effect of a mother's occupation on a child's nutritional status could be shown (Wandel and Holmboe-Ottesen, 1992). This was explained as being the result of various compensatory mechanisms employed by the mother which may have buffered the negative effects of her time constraints on child care. Other members in the household were able to compensate for the mother's time removed from child care in the event of non-farm employment. However, factors outside the control of the household can sometimes so highly influence the nutritional status, that any effects of income on the child's nutritional status are weak. This was the situation reported in the study of south-western Kenya by Kennedy (1989). Income sources did not differ between the malnourished and those not malnourished. The poor nutritional status in the sample was associated more with health factors than with household resource base.

Time commitment of women to other household chores like subsistence and home production, particularly in labour-intensive tasks like carrying water, gathering of fuelwood, and agricultural work are more important constraints to child care, health and nutritional status (McGuire and Popkin, 1989). Moreover, factors associated with entry into NFE may be more related to the child's nutritional status than to the type of employment per se. This was the explanation given for the higher probability (3 to 4 times more likely) of children of mothers engaged in NFE being hospitalized with malnutrition or diarrhoea in Cameroon (Defo and Young, 1993). In addition, in Tanzania (Mascarenhas, 1983) the worst nutritional status of children was found in households where women were working as casual labourers, jobs mainly taken by households with low food supplies. Lack of food in the household during critical pre-harvest seasons forced women to carry out labour and energy-intensive income-generating activities like casual farm work. Poorer anthropometric status has also been reported for women who were poorly paid or who were working in the informal sector, where they were often required to work long hours for little pay and with little security of income (Popkin and Bisgrove, 1988; Engle and Menon, 1996). Thus in the region, both the agricultural production level and the socio-economic level are more likely to be the cause of the mother's working in these kinds of activities and of the children's nutritional status.

Non-farm employment and the underlying clusters of malnutrition: food security, child care and health environment

Effect of non-farm employment on the household food security cluster

This section first discusses the effects of NFE on subsistence food production as this is a main source of food in rural areas in the region. Next, it looks at the relation between income level and food accessibility, the relation with the form in which the income is earned (cash or in-kind), the share of income from NFE and food accessibility, and the role of women's employment on household food accessibility.

i. Non-farm employment and subsistence food production

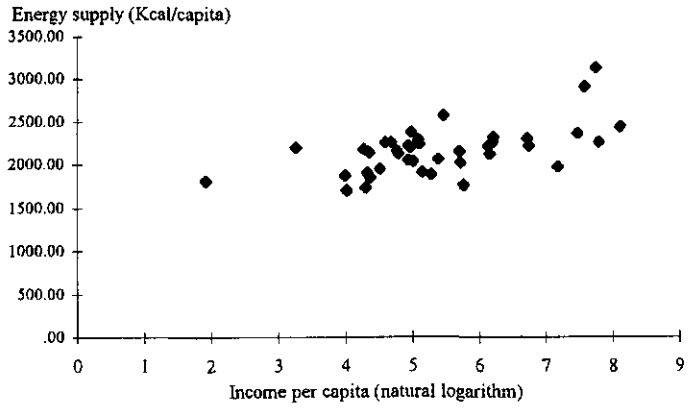
It is possible that most malnutrition in rural sub-Saharan Africa can be attributed to low levels of absolute food intake (ACC/SCN, 1994), which are a result of inability to produce and/or purchase enough food. Most rural households consume food from their own domestic production. This means that agricultural performance matters in determining hunger and malnutrition in most countries in the region. If the time or labour that is shifted from home activities to non-farm waged activities is not compensated by the income earned, then non-farm employment can have negative effects on food production. Normally the young and energetic migrate to towns and urban areas in search of work, leaving behind mostly children and women. The result is a change in roles, and an increased work load for women. This can have a negative effect on their health and on subsistence production. Haswell (1981) reported that food availability was lower in Gambian households where the males had migrated. The same was reported for Zambia (Kumar, 1985) and Uganda (UNICEF, 1989a). Even women on the smallest farms experienced an increase in farm work and their output was still lower (Brown, 1983; Palmer, 1985). Excessive workloads may mean that households switch from the cultivation of labour-intensive crops like millet, maize, groundnuts and yams to less labour-intensive crops like cassava and sweet potatoes (Haswell, 1981; Tagwireyi and Greiner, 1994). This shift may have a detrimental effect on food consumption if the new foods have a lower nutrient content or density.

The migration of men does not have to produce negative effects on food production if enough compensatory cash is made available to enable the rural household to hire labour and technology, or if the NFE are flexible enough to allow time for subsistence production when needed. On many occasions this is not possible. Reports from Swaziland, Lesotho, Kenya and Tanzania (GOS, 1979; World Bank, 1980; Tobisson, 1980; Tellegen *et al.*, 1992) state that remittances from husbands migrating for work were not regular or were rarely enough to maintain the household let alone to invest in the farm. However, there are a few positive reports that rural agriculture productivity improves in the event of substantial cash income. In Kenya, the doubling of rural non-farm income raised crop-out by 16% (Collier and Lal, 1984). This was accomplished through the financing and purchasing

of farm inputs and also through enabling deployment of existing inputs into riskier but more productive tasks. The positive role of increased financial accessibility on food production and investment in agriculture has also been reported in Tanzania and Zambia, where migrating labour was a main factor in differential rural poverty (Fleuret, 1980; Kumar, 1985). The effect is more significant if the employed are settled in their rural homes and commute to their places of work (Evans and Ngau, 1991). However, few rural households have such a privileged position; most are in remote rural areas with poor infrastructure.

ii. Income level and food accessibility

In the region, there is often a shortfall in the household level of production and hence an increased subsistence production and/or purchasing power is expected to increase household food availability. At national level, a high GNP per capita is associated with higher caloric supply per capita, which suggests that economic growth remains critical for broad-based improved food supply (Figure 2.5). A positive relation also exists between income and the availability of calories in rural households in the region. In Burkina Faso, richer households were shown to consume up to 1 000 kcal per capita per day more than poor households (Reardon, 1991).



Source of data: UNICEF, 1994; UNDP, 1994.

Fingure 2.5. Annual GNP per capita form Non-agricultural sources by energy supply per capita, 1992

In Mauritius, when the average household income increased by 86% between 1987 and 1991/1992,[6] the majority of the people could afford to buy staple foods. Retail food sales increased with the largest increase in non-staple foods, especially animal products and beverages. This positive relation between household calorie accessibility and cash income has also been shown for south-west Kenya, the Gambia, Zambia and northern Rwanda (von Braun *et al.*, 1989b; Kennedy and Cogill, 1987; von Braun *et al.*, 1991a). The effects of income on caloric intake are more significant in marginal areas.

iii. Form of income and share of income from NFE and food accessibility

The relation between the proportion of household income from non-farm sources and dietary energy availability is not very clear. It depends on the drive to engage in non-farm activities, on how and where the income is earned, and on who controls the earnings. An analysis of data from rural Zimbabwe indicated that remuneration in kind improved food accessibility in rural areas more than cash payment did (Mwadime and Baldwin, 1994). However, in the Gambia, there was no difference between a household's marginal propensity to spend on food out of cash or income in kind (Puetz and von Braun, 1991). Apart from the difference in the form in which wages are earned, the relation between the share of the household income from NFE and food security is also unclear. A negative relation was observed in south-west Kenya while a positive one was reported from the Gambia and Zambia. In Rwanda, the proportion of households consuming low levels of dietary energy was the same among those with high share of their income from NFE and those with a low share (von Braun and Pandya-Lorch, 1991).

Generally, NFE enhances food security in communities with high agricultural productivity, as is shown by studies from Gambia (von Braun *et al.*, 1991b), Zambia (Kumar, 1991; Siandwazi, 1992) and central Kenya (Evans and Ngau, 1991). In particular, because the additional income from NFE supplemented subsistence production, diversification of income sources enabled households to spread consumption over the year. However, in communities with stressed agricultural systems, the positive effects of NFE on food security were highest during agricultural stress, when the proportion of income from NFE that is used for food increases. Hence, income from NFE can be used to smooth seasonal differences in the levels of food consumption (Foeken *et al.*, 1989; Kigutha, 1994; von Braun and Pandya-Lorch, 1991; Nestle, 1985). Where a negative relation between the proportion of income from NFE and food accessibility has been reported, it is connected to two conditions. One, the engagement in NFE is largely a result of low agricultural production and low overall income levels (a symptom of poverty) - this mainly reflects the adverse impact of the low income level on food security. Secondly, the earned income is mainly

[6] This rise in household income reflects employment creation and does not necessarily indicate rise in real wages for those who are already employed.

controlled by men whose expenditure patterns are not favourable to household food intake in terms of energy.

iv. Women, non-farm employment and food accessibility

Because women are generally responsible for the family's food in most African cultures, their earning capability and NFE status is likely to affect their decision-making ability in the households. The pattern emerging from studies conducted in Africa is that though women's incomes are generally lower than men's, a higher percentage of their earning is allocated to household food (Tripp, 1981; Kennedy, 1987). This relation between earning and expenditure does not depend on the flow of the income (Brown *et al.*, 1994). However, in a few situations, not as much of the woman's income is spent on household food as might be expected. It depends on the household income level and the social roles of household members. Examples of this phenomenon can be found in well-to-do households and in cultures where men are considered the main providers of food, as in nomadic communities and some Muslim communities. Among richer households, most women's income is spent on things other than food, like clothing, medicine and trading (Maas, 1991; Cherop, 1996). Most of the household's income in richer households is likely to be controlled by men, as women in these households rarely work for money. In these households it is possible to continue to have food insecurity, even with high incomes.

Effect of non-farm employment on child care

The next aspect to look at is the potential impact of NFE on the cluster of child care: first the relation between poverty or income and care then, because women are the main caretakers of children in the region, the effect of employment of women on the cluster of child care.

i. Poverty and child care

Generally, allocating household labour/time to employment implies less time allocated to home activities, including child care. Poor households tend to spend more time and resources (in terms of money and household produce) on income-searching activities. For instance, in Rwanda, poor households spent relatively highly on "travel expenses" (von Braun *et al.*, 1991a), implying a regular absence of adults from the house. The absence of adults (caretakers) may adversely affect the care of children and hence their nutritional status.

ii. Women, non-farm employment and child care

A potentially negative impact on child nutritional status is the employment of women. The implications of female employment on child care depend on a number of factors such as where the employment activity is carried out, the level of earning from the NFE and the nature and effectiveness of the social support the mother receives in

child care. Compared to urban employment, most rural NFE activities are compatible with child care (Engle and Menon, 1996). This is either because they are carried out in or close to the home, or because the mother can take the child to her place of work (Tripp, 1981). Moreover, the extended families and close social networks that exist in rural areas create a conducive caring environment. In most cases, a relative or neighbour is available to take care of the child if the mother is involved in employed activities. Sometimes households with women engaged in NFE have a better child-caring environment than other rural households. For instance, the Zimbabwe Demographic Health Survey (ZDHS, 1994) indicated that while agricultural workers relied on sibling caretakers, mothers in non-farm work relied more on other relatives like grandparents and older siblings. Higher income NFE households could also afford to use older people, relatives or hired help. However, the survey also indicated that agricultural workers were more likely to be primary caretakers of their children (59%) than non-farm employed households (42%).

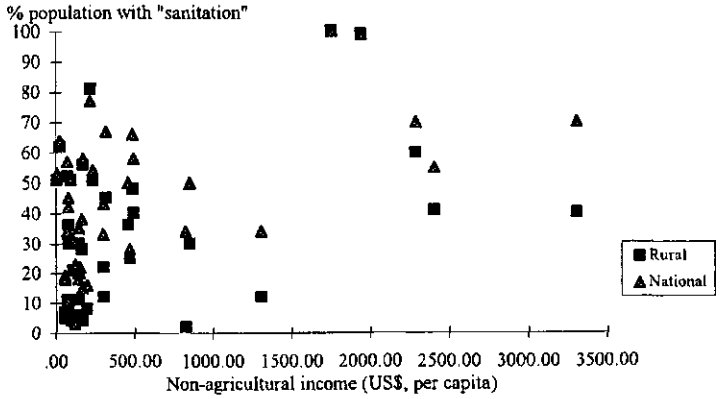
The decision to breast-feed is almost universal in sub-Saharan Africa, especially in eastern and southern Africa. Nevertheless, there is reason to believe that rural NFE mothers are more likely to wean their children earlier than non-employed rural women, as the workload and time constraints the mother faces are enormous. However, the reasons given for termination of breast-feeding in rural settings are that the mother is pregnant again, that the child or mother is ill, and that "the child refused to eat" (Mazur and Sanders, 1988; Mwadime *et al.*, 1995). Rarely do reasons like "mother had to return to work" feature except in urban studies. There is no documented evidence to support the idea that rural mothers breast-feed significantly less if they are in NFE. In fact, it is women's excessive work in agricultural food production that has been related to early weaning and early introduction of complementary foods rather than their participation in NFE (Tobison, 1980; Galvin, 1985). The competition for the mother's time and energy is more significant for child care with seasonal agriculture work than with non-farm activities. Children are fed less often and women spend less time cooking during seasons of a high agricultural workload (Paolisso *et al.*, 1990; Wandel and Holmboe-Ottesen, 1992). However, most of the time women sacrifice their leisure to home chores. Detrimental effects of maternal employment on child care have been reported in cases where the work is laborious, casual and low-paid. In Burkina Faso, time allocation studies show that the "economic work" of rural women increased during the rainy season, a time when households also had fewer food stocks and when there was an increase in participation in agricultural casual work. The increased farm and casual work was partly associated with less time spent on food preparation and child rearing. The same pattern was seen in another study in Tanzania (Mascarenhas, 1983).

Effect of non-farm employment on house-health environment

There is little documentation on the relation between rural employment and the cluster of house health environment in the region. This section discusses the implications of income on the cluster, and then evaluates the effect of non-farm employment.

i. Income level and house-health environment

On a national level, it has been shown that the correlation between accessibility to basic health services and the prevalence of malnutrition in the region is significantly negative (Mwadime *et al.*, 1993). Increased accessibility to safe water, to basic health services, vaccination with DPT (Diphtheria, Pitusis, and Tetanus) and to a trained midwife was associated with lower prevalence of malnutrition. An analysis of the association between income with sanitation and accessibility to water or health services is strong on a national level but not for the rural areas. For instance, national level of accessibility to water or sanitation is higher in countries with a higher GNP per capita, but the relation seems to be weaker in rural areas (Figure 2.6). The discrepancy is because in richer countries most of these services are in urban areas where, however, only a small proportion of the population lives. As Structural Adjustment Programmes begins to affect the lives of rural populations (Mwabu, et al, 1995) and as the level of education increases, it can be postulated that, over the next few years, the association between household income and accessibility to health care will be stronger even in rural areas.



Source of data: UNICEF, 1994; UNDP, 1994.

Figure 2.6. Accessibility to "adequate sanitation" at national level and in rural areas by non-agricultural GNP

There are relatively few community surveys investigating the relation between household income and living conditions in the region. However, it is evident that poor health and sanitation affects child growth. In rural Lesotho Esrey and other (1992) found a greater growth among children in households with a latrine and with increased water usage. In Malawi the risk of diarrhoea among children was 20% less among households with a latrine and piped water system than those families had neither (Young and Briscoe, 1987). There is no evidence that ownership of better sanitation is directly a factor of household socio-economic status. A study in coastal Kenya reported that an increase in income (independent of education) increased ownership of housing goods that improved the household's "housing quality" i.e., toilet, mosquito screens, soap, improved cooking stove and running water.

However, income was not associated with sanitation/hygiene status of the household (Chapters 5 and 6 here). In a couple of studies in Kenya, no significant difference was found between health indicators (i.e., percentage of time ill or with diarrhoea) for pre-school children from low income households and those from high income households (Korte, 1969; Mwadime *et al.*, 1996; Kennedy, 1989). This was because of the strong influence of poor health and sanitation in the research communities (Kennedy and Oniang'o, 1992). Most indicators of health environment, like sanitation, hygiene, utilisation of health services in rural areas are influenced by cultural/religious and traditional beliefs and norms (Were *et al.*, 1986; Kavishe and Mwadime, 1995) and by ecological factors (Chambers, 1982), on which income has little effect. The level of education seem to have more impact (Mwadime *et al.*, 1996). The relation between income and health environment that may be seen is mainly that of the impact of education on income which disappears when education is controlled (Yee, 1984).

ii. Non-farm employment and house-health environment

Employed women have less time for child care and household chores. Attendance or non-attendance at health clinics or use or non-use of health services in rural areas has not been associated with employment of women (NDHS, 1993). It is the agricultural workload and the distance to the health facilities that are more likely to affect the use of health services (Tagwireyi and Greiner, 1994; Kavishe and Mwadime, 1995). Nevertheless, an increased workload among women is, in most cases, associated with the migration and employment of men, because then all household and farm tasks have to be undertaken by the women (Haswell, 1981; Reynolds, 1982). This affects not only her health but also the quantity and quality of child care. In central Kenya, Paolisso and others (1990) found that the incidence of diarrhoea increased among children with fewer contacts with caretakers, because of an increase in the workload on the farms. Hence, although there is no evidence that non-farm employment directly affects household health environment, the effects of male "migratory employment" on the female workload are enormous, and this has a great

implication for the health and living environment of rural households, especially during peak agricultural periods.

Conclusions

The role of NFE in household livelihood differs not only from country to country but also within countries. This makes it difficult to generalize about its impact on nutrition on a regional scale. Using available evidence from the region, the summary is provided below.

(1) The drive to enter into NFE sometimes determines the kind of NFE, its duration and place where it is undertaken. The very poor (i.e. those lacking a minimum level of resources for subsistence), and those with high human capital (trained and highly educated) tend to migrate if their rural homes are far from areas with NFE opportunities. For those pursuing NFE as a means of coping with seasonal deficits or as a means of diversifying the sources of resources, part of the household may migrate if there are no NFE opportunities near their homes. However, these households and the very poor will mostly first exploit job opportunities nearest to their homes, including the exploitation of natural resources. These households are the ones who will be most likely to undertake laborious casual work and other kinds of NFE that are low paying. There is evidence in the region that, in many cases, it is the drive to enter into NFE, rather than the NFE itself, that is associated with nutritional status or the underlying factors.

(2) The consequence of NFE on a household's resources (time and income) depend on the kind of the NFE done, where it is carried out in relation to the rural home, when it is carried out and by whom. Migratory labour and casual work done during the agricultural peak seasons (since that is the time when most NFE in the agricultural sector are available) remove labour from the household. This has a negative effect on subsistence production and if the income earned is not enough, this can have effect on household food security. Besides, the migration of male household members accompanied by declining social networks in rural areas have increased the workload of women. This has had more detrimental effects on child care, health environment and, in turn, on the nutritional status of children. In addition, casual work done by women has also negatively affects subsistence food production, child care and household's health environment. This is more likely if there are no alternative caretakers in the house and if the NFE is labour intensive and time inflexible. There are no studies implicating the rural informal sector for poor child care or for labour inadequacy in subsistence production. This is because these kinds of NFEs allow a shift of time between NFE, subsistence production and home chores.

(3) Income from NFE can improve household food accessibility. The effect of rural informal-sector-NFE on subsistence production is positive through the income

path. Remittances from migrants (mainly those diversifying household resource sources) have also been shown to increase agricultural input use. However, in most cases the NFE that is accessible to rural households brings in little income that it can not meet household needs and also be invested in home production. Hence, the effect of NFE on food accessibility is mainly through food purchases. Significantly beneficial effects of non-farm income on food accessibility are reported mainly in communities with a high agricultural productivity. This is because in such situations, income from NFE is used to supplement household needs, and is not the main source of livelihood. In marginal areas NFE is beneficial for stabilizing food consumption throughout the year and also as a means for coping with seasonal deficiencies.

(4) The effect of NFE on nutrition through the food path is clear in areas with high agricultural production. However, in marginal areas the effect is not clear. Fluctuations in other sources of income, the use and distribution of available resources, performance in crop production, and the quantity and quality of child care and health also play a major role. Thus, wherever non-farm employment benefits a child's nutritional status, data seem to imply that this is through the income-food route. Moreover, the absolute level of income rather than the source of income is a better explanation for food security and nutritional status in households. There is evidence in the region that income alone can only eliminate the most severe forms of child malnutrition, but not the whole range of malnutrition.

(5) There is no evidence that at household level NFE-income affects child care or house health environment, at least not in rural areas. Where health and sanitation environment are critical determinants of nutritional status, the effects of household income are negligible. However, NFE activities which are laborious and energy intensive have been shown to affect care and house health environment, but this is not translated into poor nutritional status. The lack of negative effects of NFE on nutritional status through care and health environment has been attributed to the accessibility to alternative child caretakers and the nature of the jobs found in rural areas (i.e., mainly near home and time flexible). It is also because most child-care and health-seeking behaviours are imbedded in culture and tradition. Hence, there is no evidence in the region that NFE affects child nutritional status through the clusters of health environment and child care.

Table 2.1. Participation in labour force by kind of sector in sub-Saharan Africa, 1992

Country	Rural population (%)	Population in LF (%)	% of LF that are Women	% LF in agriculture	% LF in industry	% LF in services
Countries with high levels of non-farm labour						
South Africa	50	38	39	13	25	62
Mauritius	59	41	30	16	30	54
Lesotho	79	46	44	23	33	44
Botswana	73	33	38	28	11	61
Zambia	58	32	29	38	8	54
Namibia	71	29	24	43	22	35
Nigeria	63	31	33	48	7	45
Countries with medium levels of non-farm labour						
Ghana	65	38	40	59	11	30
Cote'd'Ivore	58	39	32	65	8	27
Congo	58	40	39	62	12	26
Sudan	77	35	29	72	5	23
Benin	60	35	24	70	7	23
Zimbabwe	70	41	48	71	8	21
Siera Leone	69	35	33	70	14	16
Angola	73	41	39	73	10	17
Swaziland	73	24	34	74	9	17
Somalia	65	29	39	76	8	16
Zaire	71	37	36	71	13	16
Liberia	53	36	31	75	9	16
Gabon	53	48	38	75	11	14
Cameroon	58	39	30	79	7	14
Countries with low levels of non-farm labour						
Kenya	75	40	40	81	7	12
Central	52	48	47	81	3	16
Madagascar	75	43	40	81	6	13
Comoro Islands	71	38	41	83	6	11
Senegal	59	34	26	81	6	13
Tanzania	78	47	48	85	5	10
Mali	75	32	16	85	2	13
Chad	66	37	17	83	5	12
Niger	81	51	47	85	3	12
Uganda	88	45	41	86	4	10
Ethiopia	87	41	41	88	2	10
Gambia	76	36	41	84	7	9
Bukina Faso	83	51	49	87	4	9
Mozambique	70	55	48	85	7	8
Malawi	88	43	51	87	5	8
Rwanda	94	46	54	90	2	8
Burundi	94	53	53	92	2	6

Source: UNDP Human Development Report, 1994, ILO Yearbook of labour and statistics, 1992.
LF= Labour force.

3

Effect of non-farm employment on factors of subsistence-food production in rural coastal Kenya

R.K.N. Mwadime and J.C. Hoorweg

Abstract

This study was conducted among the Digo in coastal Kenya to evaluate the effects of non-migratory non-farm employment on subsistence agricultural production. Labour allocation in subsistence production and non-farm employment by household members were monitored during an agricultural peak season (March to mid May). Cash-capital and land use were also monitored during the period. Results indicate that the community, in general, allocated few hours to agriculture compared to other communities in hinterland Kenya. Even during the peak agricultural period, over 30% of the day-time hours among employed households was allocated to "free-time". Unemployed households had approximately 45% of their day hours as "free-time". Employed households allocated more family labour to farming activities than did unemployed households. This seems to result from the ability of households with non-farm employment to use their income to access farm inputs and their ability to mobilize "unemployed" family labour into farming. This ability was lacking among unemployed households. Cash investment in agriculture was a function of both income level and the time spent in non-farm employment. Only households highest in the income distribution were able to invest more income in agriculture as more of the family time was shifted to non-farm employment. The authors conclude that agricultural production does not necessarily have to be negatively affected when non-farm employment opportunities increase. In fact, if non-farm opportunities allow households to continue to live in their rural homes, any "spare time" can be used on agricultural production and other household chores.

Key words: rural, non-farm employment, labour, subsistence-food production, Kenya.

Introduction

It is now generally accepted that under-nutrition in sub-Saharan Africa is a problem of food accessibility at household level. For most households, agriculture is the primary means of food, the other being food purchases. Households go hungry because they cannot acquire the desirable minimum food supply, either because they cannot produce enough food to last through the production seasons or because they cannot raise enough money to purchase food to fill any deficits. As regards subsistence production, labour rather than land is the primary constraint to food production for most smallholders in sub-Saharan Africa (Brown, 1983; Palmer, 1985; Sijm, 1989).

The main limitation to purchasing food, is an inadequate and unstable income resulting from lack of differentiation of income sources. Studies on commercial agriculture indicate that most households in rural Africa might improve their food security if they can combine market strategies and subsistence farm production. It has been reported that market strategies, especially non-farm employment enables households to cope with external shocks and deficits in production (Fleuret and Fleuret, 1980; Siandwazi, 1992; Hoorweg, *et al.*, 1995). Market strategies have also been found to help households increase their subsistence production through increased investment in agriculture (Fleuret, 1980; Binswanger, 1983; Besteman, 1989; Evans and Ngau, 1991).

