

Integrating Nutrition into Agricultural and Rural Development Projects



Six Case Studies

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

INTEGRATING NUTRITION INTO AGRICULTURAL AND RURAL
DEVELOPMENT PROJECTS

Six Case Studies

Nutrition Planning, Assessment and Evaluation Service
Food Policy and Nutrition Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome
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Preface

The case studies described in this volume tell the story of how nutrition was introduced as a new element in the planning and implementation of six agricultural or rural development projects. Without the nutritional assessments and inputs given in each instance, it is clear that the projects would not have resulted in an improved nutritional state for the people most disadvantaged although the standard of living of others might have been measurably better than before. Our experience has shown this to be true for most rural development projects, and has led us to evolve the methodology for integrating nutritional considerations in projects which forms the message of this volume.

Integrating Nutrition into Agricultural and Rural Development Projects is the title shared by the first two volumes in the FAO series Nutrition in Agriculture. Under the subtitle A Manual, the first volume describes the methodology developed at FAO for integrating nutritional objectives into the main objectives of agricultural and rural development projects as part of the planning process. Under the subtitle Six Case Studies, this volume, the second in the series, furnishes illustrations of the methodology as it was applied in projects in the countries of Haiti, Kenya, Peru, the Philippines, Sri Lanka and Zambia. These case studies originally formed the basis for the development of the FAO nutrition-in-agriculture methodology.

In the application of the methodology in each case, the problems encountered are analysed and discussed. The problems came about generally as the result of either poor data, or inappropriate timing of nutritional analysis in terms of the project cycle, or limitations in the methodology itself, or a combination of these. But even with such shortcomings it was possible, firstly, to identify why the projects had little or no nutritional impact on the target groups and, secondly, to propose effective remedies. This is not to suggest that the projects were poorly designed; it was simply that nutritional improvement was not an explicitly stated objective, in all but one or two cases. All the projects aimed at raising levels of living in their respective target areas, and it was broadly assumed that the results would include nutrition for those presently under-nourished. However, without a proper nutritional assessment and input, projects which are potentially beneficial for the people do not, in the end, result in improved nutrition, particularly for those most in need.

Three general findings stand out. Firstly, projects should not undermine the food security of households. Several case studies show how this was done unintentionally. Secondly, policies in sectors other than nutrition, such as credit, pricing, training and land reform, were often shown to be the key constraint to nutritional improvement. Thirdly, a nutritional assessment must be carried out at an early stage in the project cycle and must not add excessively to the time costs of project preparation and financial costs of project design. Simply stated, the nutrition analysis and recommendations must be credible.

The experience gained in these case studies represents but a start in establishing the effectiveness of the methodology. More tangible results will result from future projects where nutritional assessment is carried out as an integral part of the planning process. FAO has begun this process in some projects, but much wider application is hoped for. The principles and methodology being considered here should become a routine part of agricultural project design to be carried out by those responsible for project identification and appraisal. However, before that happens, the onus remains with the advocate of nutrition to show that projects can be modified relatively easily and without extra cost. This is the challenge we are facing now.

Finally, a debt of thanks is owed to the large number of individuals who contributed to the development and execution of the case studies. In addition to staff of the Nutrition Planning, Assessment and Evaluation Service and others in the Food Policy and Nutrition Division of FAO, several consultants provided ideas and assistance at all stages of what became an extensive undertaking. During the development and execution of these case studies, some 25 local and international consultants gave guidance and assistance in the collection, analysis and interpretation of data. Funding for some of the case study investigations by the Swedish International Development Authority is gratefully acknowledged.

Comments from readers of the material presented here, together with experiences from using the methodology, are most welcome. We hope that the shared experiences will help governments and interested development agencies begin to integrate nutritional considerations into their own projects.

P. Lunven

Director

Food Policy and Nutrition Division

Rome, June 1984

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Chapter 1

CASE STUDIES IN NUTRITION IN AGRICULTURE: CONCEPTS, METHODOLOGY AND PRACTICE

1.1 CONCEPTS

A considerable amount of attention has been given in developing countries as to how investments for socio-economic development might improve the level of living of the people in those countries. Since the Second World War and post-war period of reconstruction, during which time many countries have become independent and multilateral and bilateral aid agencies have been formed, a number of different approaches have been evolved to increase national incomes and levels of living. These strategies have encompassed rapid industrialization and infrastructural development, an emphasis on health improvement and population control measures, and more recently the consensus view that agriculture and rural development should take priority in development efforts. This is because the large majority of peoples in developing countries live in rural areas and are dependent on agriculture for their incomes; at a national level, the production of food and cash crops is vital to trade and balance of payments. And, until recently, it has been believed that the problems of malnutrition and low levels of food consumption would be alleviated as a result of expected increases in national income which would eventually reach all sectors of national economies.

Apart from such a macro-view of the nutritional situation, nutritionists during recent decades have recognized that some aspects of malnutrition are caused by certain cultural practices, lack of knowledge and poor health and hygiene. Strategies have been evolved to eradicate such influences through specific nutritional interventions involving education or health-care activities supplementary to large-scale development plans.

While such strategies have yielded benefits, recent research and experience have taught that a middle course must be steered between the two approaches of general development projects and nutritional interventions. Although economic productivity has increased and impressive efforts have been made in nutrition interventions, significant improvements in nutrition have not accompanied these advances. Food consumption and nutrition objectives must be fully integrated into the mainstream of development-oriented planning and investment and also explicitly considered at both policy and project levels. Agricultural and rural development projects are one of the most important areas for this approach

to be adopted. Nutrition interventions of the type mentioned above should be regarded as complementary to this approach.

This monograph reports on the research and field experiences carried out by FAO in integrating nutritional considerations into agricultural and rural development projects in six countries. The conceptual aspects of the exercise are not complicated. The nutritionist brings a perspective to the design of development projects that enhances important considerations which earlier may have received attention only in passing. The need to improve food consumption levels and nutrition, regarded as probably the most important ultimate objective of development, should be made explicit within project design and formulation, and so widening the effectiveness of the project. It is necessary in the review of the development project proposal to ensure that the means of implementation should not induce any negative nutritional effects, which has often been the case. For example, a project may concentrate its resources on certain population groups or agricultural commodities at the expense of attention to the malnourished who are left out of the project benefits altogether. Alternatively, large investments in a locality may indirectly have harmful effects on wages, prices, employment, food supply or other factors so that both purchasing power of the poor and food availability may be diminished.

Modification of such harmful effects is essentially part of the broader sweep to ensure that projects enhance nutrition. The nutritionist and project planner with the brief for nutrition soon find themselves reaching into the spheres of other disciplines and technical knowledge. Such a development is implicit in the concept of integration and in practice involves new methodology. There can be in practice a very wide range of additional components. Many appear at first glance not to be what have usually been considered pertinent for nutritional improvement, but are modifications of existing project elements in the areas of food production, marketing and storage or with the introduction of appropriate technology for farm and household work. The integration and addition of new components such as health and sanitation, and traditional nutrition interventions such as nutrition education, may also be required.

Several examples serve to indicate what modifications to projects might be introduced. One would be to increase subsistence production and household consumption of traditional high-energy foods among small farmers, farm women and landless labourers. Attention should be paid to the seasonal aspects of these crops so that food is available the year round. Employment considerations would be another example: remunerative work should be available for the poor so that they can buy the food they need. The development of infrastructure and storage facilities should benefit the poor by resulting in increased food availability.

It is vital to ensure that women are not left out of project benefits: for example, there might be some means of assisting their cottage industries, food processing or trading. Improved technology for women with respect to routine domestic tasks such as water-carrying would reduce their energy expenditure on repetitive activity.

The concept underlying the experience reported in these case studies is, in summary, an integration of new considerations into projects, modifications rather than separate interventions, so that projects may better reach their objectives.

1.2 METHODOLOGY

The methodology for the examination and design of projects with nutritional considerations has already been published in the first volume in the Nutrition in Agriculture series ^{1/}. This methodology was developed and refined as a result of the experiences related in the six case studies which are the subject of this second volume in the series. The methodology followed a common sequence in all six countries, involving the three stages of Desk Review, Initial Assessment and In-Depth Study. Each of these stages is briefly summarized here.

The Desk Review should take place at the reconnaissance (or "pre-identification") stage of the project planning cycle. It involves an examination of the relevant and available knowledge of nutrition and of the potential project area. The Desk Review attempts to determine the following:

- (a) Nutrition problems in the area;
- (b) Degree of governmental interest in improving the nutrition of those who are most disadvantaged;
- (c) Expertise and resources available to contribute effectively to solving the nutrition problems;
- (d) Extent to which the proposed project deals with the problems of disadvantaged rural people in terms of their work activities, productivity and incomes;
- (e) Potential of the project to improve the nutritional situation through such means as increasing food supplies, improving local marketing of food supplies, particularly for the poor, and contributing to local food security or building infrastructures;
- (f) Potential for influencing the concept or design of the project.

At the first stage, the Desk Review serves the very important function of drawing on all existing information. If carried out diligently it can save a great deal of effort later on in the project cycle.

The second stage is the Initial Assessment, which should be carried out at the identification stage in the project cycle. One of the most important contributions to the planning exercise occurs during this stage: a visit to the project site and contact with the project's potential recipients. It involves the gathering of further information and a preliminary appraisal of the project's likely effect on the nutritional situation, and includes the following:

- (a) Specification of the major food and nutritional problems in the project area, drawing on all available local sources of information;
- (b) Specification of the target groups particularly at nutritional risk in terms of their demographic, socio-economic or geographic characteristics;
- (c) Identification of any relationship of such nutritional problems to national (or local) agricultural production, price and trade policies;
- (d) Formulation of nutritional objectives for the project to be integrated with other project objectives being developed during this phase;
- (e) Development of preliminary suggestions (with other project planners and government officials) of ways in which the project could benefit the nutritionally disadvantaged.