However, although non-farm employment may be necessary for the improvement of household food security, it may not be sufficient. This is because it is likely to cause changes in tastes/preferences, and hence shifts in food purchasing and in labour and resource allocation patterns (Chernichovsky and Zangwill, 1990). The overall effects of these changes on the household food situation remain unclear. Fears have been expressed about the possibility of reduced agricultural involvement if there is an increase in participation in non-farm activities by rural households, particularly in communities where men migrate to seek employment (Fleuret, 1992 and Suda, 1992) and in areas where non-farm employment opportunities are easily accessible (Oosten, 1989; Hoorweg *et al.*, 1995). Two factors in this have been documented. One is a shift in the total hours (or labour) in a household from agricultural to non-farm activities (Palmer, 1985; Cleave, 1974). The other is an increased desire for leisure and for less time to be spent in labour-intensive activities like agriculture, a result of income-effect (Rubin, 1990; King and Evenson, 1983). Normally, some labour is lost when non-farm employment (NFE) is taken up, and this can have serious repercussions for subsistence production in areas where - and during periods when - labour is a major constraint to production. A decrease in food production normally results if the incomes earned from NFE are inadequate to meet basic household needs, including food or for hiring of additional labour to replace the labour that has migrated. However, if earning levels allow, and if households are willing, hired labour and other inputs can be used to substitute the family labour released for non-farm activities and/or leisure (Haugerud, 1981).

Households with NFE may also be able to take risks they would not otherwise have done without an assured alternative source of livelihood (Chinn, 1979; Collier and Lal, 1984). In addition, a shift in labour of a few family members to NFE may not affect family labour in agricultural activities if there are other people in the household who can shift their labour to replace those engaged in NFE, or if the NFE allows flexibility in time-use between non-farm activities and farm activities (Cleave, 1974). However, in the event of increased NFE, there is reason to suspect substitution only if there is a reduced allocation of total capital (cash capital and family labour) to farming activities among the employed households compared to the unemployed households. Such a case would imply a higher reliance on the market for family food needs; a

situation that can be detrimental to household food security if the quality and quantity of the food intake in the household is negatively affected (Dewey, 1981). But if there is no difference between the employed and unemployed in labour allocation, size of land cultivated or the level of capital investment in agriculture, then the effect of engagement in NFE is additive: a means of spreading risks in consumption. In this case, the food security of the household will improve in event of employment (Hazell and Röell, 1983; von Braun and Pandya, 1991). Assessment of the relation between NFE and factors of subsistence production has not to our knowledge been carried out in situations of increased employment under minimum labour migration, as is the case in this study.

How non-farm employment affects subsistence production in a marginal agricultural setting with a minimum labour migration can only be empirically determined through detailed resource allocation studies. This study examines whether non-farm employment affects agricultural activities and inputs, in terms of labour and cash capital. If indeed NFE does not negatively affect the allocation of family resources to subsistence food production, then programmes to promote NFE opportunities are justified means of improved household food security through increased purchasing power. Otherwise, if NFE affects the means of subsistence production negatively, an analysis would be needed to find out the net effect on food security, i.e., to what degree increased food purchases from earned income compensate for the lower home production. Data from a sample of households in rural coastal Kenya has been used.

Study methods

Area and people

The study was carried-out in an area 50 km from Mombasa, the largest coastal city in Kenya. The people live in settlements near main roads and trading centres within the coastal strip. Their major food crops are maize, cassava, cowpea, and rice. The production of food crops is entirely for home consumption. In a nearby area, yields are usually inadequate to last through the production year, households being able to cover only 40% of their energy requirements. Although most households cultivate cassava which is available throughout the year, it contributes less than 12% of the energy intake in the households (Hoorweg *et al.*, 1995).

Most households have access to land through inheritance, rarely through clan communal land, or they have borrowed from relatives, or have squatted on government land (Waaijenberg, 1993). The baseline data indicates that the average land size per family is 5.5 acres (range from 0.75 to 51 acres). Of this land 86% is put to agricultural use, 59% under tree crops and 27% planted with food crops. On average, cultivated areas per household are small (around 1.5 acres per household). Other studies have indicated that most family labour is provided by females (Oosten, 1989; Waaijenberg, 1993; Hoorweg *et al.*, 1995). Hiring of labour and use of farm inputs, like the use of

fertilisers and pesticides are insignificant. In production of all food crops, "traditional seeds" are normally used (Gillet, 1980). The study community hire labourers from the neighbouring communities. They rarely employ casual labour from among themselves. The base line data indicate that less than 4% of the adults work in casual farm labour in the peak seasons. Tractor services can be hired from private owners. Ox-ploughing is not a common practice but is available from the hinterland at half the cost per acre of a tractor.

There are two agricultural seasons per year. The *masika mwaka* lasts from mid-February till July, reaching its height in the long rains from April to June. The *vuli* season lasts from September to January, its peak being the short rains from the end of September to the end of November. As the short rains are unreliable, most agricultural activities are concentrated in the *masika-mwaka* period. During land preparation, the slashing is normally done by males but the burning is done by women. During the planting seasons, men work in the cassava and maize fields. Most family labour in the rice fields, planting, weeding and protection from birds is generally handled by women with limited help from men and young children. The post-cultivation operations including harvesting, transporting, and storing are primarily done by women. Small amounts of the subsistence production are sold. However, social exchanges go on between households and these are mainly the domain of the women. Where cassava and coconuts are sold commercially, this is mainly done by men.

Sample and survey methods

The individual and household data used in this paper were collected from the end of March through May of 1995. A sample of 185 households were randomly selected from a list of 517 households whose baseline information had been collected earlier. The study community was selected with a number of considerations in mind, notably to ensure access (physical and quality-wise) to roads/transport, agricultural extension, health and education services, and water and marketing facilities by study households.

A research team of 9 local community members, 9 research assistants, a nutritionist from the Ministry of Health, an extension officer from the Ministry of Agriculture and the first author designed the questionnaires and pre-tested them in neighbouring villages. Research assistants visited each household once every two weeks. Information on labour allocation (for example, the number of days and hours worked in the fields, the kind of activity being done) from each household member older than 10 years was collected by using pre-tested questionnaires. The recall was done for the week prior to the visit. Information on the use of hired labour, farm inputs and time allocation in non-farm activities was also collected. Socio-economic and demographic data were collected during the first visit to the household.

Data analysis

All analysis was done using the *Statistical Package for Social Sciences* (SPSS-PC), the 4th release (Norusis/SPSS Inc. 1990). Descriptive analyses were carried out by the type of NFE on different variables. One-way Analysis of Variance was used to test significance of continuous variables and the Turkey's criteria was used to compare group differences. Of the original 185 households, three had their identification numbers mixed-up during the matching of the different files and were excluded; they were all from salaried households. Four households were excluded either because the values for their income (three households) or levels of cassava production (one household) were identified as extreme outliers. The final number of households used in the analysis was 178.

Households were grouped into four categories according to the time spent on various activities by adult household members, not necessarily the head of the household.

(1) Unemployed/farmer - where none of the household members spent more than 5 days per month (average of 3 months) in NFE. Any activities like handicraft or hairdressing carried out on demand or for leisure for only a few minutes in a day were not considered to be non-farm employment, even if some money was earned.

(2) Part-time NFE - where at least one household member spent 5-15 days of the month in NFE. The activities were mainly on a part-time bases or on semi-permanent terms, or the household member was able to decide to carryout the activity whenever an opportunity arose. Examples of this type of NFE are part-time making and selling of handicrafts and foodstuffs, home beauticians for ceremonies, and all sorts of casual work.

(3) Self-employed - if at least one household member was involved in a non-farm activity like businesses/trading, carpentry, masonry or fishing on a self-employed basis (i.e., rewarding themselves from the profits) for an average of more than 15 days per month during the 3 months of the survey.

(4) Waged-employment - if a household member worked and was paid a salary on monthly basis.

The Labour Unit index (LU) was computed as the number of household members available for agricultural labour that season from Collison (1972),

i.e. **LU** = #6-12*0.40 + #13-17 * 0.67 (if males or 0.75 if females) + #18-59 * 1.00 + (#>60 * 0.75).

Results

Sample socio-demographic and economic characteristics

Of the sample households, 15% earned their livelihood mainly from farming, 26% from semi-permanent occupations, 29% from self-employment and 30% from waged-employment. Data shown in Table 3.1 show that the household size was 7.5. Men were the main controllers of resources in the homes, as nearly 79% of households were headed by males. Approximately 74% had at least one child below the age of 5 years, whether born to the head of household or to another household member. There was no statistically significant difference in the above factors between the NFE categories, which means there was no confounding of the demographic characteristics in the analysis.

As expected from the design of the analysis, the farming households had little participation in NFE (only 0.6 adults and very insignificant amounts of time). No significant difference in numbers and hours was found between the employed groups. The average monthly total income (computed as an average for three months running) per adult equivalent was higher in employed households. Households with self-employment and waged-employment had significantly higher incomes compared to unemployed households.

Distribution of farm resources according to non-farm employment group

The average land area accessible to the households was estimated at 1.4 acres per adult equivalent (AE) and the averages did not differ across categories (Table 3.2). No significant differences were observed in land usage. The average size of land cultivated with food crops in the season of study was 0.35 acres per AE, which is 25% of the available land, ranging from 21% among farmers to 28% among the part-time employed. There was also not difference between the employment groups in the value of commercial production, i.e., annual production of coconut, cashew-nut and the fruit trees the household owned or in the value of livestock. However, unemployed households produced a higher value of these commodities, though not statistically significant. The findings also indicate that the variety of food crops cultivated in the season was similar among the groups. The proportion of households cultivating rice, cassava, food crops like maize and pulses, and cash-crops, and keeping livestock did not differ across categories of households.

Table 3.1. Socio-demographic and economic characteristics of the households studied according to the main occupation of household

Characteristics	Farmers	Non-farm Employment			Total	*Singni-ficance*
		Part-time employed	Self-employed	Waged - employed		
Number of households	26	47	51	54	178	
Demographic						
Household size	7.4 (4.2)	6.9 (3.2)	7.2 (3.2)	7.3 (2.4)	7.5 (3.7)	*ns*
Sex of household head (% male)	69	79	76	85	79	*ns*
Age of household head (years)	46 (14)	43 (12)	47 (14)	45 (14)	45 (13)	*ns*
Households with underfive(s) %	82	66	74	76	74	*ns*
Non-farm employment						
Female head• in NFE (%)	15	34+	37+	32+	34	**
Total adult members in NFE	0.6 (0.5)	1.7 (1.0)+	1.6 (0.8)+	1.8 (1.2)+	1.6 (1.1)	**
Hours in NFE per household per day	0.5 (1.2)	8.8 (10.6)+	8.0 (8.9)+	9.4 (10.7)+	7.6 (9.8)	**
Hours in NFE per adult per day	0.1 (0.3)	1.6 (1.7)+	1.8 (2.0)+	2.0 (2.7)+	1.6 (2.1)	**
Household income per month (Kshs./AE) ••	887 (422)	1,026 (390)	1,132 (587)+	1,260 (605)+	1,107 (537)	**

Figures in parentheses are the standard deviation.
Kshs = Kenya shillings. AE= Adult equivalent. NFE= Non-farm employment. ** The difference of the values across the row are statistically significant at 1%. ns = Differences of the values across are not statistically significant at 5%. + Figure is significantly different from the smallest figure on the row (using Turkey's test of multi-group comparisons in one-way ANOVA). • Female head = The spouse of the male head or the head of the household where not married. •• Income from the sale of farm produce, the value of subsistence production consumed in the household, wage earnings, transfers (remittances/gifts, pensions), and earning from investments. It does not include the value of livestock or harvests not consumed or sold for cash in the six months used to estimate the value.

Table 3.2. Household farm resources and family labour inputs in farming according to non-farm employment activity

Characteristics	Farmers	Non-farm Employment			Entire sample
		Part-time employed	Self-employed	Waged-employed	
Number of Households	26	47	51	54	178
Land Use					
Total land size (acres/AE)	1.4 (1.1)	1.3 (1.1)	1.5 (1.8)	1.4 (1.1)	1.4 (1.3)
Area cultivated in season (acres/AE)	0.30 (0.31)	0.37 (0.35)	0.37 (0.40)	0.32 (0.34)	0.35 (0.35)
Commercial farm produce† (Kshs./AE)#	996 (1,507)	798 (1,354)	834 (1,200)	830 (1,027)	847 (1,235)
Number of different food crops planted	4.0 (1.5)	3.8 (1.7)	3.6 (1.7)	3.3 (1.8)	3.6 (1.7)
% farming rice	50	45	51	46	48
Labour Input					
Total available Labour Units (LU)##	5.3 (1.9)	5.5 (1.8)	5.0 (1.9)	4.8 (1.7)	5.1 (1.8)
Average LU participating in farming/day	2.2 (1.1)	2.3 (1.1)	2.4 (1.1)	2.4 (0.8)	2.4 (1.0)
Hours in farming per LU in farming	2.8 (1.5)	2.9 (1.1)	3.3 (2.1)	3.2 (1.8)	3.1 (1.8)
Average visit to farm by household head	2.1 (1.2)	1.8 (2.4)	1.4 (1.3)	1.4 (1.5)	1.6 (2.4)
Total labour (including hired) (AE man-days)	152 (143)	233 (159)	242 (219)	216 (161)	219 (178)
Family labour (AE man-days)	128 (121)	201 (168)	225 (228)	201 (161)	197 (181)
Family labour (AE man-days/LU)	26 (25)	39 (35)	52 (65)	46 (44)	43 (47)
Capital Use					
Cash-invested in agriculture (Kshs./AE)	238 (367)	234 (286)	226 (315)	232 (293)	232 (306)
% Cash- investment put in labour	82	76	54	63	67
Family labour* and cash-invested (Kshs./AE)	2294 (2034)	3374 (2728)	4453 (4198)+	3903 (3589)	3686 (3814)

Figures in parentheses are the standard deviation.
Kshs = Kenya shillings. AE = Adult equivalent. ## LU = Labour units. † Commercial farm produce = Value of produce from tree crops (like coconut, cashew-nuts, fruits) and value of livestock in stock. + Figure is significantly (at $p<0.05$) different from the smallest figure on the row (using Scheffé's test of multi-group comparisons in one-way ANOVA). * Family labour is weighted by the value of a labourer's day wage.

Note: Differences across rows were not significant at 5% except for the value of labour invested in agriculture.

Non-farm employment and family labour invested in farming

Although the average labour units available in the households was smaller in the self-employed and wage-employed households, this did not differ statistically from the other groups of households. The actual number of labour units per household[1] that participated in farming on any given day of the season averaged 2.4. The heads of the households in the waged and self-employed groups participated less in farm activities compared to the heads of unemployed households ($p=0.075$). This suggests a tendency for NFE to draw heads of households away from farming activities. The data also indicate that the employed households allocated more AE-days to farming than the unemployed households (in fact on average terms almost twice as much). The number of AE-days engaged in farming activities per labour unit was much higher in the employed groups (the highest was among the self-employed) than in the unemployed groups, although it did not differ significantly across the categories. Of the total household labour, 90% was provided by family members. Again the NFE households allocated to farming more hours per adult per day of observation, although differences were not significant. The average for the sample was three hours.

Although differences were not statistically significant, NFE households spent proportionally more hours in farming than non-NFE households (Figure 3.1). The time allocation data indicate that over 55% of the time of NFE households was either allocated to farming (20%) or non-farm employment (36%). Unemployed households spent most time being idle (45%) and in doing domestic activities (39%), although these percentages are inflated by the households not participating in NFE. Only 16% of their time was spent in activities in farming and non-farm employment. The proportion of hours allocated to farming increased with household income level (Figures 3.2a and 3.2b). It decreased with the level of time spent in NFE per adult, except for those households spending less than one hour per adult (most of them being farmers).

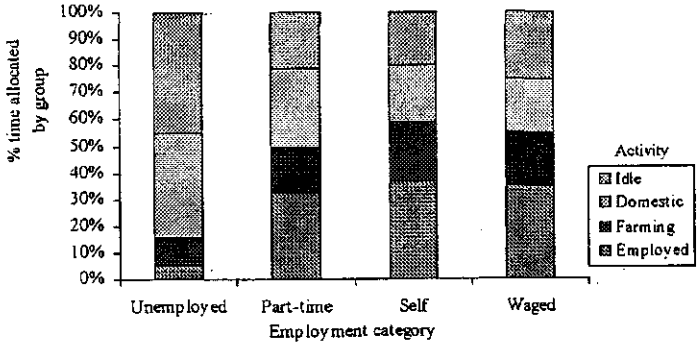


Figure 3.1. Time allocated among main activities by adults (>10 yrs) according to non-farm employment category

[1] Participation here is taken as indicated by respondents; i.e., the number of household members in different ages and sex categories who were engaged in farm activities during the season. Household members who were engaged in farming for fewer than 5 days of the 90 days of observation were excluded.

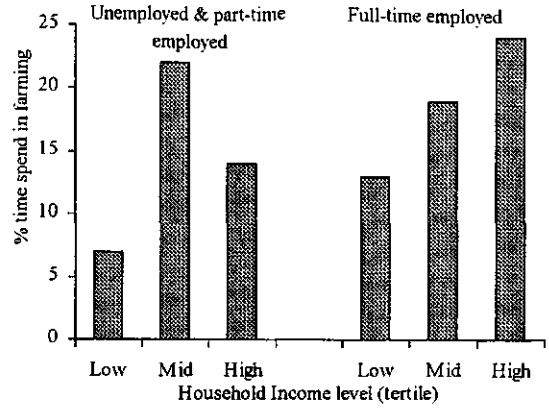


Figure 3.2a.Time spend (%) by family in farming activities according to income level and employment category

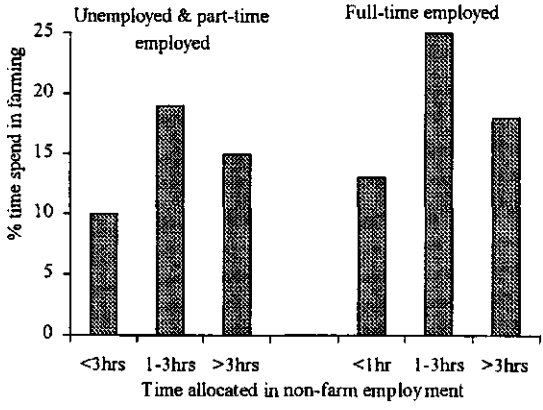


Figure 3.2b. Time (%) spent by family in farming activities according to time in non-farm activities and employment category

The first finding implies that income reinforces labour participation. The second finding implies that time in NFE competes with labour participation. The lower proportion of time in those allocating less than one hour per day to NFE is a confirmation of the findings of Table 3.1, that domestic and leisure (idle) is preferred by these households.

Reasons for why a household member did not carryout farming activities were sought for. The distribution of the reasons according to employment category are presented in Figure 3.3. Members from employed households not participating in farming activities the week prior to the interview often indicated employment as one of the reasons (30-40%). Sickness/disablement or pregnancy was a reason given by all groups (10-15%). The important reason to note is the higher proportion of those who "refused" or were sick/pregnant among the unemployed households. This was twice the proportion reported in the self-employed and wage-employed categories.

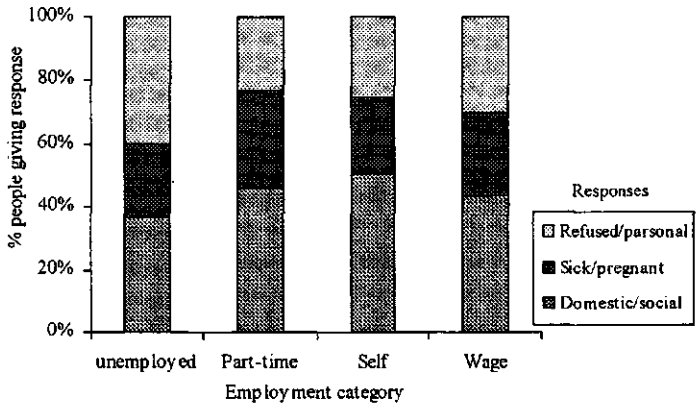


Figure 3.3. Reasons for not going to the farm by unemployed adults according to employment category

Non-farm employment and cash invested in agriculture

The study also investigated how capital was invested in agriculture (purchase tools and equipment, to hire labour, tractor or animal draught power, to buy seeds, fertilisers or pesticides), and found that it was not significantly different across the categories (Table 3.2). Neither was there a significant income effect or time effect (or an interaction between the two) on the cash investment in agriculture that season (using an ANOVA analysis, not shown in Table 3.2). The level of investment was, however, higher at the higher income level. Yet, at the high income level, there seemed to be a potential of the time spend in NFE to be compensated by cash investment in agriculture. In other words, more time in NFE per adult was associated with higher cash investment (Figure 3.4). At lower incomes levels, households tended to use less cash investment in agriculture as time in NFE per adult increased. The value of tools (wheel barrow, hand tools, oxen) among employed households was higher than among unemployed households. Self-employed and wage-employed households had more farming tools, and this was a higher among households with higher income (Figure 3.5). Self-employed and wage-employed households also invested in capital goods and services other than labour more than the other groups, who put more of their money into hired labour (Table 3.2).

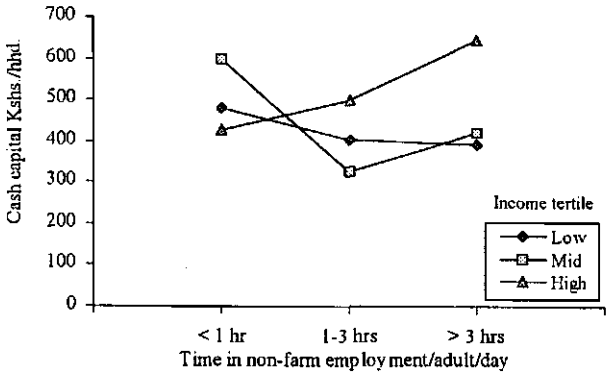


Figure 3.4. Cash capital invested in agriculture by hours allocated to farming per adult and household income level

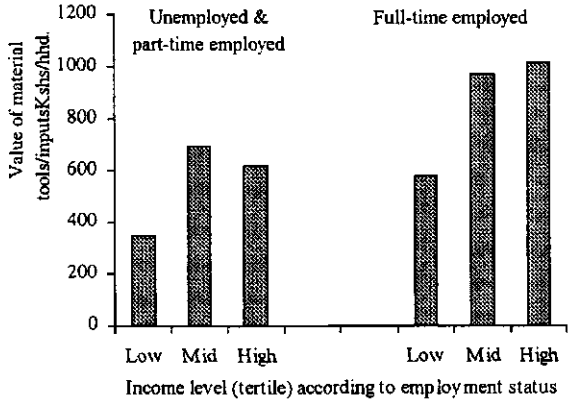


Figure 3.5. Value of farm material goods by household income level and employment category

Discussion and conclusions

This study has endeavoured to assess the effects of non-farm employment on agricultural activities in a community with relatively more opportunities for non-farm employment, little labour migration, accessibility to land and a potentially medium production level. The hypothesis was that, in such an environment households may shift their labour to non-farm employment to the detriment of subsistence production. On the contrary, the findings of this study indicate that NFE employed households actually invest more family time in the farm than unemployed household do. The findings are discussed below.

The hours allocated to farming activities in the study community (3.1 hours per day for those going to the farm or 1.5 hours per LU) were lower than those reported in a time allocation study in Ntcheu District in Malawi, where women spent an average of 4.6 hours per day in agricultural activities during the rainy seasons (Brouwer, 1994) and those reported in eastern province of Kenya, 4.3 hours (Baksh *et al.*, 1994). Hours allocated to farming in the study community were also lower than those reported for rural Benin (1.9 to 3.2 hours per adult per day) and for the Zairian Basin (2.9 hours per adult equivalent per day) during the busy agricultural seasons (Liere, 1993; Tshibaka, 1992). This shows that the study community is not as agriculturally active as some communities in other parts of the country or of Africa. In fact, they have been shown to have a lower level of self-sufficiency compared to neighbouring communities who attained a higher level of self-sufficiency even though their land was less productive (Hoorweg *et al.*, 1995). The fact that only 50% of the day-time hours are allocated to NFE and farming activities during peak agricultural season clearly shows that family labour in this community was not a serious constraint to subsistence production. The reason that has been given for the generally low regard for agriculture among Digos (especially those living next to the main roads) was high accessibility to an alternative livelihood, i.e., of non-farm employment (Oosten, 1989; Hoorweg *et al.*, 1995).

Theoretically, other things being equal, there should be an outright competition between the level of engagement in NFE, in terms of time per adult, and the family labour put into agriculture. There was no evidence that increased time allocation in NFE reduced the household time allocated to agricultural activities. In other words, it was the "household leisure time" and time for domestic activities that was shifted into NFE. The lack of a connection between time used in NFE and family labour in agriculture is also related to the fact that the amount of time allocated to either full-time farming or employment was small ("hidden labour"). These results suggest that more hours could be allocated to NFE or to agriculture without having a detrimental effect on each other. Employed household members, especially women were able to combine both NFE and agriculture efficiently as they engaged in time-flexible non-farm activities, that were not carried out every day, and only for a few hours per day, an average of 2 to 3 hours in the fields and 1 to 2 hours in NFE. Only when households allocated more than three hours per adult into NFE did the proportion of family time allocated to farming decrease. However, since women are the primary food producers and men engage more in NFE employment, increased NFE could still mean an expansion of a woman's workload (as agricultural tasks are more energy-intensive), and this could have a detrimental effect on her health and on that of the child (Engberg *et al.*, 1988; Holmboe-Ottesen *et al.*, 1989; Bantje, 1995). There is a suggestion from the data that high income households are likely to supplement family labour with hired labour, machinery or inputs, and hence compensate for the marginal labour allocated to NFE. For households with fewer resources, additional hours in NFE may negatively

affect the levels of food production (a result of reduced labour) or result in increased workload of household members, especially women.

Contrary to the hypothesis put prior to the study, the analysis by employment status shows the reverse of the competition between NFE and family labour. Households engaged in NFE put more family labour into farming activities. This they did by mobilizing their unemployed members to spend more hours in farming, and less in leisure compared to unemployed households. A comparable difference in labour engagement in farming between employed and unemployed households or the "rich" and "poor" households has been reported by other studies in sub-Saharan Africa. For instance, a study in Ethiopia and another in Kenya found that "richer households" worked almost twice as much in agricultural activities as "poorer households" (Ferro-Luzzi, 1990; Suda, 1992). The present study investigated plausible reasons that might be associated with the lower family labour investment in farming activities by the unemployed households. The arguments refer to labour investment and not to the productivity per unit time, as this was not investigated in this study.

1) Non-farm employment was a means of increasing the household's income. Firstly, the higher income in turn helped a household's accessibility to farm inputs (like hand-tools and seeds), thus enabling it to rely less on borrowed tools. Ownership of efficient tools like a wheelbarrow, and better designed (but more expensive) hand-tools among the "employed households" may have increased labour investment by motivating unemployed household members to put more man-hours into farming activities (Cleave, 1974; Bardhan, 1984). This finding underlines the centrality of private material assets ownership in the role of labour allocation, and its use in the rural household economy (Tshibaka, 1989; Becker, 1990). It also shows that assured income from non-farm employment may enable households to accumulate farm assets which, in the long-run, can increase their labour productivity (Kitching, 1977; Besteman, 1989). Secondly, increased income from NFE could also have enlarged accessibility to the increased food demand that resulted from farm labour participation. Low income among unemployed households in the community might limit their access to the increased food demand during a time of seasonal food stress. In other words, lower labour input may be connected with the functional capacity of the household members, for instance, an attempt to save body-energy. There is tentative evidence in this direction from an earlier study in coastal Kenya (Hoorweg *et al.*, 1995). This study showed that women from poor households lost the least weight during the busy agricultural season (a period when more than 40% were undernourished), implying a lower energy expenditure relative to consumption by poor households.
2) Factors facilitating or also inducing non-farm employment might be associated with a lower allocation of family labour to farming. For instance, unemployed households more often reported sickness (including pregnancy) as the reason why some members were unable to carry out farm activities in the week of observation. They also reported "refusal" and "lack of interest" more often as the reasons for not

doing farm work. This was in agreement to discussions in focus groups, where it was pointed out that farm activities in the unemployed households were mainly done by the head of household together with the spouse, where available. Other household members normally "refused" to participate. Poor inter-household and intra-household relations and "support" have been associated with low levels of subsistence production in rural households (Peters, 1986). Further analysis of the data set reported here shows that the effects of type of NFE on family labour were over and above the effect of the income level and the time allocation in NFE. This suggests other factor(s) related to employed households or the employment might have been involved in the level of investment in agriculture. NFE households mobilized their unemployed household members more effectively into family labour for farming activities. The incentive to carry out this "mobilization" was lacking in the unemployed households. The question is, whether these cultural, social behaviours, or mobilization capability are a cause or a consequence (rationalization) of lower productivity.

In conclusion, although the findings of this study apply to communities where non-farm employment allows household members to remain settled in their rural home, it illustrates the possibility of improving agricultural production, and hence household food security through increased NFE. The low level of self sufficiency reported for this location (Oosten, 1989; Heyer, 1990; Hoorweg *et al.*, 1995) are not associated in any important way with the effects of NFE on family labour. Probably they are the result of other factors within or outside the household like lack of management skills, mal-function of local extension institutions, poor soil quality (Gillet, 1980; Waaijenberg, 1994), belief systems, and cultural norms and values that "disable" food production (Mwadime and Kaai, i.p.). Labour was not a constraint in the study community and it seems that NFE does not directly or automatically lead to less labour in agriculture, on the contrary. Besides, NFE leads to capital investment in subsistence production only among the high income group. Thus, NFE is not a "cause" of the level of production but an indicator of a household's better "technology" and "economy". The former enable the household to mobilize its money and time resources among NFE, farming and other competing demands like schooling for children and religious/social events. The latter, is a catalyst or aid to the "technology". It also gives households access to required assets and, as seen in Chapter 4, to increased food purchases and hence to a higher energy intake. Policy makers and development agencies can promote NFE not only as a means of increasing rural incomes (which may or may not be invested in agriculture) but also as a direct means of advancing employment in the agricultural sector for unemployed household members.

4

Relation between household income and food accessibility in coastal Kenya. Is there a trade-off between quantity and quality of food?

R.K.N. Mwadime, J.C. Hoorweg, W. Klaver and J.G.A.J. Hautvast

Abstract

This paper examines (1) the impact of household income on food expenditure pattern (amount and types of food entering the house) and (2) the contribution of income and food variety on energy intake. A survey was done of 194 households randomly selected from a rural community in coastal Kenya. Quantities and values of foods from various sources (purchased, harvests, gifts or in-kind) were recorded on a weekly basis. Types and quantities of various foods consumed in the household were monitored independently over a period of 2 months, using two-day recalls done every week. Household composition sharing the food during the same period was also recorded. The results indicate the following points. (1) At least 88% of the value of food made available to the households was purchased. (2) Income was positively associated with the quantity of foods available in the house. (3) Although the absolute levels of income increased, the proportion allocated to traditional staples (maize and cassava) declined with household income while the proportion that increased was mainly of other foods of plant origin (i.e., rice, wheat, potatoes, pulses). There was no significant change in the share of foods of high nutrient density like fruits and vegetables, oils or animal products. (4) The level of energy intake increased with income, but within income groups the diversity of food items consumed (measured weekly) increased with energy level. Also variety in energy sources was associated with higher energy intake. (5) The higher energy intake within income groups was associated with a concomitantly higher food budget, but the cost of energy per se was not higher. Results indicate that rural households can attain higher energy intake if they can diversify their diets within current incomes.

Key words: Household income, energy intake, food diversity, Kenya.

Introduction

In rural settings, home production and other sources of food (gifts, aid, hunting/fishing) are normally not enough to meet household needs. Nor is there much in the way of variety, quality and stability. Cash income is essential to assure an adequate and stable diet (Greer and Thorbecke, 1986; von Braun and Pandya-Lorch, 1991). Higher levels of household income are associated with higher food expenditure, although the association between food expenditure or the amounts of energy consumed in a household and income is not linear (von Braun, 1990b; Bouis and

Haddad, 1990). It tends to level-off at higher values of income, a factor attributable to the effect of income on food and consumption patterns and to simple physiological facts. At high incomes, a larger proportion of food expenditures is spent on non-staples and more expensive food items that often have a lower nutritional value (such as more refined foods), but which are fresher, taste better or are quicker to prepare (McCarthy, 1977; Kaiser and Dewey, 1991a; Schiff and Valdes, 1990). Even relatively low-income families give out a portion of increased income to food with these attributes (Shah, 1983). The implication is that the inadequate intake of energy ("silent" hunger) may persist, even when income increases. A number of recent reports have expressed concern about whether increased income does, indeed, alleviate hunger and "food poverty" in developing countries (Shah, 1983; Behrmann and Deolalikar, 1987).

Although in the sixties a number of studies indicated that "food monotony" was associated with a low food intake (Périssé, 1969; Doughty, 1979), few studies have investigated the role of food variety on under-nourishment in low-income households. There is some evidence that increasing "taste" and variety in the diets of low-income households increases not only their intake of essential nutrients but also the level of intake of the staple foods (Rolls and DeWall, 1985; Immink, 1992). One can expect that the items that add taste and variety are more expensive than the common staple foods, since in general the latter constitute the cheapest source of energy. Thus, higher income can enable expenditure on those more expensive food items which, in addition to adding taste, have a higher nutritive value (fat, animal protein, minerals, vitamins) and, on balance, increase the nutritional value of whole diet. Nevertheless, specific nutrient (or energy) deficiencies can ensue if foods with a lower nutrient quality (like more refined foods) start to displace the traditional staples in the diet. This situation would demand that programmes aimed at raising the income of rural households should implement complementary efforts, alongside economic-wide ones, to sensitise communities on the optimal use of their resources.

The study reported here investigated how food expenditure and food choice varied with household income level in a community in coastal Kenya. It also looked at whether the choice of food was associated with the level of energy intake. Food choice was studied from its food dimensions (the types and amounts of food), as well as from a nutritional angle (the proportion of energy contributed by different food items).

Methodology

Study population

The community under study lives within 15 km from the Indian Ocean, in Kwale district. Over 75% of the people in the district belong to the Digo tribe and are Muslims. The traditional agricultural basis of the area is the production of maize, cassava, and legumes as the main food crops, and coconut and cashew-nut as the main cash crops. Primary staple foods are cassava cooked in coconut extract and maize

meal. Fish and pulses are the main relishes. Because of the low agricultural productivity related to the poor/infertile soils and low productive traditional farming techniques, few households are able to produce enough food to last through the production cycle. Cassava, coconut and fish are the only home-produced foods available throughout the year. The level of food sufficiency has been estimated to be less than 35%, and most dietary energy (83%) enters the household through purchased sources (Hoorweg *et al.*, 1995). The high dependence on the market for food implies that income is an important factor in determining the amounts and kinds of foods entering the house.

More than 80% of the income in the study location was earned from NFE. The manner in and extent to which each household engages in NFE in the study community varies considerably. An earlier study showed that more than 75% of the households in locations nearby had at least one NFE activity (Hoorweg *et al.*, 1995). NFE opportunities are in waged employment (in tourism sites, hotels, cottages, industry, government and service sector), trading and business, fishing and self employment in crafts-work, including carpentry, masonry, laundry, and the making and selling of handicrafts and home-processed foods. Unlike employed people in most other parts of rural Kenya, nearly all Digo in the study villages either live in their rural houses and commute daily to their work, or are able to go home at least once a week. This is true for 78% of household heads in the study area.

The community studied was chosen because it had the following characteristics in addition to those already given above. (1) There were no restrictions in the marketing of major foods (maize, rice, meat, fish, milk, wheat) or in their availability. There were minimal variations in market food prices. (2) All households had access to family land of more than 0.5 acres. (3) Drinkable water was available within 30 minutes walk. (4) Primary and secondary education, and health services were within at least 30 minutes walk. (5) Households belonged to the same tribe and religion. This avoided differences in food choices associated with these latter two factors.

Design and selection of the sample

A two stage sampling was done. A proportionate random sample of 530 households were selected out of 1890 households in three (sub)locations in the study area (see Chapter 1). The sampling frame for this study consisted of 517, of the 530 households, whose baseline data was completed. From these sampling framework, 210 households were selected by simple random sampling. Five households did not participate for the whole period of the study. Reasons given for early refusal were that they were too busy, that the head of household refused to give permission, that the household felt the information was too personal and they believed it would not be kept secret or that it would be used for other purposes contrary to their wishes.

The survey was carried out from mid-October to mid-December, 1994. This was a period identified by a previous study in 1985-86 (Hoorweg *et al.*, 1995) as having a high level of food intake, yet with a high proportion of food being purchased.

It was expected that that food expenditure and the quantity and quality of food intake would be most sensitive to the level of household income. Qualitative information was collected during the planning the survey. This, together with comments received from some community members during the presentation of the preliminary results, were used in the interpretation of results.

Implementation of the Survey

Nine field assistants collected the information for this study. Each assistant was assigned a "cluster" of 22 households. In the two months of the study, the following information was collected once a week from the households to estimate the value of food made available in the households: (1) all items bought (food and non-food), the amount, the person doing the purchasing and the earner of the money used; (2) all foods taken from the household's own farm, given to the household as a gift (including borrowed) or gathered (hunted or fished); (3) the number, sex and age of household members in the household in that week

To estimate food intake, the households were visited ones every week (days determined randomly) and together with the mother a two-day recall of all food items consumed in the household, the type, amounts and sources were estimated and recorded (Cameron and van Staveren, 1988; Gibson, 1990). Where applicable, a wastage factor of 10% of edible portions of foods consumed was applied. The number, sex and age of household members and visitors consuming the main dishes on those two days of recall were also recorded. Data are at household level rather than at individual level because the "common pot" eating pattern among the Digo made estimation of individual intake extremely difficult.

Household income was estimated by adding all NFE earnings by source and earners residing in the household or those living away from home. In addition, monetary earnings from sales of farm produce and returns from other investments and pensions were included. The value of food consumed in the household from its home production was also included at farm-gate prices. Total income was estimated for the four months before the study plus the two months of the study. Monthly income was estimated by dividing the incomes over the total period by six.

Market and average farm-gate prices were used to cross-check the prices/costs given by the individual respondents. The value of home-produced foods consumed in the house, gifts or gathered foods were estimated by weighting the amounts consumed by the average farm-gate prices collected at the time of the study. Since the each enumerator came from his/her assigned cluster of households and was a neighbour or a relative of most of the households, he/she was able to verify or correct implausible responses. Two hundred and five (205) households completed all the rounds of the survey. Eight households were excluded from the analysis because the survey team thought they had grossly falsified their responses. Three other households were excluded because they had dietary intake and expenditure values that were consistently

identified as too high compared to the rest of the sample. The final sample size used in the analyses was 194 households.

Data analysis

There were 84 different food items bought in the markets or gathered or consumed in the households. This were reduced to eight groups based on local considerations, which happened to be the same as the accepted food groups for nutritional sciences and praxis: (1) maize, (2) cassava, (3) non-traditional staple foods, e.g. rice, wheat and potatoes, (4) legumes, (5) vegetables and fruits, (6) animal-protein-rich foods like meat, milk, fish, and eggs, (7) energy-dense foods used for food preparation in the home, like sugar, fats and oils, and (8) "luxury foods" which a household can do without, but which adds variety and taste to the diet, including food items like snacks, tea, bread, spices, jam, and butter. The amounts of energy and the major nutrients of protein, vitamin A, iron, and vitamin C in the food ingredients were computed using the Technical Centre for Agriculture in the Netherlands (CTA) food tables for Eastern, Central and Southern Africa (West *et al.*, 1988). Where the food item was not found in these tables, Kenya food composition tables for 1993 were used (Sehmi, 1993). Household energy and nutrient intake levels were computed from the weekly 2-day recalls and expressed in levels per day. A consumer unit is equal to a reference adult male of 18-29 years of age. All statistical analyses were done using the *Statistical Package for the Social Sciences* (SPSS) PC+ version 4 (Norusis/SPSS Inc., 1990). The analysis of variance was used to assess the relationships, with the household income per consumer unit in tertiles as the independent variable. This allows also non-linear relationships to be seen.

Results

Table 4.1 summarizes a number of characteristics of the study sample by income group. Results indicate no significant difference between income groups in the size of household (although the low income group does have more consumer units) or in the number of pre-school children per household. More households in the "poorer" group were headed by females than in the other groups, although this was not statistically significant. Results also indicate that income level was not associated with the size of accessible land. Also income could not be directly associated with the number of people in the household participating in non-farm employment (NFE).

Table 4.1. Summaries of selected household characteristics: average values or overall percentage by income group* and statistical significance

Variable	Income Group			All	*Sig. level*
	Low	Middle	High		
Number of households	64	63	67	194	
Household size	8.8 (3.4)	7.9 (3.0)	7.8 (3.0)	8.1 (3.2)	*ns*
Consumer units/household	6.5 (2.7)††	5.6 (2.4)	4.4 (2.0)	5.4 (2.4)	**
Children < 5 yr./household	2.2 (1.2)	1.9 (1.0)	2.5 (1.9)	2.2 (1.5)	*ns*
Male headed household %	72	79	81	76	*ns*
Years of education per adult (15-60 yrs).	4.4(2.5)	5.2 (3.1)	6.5 (3.7)††	5.4 (3.3)	**
Number engaged in non-farm income activities	2.9 (1.9)	2.4 (1.7)	2.3 (2.0)	2.5 (1.9)	*ns*
Land size (acres)/CU**	1.0 (0.9)	1.2 (2.0)	1.4 (1.6)	1.2 (1.7)	*ns*
Value of consumer durable# goods (Kshs ***/CU)	1,152 (951)	1,984 (1,502)†	2,350 (1,712)†	1,836 (1,494)	**
Total household income (Kshs/CU/month)	564 (177)	1,024 (123)†	1,838 (485)††	1,150 (613)	
Share of income from sale of farm produce (%)	23.4 (23.0)†	20.4 (26.2.0)†	13.9 (15.1)	20.1 (25.1)	*
Share of household income earned by females (%)	27.6 (41.2)	16.3 (27.8)	17.2 (29.7)	19.9 (33.1)	*ns*

Figures in parentheses are the standard deviations.

* Income groups are tertiles of household income per consumer unit. ** CU= Consumer units. *** Kshs =Kenya shillings.

Durable goods include: a cooking stove, refrigerator, wheelbarrow, radio. ns =Differences across the row are not statistically significant at 5%.

* Row differences statistically significant at 5% across income groups. ** Row differences statistically significant at 1% across income groups.

† Statistically significantly larger than (only) the smallest value in the row using Scheffé's test in One-way ANOVA.

†† Statistically significantly larger than the other 2 values in the row using Scheffé's test in One-way ANOVA.

However, the education level of the working household members was a major determinant of income. Richer households had more years of education per adult than other households. Similarly, they had a higher value of consumer durable goods than poorer households and, as one would expect, income had provided the means to acquire durable goods like radio, piped water into the house, cemented floor/wall, mosquito screens, stove and refrigerator. These findings imply that the measurement of income (the independent variable) was valid.

Not unexpectedly, the composition of income differed across income groups. Between 75% and 86% of the cash income in the households was from non-farm sources. Farm income contributed a larger percentage of the income in households at the lower end of the income distribution, although in absolute terms it was still higher among households in the high income groups. Proportionally more of the total income in low-income households was earned by female members, although the differences between groups were not statistically significant at an alpha of 5%.

Relation between income and composition of food basket

Because food consumed in these rural households is mainly from either subsistence and/or purchased sources (gifts and food received in-kind being minimal), this section presents the relation between income and the values of food accessed by the household from these two main sources. Table 4.2 shows that the absolute value of 7 out of the 8 main food groups consumed in the households during the study period was, on average, higher at higher incomes. The exception to this was cassava, of which the middle-income group consumed more per month. All food groups consumed in the households, with exception of cassava, was predominately purchased.[1] More than 90% of maize, pulses, energy-rich foods and off-course snacks and luxury foods were purchased. For all food items, including cassava, the amount of purchased food increased with income. The value of subsistence food items were substantial for cassava, non-traditional foods (mainly rice and bananas), fruits and vegetables, and animal products (mainly fish).

More than 50% (even 70%) of the cassava available to households in the low income and middle income groups was from subsistence production. The amounts of non-traditional staples (rice, wheat and potatoes) from subsistence production increased with income and, in fact, in the highest income group, more than 50% of this food came from subsistence sources. The low income group accessed relatively little of subsistence-produced animal products (including fish), probably because they did not engage in fishing. In absolute terms, the average value of subsistence food accessed by the households increased with income and it probably reflects underlying production levels.

[1] It has been shown in an earlier study (Hoorweg *et al.*, 1995) that this predominance of purchasing is the same throughout the year.

Table 4.2. Value of food made available in the households per month by source and income* level

	Income group				
	Low-income group	**Mid-income group**	**High-income group**	**All**	***Signi-ficance***
Number households	64	63	67	194	
Food item	*Value of food Kshs**/CU***/month*				
Maize					
Purchased	128 (55)	148 (70) †	166 (97) †	147 (79)	**
Home-produced	1 (1)	1 (5)	1 (5)	1 (4)	*ns*
Total	129 (53)	149 (70) †	167 (97) †	148 (78)	**
Cassava					
Purchased	4 (9)	7 (17)	13 (19) †	8 (16)	*
Home-produced	14 (19)	25 (38) †	10 (19)	16 (27)	**
Total	18 (18)	32 (42) †	23 (33)	24 (33)	*
Rice/wheat/potato					
Purchased	28 (26)	60 (51) †	76 (77) ††	55 (58)	**
Home-produced	17 (41)	26 (121)	95 (124) ††	47 (115)	**
Total	45 (84)	86 (97) †	171 (153) ††	102 (114)	**
Pulses					
Purchased	12 (15)	33 (21) †	65 (38) †	37 (27)	**
Home-produced	1 (2)	0 (2)	0 (1)	0 (2)	*ns*
Total	13 (14)	33 (25) †	65 (38) †	37 (27)	**
Vegetables & fruits					
Purchased	21 (15)	36 (29) †	55 (43) ††	38 (34)	**
Home-produced	6 (25)	11 (38)	8 (16)	8 (18)	*ns*
Total	27 (27)	47 (49) †	63 47) †	46 (45)	**
Animal Protein foods					
Purchased	73 (54)	103 (75) †	164 (105) †	113 (75)	**
Home-produced	8 (41)	22 (63) †	16 (72)	15 (55)	*
Total	81 (71)	125 (76) †	180 (121) †	129 (79)	**
Energy rich foods					
Purchased	81 (36)	108 (48) †	143 (61) ††	111 (59)	**
Home-produced	0 (0.7)	2 (0.9)	1 (0.9)	1 (0.9)	*ns*
Total	81 (36)	110 (48) †	144 (61) ††	112 (59)	**
Snacks/luxury foods					
Purchased&Total	53 (32)	76 (41)	88 (50) †	72 (44)	**
All foods together					
Purchased	400 (112)	571 (257)	769 (401) ††	583 (242)	**
Home-produced	47 (73)	87 (143) †	131 (198) ††	88 (138)	**
Total	447 (157)	658 (204) †	900 (406) ††	671 (336)	**

Figures in parentheses are the standard deviations.
Row differences are statistically significant across income groups : at * 5% , ** at 1%, ns= Not significant.
* Income groups are tertiles of household income per consumer unit. ** Kshs =Kenya shillings.
*** CU= Consumer units. † Statistically significantly larger than (only) the smallest value in the row using Scheffé's test. †† Statistically significantly larger than the other 2 values in the row using Scheffé's test.

The findings presented in Table 4.3 can be summarized as follows. (i) As much as 87% of the value of food made available in the households during the survey period was purchased. (ii) The share of household income allocated to food decreased with income, i.e., from 78% in the lowest income group to 51% in the highest income group. The data also indicate that, in contrast to observations on absolute amounts reported in Table 4.2, the share of the monthly food budget allocated to maize and cassava declined as income rose, while the share of non-traditional staples and pulses increased with income. The budget shares taken by the other food groups were not significantly different across income groups. In other words, the income differentials, in the absolute amounts, of non-traditional staples and pulses were stronger than those for maize and cassava (i.e. the traditional staples), the other food groups being intermediate.

Effect of income on food intake

The data presented in the above section shed light on the value of the different food items making up the food basket in the household and the importance of each food group in the food budget. This section provides measures of dietary intake as recorded independently, using two-day weekly recalls. Table 4.4 shows that the levels of intake per consumer unit of energy and of the four nutrients increased with income. This was similar to what was seen in the value of the food budget. What strikes is the particular low vitamin A value among the low income group. In general, the average intake of energy per CU for all households, even for those in the high income group, was below the aggregate household recommended dietary intake levels. The mean protein and vitamin C[2] intake in the three income groups was above the recommended level. Only at high income levels was the average intake of iron and vitamin A above the recommended level[3]. Thus, on the whole, income enabled households to reduce the risk of being energy and nutrient deficit. The findings imply that local foods are "poor" sources of vitamin A and probably iron, but good sources of protein and vitamin C. The low intake of pro-vitamin A in the diets should be of concern, especially because of the possibility of low bio-availability (absorption) of this nutrient, given the fact that most of it was of plant origin (de Pee, 1996).

[2] Vitamin C intake would be inadequate if more than 50% of the it were lost during food preparation (cooking, leaching, etc.).

[3] Low levels of intake of energy and nutrients do not necessarily mean "insufficient intake". Those consuming below the estimated household requirement level indicated in the table may have had lower physiological requirements.

Table 4.3. Food budget and its components in relative terms, by income* group

Variable	Income Group			All	*Sig. Level*
	Low-income group	Mid-income group	High-income group		
Number of households	64	63	67	194	
Food budget as share of household income (%)	78 (13)††	64 (21)†	51 (19)	64 (18)	**
Share of food value from own production (%)	11 (10)	13 (11)	14(13)	13 (13)	*ns*
Ratio of food value own production : purchased	0.12 (0.21)	0.15 (0.19)	0.17 (0.21)	0.15 (0.20)	*ns*
Food Group**	*value of food group as a % of total food budget*				
Maize	29 (11)††	23 (10)	18 (9)	22 (11)	**
Cassava	4 (4)†	5 (6)†	2 (3)	4 (5)	**
Rice/wheat/potato	12 (12)	13 (9)	19 (11) †	15 (12)	*
Pulses	3 (4)	5 (4)	7 (5)†	6 (4)	*
Vegetables/fruits	6 (5)	7 (5)	7 (4)	7 (5)	*ns*
Animal Protein foods (meat, milk, fish, eggs)	18 (9)	19 (8)	20 (10)	19 (9)	*ns*
Energy rich foods (fats, coconut, sugar)	18 (8)	17 (6)	16 (6)	17 (7)	*ns*
Snacks/luxury foods (bread, jam, spices, teas etc.)	12 (6)	11 (6)	10 (7)	11 (6)	*ns*

Figures in parentheses are the standard deviations.

* Income groups are tertiles of household income per consumer unit. ** Food budget includes value of home-produced food (fished or cultivated) at farm-gate prices.

ns = Differences across the row are not statistically significant at 5%. * Row differences statistically significant at 5% across income groups.

** Row differences statistically significant at 1% across income groups. † Statistically significantly larger than (only) the smallest value in the row using Scheffé's test in One-way ANOVA. †† Statistically significantly larger than the other 2 values in the row using Scheffé's test in One-way ANOVA.

Table 4.4. Household dietary nutrient intake per day by income* group

Nutrient	Recommended intake▼/CU	Income Group: Low-income group	Mid-income group	High-income group	All	*Sign.*
Number of households	194	64	63	67	194	
Calories (kcal/CU**/day)	2960	1948 (589)	2395† (743)	2788†† (932)	2383 (841)	**
Protein (g/CU/day)	52	69 (34)	95† (40)	111† (49)	92 (45)	**
Iron (mg/CU/day)	17	14 (5)	17† (6)	22† (10)	17 (8)	**
Vitamin C mg/CU/day)▼▼	27	54 (32)	69 (37)	82† (69)	68 (50)	*
Vitamin A (µg RE/CU/day)	420	271 (509)	359 (618)	496† (703)	339 (560)	**

Figures in parentheses are the standard deviation. * Income groups are tertiles of household income per consumer unit. ** CU= Consumer units (an adjusted measure of the household size).
† Statistically significantly larger than (only) the smallest value in the row using Scheffé's test.
†† Statistically significantly larger than the other 2 values in the row using Scheffé's test.
RE= Retinol equivalents. ▼ Recommended intake =Levels suggested here do not apply to all households. They are only average population estimates. To judge whether households were undernourished one would need to examine the weights of adults in the different groups of the population (FAO, 1985; Wood-Dahlstrom and Callway, 1990). ▼▼ Intake figures not corrected for (unknown) cooking losses.