It is at this stage that the nutrition project planner works in close collaboration on the project site with the others designing the project. Such

^{1/} FAO, Integrating Nutrition into Agricultural and Rural Development Projects: A Manual, Nutrition in Agriculture No. 1, Rome, 1982.

collaboration makes the Initial Assessment potentially the most important stage in the methodology. It should require some two to four weeks. If information is scarce or if there are specific data requirements linked directly to the needs of the project formulation, a third stage, the In-Depth Study, may be required.

The In-Depth Study involves the collection of new quantitative information and is to be conducted only when available data are insufficient in quantity or quality to permit satisfactory analysis of the situation. In some cases it might involve new analysis of the data already collected. The In-Depth Study should be carried out at the project preparation stage. Its scope, which must be specific to the project's local situation, is determined by project identification and modified as a result of discussion with government officials and local beneficiaries as the project design is formulated. Data are required for use in making decisions on project objectives, participants, inputs, activities and outputs. The data should lend objective evidence to the subjective impressions derived in the Initial Assessment and indicate the impending impact on food consumption and nutrition. At this stage, discussions between the nutrition investigators and project planners must resolve the issue of balancing nutritional and social benefits of the project with possible economic and political costs. The In-Depth Study has the following general objectives:

- (a) Allow for more precise determination of the nutritional status, food patterns and the socio-economic situation of those who are most disadvantaged;
- (b) Contribute to more rational decisions on project objectives, participants, inputs, activities, outputs and means of evaluation;
- (c) Provide information that permits an analysis of projected nutritional and social benefits with possible economic and political costs;
- (d) Permit the identification of special nutritional components or interventions that may be needed to complement broader strategies that improve income and consumption in the longer term.

This last stage in the methodology, including the collection and analysis of data, usually takes about three to six months to complete.

In the collection of new data for the case studies described in the following chapters, it was decided that as far as possible there would be a common core of data collected, according to the categories listed below:

- (a) Anthropometry: weights and heights of children under the age of six;
- (b) Child morbidity and mortality: incidence of illnesses (fever, diarrhoea) over the preceding week; mortality of children over the last five years;
- (c) Wealth: household and farming assets, housing materials and size;
- (d) Sanitation: water sources and distances, toilet facilities, waste disposal;
- (e) Occupations, and characteristics of farming operation;
- (f) Area characteristics: distances to health services; tarmac road, access to agricultural inputs.

Subject to local modifications, this common frame was used in all the nutrition surveys.

1.3 PRACTICE

Chronologically, these case study investigations had their starting point in 1977. Resolution 8/77 of the Nineteenth FAO Conference, held in that year, recommended the preparation of methodologies for evaluating the impact of FAO projects and programmes on nutrition. After several desk reviews within FAO, prospects for field work were explored among projects which were expected to lend themselves to nutrition assessment. In 1980 staff members and consultants of the Nutrition Planning, Assessment and Evaluation Service of the FAO Food Policy and Nutrition Division assisted host country staff in applying the methodology in the six countries of Haiti, Kenya, Peru, Philippines, Sri Lanka and Zambia. The projects in these countries represented a variety of situations and were in various stages of design.

The activities commenced with a workshop at Rome in February 1980 where consultants and host country staff met to discuss the practicability of the methodological approach and to review the prepared preliminary guidelines in the light of their local situations.

In March 1980, field work was started. For three of the countries, a micro-computer system was provided for the exercise. All field work was completed by the end of 1980, and data analysis was completed in 1981. The methodological implications of the case study experiences were analyzed, refined and finally incorporated into the manual, Nutrition in Agriculture No. 1, which was published at the end of 1982.

The case studies have yielded a rich experience and serve as a secure basis for future efforts at project planning. The following comments draw on the most important lessons. In these analyses and subsequently in the individual case studies, the objectives and the various merits of the original projects are well appreciated and any criticisms are not intended to impugn those involved in their development.

In Haiti the project was designed to provide infrastructural development, irrigation, soil conservation, village water supplies, credit and extension, all of which were expected to improve small farm productivity. The methodology showed its strength in the identification of target groups. It was shown very clearly that the more malnourished were those living farthest from roads and who had small landholdings. Interestingly enough, the landless and those with the smallest holdings were not the worst off. The implications for targeting of resources, given this information on nutrition, are obvious. In this case the incidence of malnutrition and poverty are one and the same: many landholdings were too small to support the household. The prevalence of malnutrition was considered alongside the size of the affected population group to provide a measure of nutritional priority so that the project planners could weight the costs of targeted investment with numbers of malnourished reached. Therefore, a type of cost-benefit ratio could be derived as information to be considered alongside other conventional cost-benefit data.

The information provided by the nutrition team suggested a redirection of activities, rather than a change in project components, in order to reach those most in need. Rural extension centres in outlying areas were confirmed as an important requirement together with the need to strengthen production and marketing systems to reach the smallholder.

The addition of a nutrition survey to project planning activities was made particularly cost-effective and timely by linking it directly with an agricultural survey already scheduled as part of project preparation. The nutrition survey was conducted on a subsample of the agricultural study, but the analysis encompassed a variety of agricultural and socio-economic variables in order to identify the associated causes of malnutrition.

In Kenya, both project case studies (in Machakos and Kericho Districts) revealed interesting relationships between the cultivation of cash crops and nutrition. In Machakos the Integrated Development Programme which had just started involved crop development, soil and water conservation and live-stock/veterinary services. It was basically a credit scheme that, firstly, was only available to farmers of a certain land area and, secondly, involved the planting of a minimum acreage in cotton as security for the loan. This had an impact on nutrition in two ways: (a) the minimum land requirement excluded most of the poor and malnourished from project benefits; and (b) food production declined locally as food crops were replaced with cotton. The case study investigations showed a greater proportion of child malnutrition among households with smaller landholdings. In Kericho District, a much more fertile area than Machakos, the government had been promoting tea as a cash crop since 1964, by provision of extension and marketing services as well as agricultural inputs. Here, malnutrition was more common among the children of the tea growers than other groups, although tea growers enjoyed relatively higher incomes. It was also the case here that land previously planted in food crops was now devoted to tea, therefore undermining food security in the area. Foods bought by those with higher incomes were not of adequate nutritional value. The message from these two case studies was clear: cash crops should be introduced only after household food security was assured through accessible market supply and/or own production.

The Machakos case study raised an important point related to the nature of water sources. When appraising the potential of the water rehabilitation programme to improve nutrition, there were significant and consistent differences in nutrition between those households dependent on unprotected water sources (springs, wells, boreholes, subsurface dams and collected rainwater). Surprisingly, nutritional status was superior among those households using unprotected water sources. As a result of this finding it was recommended that a detailed monitoring of contamination levels in protected sources be undertaken.

Analysis of the Puno Rural Development Project in Peru also confirmed the danger of overwhelming subsistence food production systems. The nutritional assessment showed that agricultural development efforts should be geared towards small farmers, encouraging them to cultivate native crops on small plots of land on high slopes or terraces that had traditionally been a source of food security. Of particular importance among these local crops was the potato. Recommendations were also made to provide employment for the landless.

On the Puno Project there was considerable co-operation between project planners and nutrition planners. As a result, food availability does appear to have risen with the introduction of the project. However, the lack of adequately

trained local staff has been a bottleneck in implementation of the nutrition-related project activities.

The Palawan Integrated Area Development Project in the Philippines included 12 different targets for action that might all involve nutritional consideration in some way. Four of them seemed specially relevant: lowland agriculture, upland agriculture, fisheries and village water supply. The nutritional assessment was instrumental in identifying target groups for priority in project activities. Occupation was a factor which appeared to differentiate among those having higher nutritional risk than others: subsistence fishermen, farmers working small rainfed holdings and slash-and-burn farmers. Here again the planning of cropping patterns had to ensure that food-crop production among low-income groups was not jeopardized. In upland development, in order to improve income and food security and to reduce shifting cultivation, nutritional considerations led to selection of such crops as corn, cassava, mungbean, vegetables and the staple, rice, in addition to the original proposals for commercial tree crops (rubber, cashew and coffee).

A general upgrading of the neglected fishing industry was essential in Palawan, not only for improving incomes for the fishermen themselves who were recognized as a nutritional priority group, but in addition to improve the general diet in the province.

As with the assessment in Haiti, the Palawan nutrition planning team ranked population groups in order of priority on the basis of the proportion of malnourished and the size of the respective population. In this manner, nutritional priority ratios were then used to identify target groups who warranted particular attention because of their size and nutritional situation.

Frequent contact and consultation with the project planning team meant that the Palawan nutritional assessment meshed smoothly with the timing of critical steps in the project planning cycle. Thus useful nutritional information was made available to guide decisions when it was most needed.

The investigation of a major irrigation and resettlement scheme in Sri Lanka, the Mahaweli Basin Development Project, led to emphasis on including certain target groups in the benefits of development as the key to nutritional improvement. The most notable finding was the variation in response among different types of settlers to what was intended as an equitable distribution of project resources. Those with superior assets in terms of agricultural knowledge and implements, draught animals and manpower as well as good health and nutritional status, were able to take immediate advantage of the opportunities provided by the project. Those with fewer initial assets responded poorly to the new opportunities. Their lack of appropriate experience and education, the scarcity of labour and other inputs at their disposal and their poorer health meant that they began resettlement from a lower base and made much slower progress. The aims of the project did not conflict with nutritional goals but the analysis suggested some re-orientation in emphasis. The message to project implementers was that the Mahaweli project needed to increase preferentially the training and services provided to formerly disadvantaged settlers. Such a

special emphasis would be necessary to help these settlers in raising their level of living to that envisaged for all project beneficiaries.

In Zambia, many of the problem situations and proposed solutions described for other cases were seen. The Integrated Rural Development Programme was trying, in Kalichero, to raise the incomes of farmers in the areas by encouraging production of maize, cotton and groundnuts, pig and poultry raising and cattle breeding, while a less diversified approach was taken in Luangwa with cotton and rice production, improvement of water supplies, markets and roads and provision of extension and training services. However, more incentives were given to grow cotton than maize, especially in Luangwa, with the result that maize planting declined. Prices for maize were low and payment for crops was late. More land was therefore devoted to cotton. Loans to develop farm operations were only given to the larger, cotton-growing farmers. As a further source of concern on this project, the data indicated that the most malnourished children tended to belong to cotton-growing families rather than those growing maize or sorghum. A need clearly existed to improve the cultivation of maize by establishing a more remunerative price and improving market channels.