Diet composition and quantity of intake

Next, the possibility of association of differences in the household's sources of energy (i.e. diet composition) and differences in the level of energy intake within income groups were investigated. Households were arbitrarily categorized by values of energy consumption per CU as "Low Energy" (LE) if they consumed less than 1820 kcal/CU/day, "Middle Energy" (ME) if they consumed between 1821 and 2630 kcal/CU/day, and "High Energy" (HE)[4] if they consumed more than 2630 kcal/CU/day. Food items were divided into nine groups for the purpose of the study. They were *Other foods* which are seen as adding taste to the "normal" food, i.e. oils/fats/coconut, vegetables/fruits, beverages/snacks. Others were *animal products* of fish and meats/milk-products. Rice and wheat/bananas/potatoes were the groups of *non-traditional staples*, while, maize and cassava where the two *traditional foods*.

[4] It should be noted that "LE" does not necessarily mean that the household has inadequate coverage of requirements since its real requirement may be towards the lower range of normal values. Conversely, "HE" does not necessarily mean that all the households so categorized have adequate intake, since for some their real mean -unknown- requirements may be on the higher side of the range (Beaton *et al.*, 1979). Yet, "LE" can be said to have a higher probability of being energy inadequate than the other two groups, with "ME" having an intermediate probability.

Table 4.5 shows the proportion of households consuming the various food groups in the first, fifth or the eighth weeks of the study. The proportion is a kind of a prevalence figure of the use of a particular food group among the study population during these period. It combines the effect of food habit (use or non-use) and the frequency of use. Fish and maize were the most commonly consumed ingredients in the community. Meat/milk and wheat/bananas were the least widely consumed food items, less than in a third of the households. The other food items, i.e., fruits and vegetables, oils and nuts, snacks, sugar and beverages, rice and cassava were consumed in more than 80% of the households. Data indicate that, on the consumption of cassava, there was an interaction between level of energy intake and household income.

While in the low income and middle income groups the proportion of households not consuming cassava increased with energy level, among the high income group the proportion not consuming cassava decreased with level of energy intake. Generally, however, the proportion of households consuming cassava significantly decreased with income level. The proportion consuming meat and milk increased with household income, although the relation was not statistically significant. The proportion consuming oils/nuts showed a U-shape relation with income, although again not significant. The prevalence of consumption of the other food items was independent of income. Within income groups, the prevalence of consumption of most food groups tended to increase with the level of energy intake. The relations were significant only for fruit and vegetables, wheat/bananas, and rice. In case of rice, the mid income groups showed less differential between energy groups. In the case of wheat/bananas, the mid-income group had relatively high percentages. The consumption of fish, and maize were not associated with the level of energy intake, as there was no differentiation in the community. The sum of the number of different food groups consumed in the households (during the first, fifth and eighth weeks) was computed to give a "dietary variety score" (DVS). The score was not significantly associated with income level. However, within income groups it was positively associated with the level of energy intake. In other words, increased energy intake was associated with increased food variety.

As shown in Table 4.6, the main-income effect was significant for the proportion of energy consumed from "other foods" and traditional staples. As income increased, the contribution of traditional staples in the total energy declined, while that of "other foods" increased. Changes in the proportion of energy from animal products and non-traditional products were not significantly related to income. Within income groups, the proportion of energy consumption from the different food groups, except the "other foods", increased with the level of energy intake. The proportion of traditional staples (maize and cassava, which were also the cheapest) declined with energy intake. Thus, with higher income traditional staples tended to be displaced by other foods, while with higher energy intake, traditional staples tended to be displaced by animal products and non-traditional staples.

Table 4.5. Proportion of households consuming food items in study weeks by income group* and level of energy intake*

	Average energy kcal /CU** /day	Food items									Average DVS††
		Fruits/ vegs.	Snacks/ beve-rages †	Oils/ nuts	Fish	Meats/ milk	Wheat/ banana	Rice	Cassava	Maize	
		% of households consuming the food item									
LOW INCOME* (n)											
Low Energy* (37)	1530	81	86	97	97	38	49	68	95	100	7.1
Mid Energy* (17)	2209	94	88	100	100	53	59	82	94	100	7.7
High Energy* (10)	3050	90	100	100	100	50	70	90	80	100	8.0
MID INCOME											
Low Energy* (15)	1589	87	73	87	100	53	62	73	100	100	7.4
Mid Energy* (27)	2153	100	89	96	100	74	70	82	89	100	8.0
High Energy* (21)	3280	100	90	100	100	67	73	81	76	100	7.8
HIGH INCOME											
Low Energy* (8)	1680	88	88	100	100	50	50	50	62	100	6.8
Mid Energy* (28)	2232	100	93	100	100	71	64	82	75	100	7.8
High Energy* (31)	3575	97	97	100	100	77	87	90	80	100	8.4
All groups (194)	2383	93	90	98	100	61	64	79	86	100	7.7
Main-income effect (p value) ▼		0.276	0.308	0.080	0.774	0.085	0.683	0.766	0.016	.	0.724
Main-energy effect (p value) ▼		0.025	0.119	0.174	0.790	0.103	0.053	0.018	0.743	.	0.001

* Income groups are tertiles of household income per consumer unit. ** CU= Consumer units (an adjusted measure of the household size).
† Snacks/beverages = Bread, jam, spices, sugar, tea, etc. * Energy intake groups are defined by energy intake per CU per day, the cut-off points being 1820 and 2630 kcal/CU/day, respectively. ††DVS =Dietary variety score. ▼ Main effects are computed by ANOVA adjusting for effect of the other factor.

Table 4.6. Proportion of energy intake provided by different food groups, part of income allocated to food by income group* and level of energy intake

		Food Group					
	Calories /CU** /day	"Other foods"†	Animal products	Non-traditional staples††	Traditional staples†††	Food budget	Cost/ 100 kcal
		% of energy taken from food group				%	Kshs.
LOW INCOME* (n)							
Low Energy* (37)	1530	16	7	10	67	75	0.70
Mid Energy* (17)	2209	19	13	12	55	81	0.80
High Energy* (10)	3050	20	12	18	50	83	0.60
MID INCOME							
Low Energy* (15)	1589	19	10	9	62	44	0.90
Mid Energy* (27)	2153	21	12	13	53	69	1.00
High Energy* (21)	3280	21	14	13	51	74	0.70
HIGH INCOME							
Low Energy* (8)	1680	26	11	10	52	34	0.90
Mid Energy* (28)	2232	24	12	14	50	41	1.00
High Energy* (31)	3575	24	13	17	45	65	1.00
All groups (194)	2383	21	12	13	57	65	0.90
Main-income effect (p value) ▼		0.010	0.375	0.512	0.024	0.000	0.000
Main-energy effect (p value) ▼		0.764	0.007	0.016	0.001	0.000	0.007

* Income groups are tertiles of household income per consumer unit. ** CU= Consumer units (an adjusted measure of the household size). † "Other foods" = Snacks, bread, jam, spices, oils/fats, coconut, vegetables and fruits, sugar, etc. †† Non-traditional staples = Pulses, rice, wheat, potatoes. ††† Traditional staples = Cassava, maize, millet. * Energy intake groups are defined by energy intake per CU per day, the cut-off points being 1820 and 2630 kcal/CU/day, respectively. ▼ Main effects are computed by ANOVA adjusting for effect of the other factor.

As expected, the share of the budget allocated to food declined with income, but within income groups, a higher energy intake was associated with a significantly higher food budget. This reflects the partial displacement of the cheap traditional staples by the more expensive "other foods", animal products or non-traditional staples. It can also be seen that, on average, the cost per 100 kilo-calories ("calorie-value") was more among households with higher income, implying that richer households consume more expensive sources of energy. However, within income groups, the relation between "calorie-value" and level of energy intake is not linear. Households in the middle of the energy intake distribution consumed more expensive sources of energy than the corresponding food budgets would predict.

Discussion and conclusions

This study has analyzed the interaction between income, food choices and the level of energy intake among rural households in Kenya. A few comments need to be made on the procedure followed in this analysis. First, the adjustment of the household total income by the number of consumer units to produce a "basic needs relevant" welfare measure can result in "over-correction" if there are measurement errors in the consumer units (as in case of understating the energy requirements of the nominal adult male) or if there are differences in the relative proportion of children in different income groups. Since the objective of the study was to compare groups, we assume that any "over-correction" may not affect the trends of the findings significantly. It is therefore recommended that the data be used, not to provide estimates of real differences between income levels but rather to describe trends in relations. Second, an investigation into the association between income and food intake can only be justified if the variability in the income is large enough. Most studies that report no association between income level or wealth score and food intake can be criticized for limited variability in the data or in the range of economic status. The differences in income per consumer unit between income groups found in this study were quite wide: a difference which is two to three times[5].

Household income, food budget and energy intake

As expected, higher income was associated with a higher value of food available, and this was the case for all food groups. However, the importance of the traditional food items (cassava and maize) in the household's food budget declined as income increased. The proportion of energy contributed by these foods also decreased, and the consumption of cassava, in particular, also decreased. This can be interpreted to mean that these are "inferior-foods" and households will reduce the level and frequency of their intake in case of increased income. A decrease in "preference" for traditional foods with higher income led to a concomitant increase in the proportion of non-traditional staples and pulses in the food budget. The share of the food budget of food items with higher nutritive value, like vegetables/fruits and energy dense foods and animal products was statistically insignificant in association with income level. Yet, in terms of energy, the contribution of this group increased significantly with income, while the non-traditional staples were insignificant this time.

The analyses indicate that income improved a household's ability to access energy and nutrients, thus reducing the risk of dietary deficiencies. This was done through increased quantity (or the absolute monetary value) of all food items

[5] An income level of Kshs. 1500 per CU per month is equivalent to the net salary of a graduate employed in the public service in Kenya.

consumed, by increasing the levels of purchased items[6]. Given the role of food purchases in this community, households with low income, *ceritus peribus*, were thus at increased risk of being under-nourished.

Although low income households derived proportionally more of their income from farm production, they depended less on subsistence production for food compared to higher income groups. There are two possible reasons for this deviation from expectation. Firstly, most of the poorer households were likely to be headed by females, and were without an adult male. Fishing (the main source of animal products) is mainly a male activity in this community. Secondly, the level of consumption of items from subsistence food production probably reflects production levels. As shown in Chapter 3, production is likely to be a function of both income and non-farm employment. Poorer households were the least likely to be self-sufficient in this community. A third reason (but more speculative) could be that the low use of home-produced food may be due to "poorer" households trying to "spread" their food from home production so as to make it last throughout the year, as a strategy to cope with seasonal food deficits (Hoorweg *et al.*, 1995). In this way they would be using little of it at any given time provided there is income to buy the additional food required.

Household income, energy intake and food diversity

Although income can be said to have helped households to improve their energy and nutrient intakes, for some low intake persisted even at high income. This implies that factors other than income were involved in determining energy intake level. Nutrition economists have linked low energy intake at the same level of accessibility to the household's "preferences" for food habits beyond their income (Shah, 1983; Shah, 1985; Delgado and Miller, 1995). While this might be the case for some situations, it does not have to be so. The level of energy intake is also a function of the level of energy requirement (which vary widely), physical accessibility of the food, and appetite. If the decrease in the proportion of the traditional staples in the diets and the increase in the contribution of other foods is interpreted as implying increased diversity in the diets, then the higher energy intake was associated with increased diversity in the diets. If the level of energy intake (in the absence of evidence of deteriorating nutritional status) is tentatively taken to reflect the energy needs of the households at that level of consumption, then in this study area, energy intake was associated with the diversification in the energy sources. An increased diversity of the food consumed in a household (in terms of types of food items in the diets in a week) was associated with higher level of energy intake. This was also associated with a

[6] The relation between income and food intake cannot be linear over the full range of possible income. Incomes can always increase, but food consumption has to level-off for physiological reasons. The latter effect is stronger for energy (stomach volume and appetite attuned to energy expenditure) than for nutrients. But the levelling-off of energy will eventually also be reflected in nutrient intake. However, the opposite can occur. Income may become zero, even negative (as when in debt), but food intake cannot become lower than the Basal Metabolic Rate for a considerable period, or one would die.

higher food budget, although the cost per calorie tend to decline at higher energy intake level. This implies that, within income groups, more energy is derived from an additional money spent on food but not necessary at a higher cost per calorie. In summary, these findings suggest an increase in the level of energy intake is likely not only to be through an increased level of intake of all food items and an increased variety of the diets, but also implying increased expenditure on food.

Considering the findings of this study, we seek to explain the variations in energy intake among households with the same level of financial accessibility to food by a combination of two scenarios. The first postulates that the level of energy intake is a reflection of a household's current energy needs under prevailing conditions. In other words, this would mean that households which strive for improved living standards (i.e. higher income) would have higher energy needs, and they would try to increase the level of consumption of all foods, including traditional staples[7]. But the bulkiness (and probably the lack of taste) of the staples would limit the amount that can be consumed, and as a consequence, households would need to increase the consumption of the other food groups, not so much as mere alternatives but as a necessary means of realizing their energy needs. This means, there would be an increase in the quantity of intake of energy from all sources, with the contribution of traditional staples falling and that of other food groups increasing. The other scenario would be that an increase in the level of energy intake is not need-driven but choice-driven. If, for whatever reason, the household chooses to diversify its diets (by reducing the share of the total energy from traditional staples), the total amount of both that traditional food and the other food items that are consumed will be higher than if only a limited number of different foods are available (Rolls and DeWaal, 1985; Rolls *et al.*, 1981). Here the increased desire for "taste" (or variety) would be the "push factor" potentiating the intake of all foods, while in the first scenario the need for increased intake would act as the "pull factor" stimulating variety. In both scenarios, the result would be increased dietary diversity aiding food intake; what differs is the driving force or genesis of the process.

Conclusions

Programmes aimed at increasing household income are an essential goal in helping households eradicate under-nourishment. They need to be stepped up and, made more effective. Here, as in most rural communities in Africa, within the ranges of income as they existed in this study, households have particular consumption and spending behaviour through which their energy intake can increase (not decrease) if they allocate more of the available income to food. However, a small proportion of households may have a low energy intake, even if they have access to finances that can buy the food. This can be related either to the monotony or bulkiness (or another aspect still to be uncovered) of the diets or to the competing non-food needs or desires

[7] Cassava and maize are both culturally acceptable foods in that they constitute the bulk of the food, even in high income households.

which constrain food budgets in some households. The overall challenge should be to assist households to improve the quantity of intake of readily available and cheap traditional staples. To do this the quality of dishes may need to be improved. This can be done either by having households spend more of their available income on food items that add variety and nutritive value, and/or by encouraging them to use more home-produced food sources, which might constitute a source of variety in their own right. Changing the relative composition of the food items in the dishes is important, not only for increasing the energy intake, but also, in part, for solving the problem of the low nutrient content of the basic diets; in this study area, but this is not at all an exception in Africa, notably, iron and vitamin A.

5

Maternal factors in child care and safe-living conditions in coastal Kenya: what are the consequences of maternal occupation?

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Abstract

Variables identified by the community and the researchers to define 4 dimensions of child care and 2 of house-living conditions were measured in 186 study households in coastal Kenya. Principal Component Analysis was used to summarise the variables of each identified dimension into component scores. The component scores were entered into MANOVA as dependent variables to test whether the combined components of child care and of living conditions were a function of maternal occupation when controlling for the effects of child's age, mother's education and the household income (excluding mother's income). Multiple regression was used to determine the effects of maternal factors on the same scores. Results indicate that differences seen between occupation groups in care components (of "quality of time" and "care-environment") and living condition component (of "housing quality") were spurious, as they disappeared on controlling for potential confounders. Mother's age, her level of education, nutritional knowledge, and the share of household income she controlled were significant determinants of child-care dimensions and of house-living conditions. Mothers who controlled more money in the household seem to have had poorer child care scores. Household income affected only the component of housing quality, not those of care, or sanitation/hygiene. The conclusion is that non-farm employment of mothers in rural areas does not have to be detrimental to child care nor to house-living conditions. Other maternal factors like age and education are more important.

Key words: Maternal occupation, child-care, house-living conditions, nutrition.

Introduction

Of the underlying determinants of child malnutrition, "care" is the one that has been studied least, although adequate care is necessary for optimal use of human, economic and organizational resources. In nutrition, care refers to behaviours in the household which translate food and health related resources into child's growth and development (Engle, 1992; Longhurst and Tomkins, 1995; Engle and Huffman, 1996). Child-care behaviours that are related to nutrition include those promoted by nutrition interventions. These are breast-feeding, appropriate complementary feeding and weaning, and care for the child's health and dietary management during illness. Related to care is the house-living conditions, which is twofold: (i) the physical

environment of the child, such as sanitation and hygiene, housing quality and accessibility to basic health care services; and (ii) the behavioural environment in which the child is taken care of, such as utilization of health services when needed for advice or preventive purposes, and use of oral rehydration solution when the child has diarrhoea. Without these behaviours and conditions, adequate nutrition will not be secured as it is unlikely that the child's dietary intake will be adequate, or that disease and its negative effects will be controlled.

The main reason why only a limited number of studies have investigated factors determining child-care and living conditions status in rural settings is that the complexity of the concept makes it difficult to measure quantitatively. Measurements mostly used cannot adequately capture the complexity of the constructs (Esterik, 1995; Engle, 1995). This is because all behaviours or conditions associated with child-care and house-living conditions are important for the child's growth, none of them alone being sufficient to depict the concept adequately. For instance, taking child care to be synonymous with the time a mother allocates to child-caring activities is not enough (McGuire and Popkin, 1989). This is because in most cultures women view child care as a residual activity, and it is normally combined with other activities. In addition, unless the child is younger than 6 months, child care consumes much less of the mother's time than expected, since it is also performed by other family members. Therefore, attention should be paid to multidimensional indicators of child-care and house-living conditions. If measures close to the concept can be found (at least at operational level) these can be associated with household factors. Of particular interest for rural development in developing countries are the association between child care or house-living conditions, and maternal factors. This is because women are the main carers of infants and very young children (Evenson, 1978). Besides, women are the focus (rightly or not) of most rural nutrition interventions (McGuire and Popkin, 1989). Thus, if these factors can be identified, they can be used to modify or plan nutritional interventions in rural areas for the benefit of the nutritional status of children.

The objective of this study was to try and develop multidimensional measures of child care and house-living conditions, and to determine the effects of maternal factors on these measures (or components). The effect of maternal occupation on these components is among the factors whose effect is assessed. Child care and house-living conditions were defined from community-determined and desired behaviours and/or conditions in the context of a rural community.

Study area

The research was carried out among the Digo people in the Kwale district of coastal Kenya. Most of the food consumed in the households is purchased, as levels of home food production are low (Hoorweg *et al.*, 1995). The income for purchasing the food is mainly earned in NFE activities. Wage employment and casual work can be found in nearby trading centres and towns, and in tourists hotels along the Indian

Ocean. Most of the NFE activities are carried out close enough for those taking part to remain living at home and not to require long-term migration. Studies carried out in the same community showed that the amount of time spent in non-farm employment (NFE) was, on average, 1.6 hours per adult, and that spent in farming during peak agricultural period was 3.1 hours per person per day for those engaged in farming (Chapter 4).

Access to public transport, water, schools and health services was relatively better in the study community than most areas in the district. For instance over 84% of the study households used bore-holes within 30 minutes walk, while 12% had running water in their homes. Most households were within 45 minutes walk from the district hospital or health centre and within 20 minutes walk from a community growth monitoring unit. There were also established village-managed pharmacies, three primary schools and one secondary school in the study area.

Methods and Materials

Study design

The data collection was carried-out between January and March 1995, and had three components.

(1) In-depth discussions - These were held with groups of women, men and medical personnel from the community. A free discussion session (approximately 2 hours long) was held with 12 participants to identify the essential behaviours and conditions of adequate child care and house-living conditions. The first round of discussions was followed by a focus group discussion and informal interactions with health personnel. Then variables measuring different aspects of child care and house living conditions were identified. Fifty conditions or behaviours were identified as necessary for "good" child care and for "safe" house-living conditions. These are shown in Table 5.1, according to the components defining the variables. Most of these behaviours were also being emphasised in the ante-natal and post-natal clinics and in the community-based health care. It was noted that households with high scores for these conditions were more likely to have good care than households with low scores for the variables. For a parallel study, selected community members were involved in an exercise to categorize the sample households by the occupational status of the mothers. Since this was done with the same sample of households, the same categorization was used for this study.

(2) Household interviews and observations - These were held in 189 households, two weeks after the completion of the in-depth survey. The households were randomly selected from a list of 304, all with children below 3 years. The 304 households were part of a larger study of 517 households, on employment and nutrition in coastal Kenya. Information collected from the sample households was based on pre-tested questionnaires and observation schedules. Each of the study households was visited 4 times over a period of 10 weeks.

Table 5.1. Variables identified for the clusters of child-care and house-living conditions in Msambweni-Kwale, January, 1995

Identified variables for adequate child care and house-living conditions
Quality of time/availability (1) The child should always be kept clean (2) Mother/father should give time to child (3) Mother should take child with her (especially if breast-feeding) (4) Mother should not be too long away without child (5) Child activities in mother's time should be important (6) Child activities should be important in father's time (7) Child's health and activities should be priority for the parents (8) Mother/father should have good perception about her/his responsibility to give care (9) Mother/household should be concerned about the growth/health of child (growth monitoring services and use of health services when child is sick).
Breast-feeding and complementary feeding (1) Child should not be introduced to foods too early or too late (2) Child should be exclusively breast-fed in first 4 months (3) Child should be breast-fed for more than 12 months (4) Mothers should give special "baby-foods" the first 2 months of complementary feeding (5) Complementary foods should be fortified with energy-rich food items (6) Child is not bottle-fed.
Feeding and weaning (1) Child should be fed often in a day (2) Child should have its own plate so that how much it eats can be checked (not fed with other children) (3) Feeding and breast-feeding should not be withheld in the case of illness (4) Mother/adults should have right perceptions about child feeding (it is their responsibility) (5) Special foods should be made for the child (6) Child should be encouraged to eat.
Care environment (1) Child should be left with an adult if mother has to go away without child (2) Number of other non-full time working adult females, other than the mother, in the household (3) Child is held or played with an adult (4) Father/adult men in household hold/carry/play with the child (5) Father/adult men should feed the child if mother away or sick (6) Other adults should know the signs of diarrhoea, fever, pneumonia, and how to prepare ORS and read growth-monitoring card (7) Father's opinion on breast-feeding should be supportive.
Sanitation and hygiene (1) Wash hands before feeding the child (2) Wash hands before cooking, after use of toilet, or eating (3) Keep house clean always (4) Clean the courtyard every day (5) No animal or human faeces around the house at any time (6) Clean the cooking pots immediately after use (7) Have boiled drinking water for children always ready (8) Re-heat child's food before feeding (if cooked earlier) (9) No animals (goats/chicken) to live in same house as child.
House conditions for health (1) No over-crowding in the bedroom (2) House has cemented walls and floor (3) Have a toilet in the compound (4) Use the clean and safe water source in the village (5) Use mosquito nets/window screens where possible (or mosquito repellent) (6) Use anti-malarials in the wet season (7) Have the children fully immunized on time (and before they are one year old) (8) The children are dewormed as often as possible (9) Have a garbage/waste disposal pit in the compound (10) Type of main cooking fuel (11) Amount of water litres used in household per day (12) There is tap water in the house (13) Household owns a refrigerator.

The mother was interviewed and observations were made based on the contents of Table 5.1. On the first visit, households were questioned on all household characteristics and aspects of the study that were not expected to change over time.

In the same period, households were visited on four occasions to observe aspects related to sanitation and hygiene, child feeding, household composition, amount of water used, cleanliness of the child, morbidity and dietary management during illness. Scoring methods were used to quantify observations or responses, the worst situation having a score of zero and the best a score of three. The average of the 4 observations or interviews were used as the score for the household for a particular behaviour or condition. All observational information was collected by two enumerators who had been trained and "standardized" [1] to collect information on subjective estimates.

(3) Time allocation - The aim was to study how women allocated their time on distinct activities. The technique of random sport observations was employed (Johnson, 1975; Baksh, 1989). The 189 households were grouped into 6 sets, each of 30 to 32 households, according to proximity to one another. A trained field assistant was assigned the set of households nearest to his/her residence. The households within each set were visited unannounced. A visit was made every 15 minutes from 6am to 7pm, a duration of 13 hours. These spot observations were carried out over a period of eight weeks, every day excluding Fridays (the prayer day). The average number of spot checks per household did not differ between the three groups of households, i.e., as categorized by the mother's main occupation. On the visit, the main activities performed by the mother at the moment of the investigator's arrival were recorded. If the mother was not at home at the time of the visit, the recording was done later, on the next visit or by recall.

Maternal occupation was defined as the activity the community associated with the mother of the index pre-school child. Study households were categorized into three groups by a group of 7 selected community members[2]. It was based on the main activities of the mothers in the study households. However, a confirmation of the mother's occupational status was also made during analysis.

Active non-farm employed mothers. These were women actively involved in non-farm economic activities (NFEA) during the 6 months prior to the survey, who allocated at least one hour a day to NFE activities. Mothers who were categorized as "active NFE" by the participatory method, but who were found to have worked for less than an average of one hour a day in the two months preceding the survey were classified as "Part-time NFE".

[1] A scale measure of the various items (at four levels) was developed and pre-tested through observing a number of children in the community. The 2 enumerators and the principle investigator rated the same items and compared the values. This was done several times until the differences in ranking or rating were no longer significant at $p<0.05$.

[2] For a duration of 2 days, the 7 community members and the 9 field assistants, working in two groups were able to categorize the 189 households into three groups. For details of the methodology used see Mwadime and Cherop, 1995.

Part-time NFE mothers. These were women not active in NFE during the 6 months prior to the survey. They did, however, engage in NFE activities once in a while. Their state of inactivity compared to group (a) was mainly caused by a lack of capital to start or continue with NFE, by sickness or pregnancy, or because they were actively involved in farming or other undertakings.

Home caretakers. These were women who had decided to take care of their homes and were not involved in NFE, either because they were not interested (at least not the nature of activities available/possible in the villages), or their husbands or relatives would not allow them to. Women categorized as "home caretaker" but found to be involved in NFE for more than one hour a day during the two months prior to the survey were reclassified as "Part-time NFE".

The women studied were either the heads of the households or wives of the heads of households. It should be noted that, irrespective of the category, some women earned income from the sale of their jewellery and clothing (*lesso*) or received monetary gifts from their husbands, friends, children or parents. This was estimated and included in the "income under control of women". In addition, all households were practising farmers in the sense that they all had at least 0.3 acres of land per household within a walking distance from their homes.

Methods of analysis

All analyses were performed using the *Statistical Package for Social Sciences* (SPSS-PC) version 4 (Norusis/SPSS Inc. 1990). Of the 189 households sampled, three cases with missing data for one or more of the variables needed for the computation of the composite variables were deleted. The number of households used in the analyses was 186. Descriptive analyses were performed on important variables for the 186 households using Oneway Analysis Of Variance (ANOVA) to test univariate mean differences between the three occupational groups of women. Scheffé's test was used to make comparisons of group means.

The variables identified as defining the various dimensions of the clusters of child care and house-living conditions in Table 5.1 were subjected to Principal Component Analysis (PCA) in the FACTOR procedure of SPSS in order to summarize them into factors or components. The sub-concepts within the clusters of child care and house-living conditions thus constructed served as the dependent variables in this study. A scoring system was developed on the basis of the data from the 186 households. Within the group of variables defining the sub-concepts shown in Table 5.1, only those variables contributing to the first factor (with an Eigen value of more than 1.0) were used to compute the factor scores for that specific sub-concept (here known as a component), i.e. variables contributing to the other factors, other than the first one, were not included in the computation of the factor scores of that sub-concept. As an example, the sub-concept of care, called "time quality" had 9 variables (Table 5.1) which were summarized into 3 components using PCA. The first component was composed of 5 variables and the others had 2 variables each. Although

the first two components had Eigen values of more than 1, only the one providing the first component was chosen to compute the factor scores for the component of "quality of time". Each household received a standardized score for this component based on the sum of their recorded values multiplied by the weighted "loading" for each variable. The factors generated for the child care and house-living conditions clusters and their associated variables are shown in Table 5.2. They were interpreted as complementary food, feeding pattern, child care environment, sanitation and hygiene and housing quality. Two other factors were constructed using the PCA. These were maternal esteem (a measure of a mother's motivation, confidence and outreach) and her nutrition knowledge. The factors and their associated variables are also shown in Table 5.2.

To determine the effects of various maternal factors on the components of child care and house-living conditions, six multiple regression models were fitted with each of the 4 components of child care and the 2 of house-living conditions. These were the dependent variables. The independent variables were maternal factors, mother's age, education, nutrition knowledge, competence score, occupation and the share of household income earned by the mother. Other factors like the sex of the household head, the household size, the number of pre-school children, the age of the youngest child, and household income were also included in the model as controls. Complete data for this analysis was available for 183 households.

A multivariate analysis of covariance (using MANOVA) was used to assess differences between the three groups of maternal occupation on the four components of the child-care, and another was used for the two components of house-living conditions cluster. The aim was to see whether there were mean differences among the occupation groups on the combined measures of child care or house-living conditions, after controlling for the effects associated with the child's age, mother's education and household level of income (excluding the mother's income).

Table 5.2. Variables contributing to the different components of child care, house-living conditions, mother's esteem and nutritional knowledge

Components/observed variables	Source	Freq-uency	Range of values
Time-quality			
• Score of the cleanliness of the child	Observ.	4	0-3
• Duration the mother is away without the child (day before) (negative loading)	Quest. recall	4	≥ 0
• Intensity of use of community growth monitoring services for age of child (last 3 months)	Quest.	1	0-3
• Rank of child activities (in terms of time) among 9 activities normally carried out by women.	Quest.	4	1-9
• The priority (ranked) the child activities take among 6 groups of activities for mother.	Quest.	1	1-6
Complementary feeding			
• Age the child is introduced to fluid foods/fluids other than breast-milk and water (<9 months=1 else =0)	Quest.	1	0-1
• Child exclusively breast-fed (first 4 months)	Quest.	1	0-1
• Child breast-fed for more than 12 months (if still breast-feeding for younger children)	Quest.	1	0-1
• Mother made special food for child during the first 2 months of complementary feeding	Quest.	1	0-1
• Complementary foods were fortified with energy-rich food items	Quest.	1	0-1
Feeding pattern			
• Number of times the child is fed, if eating (day before recall)	Quest. recall	4	≥ 0
• Child fed from own plate and not with other children/mother (last meal)	Quest. recall	4	0-4
• Breast-milk/feeding not withheld in last episode of diarrhoea or fever/malaria (1=No else=0)	Quest. recall	1	0-1
• Child fed by the mother/adult (last meal)	Quest. recall	4	0-4
• Special food made or bought for the child in the last 24 hrs	Quest. recall	4	0-4
• Child encouraged to feed by mother/adult (last meal)	Quest. recall	4	0-4
Care environment			
• Alternative child care when mother is away (adult >15 yrs=1).	Quest. recall	4	0-4
• Mother took the child with her to work or farm (last event)	Quest. recall	4	0-4
• Number of other non full-time working adult females, other than the mother, in household	Quest.	1	≥ 0
• Child held by/playing with adult (on visit).	Observ.	4	0-4

Table 5.2 continued.

Components/observed variables	Source	Frequency	Range of values
Sanitation and hygiene			
• Washing hands before feeding the index child	Observ.	4	0-3
• Cleanliness of main house (on visit)	Observ.	4	0-3
• Washing hands by mother before cooking, after use of toilet, or eating	Observ.	4	0-3
• Cleanliness of courtyard (on visit)	Observ.	4	0-3
• Cooking pots washed at time of inspection (on visit)	Observ.	4	0-3
• Drinking water for children boiled (on visit)	Observ.	4	0-3
• Animals (goats/chicken) do not live in same house as index child.	Quest.	1	0-1
Housing quality			
• Number of bedrooms per consumer unit (crowding factor)	Quest.	1	> 0
• Main house has cemented walls and floor	Observ.	1	0-1
• Presence of a toilet in the compound	Observ.	1	0-1
• Type of main cooking fuel (0 if firewood and 1 if other)	Quest.	1	0-1
• Amount of water litres/AE used in household per day	Quest. recall	4	≥ 0
• Tap water in the house (or within 10 min. walk)	Quest.	1	0-1
Other composite indices used in the study			
Maternal esteem			
• Mother can ride a bicycle/drive a car	Quest.	1	0-1
• Mother had a Muslim/Christian wedding	Quest.	1	0-1
• Mother uses family planning method	Quest.	1	0-1
• Mother is a member of a women's group/or other community group(s)	Quest.	1	0-1
• Flowers planted outside the house	Observ.	1	0-1
• Mother knows how to knit	Quest.	1	0-1
• Mother given a gift by parents, husband, children in the last 6 months.	Quest.	1	0-1
Mother's nutrition knowledge			
• Nutrition knowledge score (5 questions)	Quest.	1	0-5
• Health knowledge score (4 questions)	Quest.	1	0-4
• Mother can correctly prepare oral rehydration solution (salt-sugar-solution)*	Quest.	1	0-1

Key: AE= adult equivalents. * This was assessed according to a recipe taught in the Ministry of Health clinics. Observ. = Information collected through observation method either at the beginning or on the other 4 visits to the household. Quest. = Information collected through a questionnaire on the first visit to the household. Quest. recall = Information collected through questioning (recall) on the 4 other visits to the household.

Results

Several characteristics of the study sample are presented in Table 5.3. Approximately 40% of the study mothers were active in NFE, 33% were part-time NFE and 27% were home caretakers. Women active in NFE were significantly older than the home caretakers, implying households with women in NFE were older. These households also had more children, the youngest child was much older, the women earned more and they controlled proportionally more of the household income. The women were, however, on average less educated than home caretakers. Most of the households headed by women were among the those with employed women. Among households with a man-head, there was no significant difference in the kind of employment of the men.

Mothers in NFE activities spent on average 2 hours away from their child (using the mean of recalls of 4 days) which was more than average (Table 5.4). However, the differences between groups was not significant. The lack of significant difference is possibly because of the tradition in this community for women to take their young infants with them, unless the activities or places being visited are unfavourable to the child. As Figure 5.1 shows, the length of the period a mother was away from her child may be a function of both the mother's occupation and the age of the youngest child. Older children were more likely to be left behind than younger children.

The percentage of the daily time mothers devoted to child care, NFE work, home and farm work and non-work activities are also summarized in Table 5.4. Women in the three groups spent virtually the same proportion of time in child-care-related activities. These results attest to the little time given by mothers to child-care activities. However, most child-care activities were also carried out by other female members of the household. As expected, NFE women allocated more time to non-farm economic activities, which was only 1.8 hrs per woman. This was compensated for by NFE women devoting less time to home/farm work and non-work. The levels of "non-work activities" in this community were relatively high. Even women with NFE spent on average 5 hours of the 13 hours of observation in non-work activities. Most of that time was spent chatting with neighbours or visiting one another, resting or sleeping, or in social activities.

Table 5.3. Selected maternal characteristics according to maternal occupation

Variable	Mother's occupation: Active NFE†	Part-time NFE	Home caretakers	Entire sample	*Signifi-cance*
Number of households	74	61	51	186	
Mean age of mother	30 (6.6)+	29 (7.7)	26 (6.3)	28 (7.1)	**
Mother's education (yrs)	3.7 (3.8)	2.6 (3.4)	5.4 (3.5)+	3.8 (3.7)	**
Maternal nutrit. knowledge	-0.01 (1.14)	-0.36 (0.84)	0.34 (0.92)+	0.00	*
Maternal esteem score	0.35 (2.21)	-0.63 (1.63)	0.09 (1.90)	0.00	*ns*
Number children/mother	4.2 (2.3)+	4.0 (2.2)	2.9 (1.8)	3.8 (2.2)	**
Number of children <5 yrs	1.6 (0.7)	1.8 (0.9)	1.8 (1.0)	1.7 (0.9)	*ns*
Age of youngest child (months)	24.0 (12.8)++	19.2 (10.0)	18.5 (12.1)	20.9 (11.1)	**
Household size	6.7 (2.0)	6.8 (2.3)	7.0 (2.3)	6.8 (2.2)	*ns*
Income without mother's (Kshs•/AE••/month)	973 (706)	764 (518)	932 (647)	894 (637)	*ns*
Mother's income†† (Kshs/AE/month)	184 (291)++	41 (108)	58 (178)	103 (224)	**
Share mother's income in house (%)	19.2 (29.2)++	6.8 (19.6)	6.7 (20.8)	11.7 (24.8)	**
Occupation of husband					
• Households without a husbands	28	27	20	26	*ns*
• Farming or none	12	13	16	13	*ns*
• Semi-permanent NFE	11	15	18	14	*ns*
• Self-employed	20	19	24	21	*ns*
• Wage-employed	29	26	22	26	*ns*

Figures in parentheses are standard deviations. * Row differences significant at 5%. ** Row differences significant at 1%. ns= Not significant at 5%. +Significantly higher than the smallest value in the row. ++ Significantly higher than the other 2 values in the row. † NFE = Non-farm employment. †† Includes income earned from sale of agricultural produced by women, monetary gifts, sale of jewellery and clothing, handicrafts. • Kshs = Kenya shillings. ••AE = Adult equivalents.

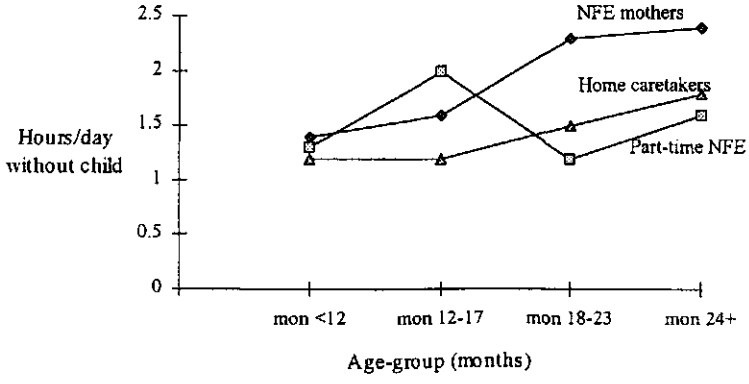

Figure 5.1. Average duration (in hrs) mother away without child by child's age according to mother's occupation

Table 5.4. Percentage of time women devote to child care, market-work and other activities by mother's occupation

Variable	Mother's occupation: Active NFE†	Part-time NFE	Home caretakers	Entire sample
Number of households	74	61	51	186
Duration mother away from child, 4 days average (hrs/day) •	2.0 (2.6)	1.5 (2.9)	1.5 (2.5)	1.7 (2.6)
Activity	**% daily time devoted by group°**			
Child-care activities[a]	7.5	9.0	8.8	8.3
NFE/market work[b]	14.2	1.8	2.8	7.0
Home/farm work[c]	39.3	43.1	45.0	42.1
Non-work[d]	39.0	46.1	43.4	42.6
Number of observations	4912	3842	3570	12324

° The percentages are for households in the occupational category (time in activity in the 13 hours of observation). [a] Child care activities include holding, breast-feeding/feeding, washing, dressing, health care (including growth monitoring). [b] NFE/market work includes preparation of the items for sale, and the marketing of products, or employed activities. It also include tasks being done for money at the time of observation (i.e., handicraft making or food processing for sale). [c] Home/farm activities include home food preparation, housework, repairing household goods, food procurement, farm activities. [d] Non-work includes eating, resting, socialising, inactive, idle due to illness or caring for the sick, recreation, ceremonies, sleeping. • Collected through 24 hr recall for 4 separate days. † **NFE** = Non-farm employed.

In order to assess the effects of various maternal factors on the components of child care and house-living conditions, multiple regressions equations were fitted separately for each of the components. The means and standard deviations of these variables are presented in one or other table in the text. The following observations can be made from Table 5.5. The proportion of variance of the dependent variables explained by the independent variables were generally low (6-12% for the care components, 4% for the sanitation/hygiene and 14% for the housing quality component). This suggests that most of the variability in the components was not associated with the variables tested.

The age of the youngest child had significant effects on the level of child-care components of "time-quality" and the "care environment". Younger children demanded or received a higher time-quality, and were more likely to be in households with better care environment. However, households with more pre-school children had lower

Table 5.5. Multiple regression coefficients for the components of child care and house-living conditions as dependent variables with maternal factors (stepwise entered) as independent variables (n=183)#

	Dependent variable					
Independent variables	Time-quality	Comple-mentary food	Feeding pattern	Care environ.	Sanitat./ hygiene	Housing quality
	Partial regression coefficients (b)					
Sex household (1=male)	ns	ns	ns	ns	ns	ns
Household size	ns	ns	ns	ns	ns	ns
Num. of pre-school children	ns	ns	ns	-0.151**	ns	ns
Youngest child' age (months)	-0.016**	ns	ns	-0.012*	0.009*	ns
Household income/1000	ns	ns	ns	ns	ns	0.295**
Mother's age (yrs)	ns	0.028*	ns	0.025*	ns	0.045**
Mother's education (yrs)	ns	0.032*	0.039**	ns	0.030*	0.106**
Nutrition knowledge score	ns	0.339**	ns	ns	ns	ns
Maternal esteem score	ns	0.113*	ns	ns	ns	ns
% income mother controls	-0.481*	ns	ns	-0.722**	ns	0.436*
Adjusted R-squared	0.060**	0.112**	0.055**	0.123**	0.044*	0.141**

Three households with incomplete information for calculating the sanitation and hygiene index.
* Significantly different from zero at 5% ** Significantly different from zero at 1%. ns = Insignificant at entry criteria of 5%

levels of care environment, suggesting competition for care among children. The effect of the age of the youngest child on the sanitation/hygiene component was positive and marginally significant (p=0.047). Household income had a positive effect on all components studied, except for the feeding pattern. However, the effects were statistically significant only for the housing quality index.

The level of formal education of the mothers significantly favoured a superior feeding pattern and complementary feeding. It also had positive significant effects on the housing quality and sanitation/hygiene conditions. It did not, however, have significant effects on the time-quality or the care-environment. Nutritional knowledge of the mother had positive and significant effect only on the complementary feeding. Its effect on most of the other components of child care was positive, even though not significant. The mother's age, a proxy indicator of her experience and social "power", had positive and significant effects on the indices of complementary food, the care-environment and housing quality. Its coefficient on the quality of the mother's time was negative, implying that older mothers gave less time to their children (i.e., leaving more child-care responsibilities to other household members) or they had a "poor" attitude towards child-care (probably because their children were a bit older).

Maternal esteem (a proxy of her skills and motivation) had a significant effect only on the component of complementary feeding.

The level of household financial resources earned by the child's mother had significant and negative effects on time-quality of care and the care environment. However, this indicator had positive effects on the housing quality. Interaction terms were fitted between maternal financial control with household income and also with household size in order to try and understand the unexpected negative signs of the regression coefficients. These were not significant at 5% for all the six components. The coefficient of the interaction between maternal financial control and household size, however, had a "p" value of 0.08 for the care environment (a negative coefficient).

The mean scores of the composite indices of child care and house-living conditions according to mother's occupation are shown in Table 5.6. There was no particular pattern in the scores across the three occupations. Generally, most indices were lowest among home caretakers. This group scored significantly higher on the level of care quality-time; a factor attributed to their elevated contact with their children. This was either because their children were younger and demanded the contact or because the women were mostly with the child.

Table 5.6. Unadjusted mean scores of indices of child-care and house-living conditions by maternal occupation

	Mother's occupation			
Variable	**Active NFE**	**Part-time NFE**	**Home caretakers**	***Signifi-cance***
Number of households	74	61	48#	
Child-care cluster				
Time-quality	-0.025 (0.12)	-0.151 (0.85)	0.236 (0.93)+	*
Feeding pattern	-0.056 (1.07)	0.036 (0.97)	0.037 (0.94)	*ns*
Complementary food	0.150 (0.97)	-0.067 (1.15)	-0.058 (0.96)	*ns*
Care environment	0.017 (1.02)	0.237 (0.91)+	-0.218 (1.01)	*
House-living conditions				
Housing quality	0.394 (1.96)	-0.362 (1.43)	-0.155 (1.63)	*
Sanitation and hygiene	0.104 (0.99)	0.238 (0.99)	-0.023 (0.94)	*ns*

Figures in parentheses are standard deviations.
Three households had incomplete information to calculate the sanitation and hygiene index.
* Significant at 5%, ns = Not significant at 5%. + Significantly higher than the smallest value in row
++ Significantly higher than the smallest 2 values in row. † NFE= Non-farm employed.

Households of women who were part-time in NFE scored highest in the component of care environment, while households with women in market activities had the highest scores of housing quality.

To test whether the significant effects shown in Table 5.6 were associated indeed to the occupation category, a MANOVA procedure was used to investigate the effects of maternal occupation after adjusting for factors that could be associated with belonging to a certain group (since natural randomness in this cannot be assumed). The other objective was to find the group effect on the combined components of the clusters of child care and house-living conditions. The age of the youngest child, the mother's education and the household level of income (excluding the mother's income) were used as adjusting factors. The results of the MANOVA analysis are shown in Table 5.7. The Wilk's lambda of the combined components of the child-care cluster were not significantly related to the maternal occupational groups. However, the combined components of the child-care cluster were significantly related to the set of covariates: $F(12,460)=3.3$, $p<0.001$. While the main effects of maternal occupation accounted for only 3% of the variance in the cluster of the child-care (the combined effect of the 4 components), the three covariates accounted for 20% of the variance[3]. The covariates and not the main effects of occupation accounted for most of the variability in the cluster of child care. Similarly, the combined two composite variables of house-living conditions were significantly affected by the covariates in the model; $F(6,350)=3.633$ and $p=0.002$. However, after adjusting for covariates they were not associated with the occupation of the mothers. The covariates were associated with 12% of the variance in the house-living conditions cluster and the main effects of the mother's occupation were associated with only 3% of the variance.

Discussion and Conclusions

The study attempted to assess the effects of maternal factors on the components of child care and house-living conditions. Emphasis was placed on the effects of the occupation of the mother on these components. In the first instance, the measures of child care and house-living conditions were developed. In developing the indices of these components, certain limitations were encountered and should be taken

[3] The measure of strength of association is available from the Wilk's Lambda, Λ, which is a measure of the variance not accounted for by the combined dependent variables in MANOVA. Therefore, the variance that is accounted for is computed as, $\eta^2 = 1 - \Lambda$ (Tabachnick and Fidell, 1989; pg 339).

Table 5.7. Relation between maternal occupation and child care and house-living conditions controlled for three covariates (n=183)#

Effect	Dependent Variable	*df*	Wilks Lambda	*F*	*Sig. of F*
	Child-care cluster				
Covariates significantly adjustment†					
Child's age	Time-quality	3/177		3.060	*
(None)	Complementary food	3/177		1.800	*ns*
Mother's education	Feeding pattern	3/177		4.106	**
Child's age, mother's education	Care environment	3/177		4.523	**
	Wilks Lambda	*12/460*	*0.802*	*3.320*	**
Maternal Occupation	Time-quality	2/177		0.619	*ns*
	Complementary food	2/177		0.416	*ns*
	Feeding pattern	2/177		0.698	*ns*
	Care environment	2/177		0.941	*ns*
	Wilks Lambda	*8/348*	*0.969*	*0.688*	*ns*
	House-living conditions				
Covariates significantly adjustment†					
Mother's education and household income	Housing quality	3/177		5.782	**
Child's age	Sanitation/hygiene	3/177		1.772	*ns*
	Wilks Lambda	*6/350*	*0.886*	*3.633*	**
Maternal Occupation	Housing quality	2/177		1.320	*ns*
	Sanitation/hygiene	2/177		1.542	*ns*
	Wilks Lambda	*4/350*	*0.968*	*1.354*	*ns*

Three households in the "home caretakers" had incomplete information for calculating the sanitation and hygiene index. †Adjusted for the child's age, mother's education and household income (excluding mother's income). * Effect is significant at 5%, ** Effect is significant at 1%, ns = Effect is NOT significant at 5%.

into consideration when interpreting the findings of the study. First, the variables used to develop the various indices of child care and of house-living conditions were derived from considerations of the researchers on the basis of discussions or interaction with community representatives, and from general experience. They are operational rather than theoretical. Other locally important factors might have been overlooked. In the absence of a well-tested framework of variables for constructing a multidimensional

measure of child care and house-living conditions, the results should be taken as a preliminary analysis only. Future research should try to assess the reliability and validity of the resulting composite variables. Second, subjectivity in measuring some of the structural variables, e.g., the cleanliness of the house and the children means that there were inherent methodological problems in estimating them. Faith in their validity is based on the quality of training and the "standardization" of the field assistants, plus the close supervision done during the survey. Moreover, the use of only two assistants to rank the observations hopefully reduced inter-observer variability. The unambiguous findings and the clarity of many of the results is itself unusual, given these problems. Finally, the findings apply to a community in which women spend few hours in farming and engage mainly in informal employment. They might not apply in a community which is more agricultural and which is highly involved in non-farm activities that are not "time-flexible".

Given the above considerations, generalizations about the findings of this study should be made with great caution. Nevertheless, the value of a number of insights are of significantly heuristic to warrant further analysis. This is because of the operationalization of a nutrition strategy that uses a framework incorporating child care and house-living conditions among the underlying causes of malnutrition. Important findings of the study are discussed below.

Factors which affect care and house-living conditions are numerous. Engle (1994) grouped the possible risk factors of the "quantity" and "quality" of child care into three sets of child-related factors, household and community related factors, and maternal (or caregiver's) related ones. In this study, the interest was on maternal-related factors. However, two other factors, the child's age and household income level are briefly discussed.

The age of the youngest child was a determinant of the quality of time, care environment, and sanitation and hygiene. As the child becomes older it demands and needs less care, the quality of care and contacts with adults in the household decreases (Paolisso et al., 1990) and exclusive maternal care is replaced by care from other family members (Esterik, 1995). The low sanitation and hygiene situations among households with younger children is likely to be spurious. If it is not, the finding may imply that protection against infection was not available in households when it was most required. This could have serious repercussions on the health and nutrition of young children. In relation to household level of income, this was not a significant determinant of the indices of child care and that of sanitation/hygiene in rural households, but it was for housing quality. This finding supports other studies which postulate that increased household income does not improve the aspects of child care and sanitation/hygiene and therefore income might not influence nutrition in communities where the poor health is the main factor (Kennedy *et al.*, 1992; von Braun *et al.*, 1989a).

The effects of six maternal factors on the components of child care and living conditions were investigated in this study. These were mother's occupation, the share

of the family financial resources she earned, her level of formal education and her level of nutritional and health knowledge, level of esteem and her age. The effects of each of these factors is discussed below.

Mother's occupation

Theoretically, it was expected that a mother's time allocation outside household tasks would compete with child care and house-living conditions, especially during busy agricultural periods (Baksh *et al.*, 1994; Akin *et al.*, 1985). This would then have detrimental effects on the aspects of care or living conditions which need time input (i.e., time-quality, child feeding, and sanitation/hygiene). The analyses reported here indicated that the effect of maternal occupation on the components of child care and house-living conditions were insignificant after adjusting for differences in the groups associated with the education of the mother, the age of the youngest child and the household income. There are several explanations as to why maternal employment had insignificant effects in the study community. (1) There was easy availability of surrogate care taker(s) from family members in the extended households who would take care of the child in mother's absence.[4] (2) Women allocated little time to the NFE activities and agricultural field work and, in most cases, the activities were not carried out on a daily basis. (3) Activities were mainly in the informal sector with time-flexibility, and most were carried out near the home or, if done outside the home, they were compatible with child care activities (Doan and Popkin, 1993). The last two reasons imply that mothers had a lot of "spare time" to undertake child care activities. Were women to be engagement for more hours in non-farm economic activities outside the home there would be a likelihood of a significant mean difference between the occupations (Soakirman, 1983). However, as has been shown in the Philippines, only when mothers were engaged for more than 6 hours per day in market activities was there a significant difference between the employed and the unemployed in their input in home chore and child-care activities (King and Evenson, 1983).