These selected observations from the case studies point to two main conclusions. The first is to emphasize the importance of providing for family food security. Projects should not result in reduced food supplies at household level because of declining production or increased prices. The second conclusion is less obvious. In several of the cases elements apparently quite unrelated to nutrition and part of other development sectors became a serious constraint on nutritional improvement. These included credit and pricing policies in Zambia, manpower training in Peru and credit policies in Kenya. These findings strongly emphasize the need to integrate nutritional considerations with all parts of the project.

Finally, in assessing the usefulness of the nutrition-in-agriculture approach through initial feed-back, it is important to learn how far the investigations and analyses influenced project design and what should be the lessons for the future. Some of the projects benefited from the assistance of an already committed nutrition policy unit, such as the National Nutrition Council in the Philippines. FAO involvement gave an impetus to the project activities which such groups were already carrying out. However, in other instances project efforts were limited for the following reasons. (a) FAO was evolving a methodology through practice in on-going projects for the first time; much of the work was necessarily experimental and could not be as effective as future efforts are hoped to be. (b) Nutritional improvement was stifled by governmental policies not conducive to project success or by a financing agency sceptical that nutrition would be improved without complicated and costly modification to existing design. (c) Often the timing was wrong: the nutrition assessment team was not at the project site when maximum impact might have been exerted on project planners. For a project design to be effective, the nutritional assessment must come as early as possible.

Chapter 2

HAITI:

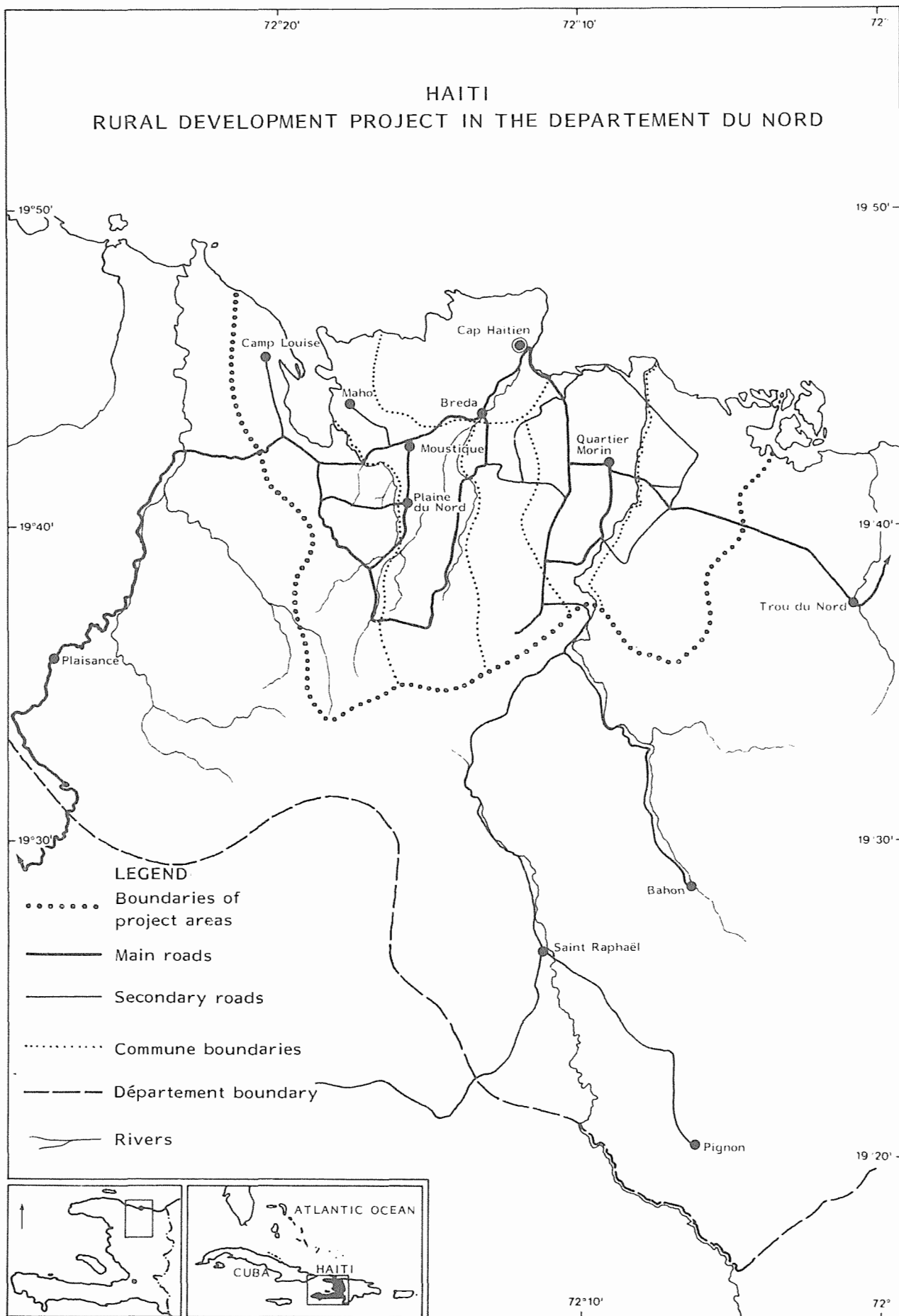
PROJET DE DEVELOPPEMENT RURAL DU NORD - PHASE II

The Département du Nord, the central northern part of the island country of Haiti, is underdeveloped, heavily populated, predominantly rural and extremely poor. Serious development efforts in the Département du Nord began with a loan agreement between the Government of Haiti and the World Bank/International Development Association in 1976. Supplemented by French and German bilateral aid and World Food Programme food assistance, Projet de Développement Rural du Nord Phase I began implementation in May 1977. The Project was designed to provide for infrastructural development, irrigation and soil conservation, village water supplies, credit, extension services and a number of other components aimed at upgrading agricultural productivity for 30 000 of the small farmers in the region. To supervise the progress of the Project, a regional development office was established in the Département du Nord, known as the Organisme du Développement du Nord (ODN). It was hoped that the Project activities would break the cycle of poverty in the Département and increase both agricultural production and incomes.

As early as 1978, Project planners began preparation for Phase II. The second phase would complement the first phase and extend successful activities into other areas of the Département du Nord. Although Phase I was running somewhat behind schedule, the Project applied itself early to detailed planning for Phase II in order to avoid any interruption in activities between the two phases.

2.1 ECOLOGICAL, AGRICULTURAL, SOCIAL, AND ECONOMIC CONDITIONS

Located on the northern side of Haiti, bordering the Département du Nord-Ouest, the Département du Nord is in the part of the island that has suffered from severe droughts in recent years. The land is mountainous; coastal and inland plains rise through foothills to steep mountains. Rainfall, which averages about 1 500 to 2 000 millimetres annually, is spread throughout the year, and allows for multiple cropping in many parts of the Département. The land is not easy to farm, but it is not unproductive.



With a total population of about three quarters of a million people, population density is extremely high. In rural areas, the Département supports from 220 to 330 persons per square kilometre (km²). Approximately 16 per cent of the population of Haiti lives in the Département du Nord.

Because of the extreme population pressure, every possible piece of land is used for cultivation. With much of the land mountainous and marginal, the heavy cultivation has led to erosion and degradation of the soil, which in turn has limited the production capacity. Cereals (such as rice and maize) and root crops (such as cassava, taro and sweet potatoes) provide the staple foods for the region. Both can be grown on the plains and in the foothills.

Cap-Haitien, the capital of the Département, is the second largest town in the country with approximately 50 000 people. Only Port-au-Prince is larger. The rest of the population lives in the several small towns or in the countryside. Over 80 per cent of the population is rural, living in what have been termed "agglomerations" or dispersed communities. These are not villages in the usual sense but more like rural communities. However, they are treated as villages for planning and statistical purposes.

Because of the rough terrain and the extreme underdevelopment of the Département, services and communications are poor, particularly in the rural areas. Extreme poverty is evident everywhere. Health records in the Département indicate that the major causes of morbidity are intestinal parasites, malaria, gastroenteritis and tuberculosis.

2.2 NUTRITION AND THE NORTHERN RURAL DEVELOPMENT PROJECT

The Desk Review

With the first phase only barely underway at the time that planning for Phase II began, it was somewhat difficult for the Desk Review to come up with a definitive conclusion about the nutritional potential of the Project. Clearly the poverty and health problems in the Département du Nord were severe enough to justify a commitment to any effort to improve life for the rural poor. The Project components incorporated into the first phase, which included soil conservation, irrigation, village water supplies, agricultural credit and extension services and supporting infrastructures, met the FAO criteria for integrated development. It seemed likely that, if the components were delivered successfully, the region would benefit economically and socially.

There had been no specific mention of nutrition or nutrition-related objectives in the first phase. However, the planning stages of the second phase of the Project of the Département du Nord happened to coincide with the time when both FAO and the World Bank were exploring seriously the potential for incorporating nutrition into development projects. A review of the planning process indicated that there was a greater possibility of influencing the second phase - which, although building on the first, was a distinct entity - to enhance the nutritional benefit than there would be in trying to redirect implementation of the first phase. Based on the fact that planning for the second phase was just beginning, the Desk Review recommended using Haiti as a case study for the methodology.

On the basis of the work of the identification mission, the Project components plus the estimated percentage of budget that should be spent on

each component were listed as follows:

- (a) Credit, short and medium-term (20 per cent)
- (b) Soil conservation (12 per cent)
- (c) Drainage (12 per cent)
- (d) Fisheries (3 per cent)
- (e) Marketing (6 per cent)
- (f) Feeder roads (14 per cent)
- (g) Social services and infrastructure: village water supply and health/nutrition components (7 per cent)
- (h) Organization and management (20 per cent)
- (i) Further studies (6 per cent)

The budget for Phase II was set at US\$ 14.5 million, of which \$ 8.8 million would be in foreign exchange.