Mother's control of household financial resources

This has been suggested as a measure of "the woman's power to influence the allocation of resources for the purpose relevant to the child's health and nutrition" (Guyer, 1980; Buvinic, 1983; Onyang'o *et al.*, 1994). The data reported here indicate that maternal control of family financial resources had a negative effect on child care. The fact that there was no significant interaction between income and the level of control of family resources in determining the components of child care implies that the findings were not of an aspect related to family income. Nor were they related to household size or its composition. There are various ways in which this trend could happen. (1) To earn more income, the mother needs to sacrifice more in terms of time

[4] However, it has been shown that reliance on kin-members to provide care might not always be a compensation for the mother's time engaged in non-farm employment (Popkin, 1983; Wandel and Holmboe-Ottesen, 1992).

and energy. Child-care components that need time and energy will likely suffer, especially if households do not have adequate alternative caretakers. The negative coefficient of this variable on care environment may imply that only an inadequate substitute is available or that there is little support from kin-family. (2) Even if the mother were to shift child-caring responsibilities (like feeding the child, cleaning the child) to other household members (or a house help), this might be detrimental to the quality of care, especially if the mother's supervision is limited. (3) In the case of an increased income, the mother's value of time increases (i.e., increasing the opportunity cost of child care for the mother), therefore reducing the time spent on child care (Chernichovsky and Zangwill, 1990; Senaur, 1990). However, those aspects of the household that need financial inputs (like child feeding and housing quality) benefit from the mother's increased control of household finances. This is because these aspects are more "superior services/goods" to the mother or she is in a better position to influence them.

Mother's level of formal education

This was an important determinant of the components of child care and house-living conditions. Both the components of house-living conditions and the child-care components of feeding pattern, sanitation and hygiene are recent skills and are learned. Thus, one would expect that they would be easily influenced by formal education. However, in this study, child care components like complementary food which are still strongly determined by traditional notions were also positively associated with maternal level of formal education, at least of the mother alone. The positive effect of a mother's education on her child's nutritional status could be through the positive impact of education on child-care practices and house-living conditions. However, the actual mechanism of how even a few years of maternal education can affect child care and living conditions in communities with strong social and cultural influences is still a question.

Mother's self-esteem and level of nutritional knowledge

These two factors only affected the component of complementary feeding. The mother's motivation and esteem, and her nutritional knowledge were not good predictors of the clusters of house-living conditions and other child-care components in this community. In other words, the variability in these factors was inadequate to cause change in the child care and house-living conditions. This implies that most child care aspects, like quality of time, feeding patterns, and caring environment may not be differentiated by nutritional knowledge as expected (Smith *et al.*, 1983; Christian *et al.*, 1989; Ruel *et al.*, 1992). Cultural factors and traditional habits have more important influence on these aspects. And neither the nutritional knowledge or skills of the mother nor her level of esteem/motivation are by themselves able to influence them. However, it seems that complementary feeding is positively influenced by these two maternal factors.

Mother's age

Older mothers were more likely to have better scores of child caring and house-living conditions than younger mothers. In this community, the mother's age was a proxy of the "socio-power" and experience. Older women were likely to have someone to assist with child care, to demand assistance from household members, and to have a cumulated effect on housing quality.

In conclusion, although the current levels of time input and earning from maternal non-farm employment did not have a significant effect on the components of child care and house-living conditions, such trends cannot be denied nor underrated. Increased opportunities for women's engagement in non-farm employment in this community may not affect dimensions of child care, as there is still a lot of "buffer-time" that can be shifted to more productive activities. However, this would benefit child welfare if the "quality" of potential substitute caretakers is considered in nutritional programming. Although factors detrimental to complementary food and poor sanitation/hygiene will obviously be more effectively influenced through community factors like general beliefs, traditions and religion (which were not addressed in this study), the education of the mother goes a long way towards improving the components of the child-care and living-environment clusters. The positive effect of a mother's education on the nutrition of her children is likely to be through choices of better care in child feeding, "complementary food", and her influence on house-living conditions. The employment of the mother and the household income have a limited influence on child care and sanitation/hygiene.

6

Links between non-farm employment and child nutritional status among farming households in rural coastal Kenya

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Abstract

This paper tries to identify the links between non-farm employment and a child's nutritional status in a rural community in Kenya. The study was carried out in a community with relatively good access to public amenities of water, health services, schools and transport. The principal component technique was used to summarise variables identified by 3 previous studies in the same study area as important measures of child care, house-living conditions and household food security. The findings indicate that income from non-farm employment was an important determinant of a long-term nutritional condition through the food security pathway. Child "feeding patterns" affected the short-term as well as the long-term nutritional condition of children, but neither income nor time spent in non-farm employment had direct effect on child feeding patterns. Income had an indirect effect on child feeding patterns through housing quality. Income did not affect child-care components of "complementary feeding", "care environment" and "quality of time in care". It also did not affect sanitation/hygiene and household investment in agriculture. Although women's time in non-farm employment affected sanitation/hygiene, this did not significantly translate into poor nutritional status. Thus, any effects of the components of child care or house-living conditions on nutritional status were independent of non-farm employment. So the principal effect of non-farm employment on nutritional status in this study area is through the food security pathway. Any antagonism effect of non-farm employment through reduced time availability did not translate into lower nutritional status, at least not with current levels of sanitation, health, culture, general time availability and flexibility and, social networks in this area.

Key words: Non-farm employment, nutritional status, child care, food security, health.

Introduction

Strengthening the resource base of households by raising incomes is paramount in alleviating malnutrition in developing countries. Studies have increasingly shown the need for households to have access to their own resources (i.e. knowledge, land, time and income) as a means of alleviating malnutrition and ill health (Strauss, 1990; Sahn, 1994; Alderman and Garcia, 1994). This recommendation has been incorporated into most strategies and "National Plans of Action on Nutrition" (Frankenberger *et al.*, 1993; Kavishe and Mwadime, 1995), with different conceptual frameworks being used to link household resource accessibility with nutritional status, particularly of young

children. Most of the programmes and strategies are based on the conceptual framework of the "UNICEF Nutrition Strategy for the 1990s" (UNICEF, 1990; Kavishe and Mushi, 1993).

Governmental and non-governmental organizations promote rural non-farm employment (NFE) as a way of achieving health and nutritional objectives (GoK, 1994; Frankenberger *et al.*, 1993). But the conditions under which this will effectively occur are poorly, if at all, specified. For example, that non-farm employment may also have negative effects through limiting mother's time use is recognized but empirical evidence of the net effects is missing. In fact, research on household resources and nutritional status so far has only investigated components of the model, or only particular links, but has not evaluated the empirical relevance of the frameworks being used as a whole. A related question is whether there is a link between NFE and nutritional status through the pathways predicted by the conceptual framework.

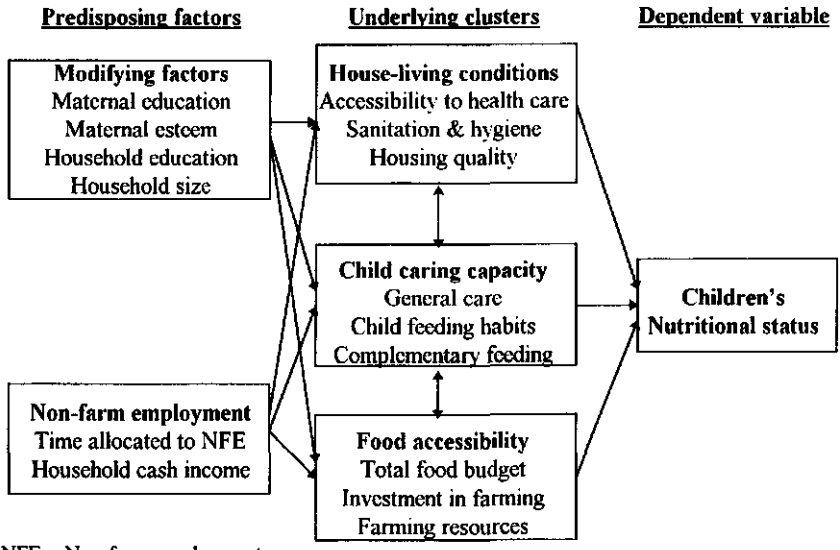
The purpose of the study discussed in this paper was to identify the links between non-farm employment and childhood nutritional status through the main underlying determinants of malnutrition as postulated by the UNICEF framework. A study area was chosen to control for community factors and infrastructures that would otherwise have confounded the relationships. If the links between household resources and child nutritional status agreed with the commonly used conceptual framework, then programmes developed on the basis of that framework would be expected to more likely to produce better nutritional status.

Analytical Model

The variables and pathways through which household non-farm employment[1] can influence the three clusters of health, care and food and hence the nutritional status of children in the UNICEF framework is shown in Figure 6.1. It assumes that, at household level, variations in the components in the three clusters are associated with variations in the child's nutritional status. Hence, an appropriately combined mix (as to quantity and efficiency) of inputs of the three clusters are needed to ensure an adequate nutritional status of household members at all times (Engle, 1992; Haddad *et al.*, 1994).

Theoretically, non-farm employment (NFE) influences nutrition through the time spent in NFE, income earned as well as the changes in control and use of other available resources. These consequences can influence the components of the three underlying determinants of nutritional status. They are supposed to have no direct effect on a child's nutritional status *per se*. It is difficult to predict the effect of the trade-off between household income and time in NFE on nutritional status.

[1] In this study, non-farm employment is defined as an activity, other than the household's farm or house work, in which some time is spend working and through which money is earned or some other economic reward is gained.



NFE = Non-farm employment.

Adopted from UNICEF, 1990.

Figure 6.1. Theoretical model explaining the relation between non-farm employment and nutritional status

Household income can produce positive effects on the three clusters of underlying factors of the framework.

1) Income can improve food security (i) directly, through increased expenditure on food and/or (ii) indirectly, through increased investment in domestic production and increased farm resources and hence increased food self-sufficiency.
2) Income can also improve the house-living conditions, i.e. improved housing quality (cementing the walls and floor, owning mosquito screens/nets, safer water sources, acquiring a refrigerator or stove), improved sanitation and hygiene (a better toilet, waste-disposal, the purchase of soap and more clothes), and financial accessibility for health care.
3) Income can also improve child care, most likely through widening the resource base options offered by the clusters of food or health, i.e. through frequent feeding of the child if more food is available or if there are more efficient means for handling the food (re-heating or storage), through the purchasing of special foods (high in nutrients and energy) for the baby, through keeping the children cleaner because of availability of water, soap and clothing, or through being able to afford a baby-sitter if both parents are away.

However, the time shifted from necessary household chores to employment activities can also have negative effects on the different components in the three clusters.

1) Food security can be reduced if home production decreases as a result of a shift of labour from domestic production to NFE (like farm labour, fetching water and firewood). These labour deficits can reduce direct food availability and/or shift a household's production or purchasing towards foods which can be prepared more quickly or need less labour (Haswell, 1981), but which have a lower nutritive value.
2) The status of house-living conditions can be reduced if the time available for utilizing health services is difficult to find (as in NFE with inflexible time schedules), if there is less time for maintaining high standards of sanitation/hygiene or if (as in the case of migrants) workers may have to live in settlements with poor sanitation and living conditions.
3) Child care can be reduced if the time available for it decreases, especially if the mother is employed and cannot take the child with her, while there are inadequate alternative care-givers. This can lead to a shorter duration of exclusive breast-feeding and to early weaning. Under time pressure, child care can also be affected by inadequate feeding habits e.g. in terms of inadequate frequency of feeding, ot preparation of children's food or by the sorts of food fed to the child (Engle, 1994; Wandel and Holmboe-Ottesen, 1992).

Other predisposing factors are also involved in the translation of income or time into food, care and health. These include the level of education for the household members, especially that of the mother (Wolfe and Behrman, 1982; Sahn, 1994), the mother's level of self-confidence/esteem which finds expression in such things as her competency level, skills, motivation, out-going orientation and control of resources (Tucker and Sanjur, 1988; Kennedy and Cogill, 1987), and the household size (Sahn, 1994; Niemeijer *et al.*,1991). These modifying factors can affect any of the components of the three clusters. They can even affect factors of NFE. For instance, household education can affect the level of earning from NFE.

Study Sites and Data Collection

Selection of study sites

The research was carried out among the Digo people in the Kwale district of coastal Kenya. Their staple foods are cassava and maize, while fish is a major component of the relish. Coconut is used in the cooking of most foods. On average, over 80% of the food consumed (in terms of value and energy) in the households is purchased since home food production is low (Hoorweg *et al.*, 1995; Chapter 4). The income for purchasing the food is mainly earned through NFE activities. Wage employment and casual work can be found in nearby trading centres and towns, and in

tourists hotels along the Indian Ocean. Fishing, trading/business, the service sector, as well as handicrafts, the sale of coconut and cashew-nuts and, to a lesser extent, cassava are the other sources of income in the community. Most of the NFE activities are carried out close to the rural homes so that those taking part are able to commute to their places of work.

By development standards, the study villages ranks among the best in that part of coastal Kenya. The baseline data had indicated that over 84% of the households were within 30 minutes walk of a watering point, while 12% had running water in their homes. All households were within 45 minutes walk from the district hospital or a health centre and within 20 minutes walk from a community growth monitoring unit. In addition, there was community health care, a village-managed pharmacy, three primary schools and one secondary school in the area.

Sampling and data collection

The analysis was based on a survey of 178 households randomly selected from a larger pool of 391 households (of 517 households whose baseline data had been collected 10 months earlier) in which there was at least one child aged between 6 and 59 months. All study children had been in the study area for at least 5 months.

The survey team consisted of a field nutritionist from the Ministry of Health, two post-graduate students from the Applied Nutrition Programme in the University of Nairobi, and the first author. Six field assistants were also recruited as part of the team. Data were collected by using an administered questionnaire for the mother, and by observation and examination using a standard schedule developed from the experience of three studies already carried out (Chapters 3, 4 and 5).

The study was carried out in May and June, a very busy period in the fields, when households allocate more time to farm activities. Households were also expected by and large to have exhausted their food stocks (Hoorweg *et al.*, 1995). Under these conditions, it was likely that a small variation in the income and household time could affect the components of the three clusters and, in turn, the children's nutritional status.

Dependent and independent variables

The dependent variable in this study was the children's nutritional status as measured by the nutritional status indicators of weight-for-height (a measure of short-term nutritional situation) and height-for-age (an indicator of long-term nutritional condition). Anthropometric measurements of weight and height of all pre-school children in the households were collected in the second month of the study. The age of the child was recorded from the "health card", birth certificate, household records or recall[2]. The indices of weight-for-height and height-for-age expressed as Z scores were

[2] For only 3% of the children were there no recorded dates, so that the children's age had to by the mothers or other adults in the households.

computed for every child, using the ANTHRO computer programme (CDC, 1990) which includes the international references of the National Centre for Health Statistics (NCHS/WHO).

The proximal independent variables pertained to the clusters of house-living conditions, child care and food accessibility while the distal independent variables were the proxy measures of NFE, namely, time and income. Household income comprised the gross farm income, income from NFE (by all household members), and returns from other investments and pensions. The baseline data indicated that over 75% of all income in the household was acquired from NFE. The number of hours allocated to NFE was collected through seven days recall. The recall was done on two occasions in each household, one at the beginning of the survey and the other in the last week of the survey. The average of the two recalls was used to estimate the hours engaged in NFE per day. Data were disaggregated by the sex of the participants.

The three clusters of house-living conditions, child care and food accessibility are not uni-dimensional concepts that lend themselves to a single measure. Composite indices (or "components") in each cluster were computed to reflect these different dimensions. To do this, relevant variables were carefully chosen and grouped according to the three hypothesized clusters. The choice of the particular variables for each of the cluster was based on the findings of three studies carried out prior to this study (Chapters 3, 4 and 5). From the set of measured variables, three components within child care, two within house-living conditions and two within food accessibility were constructed using Principal Component Analysis (PCA) in the *Statistical Package for the Social Sciences* (SPSS PC+), 4th release (SPSS Inc./Norusis, 1990). Only the variables contributing to the first factor were used to compute the factor scores of the specific component. In this way the most important variance available from the data is extracted (see Chapter 5 for details on the construction of the components). The list of the variables used for each component for the three clusters is provided in Table 6.1. In addition to the two components of the cluster of food accessibility created by PCA, the value of the food consumed in the household per month was also used as an indicator of the cluster. It was preferred here to use the conventional construct of simply summing up the value of contributions by all individual foods consumed in the household in the month. The correlation coefficients shown in the matrix in Table 6.2 indicate that the components of the different clusters measured unrelated virtually independent aspects of the clusters. Thus, there was no need to assess the combined effect of the components as had initially been hypothesized.

Table 1. Description of observed variables used to construct the components of child care, house-living conditions, food accessibility and maternal esteem

Observed variables	Range	Mean	SD
Cluster of child care			
General care			
• Cleanliness of the child at time of survey (score)†	0-3	1.38	0.66
• Duration (per day) the mother is with the child (24 - hrs. without the child)	0-8	0.82	1.32
• Mother took the child with her to her work place or farm	0-1	0.53	0.50
• Rank of child activities (in terms of time) among 9 activities carried out by mother from day to day (1=least, 9=most time)	2-9	3.62	1.63
• Rank in order of priority of child activities among 6 groups of activities the mother carries out (6=highest priority)	2-6	4.02	1.32
• Alternative child care when mother is away. (0 = sibling <10yrs, 1= caretaker 10-15 yrs. 2 = adult).	0-2	1.38	1.02
Complementary feeding			
• Age child introduced to fluid foods/fluids other than breast-milk and water (4-9 months=2, <4 months=1, rest =0)	0-2	1.12	1.02
• Child exclusively breast-fed (first 4 months)	0-1	0.26	0.44
• Child breast-fed for more than 12 months (if still breast-feeding for younger children)	0-1	0.91	0.15
• Mother made special foods for child in first 2 months of complementary feeding	0-1	0.64	0.40
• Complementary foods fortified with energy-rich food (never=0, rarely=1, always=2)	0-2	0.83	1.02
Feeding pattern			
• Number of times the child was fed if eating (day before recall)	1-6	3.78	1.32
• Child fed from own plate (not with other children or mother)	0-1	0.54	0.53
• Breast-milk/feeding not withheld in last episode of diarrhoea or fever/malaria (1=Not else=0)	0-1	0.73	0.25
• Child fed/encouraged to feed by the mother/adult last 2 main meals	0-1	0.46	0.50
• Special food made or bought for the child in the last 48 hrs	0-1	0.28	0.45
Cluster of house-living conditions			
Sanitation and hygiene ††			
• Washing hands before feeding/serving the child	0-3	1.88	0.78
• Cleanliness of main house	0-3	2.07	0.66
• Washing hands by mother before cooking, after using toilet, or eating	0-3	1.92	1.01
• Cleanliness of courtyard	0-3	2.17	0.83
• Cooking pots washed at time of inspection	0-3	2.04	0.77
• Boiled drinking water for children available in the house	0-3	0.43	0.45
• Animals (goats/chicken) not living in same house as child.	0-1	0.73	0.18

Continued. Table 6.1.

Observed variables	Range	Mean	SD
Housing quality			
• Number of bedrooms per consumer unit (crowding factor)	0.2-2	0.49	1.01
• House has cemented walls and floor	0-1	0.35	0.48
• Presence of a toilet in the compound	0-1	0.47	0.50
• Mosquito screens/nets in the house	0-1	0.27	0.45
• Soap (for washing) in the house	0-1	0.71	0.21
• Type of main cooking fuel (0 if firewood and 1 if other)	0-1	0.19	0.39
• Running water in the house	0-1	0.16	0.37
Cluster of food accessibility			
Total food budget			
• Value (Kshs/AE) at market prices of all food consumed in the house over two months (purchased + home produced) expressed per month	113-1650	689	304
Agricultural investment			
• Household hired agricultural labour that season	0-1	0.43	0.50
• Rented/used tractor or animal draught that season	0-1	0.11	0.32
• Used fertilizers or manure	0-1	0.27	0.62
• Area of land cultivated with food crops that season (acres)	0-6	1.51	1.18
• Frequency the head of household went to the farm in the week	0-7	2.79	2.66
• Used hybrid seeds (for maize and pulses)	0-1	0.21	0.64
Farm resources			
• Total land size (acres)	1-23	5.3	7.50
• Number of mature productive coconut plants	0-121	42	53.21
• Number of animals owned (Livestock Units*)	0-23	0.89	5.21
• Area planted with rice (acres)	0-5	0.75	1.86
• Household head gathered, hunted or fished food for household (0=not, 1=rarely, 2=frequently)	0-2	0.94	1.32
Modifying factor			
Maternal esteem			
• Mother can ride a bicycle/drive a car	0-1	0.13	0.34
• Mother uses family planning method	0-1	0.24	0.43
• Mother is a member of a women's group/or other community group(s)	0-1	0.16	0.37
• Flowers planted outside the house	0-1	0.18	0.41
• Mother given a gift by parents, husband or children in the last 6 months.	0-1	0.32	0.38

Key: AE = Adult equivalents. Kshs = Kenya shilling. † Four point scale (0=worst ...3=best).
†† Apart from the last item in this component the rest have a four point scale (0=worst ...3=best).
* 1 Mature cow (East African Zebu) is taken to be equivalent to 6 goats or sheep or 43 chickens.

Table 6.2. Correlation matrix of the association between the components of child care, house-living conditions and food accessibility

Variable	1	2	3	4	5	6	7	8
1. Sanitation/hygiene	1.000							
2. Housing quality	0.025							
3. General care	0.001	-0.001						
4. Complement feeding	0.135	-0.072	0.021					
5. Feeding pattern	0.086	0.169*	0.088	0.104				
6. Total food budget	-0.070	0.039	-0.059	-0.024	0.144			
7. Agricultural investment	0.105	0.106	0.010	-0.058	-0.022	0.038		
8. Farm resources	0.077	-0.156	0.069	-0.112	0.032	-0.048	-0.048	1.000

Numbers in the horizontal depict related variables on the vertical.
* = Significantly different from zero at 5%.

Another composite measure, labelled "maternal esteem" was also computed using the PCA and was used in the analysis as a potential modifier of the relation between resources and the clusters of care, health and food.

Data analysis

The link between underlying factors and NFE was investigated by 2-way Analysis of Variance (ANOVA). The link between the underlying factors and nutritional status was studied by chi-square analysis on a 3 by 2 contingency tables constructed for the purpose. *The Structural EQuations statistical programme, EQS version 4* (Bentler, 1992) was used to evaluate a causal structure which links NFE and nutritional status through underlying factors (of the three clusters) and influenced by a number of mediating factors. Standard maximum likelihood procedures were used to estimate the path coefficients. The model incorporates only one-way or non-reciprocal causal paths, but these can be both direct or indirect. In the first instance, all paths connecting measures of NFE, all the components within the three clusters, the modifying factors and nutritional status were entered into the model specification (Figure 6.1). The final model was derived by deleting unnecessary non-significant paths. Paths with absolute t-values of less than 1.98 were considered not significantly different from zero and were excluded from the model. The exceptions were direct paths from the components of the three clusters to nutritional indicators. If all paths from the components of an underlying cluster to nutritional status were insignificant, only the one with the largest coefficient was presented. A model with X^2/df of less than or close to 1 and an adjusted Normed Fit Index (NFI) > 0.900 was considered to indicate a good fit.

Results

Non-farm employment and components of the clusters of house-living conditions, child care and food accessibility

First an assessment was made as to whether NFE relates with the components of the clusters of house-living conditions, child care and food accessibility. Two proxy indicators of NFE, namely, time and income, were related with the components studied. A Two-way Analysis of Variance was used. The time allocated to NFE by all household members was not as informative in the associations (i.e. it had no significant nor consistent trends with the dependent variables). Similarly, an earlier study in the locality had shown that the employment of the mother alone was also not associated with the components of child care and house-living conditions (Chapter 5). In this study the time aspect of NFE was represented by the average time allocated to NFE per woman member of the household. The analysis indicates that there was a significant association between time in NFE per woman with the components of sanitation/hygiene and that of general care (Table 6.3). Increasing women's time in NFE reduced the sanitation/hygiene and the general care. NFE by women also had a negative effect on feeding patterns, but this effect was not statistically significant. Overall, closer inspection of the results suggest that the association is significant among the low income and middle income households. Income had a positive effect on housing quality and total food expenditure. Households in the middle of the income distribution had higher levels of farm resources and agricultural investment, but the differences were not significant.

House-living conditions, child care and food with child nutritional status

Next, an assessment was made of the association between the components of the underlying clusters and malnutrition. Chi-square analyses were done on the prevalence of malnutrition (defined as either a weight-for-height or height-for-age less than - 2 of the Z-scores) and the components studied, each divided into three levels of almost equal numbers of households. The prevalence of wasting decreased significantly with the level of the components of feeding pattern, complementary feeding and the level of investment in agriculture[3] (Table 6.4).

[3] Households which invest more in agriculture (hired labour or draught power or more efficient tools) are likely to shift family labour to less laborious activities and hence safe time for other household activities and child care.