Although Phase II intended to concentrate its efforts in the areas of Limbe, Port Margot and Plaine du Nord (areas west of those covered in the first phase), feasibility studies to be undertaken during project preparation would determine precisely the locations of public works and services.

The Initial Assessment

In June 1979, an FAO nutritionist spent two weeks in Haiti working on the Initial Assessment of the nutritional situation in the Département. The objective of the Assessment was to recommend ways that Phase II of the Département du Nord could improve the nutritional status of people in the region. To meet that objective, the nutritionist looked specifically at the targeting for Project activities and the potential effects of certain production-oriented components on nutrition. To ensure that health and nutrition would be, as suggested by the identification mission, a stated objective of development, the nutritionist also worked on designing a nutrition component for the Project.

To assess the nutritional situation, the nutritionist used descriptive data on nutritional status, food consumption and food supply along with information on the general characteristics of malnourished groups in the Département and basic knowledge of the causes of malnutrition.

(a) Nutritional status

Research into available data revealed that there was no information relating specifically to the Project area itself. However, the Département du Nord was treated as one category in the National Nutrition Status Survey of 1978. According to those data, of all Départements in the country, the Département du Nord had the highest incidence of stunting, the second highest incidence of wasting and the second highest incidence of anemia. Previous reports indicated that kwashiorkor, found frequently in high starch/low protein diets, was particularly severe in the region. Between 9 per cent and 16 per cent of the population suffered from oedema which is the key clinical sign of kwashiorkor. The incidence of oedema was high compared with levels in the rest of the country and in other countries with a similar ecological environment. Only national figures were available for infant and child mortality. The figures were high: approximately 25 per cent of children die before the age of 5.

Combining that statistical data with observations in the region and with information supplied by local health personnel, the nutritionist concluded that the nutritional situation in the Département was a serious problem. Malnutrition

in the region, particularly widespread among children, indicated that total food intake was inadequate; moreover the diet was high in starch and low in protein. It was likely that the prevalence of malnutrition (wasting and kwashiorkor) varied seasonally and depended on food availability and market prices. Although there were no seasonal data, the period from April to July was probably the worst in terms of nutrition. Children in the Departement displayed symptoms of chronic malnutrition and marginal protein deficiency rather than acute malnutrition. In the opinion of the nutritionist, the physical effects of what seemed to be a chronic problem continued well beyond the age of 5. There seemed to be little doubt that lack of food of the proper quality had contributed to high child mortality rates. Although adults were probably not seriously affected during normal years, the nutritional situation in the region indicated that pregnant and lactating women were likely to suffer from some undernutrition and that anemia was probably widespread, particularly among women.

Although the data did not delineate a direct relationship between the malnutrition and the major causes of morbidity, it seemed logical that the inadequate food intake would make the population more vulnerable to infectious diseases such as intestinal parasites, pneumonia, enteritis and tetanus.

(b) Food consumption

The 12 food consumption surveys carried out in different parts of the country since 1958 all confirmed a substantial deficit in food energy and protein intakes. Synthesizing the results of the different surveys, the nutritional assessment officer was able to determine an average deficit of from 300 to 500 kilocalories (kcal) per person per day, which was equal to approximately 14 to 25 per cent of the total requirement. On average, the people of Departement du Nord consumed around 1 700 kcal per person per day, or 77 per cent of their estimated daily food energy requirement. The proportion of protein in the diet was correspondingly low. Only about 8.5 to 9.5 per cent of total energy intake was protein which indicated that unlike most diets, even if total food energy intake were adequate, the diet would still be marginally deficient in protein.

Only one of the surveys looked at seasonal variations in food consumption, and found that they were substantial. Intake ranged from 55 per cent of total energy requirement in March to 100 per cent in June.

Based on this information, in order to eliminate food deficits at the household level, it would be necessary to increase kcal intake by 300 to 500 kcal per person per day averaged over the year, which is equivalent to, for 300 kcal, 30 kilograms of maize per person per year or 210 kg of maize per household per year. It would also be necessary to increase the amount of protein in the average diet from 9 to 10 per cent of calories. That 1 per cent increase could be provided, for example, by substituting approximately 8 kg of peas per person per year for an equivalent amount of maize.

(c) Food supply

Food balance sheets gave a slightly different picture of food availability. The estimated kcal supply for 1974, allowing 10 per cent for wastage at the household level, was 1 900 kcal, or 200 kcal more than the average intake estimated from food consumption data for the Departement.

In addition to the food balance sheets, a small socio-economic survey carried out in February 1979 by ODN was available. Although the survey had been for the most part concerned with parts of the region in the Phase I area, it did provide some unpublished data relevant to the Phase II area. From that study

it appeared that only 30 to 50 per cent of food energy needs of the area were produced within it.

If, as other studies show, 65 per cent of income was spent on food, on average, most households had sufficient income from coffee, cocoa and sugar cane to be able to purchase enough food. Presumably some of those purchases were foods produced outside the area. However, those households which had less than 0.5 hectares (ha) of land were probably suffering from substantial food deficits and did not have the income to purchase the food they needed. For a population with so uncertain a food supply, a surprising amount of food crops were sold in the market. An estimated 60 to 90 per cent of food crops passed through the market of which a considerable portion (e.g. cassava) probably left the area. In fact, only about 20 per cent of the diet of the average household in the Departement was provided by subsistence agriculture.

(d) Factors related to malnutrition

It was reasonable to assume that those in the population who were biologically vulnerable - i.e. infants, pre-school children, pregnant and lactating women - were more likely to suffer from malnutrition. It was much more difficult to identify other groups in the society who might, in socio-economic terms, be particularly vulnerable to nutritional problems. Those factors most likely to affect income and, thus, nutrition, were the size of landholding, the system of land tenure, altitude of the land - which could affect cropping patterns and the transmission of diseases - access to water, access to health services and the communications/transportation system.

No available data related these factors specifically to nutritional status. But, on the basis of experience with nutrition problems in rural settings, the nutritionist was able to describe those households most likely to be affected by undernutrition: those with the smallest landholdings (less than 0.5 ha), particularly those who were not proprietors of the land (tenants); those located in areas such as the lowlands with little or no water control; those without potable water; and those farthest from roads and health services. The effect of altitude was still to be determined.

The impact of the Project on nutrition depends on the extent to which it is able to reach those people that fall into these most vulnerable socio-economic groups.

(e) The causes of malnutrition

The nutritional assessment officer looked specifically at those causes of malnutrition that were relevant to planned Project activities.

Several of the main causes of malnutrition were directly related to agricultural production and cropping patterns. Research figures indicated that agricultural production from the average holding was inadequate to support the household. This was because of the very small size of the landholdings, exacerbated by the rapidly increasing population and the pressure on available arable land.

Although the current cropping pattern, whereby farmers devoted as much land as possible to cash crops (sugar cane, coffee, cocoa) and used the proceeds to buy food, was economically attractive, it might have been contributing to nutritional problems in the region. Farmers might have had higher incomes, but their food supply was less secure. They were dependent on the market for food, and vulnerable to shortages in supply and to price increases.

Those farmers who did grow food were also victims of the marketing system in the Departement. As the system for moving food through the area was quite efficient, farmers were encouraged to sell their crops, perhaps retaining some for home consumption. Between harvests, they would buy food in the market to feed their families.

As it was the aim of the Project to increase the production capacity of the arable land in the Departement, some of the problems of inadequate supply would be brought under control. In the plans for increased production, the Project should consider the relative proportion of land that should be devoted to cash and food crops. In addition, plans for production should consider promoting - if agronomically feasible - the cultivation of beans, peas, groundnuts and soya. Those crops would provide good sources of protein in the diet. To tackle the problems of marketing produce, the Project could improve nutrition by putting less emphasis on selling produce and more emphasis on subsistence agriculture and the storage of food for use throughout the year.

The lack of potable water, poor sewage disposal, the general lack of hygiene and poor housing all contributed, indirectly, to high levels of malnutrition. As potable water was already included as a Project component, improved water supply would undoubtedly lead to some improvement in malnutrition. Any effort at rural education on sewage disposal, housing and improved hygiene should also lead to a reduction in the incidence of malnutrition.

Access to existing health services was poor in the Project area, and the services that did exist were inadequately supported. It was estimated that only 10 to 20 per cent of the children in an area served by one dispensary, had ever visited the facility or made use of the service. Insufficient health care was contributing to malnutrition. Any improvement in the quality of care and its delivery system would improve health and nutrition in the Departement.

Initial strategy for improving nutrition

Rural development itself was regarded as the main means of improving nutrition in the Departement. Project components such as increased production, improved water supply and improved health services were, in fact, all likely to contribute to better nutrition. But the key question about the potential effectiveness of the Project was "Who will benefit?" Would the Project, as it was designed, reach those who are suffering most from malnutrition? Would it reach the greatest possible number of malnourished? How could project planners ensure that the Project would have the optimum impact on those it did reach?

To make sure that the Project would reach those most at risk of malnutrition, the nutritional assessment officer recommended that target groups for the Project be taken into account in designing the various activities and components. In addition to directing the Project specifically at those most in need, the assessment report recommended that the nutrition component suggested by the identification mission be used to enhance the impact on nutrition.

From the research done by the nutritional assessment officer, it was clear that the Project could maximize its nutrition potential by directing activities such as public works and agricultural extension to parts of the Departement on the basis of the severity of nutritional problems.

Agricultural components could be strengthened through the introduction of new varieties of food crops such as sweet cassava, peas, beans, soya or groundnuts. By promoting oil-bearing crops such as groundnuts and palm oil, the

Project could contribute much-needed calories and nutrients to the diets of the region. Aquaculture might have some potential to increase production in a region that was short of arable land and should be explored for its feasibility. If the Project could develop local maize milling capacities, more of the food could be processed and stay in the region, reducing the dependence on market sources for food. Such efforts at local industry would reduce food crop losses, and create employment opportunities.

As to the nutritional component itself, it was the opinion of the nutritional assessment officer that the most effective way to increase the impact would be through strengthening the proposed rural extension services. Rural extension centres would be located in areas where malnutrition was prevalent, where it was ecologically possible to intensify production or introduce new crops and where other Project components such as road access, water control, potable water and a credit scheme could create an environment conducive to improved nutrition.

The nutritional component would provide the physical structures themselves (rural extension centres), additional extension workers, demonstration and communication equipment, training for the extension workers, logistic support and support to the ODN to service those activities.

According to the initial design for the component, the function of the rural extension centres would be to combine and focus the activities which were commonly part of rural development. Both agricultural and health personnel would use the centres as a base for their operations. The centres would also serve as educational facilities, demonstrating the use of agricultural techniques, the use of potable water and providing preventive and curative health information. The kinds of advisory services available from the centres would help schools in the area with food crop production, and support the development of community cooperatives. Information would be available on food storage and on the commercialization of cereals as production in the area progressed.

Within the Project area at the time of the assessment for Phase II, there were about 30 agricultural extension workers and about 100 health-care workers. The nutritional component suggested a rate of one rural extension centre for every three agricultural workers, for a total of 10 centres. According to the plans, each centre should serve a community which would be defined roughly by the use of a certain market. Each centre would be located close to a rural market. From population figures in the region, each centre would serve approximately 5 000 people, or a total of 50 000 people by the ten centres. In addition, the nutritional component would fund the recruitment of an extra extension worker for each centre to support the efforts of the workers already in the area. To service those 10 centres, ODN would require two trained staff, promotional materials, consultant services and funding for monitoring the progress of the centres. Over a four-year period, it was estimated that the 10 centres would cost \$ 460 000 which was equal to the provisional budget allocated for the health/nutrition component.

The next step in strengthening the nutrition impact of the Project activities was to identify the prevalence of malnutrition in the Departement. There were not enough data of sufficient detail and quality to select target groups. To rectify that, the nutritional assessment officer suggested three means by which useful data could be obtained. The first was to add socio-economic variables to the data collected in the 1978 National Nutrition Status Survey. Thirty of the clusters questioned for that survey were in the Departement. It would be possible for enumerators to visit these clusters and obtain additional information. The second suggestion was to add nutritional data

to the socio-economic variables collected from 630 households in the February 1979 ODN survey.

As only 10 clusters from the 1978 survey were actually located in the Phase II area and as revisiting the households and reanalyzing the data would have been a major undertaking, the first choice was discounted. The second choice was quickly dismissed; there had been major problems with the survey and the data were not felt to be totally reliable.

The third suggestion was to include nutritional data in the upcoming Project preparation surveys. Because plans were already underway for a detailed agro-economic survey of the Project region as part of the feasibility study, it made sense to include nutrition and related measurements as part of that survey. The new survey, specifically confined to the Phase II parts of the Departement, provided an opportunity to collect up-to-date, reliable data designed specifically for the required purposes. The nutrition team took advantage of the third option.

In-Depth Study

From January to April 1980, a survey was carried out in the Project area. Predominantly concerned with agricultural and economic factors, the nutritional module was only a small part of the survey.

(a) Survey methods

The survey covered the three administrative districts. Two of the three districts coincided with watershed areas; the third was divided into two watershed areas: Port Margot, Plaine du Nord, Limbé (lower) and Limbé (upper). For analytical purposes, the area was subdivided further between the plains and mountain regions in Limbé (lower) and between the northern and southern regions of Plaine du Nord.

Using a two-stage procedure, the survey sample was selected. For the first stage, cluster sampling, survey planners set the maximum number of clusters that could be adequately surveyed - given available time, funds and personnel - at 40. Assumptions on the variance of agro-economic variables suggested that a lower limit of 60 to 80 households would be required to yield sufficiently large cell sizes for analytical purposes. In order that each of the Project subdivisions would be adequately represented, the total sample for the survey, allowing for non-response and landless households, was calculated to be about 500 households, or a mean of 12.5 households per cluster in the second stage of sampling.

Clusters were selected by listing all 694 localities in the survey area by altitude within each of the administrative districts. Then from local records, such as those provided by the malaria eradication service, officials were able to estimate the number of households in each locality. Of the 20 016 households in the 40 selected clusters, each household had an equal chance of being selected for the survey. Interviews were successfully completed in 462 households. Children aged 1 through 6 were measured in 277 of the 462 households surveyed.

The full survey consisted of 10 questionnaires, of which nine dealt with agro-economic variables and one with nutrition. Prepared in the local language, Creole, the questionnaires were field-tested during enumerator training.

Information provided by the nine agro-economic questionnaires included details about the head of the household (including educational level and employ-

ment), demographic figures on other household members, the type of housing, data on the land, including ecology, tenure, and agricultural problems, facts about the types of crops grown, their value and the amount consumed at home, income and expenditure figures, livestock data and details about credit.

The questionnaires were administered by the agro-economic survey team. The nutrition questionnaire, administered by the nutrition enumeration team, collected data on the age, weight, height and health of children, on child mortality and on the distance from the household to water and health services.

The agro-economic survey involved seven enumerators and two supervisors; the nutrition survey involved eight enumerators, who worked in two teams of four. Surveys of the more accessible clusters could be done within one day. In the case of the more isolated clusters, the agro-economic survey would send a team of two enumerators who would spend up to four or five days on site to complete all the interviews. Questionnaires were checked by the team supervisor within two days of completion, and by the survey supervisor within three or four days. Enumerators could complete the agro-economic survey within 90 minutes. The nutrition survey took about 30 minutes. The main time constraint was in reaching the household and locating the male head of the household (who was considered the required respondent for the agro-economic data) and the mother or children's guardian (who was considered the required respondent for the nutrition data).

Scales and measuring boards were tested and enumerators' work evaluated three times throughout the nutrition survey to ensure the reliability and validity of the anthropometric results. Weight was measured with Salter hanging scales. Height and length were measured using custom-made measuring boards from the 1978 National Nutrition Status Survey.

Each child was tested for oedema, a clinical sign of kwashiorkor. Enumerators would put thumb pressure on the dorsum of both feet and check for the occurrence of pitting.

Age was determined from documentation such as baptismal certificate, birth certificate or clinic card or, in the absence of any authoritative document, from a calendar of events.

During data collection, a programmable calculator tested height-for-age and weight-for-height figures of the children to identify any dubious results. Any forms containing questionable age and/or anthropometric results were pulled from the sample, and checked with repeat visits.

(b) Data analysis

Using the data supplied by all 10 questionnaires, the Project preparation team prepared a descriptive analysis of the agro-economic situation in the area using the FAO Farm Management Survey programmes. The nutrition team carried out a descriptive analysis of the nutritional situation using the FAO nutrition survey analysis package on a micro-computer. Anthropometric data were compared with Harvard standards.

This case study presents only the results from the nutritional analysis. Variables used in the analysis were derived from both the agro-economic questionnaires and from the nutrition questionnaire, and are shown in table 2.1. In total, 430 children from 261 households were measured and weighed. (In fact, children from 277 households were measured, but there were no household data on 16 of the households with children so they were omitted from the analysis.)

Table 2.1 Variables used in nutritional analysis

A.	<u>Area characteristics</u>	1.	Watershed	
		2.	Agro-zone (plains or mountain)	
		3.	Distance to nearest town	(in 4 categories, by minutes)
		4.	Distance to dispensary	(in 4 categories, by minutes)
		5.	Distance to road	(in 4 categories, by minutes)
		6.	Altitude	(in 4 categories, by metres)
B.	<u>Household characteristics</u>	1.	Main income source	(farming, cash employment, self-employed)
		2.	Secondary income source	(farming, cash employment)
		3.	Data by income source:	farmer - area cultivated (in 4 categories) tenure status, cropping pattern (19 types) cash-employment - casual, regular self-employment - shopkeeper, trader
		4.	Demography:	total number in household, number of children, basis of age estimate
C.	<u>Indicators</u>	1.	Nutritional Status:	for each child of 1-6 years - date of birth, weight, height, presence/absence of oedema
		2.	Morbidity:	for each child - fever and/or diarrhoea in previous day or week
		3.	Mortality:	for each mother of a child of 1-6 years - number of children ever born and number alive now
		4.	Sanitary environment:	by household - distance to water supply (in 5 categories)
		5.	Wealth indicators:	by household - type of housing (material of walls and roof, 4 categories) number of rooms, possession of bed

Note: Variables from nutrition questionnaire were C1-4, A4, and basis of age estimate (in B4); all others were extracted from the agro-economic questionnaires.

Checked and corrected data were fed into the micro-computer. The procedure involved selecting characteristics of households and then aggregating households. Each computer run gave one line of results.

The analysis took from two to three weeks. Statistical tests were carried out using either a t-test to compare means, or χ^2 to evaluate different proportions, as 2xn tables (e.g. less than or greater than 80 per cent weight-for-age). The survey results provided three types of information relevant to the design of the Departement du Nord Development Project Phase II. The first described the extent and severity of malnutrition and defined by location the groups most affected. The second gave insight into factors associated with the prevalence of malnutrition. The third provided data that could be exploited to determine the possible causal relationships between income, the environment and nutrition.

(c) The prevalence of malnutrition

Table 2.3 compares data on stunting and wasting from the 1978 survey with data from the case study survey. The prevalence of low weight-for-age is similar in both sets of data, but the recent survey indicates an increase in stunting and a decrease in wasting. Because the samples from the two surveys are not strictly comparable, this difference is difficult to evaluate.

From the data, it is clear that, as indicated in the Initial Assessment, chronic malnutrition predominates. Nearly half the children in the Project area are stunted (less than 90 per cent height-for-age).