Table 6.3. Average scores of the components of the clusters of house-living conditions, child care and food accessibility, by household income level and level of time allocated to non-farm employment by female household members

Level of income→	Low Income			Middle Income			High Income			ANOVA results		
	Time allocation in NFE by adult females											
Component	**LOW†**	**MID**	**HIGH**	**LOW**	**MID**	**HIGH**	**LOW**	**MID**	**HIGH**	**Income effect**	**Time effect**	**Inter-action**
Number households	17	17	21	15	18	29	22	19	20			
Health cluster												
Sanit. & Hygiene	0.146	-0.037	-0.195	0.366	0.028	-0.082	0.228	-0.328	-0.050	*ns*	*	*ns*
Housing quality	-0.039	-0.901	-0.550	0.223	-0.024	-0.056	0.540	-0.203	0.337	*	*ns*	*ns*
Care cluster												
General care	0.098	-0.093	-0.256	0.015	0.066	-0.106	0.198	-0.548	-0.100	*ns*	*	*ns*
Feeding pattern	0.289	0.022	-0.465	-0.014	-0.143	-0.377	0.173	0.270	0.070	*ns*	*ns*	*ns*
Complementary fd.	-0.222	0.199	0.260	-0.103	-0.177	0.104	0.052	-0.210	-0.050	*ns*	*ns*	*ns*
Food cluster												
Farm resources	0.024	-0.212	-0.064	0.044	0.426	-0.061	-0.312	-0.405	-0.205	*ns*	*ns*	*ns*
Farm investment	0.006	-0.477	0.343	0.317	-0.169	0.107	0.038	-0.226	-0.026	*ns*	*ns*	*ns*
Food budget Kshs./month††	2347	2376	2284	3762	3627	3577	4162	3868	4041	**	*ns*	*ns*

NFE = Non-farm employment.

† Low = Not in NFE. Mid =Working up to 1 hr per adult female per day in NFE. High = Working for more than 1 hr. per adult female per day in NFE.

†† values in this category have been adjusted for differences between the groups in household adult equivalents. * Effects are significant at 5% using ANOVA.

** Effects are significant at 1% using ANOVA. *ns* = Effects are not significant at 5% level.

Table 6.4. Rate of malnutrition according to level of the components of health, care and food

Cluster/components (num. of households)	Nutritional status indicator: Weight-for-height	Height-for-age
Health cluster	% < - 2SD	% < - 2SD
Sanitation & hygiene		
Low† (66)	12	48
Mid (51)	6	27
High (61)	8	32
Significance	ns	*
Housing quality		
Low (70)	12	54
Mid (54)	7	26
High (54)	7	26
Significance	ns	*
Child-care cluster		
General care		
Low (62)	14	44
Mid (58)	5	34
High (58)	7	32
Significance	ns	ns
Feeding pattern		
Low (70)	16	47
Mid (52)	6	30
High (56)	4	28
Significance	*	ns
Complementary feeding		
Low (73)	12	45
Mid (45)	13	31
High (60)	2	32
Significance	*	ns
Food cluster		
Food budget		
Low (59)	10	47
Mid (60)	7	38
High (59)	10	26
Significance	ns	*
Agric. investment		
Low (60)	17	42
Mid (59)	7	30
High (59)	3	38
Significance	*	ns
Farm resources		
Low (62)	6	37
Mid (58)	12	40
High (58)	9	34
Significance	ns	ns

* Differences across the column significant at 5% using Chi-square Analysis. *ns* = Not significant at 5% level. † Low, Mid and High refer to the levels of the components scores divided into three groups of almost equal number of households.

As wasting is a short-term indicator of nutritional condition, it was influenced by these factors as they were likely to change during the peak agricultural period. The prevalence of stunting was associated with lower scores of housing quality and of sanitation/hygiene. However, the association was not significant when Ht/age was measured on a continuos scale, which suggests that the relationship was only marginal or not linear. Stunting was also associated with food budget, but not with other indices of child care and food accessibility.

Relation between non-farm employment and child nutritional status

The prevalence of stunting was estimated as 37% and that of wasting around 9%. Figure 6.2 shows that the relation between stunting and household income level was not negative through-out. The prevalence was lowest among households in the middle of the income distribution, but no significant. The prevalence of wasting dropped with level of income, but overall the pattern was not significant at 5% level. An analysis to find the effect of (women's) time and household income on children's nutritional status indicates a general increase in the stunting and wasting rates with an increase in the average time of women spent in NFE (Figure 6.3). At higher income, however, more than 1 hour in NFE was associated with a reduced prevalence of stunting and wasting. This might be because these households were likely to be the ones with women (or the main woman) employed in more secure or luxurious jobs i.e. family business or waged employment.

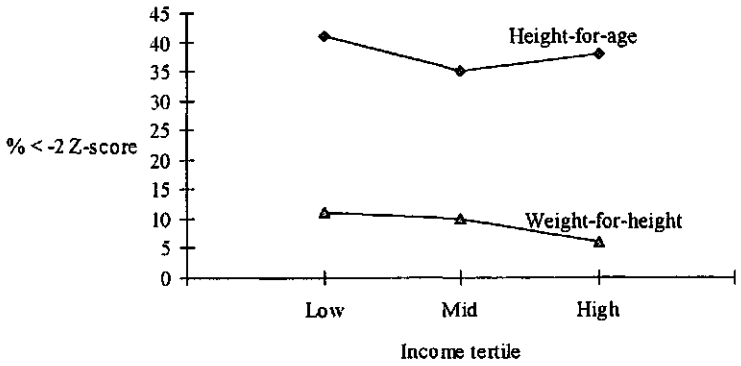


Figure 6.2. Prevalence of malnutrition by household income level

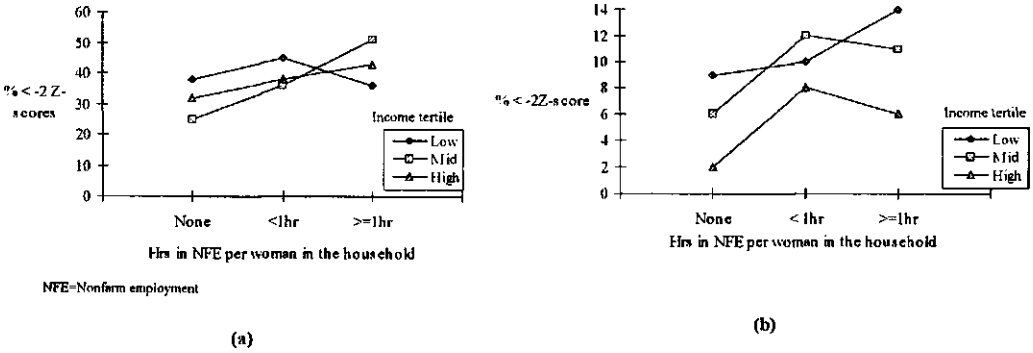


Figure 6.3 Prevalence of stunting (a) and wasting (b) by time spent in non-farm employment by women according to household income

The results of the *EQS* modelling exercise are shown as path diagrams in Figures 6.4a and 6.4b. Models with an acceptable fit could be produced, as shown by the Normed Fit Index and χ^2/df ratio. Income had no significant direct effect (i.e. bypassing the clusters) on the indicators of nutritional status. However, income significantly influenced the total food budget and housing quality. Income did not directly and significantly predict any of the components of child care, nor did it predict the components of sanitation/hygiene, farm resource ownership or agricultural investment. This confirms the results of the partial analysis in Table 6.3.

The average hours engaged per adult woman negatively and significantly affected the sanitation/hygiene score. Its impact on the component of feeding pattern was negative but not significant at 5%. It did not have any effect on the three components of the food-accessibility cluster, nor on housing quality, complementary feeding or general care. The correlation between time in NFE by women and household income was negative (not shown in the path diagrams), implying that more female hours were allocated in NFE in households with low incomes. Years of education per adult significantly predicted housing quality and sanitation/hygiene, but not the components of the food cluster or of child care. Finally, only the feeding pattern significantly predicted the weight-for-height and height-for-age of the child, over and above the effects of the other components. The food budget, significantly predicted height-for-age of children, but not their weight-for-height. Surprisingly, sanitation/ hygiene did not predict any of the indicators of childhood nutritional status, although in Table 6.4 it was associated with stunting. Also for other variables (like housing quality, agricultural investment, and complementary feeding) there was a shift, compared to Table 6.4.

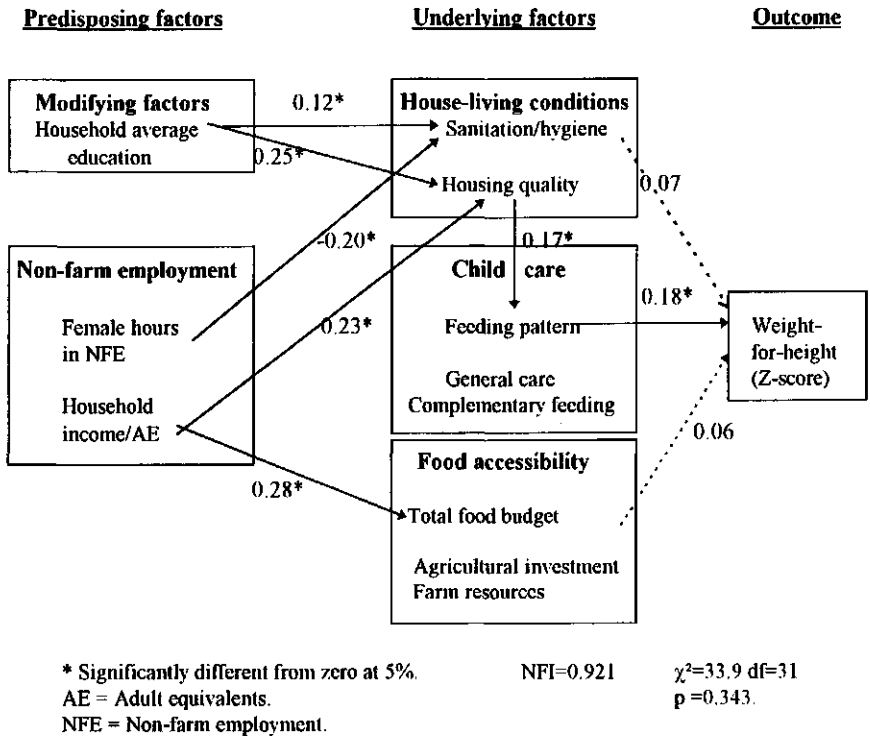


Figure 6.4a. Links between non-farm employment and children's weight-for-height

Discussion and conclusions

This study attempted to determine the links between rural non-farm employment and childhood nutritional status, using the UNICEF operational framework (UNICEF, 1990) as the basis. Child care, food accessibility and house-living conditions, which underlie nutritional status were treated as multi-dimensional abstractions of a combination of various variables. Variables used to construct components within these clusters were chosen with the help of the community (see Chapter 5) and the health personnel working in the study locality. Nevertheless, account was taken of both theoretical and programming considerations.

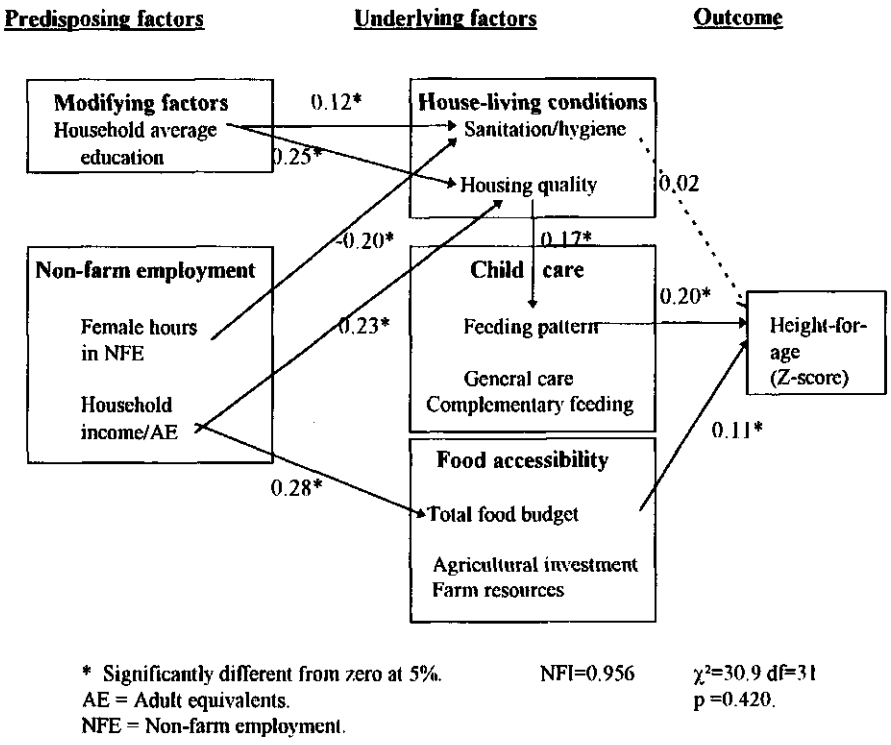


Figure 6.4b. Links between non-farm employment and children's height-for-age

Two variables, household income level (75% to 86% of the income is from NFE) and time allocated to non-farm employment per adult female in the household were used as proxy indicators of non-farm employment.

The results indicate that only the component of child "feeding pattern" significantly predicted both height-for-age and weight-for-height of children under five years old. The association between complementary feeding and wasting that was seen in the earlier univariate analysis did not emerge on the linear and continuous scale of the EQS model. This implies that the effect seen in the univariate analysis is likely to be spurious, or at best non-linear. Similarly, sanitation/hygiene and housing quality were associated with chronic malnutrition[4] when measured on a dichotomous scale, but not when measured on a continuous scale. This can be attributed to the non-linearity of the relations; besides, in the overall model the effects of housing quality were expressed indirectly through child "feeding pattern". Whether this latter link is causal, is difficult to say.

[4] Theoretically, there should be a relation between weight-for-height and environmental conditions (sanitation/hygiene), because weight fluctuations caused by infections resulting from poor house-living conditions would lead to wasting.

Since the study was conducted during a busy period of the year, variations in child "feeding pattern" were likely to occur which, *ceteris paribus*, would affect food intake and, subsequently affect the indicators of short-term and long-term nutritional situations. The data also indicate that the food purchased by the household (food budget) did benefit the child's nutritional status in the long-run. The effect of the food budget on children's height-for-age was independent of that of child care. Hence, as well as good feeding pattern, the quantity or quality of food in the household, as a whole, was an essential factor in determining long-term nutritional status. Strategies that improve food accessibility will better be able to help alleviate stunting but more improvement will ensue if child feeding patterns are also improved.

While child "feeding pattern" was the major determinant of the children's nutritional status, it was not directly affected by the measures of NFE, namely income and the hours spent in NFE per adult woman in the household. The "feeding pattern" was indirectly affected by household income (and household education) through housing quality. A better feeding pattern is possible if children were to eat more often, if the cooking fuel was gas or charcoal rather than firewood, if cooking pots were made of tin rather than clay, or if there was running water in the house. Another possibility is that both housing quality and aspects of feeding patterns, such as "own plate" or buying special food(s) for the child, are caused by a common underlying factor, maybe an interaction of education and income. The fact that time in NFE did not directly affect "feeding pattern" could be result if the time allocated to NFE was little or showed too little variability. This was the situation reported in Chapter 5, where it was shown that a lot of "spare time" was left for carrying out child care activities and that women's NFEs were compatible with child care.

The time allocated to NFE negatively affected household sanitation/hygiene, although this did not have significant effects on the children's nutritional status. Similar findings were reported in a study in Tanzania where, although maternal occupation reduced child care and household sanitation, this did not result in a poor nutritional status (Wandel and Holmboe-Ottesen, 1994). In the present study, the lack of linear relation between sanitation/hygiene and indicators of nutrition may explain the insignificant association between them in the final analysis. However, although on average women allocated only 0.7 hours in NFE per day, in addition to the 2.5 hours per day per woman allocated to farming, this was still at the expense of home sanitation/hygiene. This is can be associated with the type of NFE, especially for households with a low income. Field observations indicated that women in these households were often involved in NFE like beer brewing, clay handicraft, or fish processing, all of which are associated with lower sanitary conditions.

The link between household income and long-term nutritional status (height-for-age) was through food budget. The strong effect of income on food levels in the household is because over 88% of the value of the food consumed in the households was purchased (Chapter 4). This must have overruled any effect of subsistence production. Similarly, the effect of income on housing quality can be explained by

because higher income implies ability to own commodities like mosquito screens, soap, and the use of gas, paraffin or charcoal as cooking fuel. However, income did not significantly predict the components of farm resources or agricultural investment, or those of sanitation/ hygiene or of child care. This has to be interpreted to mean that these components were the least influenced by the level of financial accessibility. The former has been explained in Chapter 3. The latter finding corresponds to those of other authors, namely that in communities with most morbidity resulting from poor sanitation/hygiene or inferior child care practices (i.e. poor child care skills and knowledge), improved cash income may not necessarily improve the health and nutrition conditions of children (Kennedy and Oniang'o, 1993; von Braun *et al.*, 1989). On the other hand, a synergistic relationship between feeding and morbidity should not be ruled out either (Lutter, 1992).

Finally, it is important to mention that among the modifying factors, the average number of years of education per adult had more influence of the circumstances studied than the mother's education level. In other words, house-living conditions are the result of actions and preferences of most household members and not the mother alone. However, the lack of such a relation with the components of food accessibility implies that the direct influence of household education on amounts and types of foods consumed in this community was minimal. Indirect effects of education can be expected on food consumption through augmented household income, because in this study well-educated households were more likely to have higher paying NFE (Chapters 3 and 4).

To conclude, the effects of NFE on child nutritional status in this community were likely to be through the food security path, as was predicted by other studies (Sahn, 1994; Alderman and Garcia, 1994). Income increased the household's access to food through increased purchasing power, which then had a positive effect on long-term nutritional status. NFE, through income, and through its effect on housing quality, indirectly influenced "feeding pattern". "Feeding pattern", in turn, influenced the children's nutritional status. It is possible that the variability in income was inadequate to produce significant direct effects on the components of child care, sanitation/hygiene and farming capital input. NFE, through its effect on women's time, can influence the sanitation/hygiene, but it is not automatic that the path from sanitation/hygiene to nutritional status is significant, although a protective effect of feeding on morbidity cannot be ruled out. Hence, non-farm employment is justified in nutritional terms to the extent that it improves household food security through food budget and household possessions (like a stove, soap, refrigerator, spacious house). Either directly or indirectly, these two effects can affect the child's nutritional status. Women involvement in employment, as such, may result in lower sanitation/hygiene of the household, but this does not have to compromise child's nutritional status.

7

General Discussion

Poor nutrition in rural areas is associated with inadequate and untimely resources that give households access to food, care and health that they may need in order to achieve the required levels of nutrition. While governmental and non-governmental organizations currently promote non-farm employment as a means of helping households generate the necessary financial resources, there is no real guarantee that these strategies indeed bring about improved nutrition, because of the influence of a number of intervening and confounding variables. In order to assess the potential of non-farm employment to influence rural nutritional status, this study examined the links between non-farm employment and the nutritional status of pre-school children in a rural community in coastal Kenya. In the first instance, three studies investigated different parts of the linkage model, namely, the relation of non-farm employment to agricultural activities, the relation of household income to food choice and energy intake, and the relation of maternal occupation to child care and house-living conditions. In a fourth and final study, the indicators developed during these three studies and the experience learned in the process were used to carry out an overall test of the linkage model, this time with child nutritional status as the final outcome.

In this chapter the main characteristics and findings of the studies are reviewed. First, some characteristics of the research area and population that are important to the interpretation of the results are discussed. Then the indicators used in the study are revisited. Next, the main findings of the study are discussed, and finally, implications of the findings for policy and future research are formulated.

Research area and population

The research took place in an area with high rates of childhood morbidity, compared to most other parts of the country. For instance, the two-week prevalence of diarrhoea and fever among pre-school children in the district was estimated at 34% and 39% respectively (KDHS, 1994). This high morbidity has been associated with the high incidence of malaria and with the general poor nutritional status in the district. The district had the highest rates of malnutrition in the country in the last three national surveys (CBS, 1991; KDHS, 1994; GOK, 1995). This in turn may be explained by the

generally poor environmental and house-living conditions. The baseline survey in the area found that only 37% of the households had a toilet, and only 22% used mosquito screens or nets. Because the study households lived in villages that are within 15 km of each other they are homogeneous in environmental factors affecting a the health and nutritional status of children. Thus, at community level those general conditions were not a variable in this study, but they were relevant variables at household level as they bring out the ability of an household to deal with the situations with available resources.

The day to day life of the Digo people is determined by a mingle of culture, tradition and religion, and the influence of the market system. Cultural beliefs related to the causes and management of illness (including malnutrition) and to feeding practices widely exist. In addition, Islam has deep roots in the community, with its dedication to daily prayers and annual ceremonies. While the traditional beliefs may have an impact on the health status of children and in turn, on their nutritional status, the religious obligations affect the management of time, the use and allocation of resources within and among households, and the exploitation of employment opportunities. The strong kinship-networks and social-support systems and the culturally and religiously driven obligations, require sharing with the "less well off". This flow of resources (and probably ideas and tasks) may reduce differentiation between households in aspects related to household resources, although there are wide household variations in the adherence and dedication to both cultural and religious norms and, by implication, in the clusters of care and house sanitation and hygiene.

Non-farm employment is a major source of livelihood for most households in the study area, although this is not typical of all areas in the coast, or in Kenya for that matter, the choice was intentional in view of the study's objectives. Households which combine both NFE and agricultural sources have higher incomes than those which depend on only one source (Hoorweg *et al.*, 1991; Hoorweg, *et al.*, 1995). This was confirmed in Chapter 3 of this study. What is more, non-farm employment is most useful to a rural household's welfare if it can be combined with subsistence production (Evans and Ngau, 1991; Suda, 1992). More than 70% of the employed continued to live in their rural homes. Women were often involved in non-farm employment activities that were done in or near their homes, a factor related to religious expectations. Men were able to commute to their place of work each day, and thus being able to endeavour in higher paying jobs in the locality. This should allow households to benefit from the proceeds of the employment and to use any "buffer time" in household or subsistence production. For instance, among the women, most of the time spent in non-farm employment was in the homes, preparing or processing items for sale in the market. In addition, the income-generating tasks were often shared among the women in the household, for example, the younger women preparing the items for sale and the older women taking them to the market.

Operationalization of concepts

The guiding conceptual framework used in this study presents the underlying determinants of nutritional status as multidimensional clusters of child care, food security and house-living conditions. No single variable is adequate to measure these clusters (Haddad *et al.*, 1994; Maxwell and Frankenberger, 1992; Engle, 1994). Besides, because the characteristics of the clusters are determined by geographic and socio-cultural factors, the construct measures of the various clusters are area specific to a certain extent. In this study, community experiences, ideas from personnel in related government sectors and the experiences of the researcher were used to identify the relevant variables for defining each particular cluster. Principal Component Analysis was used to summarize the variables into components that were used as indicators for measuring the different dimensions of each cluster. The cluster of child care was measured by the components of "time quality" (an indicator of the quality of time given to child activities), "complementary foods" (an indicator based on breast-feeding and complementary feeding), "feeding patterns" (day to day feeding) and "care-environment" (participation of others in child care) (Chapter 5). The cluster of food security was measured by the level of food expenditure per consumer unit, the access to farm resources (land, trees and labour) and the level of investment in agriculture, i.e., in terms of tools, hired labour and cash-capital (Chapters 3 & 4). The cluster of house-living conditions was measured by composite variables of sanitation and hygiene and of housing quality (Chapter 5). Within clusters, components are considered to reflect mutually independent aspects. Some reflect the "potential to access", the resources needed to meet acceptable levels of that cluster, while others reflect the "actual status" of those levels as such. One technical limitation of the indicators is that their validity and reliability could not be tested in an independent study. However, care has been taken not to use the outcome variable (nutritional status) for their calibration, but to develop the components (Chapters 3-5) first before carrying analysis with the outcome variable (Chapter 6).

Non-farm employment in this study was first and foremost measured by the time spent in income-generating activities and the household income (most of which accrues from it), since these two are the main factors in terms of resource allocation. However, other elements of employment like where situated, the type, time flexibility and security are considered to be well captured by the dimensions of time and income. However, in Chapter 6, a gender specific analysis was preferred: the hours allocated to non-farm employment per adult woman were used as proxy measure of non-farm employment as far as it influences child nutritional status. This was because, in the presence of household income, women's time is an important factor in child care, house-living environment and family labour. Furthermore in Chapter 3, employment was categorized by type, i.e. whether it was part-time, self-employed, waged or otherwise. In Chapter 5, the income earned by the mother of the child was used as a measure of the level of control of household financial resources.

Main findings

I. Relation between non-farm employment and nutritional status is weak. This was not surprising, because trade-offs between opposing tendencies could be expected on the basis of international literature. Studies investigating the association between income (or socio-economic status) and nutritional status of children have reported conflicting findings (von Braun and Pandya-Lorch, 1991). While a number of them found a positive and significant relations (Sahn, 1994; Alderman and Garcia, 1994), others reported it to be weak or non-existent (Kennedy and O'niango, 1990; Leire, 1994; Hoorweg *et al.*, 1995). The research reported here also found a weak association between non-farm employment (whether measured in terms of time spent in the activities or income earned) with children's nutritional status (Chapter 6). Weak associations between income and nutritional status have been attributed to low control of income by women, inadequate resources like land, labour and capital, high rates of time engagement in non-farm employment by women, and the influence of the health and sanitation environment. Other factors like the household's social atmosphere, the education level of the parents (especially the mother), intra-household distribution of resources (of time, food, care and money), and even elements of local politics and power structures in the society may influence household decisions and use of available resources and, in turn, the nutritional status of children.

II. Non-farm employment can positively affect nutritional status through the food security path. There was a positive relation between household income and the level of household food expenditure (Chapter 4), which was, in turn, positively associated with the long-term nutritional status of children. This latter finding has been reported for communities where food provision from own production is strained (von Braun and Pandya-Lorch, 1991). In the study area, food purchases were the main source of the food consumed in the households, as the degree of self-sufficiency in food production was low (Niemeijer *et al.*, 1991). Thus, the conclusion is that household incomes are essential to reduction of energy deficiency in the community. Although higher income was associated with eating habits that reflect a preference for more expensive sources of energy (Chapter 4), households could still have a net higher energy intake if they increased their level of food expenditure. Low income households consumed more monotonous diets, and food diversity increased with income level. Moreover, even within income groups, higher energy intake occurred among households with more diversified diets. Thus, energy intake was a function of income and also of non-income driven diversity of the diets. However, higher food diversity and energy intake within income groups was realized at the expense of supposedly competing non-food needs[1]. This means that that since increasing food intake is "costly", because of the

[1] This finding implies that the food budget ratio should be used to indicate a household's financial access to food (as more of the household's resources are used on food) and not as an indicator of food adequacy, especially where households' income ranges are small.

accompanying variety, competing non-food needs are a potential threat to energy intake.

Neither income nor the time engaged in non-farm employment had direct linear effects on short-term investment for subsistence production (Chapter 3). There was some evidence that households with non-farm employment engaged more family labour in agriculture. This was attributed partly to the higher (long-term) income which enabled access to equipment and farming tools, and partly to their greater ability to mobilize their unemployed members to put more hours into own-farm labour. However, the lack of association between time in non-farm employment and family labour involved in agriculture implies that labour was not a serious constraint to subsistence production (Chapter 3). This can be attributed to the large family sizes which, coupled with the high rate of unemployment in the location, left many available labour units in the household unoccupied. It can also be partly attributed to the fact that most non-farm employment activities were carried out near the homes and were flexible, allowing time to be shifted between work and subsistence production. However, it can also be the result of the generally low regard for agriculture in the community. Even during the "peak agricultural period", more than 50% of the adult's day-time in households with non-farm employment was spent outside farming or employment activities. The proportion was similarly large among unemployed households. This finding contradicts those studies which show a competition between subsistence production in rural areas and non-farm employment (Suda, 1992). In fact there was no evidence to attribute the general low level of food sufficiency reported in nearby locations to the level of engagement in non-farm employment (Waaijenberg, 1994; Hoorweg *et al.*, 1995).

To sum up, the findings of the present studies indicate that the income from non-farm employment can be used to benefit household food security through increased food purchases, without having negative effects on subsistence food production. The positive effect of food expenditure on nutritional status reported in Chapter 6 implies that children get their share of the food purchased by the household. However, the actual food purchasing behaviour is also driven by other factors other than income level, but which were not analysed in these studies.

III. Non-farm employment has no effect on nutritional status through house-living conditions or child care. In recent years there have been fears that employment outside the farm might not benefit the nutritional status of children (Leslie, 1988). A number of studies suggest that non-farm employment has a negative effects on child care in terms of the time allocated to child-care activities (Ho, 1979; Engle and Pedersen, 1989; Wandel and Holmboe-Ottesen, 1992), breast-feeding and its duration (Winikoff *et al.*, 1986; Mazur and Sanders, 1988), and types of foods made for the child (Popkin and Solon, 1976). The study reported in Chapter 6 found the two proxy measures of non-farm employment, namely household income and time in the activities per woman to have no linear effects on the components of child care. However,

income did affect housing quality, while women's time affected household sanitation/hygiene. The more specific study reported in Chapter 5 also reports no significant effects of maternal employment on the components of child care and house-living conditions when controlling for the age of the youngest child, mother's education and household income. Although some studies have reported a negative relation between maternal employment and child care or house-living conditions (i.e., in terms of feeding frequency, cleanliness of the child, sanitation and hygiene) these studies are descriptive in nature with no control of potential confounding factors (e.g. Wandel and Holmboe-Ottesen, 1992). Finally, Chapters 5 and 6 indicated that education, the age of the mother (reflecting "parental experience", her "social power" and the "family stage") and women's level of control of household resources do seem to affect the components of care and house-living environment. While both the mother's education and age had positive effects on child care and house-living environment, her level of control of household financial resources were negatively associated with the components of child care. However, its effect on house-living conditions was positive.

The lack of a significant link between non-farm employment and the components in the child-care cluster may be explained in various ways, depending on the particular component. In the first place, this is a community where child care is more likely to be decided by cultural and religious factors. Furthermore, there were alternative caretakers readily available when the mother was absent. In addition, most non-farm activities were carried out near or in the homes and/or were compatible with child care activities as also reported in other studies (Uyanga, 1980; Tripp, 1981; Uwagbute and Nnanylugo, 1987). Finally, there was a lot of "spare time" for the mother, as only a few hours (on average 2.5 hours per day) were allocated to non-farm employment or to agricultural activities per woman (Chapter 3).

In summary, the analysis suggests that non-farm employment influences a child's long-term nutritional status through the effect of earned income on energy and nutrient intake and through purchased goods that improve housing quality. Although women's time in non-farm employment may affect house sanitation/hygiene, this does not further influence a child's nutritional status.

Conclusions and implications for research and policy

Several conclusions related to the conceptual framework of the study and suggestions for future research and implications for policy making at national and community level can be drawn.

UNICEF model

The UNICEF framework was used in this study as the basis for specifying how non-farm employment is linked to nutritional status in rural households. It was implicitly assumed that in this model that households act according to rational economic thinking, i.e. their behaviour is based on or shaped by the access to resources

(time and income), which are allocated optimally according to their scarcity and existing or perceived needs. However, the danger of such a model is that it ignores cultural, traditional (including historical), religious, ecological and other non-economic factors that can affect the behaviour of households. Even if they are mentioned in the model, they are considered as confounders, interfering with, but not acting in the "mainstream" of the resource flow. However, in most rural communities, variability in these factors are important determinants of the components of child care, sanitation/hygiene and input in agriculture, even so much so that variations caused by resource factors may become insignificant (Adeoyin and Watts, 1989; Guldan *et al.*, 1993). Moreover, beyond household behavioural variables, other factors like community health and sanitation status are also critical determinants of nutritional status as has been reported by other studies (von Braun and Wiegand-Jahn, 1991; Kennedy and Oniango, 1992; Alderman and Garcia, 1994). Thus, the relation between non-farm employment and child nutritional status is highly dependent on the role of non-economic factors in influencing the components of food, child care, and health. Where these factors play a large role, the relation is less evident and clear than in communities where these factors have little influence (Cleland and Ginneken, 1988). Hence, financial resources at household level may not translate into improved nutritional status through care and house-living environment, unless income becomes too high or unless a lot of time is allocated to non-farm employment outside the house; situations that are rare in rural areas in sub-Saharan Africa (review in Chapter 2). Although non-farm employment opens for an opportunity for enhanced nutritional status through improved access to food, the actual use that is made of this opportunity is dependent on cultural and other factors. In particular, the findings of this study suggest that the proportion of income spent on food and the variety of the diet are not, to a large extent, a function of income.

Another finding about the model was that it was possible (by PCA and community participation) to identify more than one, more or less, statistically independent components of each of the "clusters" (Chapter 5 and 6). This means that the word "cluster" is misleading if taken to imply that the components form a one-dimensional concept, which is not the case. Therefore, for research purposes it might be more revealing to treat the components as independent, each in their own right and not as "clusters". Their effects can then be modelled as additive or as interactive. In other words, each component may have a different and independent association with nutritional status. Grouping the components into "clusters" that depict similar issues is useful mainly for programming and broad training.

Research agenda

My personal experience in this community was that cultural and religious factors are very important in child health and nutrition and need more attention. Although programmes may have their own approach to the alleviation of poor nutrition, communities may have very different approaches to health and nutritional

problems, which means that their day to day life and actions may make "nutrition programmes" ineffective (see "Final remark"). These socio-cultural factors should also be a focus of research.

In communities where few hours are allocated to agriculture and non-farm employment (especially by women, who are the main caretakers and undertakers of household chores), the relations between non-farm employment and the components of child care and sanitation/hygiene are weak. If women were to spend more hours and energy in non-farm employment, and mainly, outside the home, this may have more drastic consequences for household sanitation/hygiene and for child care. Future studies should investigate this linkage in communities under time constraints (i.e., either in more agrarian or in more de-agrarianized settings).

Few studies have investigated the effects of household economic strategies on nutrition in sub-Saharan Africa. More research is needed to identify the links between such economic strategies and nutrition in order to provide a scientific basis of related policies. This will require time allocation studies that monitor the effects of maternal employment and the employment of other household members on child care and the health-environment at household level. For the UNICEF framework, the indicators for monitoring and evaluation the different components at different levels (household, community and national) are weakly developed. If the conceptual framework is to continue to be used in the region, there is a need for further research to identify, test and validate measures for the components within the clusters of food, care and health. This will be more effective if they can also be used at community level.

National policy

In most communities in sub-Saharan Africa, the relation between non-farm employment and child nutritional status is probably through the food security path (Chapter 2). Non-farm employment increases household income, which is used to increase or stabilize seasonal energy intake and, in turn, to improve nutritional status. This seems to be the case in communities with a low level of self-sufficiency, implying an increased dependence on purchased food and on the market infrastructure. Where most food is from purchased sources, it is paramount that the marketing network through which essential staples are distributed is sufficiently functional and that prices are not too high for households to afford food in the local stores. The recent marketing liberalization policies in most of the countries of the region have led to higher prices of the local staples (GOK, 1994; Kavishe and Mwadime, 1995) but the effect of this on household food security has still to be assessed. There is a chance that, as a result of increasing costs of living, especially in food costs, more and more households will try to increase subsistence production and consumption of their own produced foods. This would mean that subsistence production becomes relatively more rewarding.

Since non-farm employment is a major source of livelihood for most rural households in sub-Saharan Africa, there is a need to ensure access to non-farm employment. This should ideally be done in such a way that working household

members can commute and be able to remain living in their rural homes. This is because such activities allow higher returns of the earned income for the rural home, and also because the "free-time" can be used for subsistence or home production. Non-farm activities will be most useful to household welfare if they are compatible with child care, house-living conditions and subsistence production. For instance, for women, this may include small enterprise activities (e.g. local products and services) that can be undertaken in or near the home, including opportunities of in-compound small animal husbandry.

Community action

First, the weak link between non-farm employment and nutritional status through the clusters of child care and house-living environment in the study community was attributed to community and other household factors unrelated to household resources. Although there are numerous public health amenities in the study area, the community health and sanitation situation still needs improvement. Improvements in waste-disposal should be of particular concern. Construction and use of pit latrines is necessary for improved sanitation in the villages. Beliefs limiting the utilization of existing utilities and services should be investigated in more detail. Nutrition education should not only be aimed at mothers, but also at "households", as most behaviours related to child care, health and health-seeking behaviours are likely to be influenced by household or community norms. Besides, health education programmes that illustrate the positive benefits of keeping infants and children away from sources of infectious organisms can go a long way in reducing morbidity among children. Existing community health programmes in the area can be used for this purpose.

Secondly, although government policy emphasizes the need for self-sufficiency in basic staples (GOK, 1994a; GOK, 1994b), it is unlikely that this will be realized in the study area or most other parts of coastal Kenya (Waaijenberg, 1994). In the study area, this is not only because of the poor soil conditions as reported by Waaijenberg (1994) and the high cost of inputs, but also the generally low regard for (traditional) agriculture by the local communities (Oosten, 1989). Possibly, as was indicated in the in-depth discussions with community members, subsistence production can be stimulated through modernization, i.e. through use of better tools like ploughs, wheelbarrows and cheap tractor services, and through more use of inputs like fertilisers and pesticides. This might also be an effective way of mobilizing "spare" labour into agriculture. However, the current level of household incomes limits these options as most of the income is needed to feed the household. Nevertheless, households could still increase their incomes by allocating more hours to non-farm employment, without this having a negative impact on agriculture and child care.

Final remark

As alluded above, the transformation of household resources into better nutrition in the study community is done independent (and partly outside) of the conceptual framework that is used by governmental and non-governmental organizations working in the area. Households do not consciously allocate their resources among the clusters of food security, child care and health for the purpose of improving nutritional status. Rather, they are likely to allocate their resources to further their survival and their role in the society. Thus, the most appropriate research and, by implication, programming "framework" would be one that sees the seeking, allocation and use of resources (of time, money, assets) from the household's perspective, rather than from the current "scientific" perspective, which is basically an "outsider's" view.

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Summary

Employment outside agriculture is an important means of raising income which is vital for acquisition of food, health and care needed for good nutrition in rural areas. It is also a strategy for stabilizing consumption throughout the year, and for guarding against "external shocks" to agricultural production. Nevertheless, a number of studies have shown that increased income does not always translate into improved food consumption or nutritional condition. However, few studies have looked at the link between rural household employment in non-farm activities and nutritional status of children. This study was meant to do that. First three studies were done: on the potential effects of non-farm employment on factors of subsistence food production, on the effect of maternal factors (mainly occupation) on child care and living conditions and, on the effect of income on food choice and energy intake. Indicators developed during these three studies and the experience learned in the process were used to examine the linkages between non-farm employment and nutritional status.

Chapter 1 develops the theoretical framework which was the basis of the study, using the "UNICEF framework for Nutritional Strategy for the 1990s". According to theory, non-farm employment increases household income but also removes time/labour from the household. The trade-off between labour and income, if there is one, can have different implications for child nutritional status, depending on household preferences, productivity, skills and other resources of labour and material within the given geographical and social cultural environment.

Chapter 2, is an overview of the literature on the relation between employment and nutrition in sub-Saharan Africa. National data are used where possible to be able to see the relations at macro-level. It appears that in those countries where agricultural income is low, the dependence on non-farm income as a means of livelihood is high. Non-farm employment can affect nutrition through the food security pathway, though the effects are weak where health and child care conditions are very poor. The increasing migration of men with declined remittances and weakening social-networks has increased the workload of women and this has had detrimental effect on child-care and, in turn, on the health and nutritional status of the children. However, there is no evidence that employment in the informal sector near the home has any detrimental effect on child nutrition.

Chapter 3 reports on a study that assessed the effects of non-farm employment on factors of subsistence production. During the peak agricultural season, households in the community generally allocated very few hours to agriculture per person compared to other communities in the region or in the country. Availability of labour was not a constraint in the community and non-farm employment did not directly lead to less labour in agriculture. In fact, the result was opposite. Besides, non-farm employment led to capital investment in own agriculture, but more so among the high income. Hence, non-farm employment is not a "cause" of a higher level of production,

but an indicator of a household's better "technology" and "economy", as such both factors that are associated with higher investment among the employed.

Chapter 4 examines the relation between household income and food purchasing, and whether a trade-off exists between the level of intake of energy and diversity in the food. Most food consumed in the household was from purchased sources and the quantities of food available in the household were higher at higher income levels. The level of energy intake was also positively associated with income level, but within income groups it was a function of diversity in the diet. Furthermore, at same income level a higher energy intake level meant a higher budget allocated to food. Hence, competing non-food needs were seen as possible factors contributing to low energy intake within income groups.

Chapter 5 deals with relevant maternal factors in child care and house-living conditions. Emphasis is put on maternal employment. The differences seen between occupational groups in components of child care and house living conditions disappeared on controlling for the effects of potential confounders. The mother's level of control of household resources seems to have a bad effect on child care, but a good effect on house-living conditions. The latter finding suggests an income effect. Maternal education is an important predictor of the components of child care and house-living conditions. Others are the mother's age and her nutritional knowledge.

Chapter 6 combines the findings of the previous three chapters to test the link between non-farm employment and child nutritional status at household level. Use was made of the UNICEF framework for "Nutrition Strategies for the 1990s". Although child "feeding pattern" was an important determinant of nutritional status, this could not be directly linked to non-farm employment. In the same way, although employment of women affected household "sanitation/hygiene" conditions, this was not linked to nutritional status. The only pathway that linked non-farm employment and improved nutritional status was through food security (specifically purchasing).

Chapter 7 is the general discussion of the thesis. The main findings are discussed in the context of the research area and the UNICEF model. It is shown that the findings of a study like this one depend on the geographical, socio-cultural and socio-economic context of the study area. Yet, the results lead to a suggestion that the components of the three underlying "clusters" used in the model measure different and independent dimensions of each "cluster". This means that for research purposes they do not necessarily have to be combined into a single measure of a "cluster". More research is needed, however, on the best measures of these various components of the "clusters", especially at operational level. These can be differentiated for household, community, and national level. Results of the present study give several starting points for the development of such a framework and its measures.

Samenvatting

Werk buiten de landbouw is een belangrijk middel tot inkomensverhoging, hetgeen onmisbaar is voor het garanderen van voldoende voedsel, gezondheid en zorg, die nodig zijn voor een adequate voeding in plattelandsgebieden. Daarnaast dient het als strategie om schommelingen in de consumptie gedurende het jaar op te vangen en om weerstand te bieden aan ernstige bedreigingen van de landbouwproductie door de inwerking van externe omstandigheden. Niettemin heeft onderzoek aangetoond, dat inkomensverhoging niet altijd resulteert in verbeterde voedselconsumptie of voedingstoestand. Studies die hebben gekeken naar het verband tussen deelname door plattelandshuishoudens aan werkgelegenheid buiten de landbouw en de voedingstoestand van kinderen, zijn echter schaars. Dat was dan ook het onderwerp van dit onderzoek. Daartoe werden eerst drie deelstudies verricht: naar de mogelijke effecten van werk buiten de landbouw op factoren die de eigen voedselproductie bepalen, naar het effect van karakteristieken van de moeder (met name het soort werk) op kindzorg en levensomstandigheden en naar het effect van inkomen op voedselkeuze en energie-inneming. Meetmethoden ontwikkeld gedurende deze drie studies en ervaringsfeiten die tijdens de uitvoering daarvan werden opgedaan werden vervolgens gebruikt om de verbanden te onderzoeken tussen werk buiten de landbouw en de voedingstoestand.

Het eerste hoofdstuk behandelt het theoretisch kader dat ten grondslag lag aan deze studie, aan de hand van het schema dat UNICEF (het Kinderfonds van de Verenigde Naties) gebruikt voor haar zogeheten "voedingsverbeteringsstrategie voor de negentiger jaren". Volgens de theorie verhoogt werk buiten de landbouw het huishoudinkomen, maar doet tevens een aanslag op tijd/arbeidsbeschikbaarheid van huishoudleden. Voor zover arbeid moet worden ingeleverd ten gunste van inkomensverwerving, kan dat verschillende gevolgen hebben voor de voedingstoestand van kinderen, afhankelijk van de voorkeuren, productiviteit, vaardigheden en andere hulpbronnen (zowel qua menskracht als materieel) van het huishouden, binnen de gegeven geografische en sociaal-culturele omgeving.

Hoofdstuk 2 is een literatuurstudie over het verband tussen werk en voeding in Afrika ten Zuiden van de Sahara. Voor zover nationale gegevens voorhanden zijn, worden deze gebruikt om inzicht te verkrijgen in de verbanden op macro-niveau. Het blijkt, dat in die landen waar inkomen uit de landbouw laag is, er een grote mate van afhankelijkheid is van inkomen van buiten de landbouw om in het levensonderhoud te voorzien. Werk buiten de landbouw kan van invloed zijn op de voeding via de weg van de voedselzekerheid, maar de effecten zijn zwak waar de omstandigheden van gezondheid en kindzorg erg slecht zijn. Door het toenemende wegtrekken van de mannen, die tegenwoordig niet meer zoveel geld naar huis terugsturen, en het verzwakken van de maatschappelijke verbanden is de werkdruk van vrouwen toegenomen en dit heeft een nadelige invloed op kindzorg en daardoor op de gezondheids- en voedingstoestand van kinderen. Daarentegen zijn er geen

aanwijzingen dat werk binnen de informele sector dicht bij huis enige nadelige invloed heeft op de voeding van kinderen.

Hoofdstuk 3 beschrijft een studie naar de effecten van werk buiten de landbouw op factoren die de eigen landbouwproductie bepalen. Gedurende het drukste landbouwseizoen besteedden huishoudens in de onderzochte gemeenschap over het algemeen - in vergelijking met andere gemeenschappen in het onderzoeksgebied dan wel in het hele land - weinig uren per persoon per dag aan landbouwactiviteiten. De beschikbaarheid van arbeidskrachten was geen knelpunt in deze gemeenschap en werk buiten de landbouw leidde niet direct tot vermindering van arbeidsinzet in de landbouw. In feite gebeurde het omgekeerde. Bovendien leidde werk buiten de landbouw tot kapitaalsinvesteringen in de eigen landbouw, maar dit verband was sterker bij huishoudens met een hoger inkomen. Daarom moet werk buiten de landbouw niet gezien worden als een "oorzaak" voor een hoger productieniveau, maar als een uiting van een hoger niveau van zowel "technologische" als "economische" hulpbronnen als zodanig, welke allebei factoren zijn die samengaan met hogere investeringen onder huishoudens met werk.

Hoofdstuk 4 gaat in op de samenhang tussen huishoudinkomen en voedselaankoopgedrag en op de vraag of een gevarieerde samenstelling van het voedselpakket ten koste gaat van de hoogte van de energie-inneming. Het grootste deel van het voedsel dat werd geconsumeerd in het huishouden kwam uit aankopen en de beschikbare voedselhoeveelheden in het huishouden waren groter bij hoger inkomensniveau. De hoogte van de energie-inneming toonde ook een positief verband met het inkomensniveau, maar binnen de inkomensgroepen was deze een functie van de gevarieerdheid van de voeding. Bovendien leidde bij eenzelfde inkomensniveau een hogere energie-inneming tot hogere totale voedselkosten. Daarop doorredenerend werden de eisen die de behoeften van andere aard dan voedsel stellen, gezien als mogelijke factoren die mede leiden tot een lage energie-inneming binnen iedere inkomensgroep.

Hoofdstuk 5 behandelt de van toepassing zijnde karakteristieken van de moeder in verband met kindzorg en woon- en levensomstandigheden. De nadruk ligt op het werk van de moeder. De verschillen die gevonden werden tussen beroepsgroepen in termen van aspecten van kindzorg en van woon- en levensomstandigheden verdwenen zodra gecorrigeerd werd voor de effecten van verstrengelende variabelen. De mate waarin de moeder beslissingsmacht heeft over de aanwending van hulpbronnen voor het huishouden schijnt een nadelig effect te hebben op kindzorg, maar een gunstig effect op woon- en levensomstandigheden. Dit laatste kan mogelijk worden toegeschreven aan de invloed van het inkomen. Het opleidingsniveau van de moeder bepaalt in belangrijke mate de diverse aspecten van kindzorg en van woon- en levensomstandigheden. Tenslotte zijn de leeftijd en de voedingskennis van de moeder ook van invloed.

Hoofdstuk 6 integreert de resultaten van de vorige drie hoofdstukken met als doel om op huishoudniveau het verband te onderzoeken tussen werk buiten de

landbouw en de voedingstoestand van kinderen. Daarbij werd gebruik gemaakt van het schema dat UNICEF gebruikt voor haar "voedingsverbeteringsstrategie voor de negentiger jaren". Terwijl het "voedingspatroon" van het kind in belangrijke mate de voedingstoestand bepaalde, kon dit niet direct worden toegeschreven aan werk buiten de landbouw. Evenzo had werk van de vrouwen weliswaar repercussies op "properheid en hygiene" binnen het huishouden, maar dit leidde niet tot een verslechterde voedingstoestand. De enige weg waarlangs werk buiten de landbouw leidde tot een (betere) voedingstoestand verliep via de voedselzekerheid (meer in het bijzonder via voedselaankopen).

Hoofdstuk 7 is de algemene discussie van dit proefschrift. De algehele resultaten worden besproken zoals zij passen binnen het grotere verband van het onderzoeksgebied en zoals zij aansluiten bij het model van UNICEF. De bespreking toont aan dat de resultaten van een studie als deze nogal bepaald worden door de geografische, sociaal-culturele en sociaal-economische context van het onderzoeksgebied. Toch wordt uit de resultaten voorzichtig de algemene gevolgtrekking gedaan, dat de verschillende aspecten die van belang zijn om ieder van de drie bepalende aandachtsgebieden ("clusters") binnen het model in kaart te brengen eigenlijk verschillende onafhankelijke dimensies meten binnen ieder "cluster". Dit betekent, dat voor onderzoeksdoeleinden deze afzonderlijke aspecten niet persé hoeven te worden gecombineerd tot éé n enkele maat voor een "cluster". Nader onderzoek is echter nodig naar de beste manier om deze verschillende aspecten van een "cluster" te meten, met name met het oog op toepassing in the praktijk. Deze maten kunnen onderscheiden worden naar huishoud-, gemeenschaps- en nationaal niveau. De resultaten van deze studie bieden verschillende mogelijke aanzetten voor de ontwikkeling van zo'n raamwerk en de bijbehorende meetmethoden.

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Curriculum Vitae

Robert Kim Ngolo Mwadime was born in 1962. In 1981 he graduated from high school and joined the University of Nairobi, Faculty of Agriculture. In 1986 he was awarded the degree of Bachelor of Science and in 1989, obtained a Master of Science degree in Applied Human Nutrition. The same year he joined World Vision International, a non-governmental organization, as the Technical Advisor to the Director. The following year he went to the School of Public Health, Johns Hopkins University, USA and in 1991, obtained a Master of Public Health degree, with Nutrition Economics as the major topic and Biostatistics and International Health as the minors.

Back in Kenya he joined the Applied Nutrition Programme in the University of Nairobi as a lecturer in nutrition programme planning and nutrition and food policy. He has carried out a number of research, (1) food consumption, expenditures and nutritional status in a rice irrigation scheme in Kenya, (2) effectiveness of nutrition rehabilitation centres in Kenya, (3) indigenous knowledge for monitoring food security in coastal and eastern Kenya. He has attended postgraduate courses in Qualitative Data Methods in Health and Nutrition Research by the International Development Research Centre (Canada) in Nairobi and the Epidemiology & Statistics Summer Course at Johns Hopkins University in the USA. Mwadime has also consulted for UNICEF (East and South Africa Regional Office) in Kenya, Uganda and Malawi, with World Bank/GTZ in Tanzania and with various organizations in Kenya and for GTZ in Pakistan.

In November of 1993 he started as a Ph.D-fellow in the Department of Human Nutrition, Wageningen Agricultural University, researching into "non-farm employment and nutritional status of children among farming households in coastal Kenya". After his graduation, Mwadime will be a member of staff in the Department of Food Technology and Nutrition, University of Nairobi.