Acute malnutrition is less common, but the fact that 3 per cent of the children measured shows signs of wasting (<80 per cent weight-for-height) and 3 per cent displays symptoms of oedema indicates a potentially serious situation. From the data, it was estimated that 17 per cent of the children born over the last five years to mothers interviewed in the survey had died. Given the high risk of mortality for children with kwashiorkor, the fact that 15 children in the sample showed signs of oedema suggests that this form of malnutrition is contributing to high child mortality.

Although symptoms of acute malnutrition must be of some concern to those trying to improve health and nutrition in the region, more children suffer from chronic malnutrition than acute malnutrition, and it is likely that chronic malnutrition is a better indicator of deprivation in the household.

The nutrition team was able to show from the data analysis that malnutrition is not spread evenly through the Project area, although the differences among the various parts of the region may not be obvious. When the data are compared by watershed and/or ecological area only the mountain area of Lower-Limbé is significantly different from the other areas (see table 2.4). They show the prevalence of malnutrition, stunting and wasting in that area to be the lowest. Other data show that within any area there is considerable diversity.

(d) Factors associated with prevalence of malnutrition

The variation in the prevalence of malnutrition was more evident in terms of the distance from towns (see table 2.5). Malnutrition, mortality and morbidity increased with the distance from the towns. In fact, mortality was 70 per cent higher in the regions farthest from the towns than it was in those areas close to towns. Wealth decreased with the distance from the towns. A similar pattern existed within the administrative districts. The most isolated

Table 2.2 Nutritional status, morbidity, mortality, sanitation and wealth indicators by watershed

Watershed	Total child- ren	Total HH <u>a</u> /	Nutritional status						Child morbidity		Child mor- tality	Sani- tation	Wealth
			HA		WA		WH		% F/D	% oedema			
			mean %	% less than 90%	mean %	% less than 80%	mean %	% less than 80%					
Port Margot	79	45	90.2	51.9	79.9	53.2	93.7	3.8	17.7	3.8	15.7	1.84	1.64
Limbe Lower	127	75	91.7	37.8	82.0	46.5	93.7	3.1	15.0	0	13.4	2.05	1.85
Limbe Upper	108	69	90.4	48.1	80.2	50.9	93.7	5.6	31.5	5.6	18.4	1.72	2.03
Plaine du Nord	116	72	89.5	52.6	79.5	53.4	94.6	0.9	22.4	4.3	17.8	1.82	1.89
TOTAL	430	261	90.5	47.0	80.5	50.7	93.9	3.3	21.6	3.3	16.5	1.87	1.87

Notes: HH - households; HA - height-for-age; WA - weight-for-age; WH - weight-for-height; F/D - fever and/or diarrhoea the day before survey.

a/ The water index is derived from the time taken, for each cluster, to go to the domestic water supply. The higher the number (range 1-4) c/, the greater the average distance from each household in the cluster to water source.

b/ The housing type index is the average for the group (range: types 1-4) d/. The higher the number, the better the quality of housing.

<u>c/</u>	Distance 1:	0-5 minutes	<u>d/</u>	Type: 1	dirt floor, straw roof
	Distance 2:	5-30 minutes		Type: 2	dirt floor, tin roof
	Distance 3:	30-60 minutes		Type: 3	cement floor, straw roof
	Distance 4:	> 60 minutes		Type: 4	cement floor, tin roof

Table 2.3 Comparison of anthropometric results from national survey (1978) and case study survey (in percentages of samples)

	Wasting < 80% weight/height	Stunting < 90% height/age
<u>1978 national survey</u>		
Representative rural sample	6.4	28.6
Dept. du Nord	6.8	33.4
<u>Case study survey (1980)</u>		
Dept. du Nord	3.3	47.0

parts of Port Margot and Plaine du Nord suffered most in terms of stunting and child mortality. In fact, the distant, isolated parts of Port Margot seemed to be the worst in the Departement.

Examining more closely the effect of the distance from towns on malnutrition, the nutritional investigators were able to determine that the distance did not reflect access to health services. There are more dispensaries than there are towns, and the survey revealed no specific relationship between malnutrition and distance from a dispensary.

Table 2.4 Nutrition and other indicators by watershed/ecological area

	Port Margot	Limbe Lower (plains)	Limbe Lower (mountains)	Limbe Upper	Plaine du Nord (south)	Plaine du Nord (north)	Total
Number of households in area	3 440	3 760	2 000	5 290	2 520	2 980	20 000
Population % in each area	17.2	18.8	10.0	26.4	12.6	14.5	100
Number of households in sample	45	49	26	69	33	39	261
Number of children in sample	79	80	47	108	54	62	430
<u>Nutrition:</u> % < 90% height/age	51.9	46.3	23.4	48.1	53.7	51.6	47.0
% < 80% weight/age	53.2	57.5	27.7 ^{a/}	50.9	55.6	51.6	50.7
% total malnourished in each area	18.1	21.4	5.5	26.6	13.9	15.2	100
<u>Mortality:</u> % children born and died	15.7	13.8	12.4	18.4	16.5	19.2	16.5
<u>Morbidity:</u> % sick last week	50.6	48.8	46.8	63.0	72.2	43.5	54.7
<u>Wealth:</u> % unimproved housing	35.6	42.9	7.7	26.1	27.3	33.3	30.3
Nutrition Priority 1	1.05	1.13	0.55	1.00	1.10	1.02	
Nutrition Priority 2	1.09	1.27	0.33	1.58	0.83	0.91	

Note: ^{a/} chi-squared value = 5.6; P < 0.05

Table 2.5 Nutrition and other indicators by distance to town (administrative centre)

		Time to town, minutes				Total
		0-50	50-100	100-200	> 200	
Number of households in each group		3 140	5 520	8 130	3 140	20 000
Population % in each group		15.7	27.6	40.6	15.7	100
Number of households in sample		41	72	106	42	261
Number of children in sample		67	120	174	69	430
<u>Nutrition:</u>	% <90% height/age	34.3	35.0	54.0	62.3	47.0
	% <80% weight/age ^{a/}	32.8	49.2	57.5	53.6	50.7
% total malnourished in each group		10.2	26.8	46.1	16.6	100
<u>Mortality:</u>	% children born and died	13.4	13.1	17.2	22.5	16.5
<u>Morbidity:</u>	% sick last week	44.8	50.8	57.5	63.8	54.7
<u>Wealth:</u>	% unimproved housing	19.5	26.4	35.8	33.3	30.3
Nutrition Priority 1		0.65	0.97	1.13	1.06	
Nutrition Priority 2		0.41	1.06	1.83	0.66	

Note: a/ P < 0.05 for % of children <80% weight/age, for >100 min and <100 min (using one half n to allow for clustering)

Distance to the nearest road, however, which was often similar or the same as to the nearest town, also showed a strong association with malnutrition. Indeed, one of the highest prevalences of malnutrition (62.5 per cent) and mortality rates (23.6 per cent) found was in the population living more than 200 minutes from the nearest road.

The nutritional investigators expected the nature of land tenure and the size of landholding to have a direct relationship with nutritional status. From the survey data, however, no direct relationship was found between malnutrition and land tenure either among the population as a whole or within the distance-to-town categories. The percentage of underweight children was much the same whether or not the father was a landowner.

In terms of wealth indicators, those who owned land seemed better off. For example, only 26 to 32 per cent of landowners had unimproved housing, while 44 to 52 per cent of tenants and sharecroppers lived in poor housing.

On the other hand, the size of landholding appeared to be associated with nutrition. Table 2.6 shows that farmers with only 0.2 to 1.0 carreaux (cx)^{1/} of land were significantly worse off in terms of malnutrition, child mortality and housing than those with from 1 to 5 cx. Those households with very small landholdings (less than 0.2cx) usually had off-farm employment and appeared to fall somewhere between the two groups of farmers in terms of the prevalence of malnutrition. When the small size of the landholding was combined with isolation from the towns, the potential for chronic malnutrition was severe.

A review of the relationship between cropping patterns and nutrition revealed that the cropping pattern was not an obvious determinant of malnutrition, mortality or morbidity. While the cropping pattern did not appear to have an adverse effect on nutrition, data from the agro-economic analysis indicated that cropping pattern was directly related to income. Those farmers growing coffee had better housing and incomes substantially higher than those growing other crops.

Nutrition investigators also explored the relationship between housing and nutrition, and discovered that the incidence of malnutrition and mortality decreased as housing improved, but that the incidence of morbidity did not appear to be related to housing.

2.3 IMPLICATIONS OF THE NUTRITION STUDY FOR PROJECT DESIGN

The analyses of the nutrition survey data indicated that such information could be used to help direct Project components and activities towards those most at risk of malnutrition and those most in need of social, economic and nutritional improvements. In order to have the maximum effect on nutrition in the Departement, the Project should attempt to concentrate its efforts on small farmers in the most isolated parts of the project area.

Those farthest from markets and services, though not necessarily those farthest from health services were the most vulnerable to malnutrition.

Those farming areas that were between 0.2 and 1 cx are consistently the worst off in terms of nutrition. The smaller farmers living at the greatest

^{1/} 1 carreaux (cx) = 1.29 ha

Table 2.6 Nutrition and other indicators by size of landholding

		Landholding area				
		'Non-farmers' <u>a/</u>	0.1 - 0.2 cx	0.2 - 1.0 cx	1.0 - 5.0 cx <u>b/</u>	Total
Number of households in each group	1 840		2 060	11 130	4 760	20 000
Population % in each group	9.2		10.3	55.6	23.8	100
Number of households in sample	24		27	145	62	261
Number of children in sample	39		39	241	107	430
<u>Nutrition:</u> % < 90% height/age	48.7		48.7	51.5	36.4	47.0
% < 80% weight/age	51.3		48.7	57.3	38.3	50.7
% total malnourished in each group	9.3		9.9	62.8	18.0	100
<u>Mortality:</u> % children born and died	15.1		21.6	17.3	13.5	16.5
<u>Morbidity:</u> % sick last week	59.0		59.0	49.4	64.5	54.7
<u>Wealth:</u> % unimproved housing	25.0		40.7	37.2	11.8	30.3
Nutrition Priority 1	1.01		0.96	1.13	0.76	1.00
Nutrition Priority 2	0.37		0.40	2.51	0.73	1.00

Notes: 1 carreau (cx) = 1.29 hectares

a/ Non-farmers defined as having less than 0.1 cx; all had other sources of income.

b/ Includes two households of holding more than 5.0 cx.

distance from towns constituted 43 per cent of the population of the region and a major deprived group. (See table 2.7).

To express the target groups for project benefits in terms of priority, the nutritional investigators devised a "nutrition priority ratio" (shown in the last two rows of tables 2.4, 2.5, 2.6 and 2.7). The figure for nutrition priority is the ratio of the prevalence of malnutrition in a given group to the mean prevalence of malnutrition for the population as a whole. 'Nutrition Priority 1' expresses the expected benefit of reaching one group as opposed to another; e.g. if the Project team were trying to choose between locating a Project component in one area as opposed to another, the nutritional priority ratio would identify which areas have the greatest nutritional problem (the highest ratios), and which would therefore benefit the most from the activity.

The 'Nutrition Priority 2' weighs the prevalence of malnutrition against the size of the population group. One area may have a particularly high prevalence of chronic malnutrition, but the number of people in the group may be quite small. In that case, the Project can weigh the advantages of putting a fixed investment, such as a road, into an area that would reach only a small percentage of the population or of going into an area where the nutritional problems may not be as serious but where a greater percentage of the population would benefit.

Using the relative cost of the participation of different groups in the Project, the priority ratio figures can be modified to estimate the potential benefit relative to cost. This kind of cost/benefit analysis assumes that the benefit in terms of nutrition from a given service, e.g. access to infrastructure, is similar for different groups of people - even if it is more expensive to provide the service to one group than to another.

Using the nutrition priority ratio, Project planners can measure the expected nutritional benefit of reaching one group in the population as opposed to another.

The location of the public works components for soil conservation, drainage, feeder roads and village water supply and the areas to benefit from the development of such services as credit, marketing and social services were to be based on the findings of feasibility studies. According to the nutritional studies, the priority areas for Project infrastructures and services are the remote regions. In fact, the high incidence of malnutrition in the remote areas is probably related precisely to the lack of such facilities.

Specifically, the nutritional study recommended that the feasibility studies consider extending Project services to the areas of the Departement more than 10 km from the towns, particularly in the districts of Port Margot and Plaine du Nord. Although such a policy would probably lead to increased costs and, possibly, reduced economic returns, the increased impact on nutrition and the satisfaction of basic needs would be substantial.

To reach the smaller landholders, the Project should make careful use of production and marketing credit systems. The farmers with small holdings account for 63 per cent of the malnourished. Although credit schemes have run into problems in the past, some effort must be made to help this group purchase seeds, fertilizer and other inputs, and to improve storage facilities for food.

Examining the initial plans for a nutrition component in light of the In-Depth Study, the nutritional investigators felt that the rural extension centres proposed would facilitate the delivery of services to the outlying areas and

Table 2.7 Nutrition and other indicators by landholding size and distance-to-town

		<u>Distance to town</u>						
		less than 100 minutes			more than 100 minutes			<u>Total</u>
		holding (cx)			holding (cx)			
		< 0.2	0.2 - 1.0	> 1.0	< 0.2	0.2 - 1.0	> 1.0	
-28-	Number of households in each group	2 220	4 060	2 220	1 680	7 070	2 520	20 000
	Population % in each group	11.1	20.3	11.1	8.4	35.3	12.6	100
	Number of households in sample	29	53	29	22	92	33	261
	Number of children in sample	46	92	46	32	149	61	430
	<u>Nutrition:</u> % <90% height/age	37.0	40.2	21.7	65.6	58.4	47.5	47.0
	% <80% weight/age	41.3	52.2	30.4	62.5	60.4	44.3	50.7
	% total malnourished in each group	9.0	20.9	6.7	10.4	42.1	11.0	100
	<u>Mortality:</u> % children born and died	12.8	15.5	9.6	25.9	18.5	15.9	16.5
	<u>Morbidity:</u> % sick last week	56.5	38.0	63.0	62.5	56.4	65.6	54.7
	<u>Wealth:</u> % unimproved housing	27.6	30.2	10.3	40.9	41.3	15.2	30.3
	Nutrition Priority 1	0.81	1.03	0.60	1.23	1.19	0.87	1.00
	Nutrition Priority 2	0.54	1.25	0.40	0.62	2.52	0.66	1.00

Note: 1 carreau (cx) = 1.29 hectares

Project. This was an economical and efficient way to gather data. By using the same sample, the nutrition team could be more confident in their analysis of the relationship between nutrition and agricultural and economic variables.

Given the early incorporation in the Project, it seems likely that nutrition could become a factor in the cost/benefit analysis that forms part of the feasibility studies for the development.

The strength of the methodology lies in being able to identify priority target groups within the population of the Project area. It provides a focus for activities that would be missing if planners looked only at economic or return-on-investment potential in various parts of the region. The priority rating system that was used in Haiti also offers the Project a clear comparison of the severity of the social and nutrition problems among different groups. Using the priority ratings, the Project can be sure it is committing funds to improve the quality of life for the largest number of vulnerable people.

The weakness in this case study is not so much a weakness in the methodology as much as in the development process. As much as people will benefit from nutrition being integrated into rural development, they will also suffer when there are delays, problems or hold-ups with the implementation of development projects. In the case of Haiti, where the nutrition problem has been identified and possible solutions planned, no action will be taken until the Project itself is initiated.

It is unfortunate that, in the case of the Departement du Nord, some of the nutrition findings could not be incorporated into Phase I. But with the problems plaguing Phase I, it is unlikely that the nutrition input would be either welcomed or used.

maximize the use of the resources made available for improving nutrition through integration with other activities. In short, the survey confirmed that rural extension centres would be a suitable approach for reaching those most in need.

These recommendations from the nutrition team, available to Project officials early in the planning preparation stage, can be incorporated into the Project design fairly easily. They involve no basic changes in components, just a redirection of activities to reach those most in need of the benefits of rural development. As to the nutrition component itself, it was designed within the context of the Project and reflects the effort made by the nutrition team to support and enhance the work the project itself would bring about.

At the time that the nutrition team was preparing its recommendations for Project design, Phase I of the Project was running seriously behind schedule. As Phase II was supposed to augment and support the work of Phase I, the World Bank decided to suspend the preparations for Phase II until such time as Phase I was running to capacity. This decision left the report from the In-Depth Study in a state of limbo. It remains to be seen, when Phase II preparations are resumed, what impact the nutritional findings and recommendations will have on final design and on the location and selection of target groups for specific activities.

Although it was disappointing to invest time and effort in a Project whose future became uncertain, the FAO nutrition team is encouraged by the fact that the funding agency, the World Bank, is committed to the integration of nutrition in rural development. The fact that the need for nutrition input and a nutrition component was part of the identification mission for Phase II means that, when and if the second part of the development of the Departement du Nord is in place, nutrition is likely to receive emphasis.

2.4 CONCLUSION AND RECOMMENDATIONS

In Haiti, the FAO methodology benefited from the World Bank's commitment to integrating nutrition into rural development. That commitment, along with Government support for improved nutrition as a Project objective, means that nutrition is likely to be part of Phase II when it is implemented.

Unfortunately, for the purposes of the case study, it is impossible to measure the potential results of this particular application of the methodology. Instead, FAO must assess the benefit of this experience in terms of the strengths and weaknesses of the process itself. When final planning and implementation of Phase II takes place, FAO will be in a better position to assess the effect that the nutrition study had on Project design, and to monitor any changes in nutritional status that result from the development.

As to the use of the methodology in Haiti, FAO realized the benefit of being involved in the early stages of Project planning. Because nutrition was identified as a concern in the identification mission, a budget was established for a nutritional assessment of the Project area, along with recommendations and a budget for a nutrition component. Because nutritionists were brought into the Project during the preparation for planning, it was possible for them to "piggy-back" their data requirements onto the agro-economic surveys necessary for the

There now exists more up-to-date information on the Kenya Case Studies presented in this Manual including the In-depth study of Baringo District which completes the stages in the nutrition planning process proposed in Manual No. 1. The up-to-date information will be published in subsequent Manuals and other publications of FAO in the near future.

Chapter 3

KENYA:

TWO PROJECTS IN THE DISTRICTS OF MACHAKOS AND KERICHO

THE MACHAKOS INTEGRATED DEVELOPMENT PROGRAMME

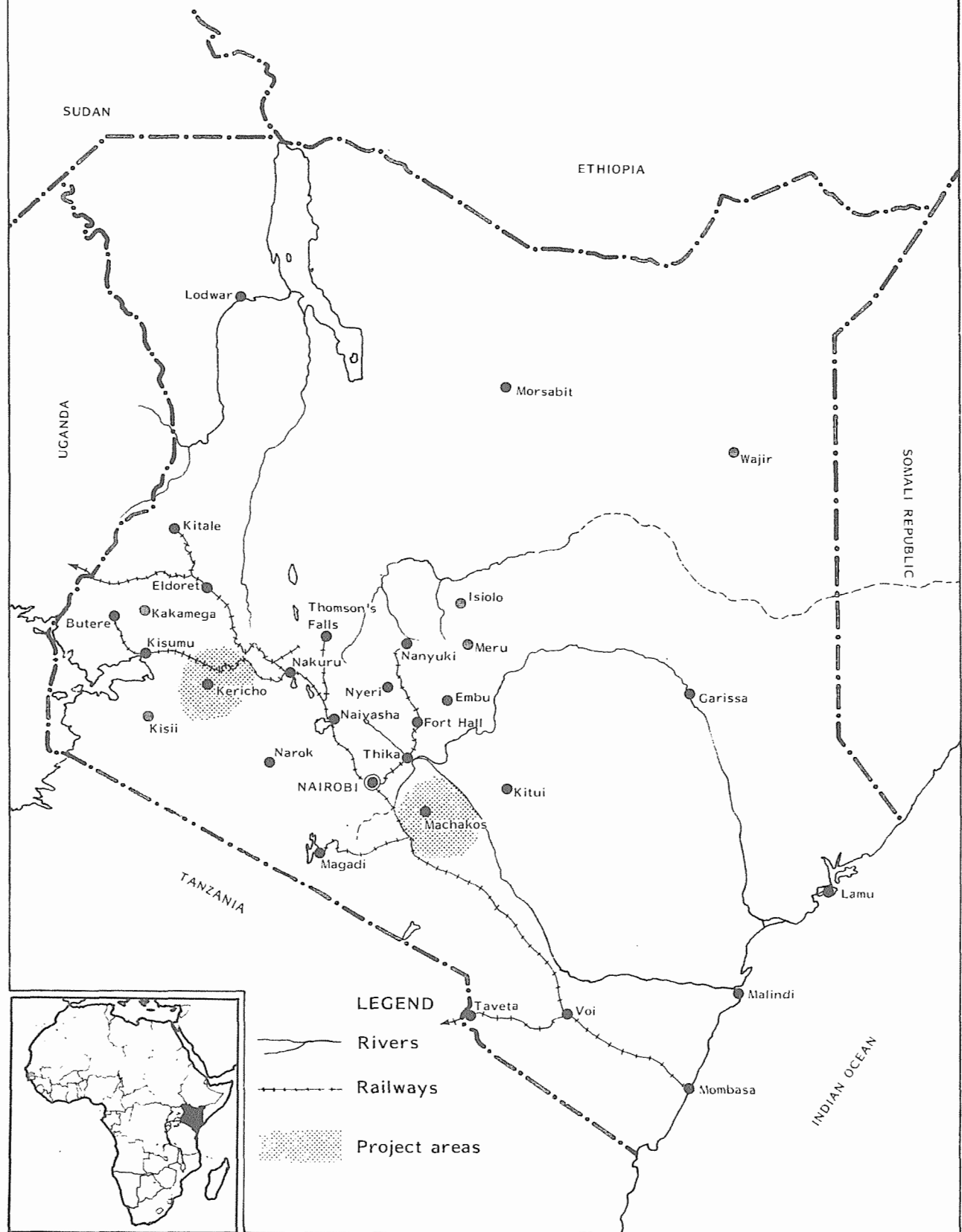
Machakos District is in an arid area of Kenya where only about 10 per cent of the land may be considered as having a high agricultural potential. Consequently, farming families in the region suffer from severe poverty and periods of food shortages both between and within crop years. In 1978, the Kenyan Government began to implement the Machakos Integrated Development Programme (MIDP) which was aimed at the constraints faced by the small farmers in Machakos. The Machakos District covers an area of about 14 156 square kilometres (km²), extending from Nairobi City and Kajiado in the west, to the Tana River in the north, to the Taita District and Tsavo in the south and the Athi River in the east. The total population is 1 million and increasing rapidly, with the majority of the people concentrated in the Central, Northern, Western and East Divisions. The population in the Southern Division and in the Yatta area is much sparser.

The approximately 1 million hectares (ha) of farmland in the MIDP area are made up of small farms (78 per cent) and large farms (22 per cent). Only 1 per cent of the total area is forested.

3.1 THE AGRICULTURAL, SOCIAL AND ECONOMIC CONDITIONS

The only high-potential agricultural land is in the fertile and well-watered, coffee-growing area of highlands, which represents 10 per cent of total farmland in Machakos. Of the remaining land in the region, 57 per cent is considered medium potential and 34 per cent low potential. Much of the soil in the low-potential areas is not suitable for cultivation. It is estimated that about 18 per cent of the population in the District lives on land which is not suitable for mixed farming. The areas of poorest soil are also those areas most vulnerable to drought.

KENYA MACHAKOS AND KERICHO RURAL DEVELOPMENT PROJECTS



The problems of poor soil are exacerbated by variations between heavy rains that fall in April and May and in November and December, causing flood-like conditions and heavy soil erosion, and by periods of drought during the other months of the year. The farmland is being intensively cultivated, with severe soil erosion on steep slopes and silting in the catchment areas. Other areas are being over-grazed.

The areas devoted to different crops are shown in table 3.1. The cropping patterns are dominated by Katumani maize to which nearly half the land is devoted. About 40 per cent of the land is planted to legumes including the important drought-resistant crops of pigeon peas and cowpeas.

In recent years, there has been a marked shift from local maize, sorghum and millet to the hybrid, drought-resistant Katumani maize, with over 80 per cent of the maize currently produced in the District being hybrid maize. Yields are significantly higher than those of the local white maize when averaged over good and bad crop years. Katumani maize will feed seven people per unit^{1/} of labour on 2.5 ha of land, while local maize will only feed three people.^{2/} However, although the hybrid maize has higher yields, it is more demanding on soil fertility. The shift to the hybrid maize reflects the consumer preference for maize, the high losses of sorghum and millet to animals and the lack of incentive to farmers to grow either of the more traditional crops. However, it should be noted that both sorghum and millet are more drought-resistant and more nutritious than the Katumani maize. Diminishing returns and labour constraints have meant that cotton is declining in importance despite having been grown in the District for more than 40 years.

Livestock is a major source of food and income. It is estimated that grazing land in Machakos supports some 480 000 head of cattle and 1.5 to 2 million sheep and goats. In the semi-arid parts of the region, 80 per cent of the households have livestock with an average household holding of 6 cattle, 10 goats and 2 sheep.^{2/} The Machakos population maintain herds more for economic than for social or ceremonial purposes. Overgrazing is a serious problem exacerbating soil erosion and depletion and further reducing the productivity of the marginal lands. On the other hand, livestock herds provide meat and milk (energy and protein) and allow the farmers to make maximum use of infertile rangeland.

Population pressures have worked to decrease the average size of land-holdings, compounding problems of poor land quality and severe environmental conditions. The median size landholding in this region with a relatively low agricultural potential is about 2 ha with 4.3 per cent of farmers having less than 0.5 ha, while 48.4 per cent have between 0.5 and 1.9 ha.^{2/} In addition, increasing numbers of farmers are trying to compensate for the lack of land by moving onto the more marginal lands where traditional agricultural techniques are less appropriate.

^{1/} Heyer J., "Alternative development strategies for lowland Machakos farms", IDS Discussion Paper No. 35, Institute for Development Studies, Sussex University, Sussex, UK, 1966.

^{2/} Kenya Marginal/Semi-Arid Lands Pre-Investment Inventory. Report No. 6, Nairobi, Government of Kenya, 1978

^{3/} Government of Kenya, Central Bureau of Statistics, Integrated Rural Survey 1974-75, Basic Report, Nairobi

Table 3.1 Staple food crop areas, yields and production in Machakos District, 1976

	Crop area		Yield (kg/ha)	Total production (1 000 kg)
	1 000 ha	percentage		
<u>Grains</u>				
Katumani maize	110.1	45.4	1 000	110 100
local white maize	27.0	11.1	280	756
sorghum	1.1	0.5	625	626
millet	<u>1.7</u>	<u>0.7</u>	220	374
Total grain area	139.9	57.7		
<u>Legumes</u>				
beans	58.0	23.9	220	1 276
cowpeas	12.3	5.1	300	3 690
pigeon peas	27.0	11.1	300	8 100
grams	<u>3.5</u>	<u>1.4</u>	250	875
Total legume area	100.8	41.5		
<u>Cassava</u>	<u>1.7</u>	0.7	7 500	12 750
Total area planted in staple food crops	242.4			

Source: Kenya Marginal/Semi-Arid Lands Pre-Investment Inventory. Report No. 2. H.O. Mann and I.D.R. Mariuki. Nairobi: Government of Kenya, 1978. Tables 2.1, 2.4 and 2.5

In Machakos, many household members, particularly the men, migrate from the District in search of employment, causing labour shortages. Although Kenyan Government figures estimate that only 3 per cent of the population of Machakos is formally involved in wage-earning activities, the Pre-Investment Inventory for the project discovered that 30 per cent of the males from farm households on marginal lands was absent from the household. Labour shortages during planting and harvesting seasons contribute to low productivity and a high level of crop losses, and can sometimes be the direct cause of crop failure.

Small landholders in Machakos do their own work on their land, with women bearing particularly heavy workloads, even when the male head of the house is present. It is also the responsibility of the women to fetch water, gather firewood, prepare the food and care for the children.^{4/}

Transportation in much of the District is poor, with roads washed out during the rainy season and outlying areas therefore effectively isolated for about four months of the year. The average farmer lives some 13 km from the nearest market.

Health services are also limited, with one health centre for every 115 750 people. Approximately 71 per cent of the population lives more than 12 km from the nearest health centre.^{5/} The most prevalent diseases in the area are malaria, acute respiratory tract infections, skin diseases and diarrhoea.^{6/} Schistosomiasis is also endemic. Pre-school children suffer from high infestation of ascaris, hookworm and trichuris.^{7/}

Over 70 per cent of the water used in the District is drawn from open water sources rather than from springs, wells or dams. About 23 per cent of the population lives more than 6 km from sources of water in the dry season.^{8/}

Food security would appear to be a severe problem in Machakos, particularly in the one-third part of the region that is semi-arid. In November and December of 1976, 90 per cent of the population of the Southern Division was on famine relief. Between 1972 and 1976, 61 per cent of the total population of the District received some famine relief.

3.2 THE INTEGRATED DEVELOPMENT PROGRAMME

Food security was an obvious problem in Machakos, with population pressure, labour constraints, harsh environmental conditions, small landholdings and inappropriate agricultural techniques all contributing to soil erosion, over grazing, soil depletion and low productivity.

^{4/} The Pre-Investment Inventory estimated that women in Machakos spend one third of their time fetching water.

^{5/} Arid and Semi-Arid Lands Development in Kenya, Prudential Printers, Nairobi, 1979.

^{6/} Health Information Bulletin 3 (2): 17, 1979.

^{7/} Stephenson, L. S. et al., "Nutritional status and stool examinations for internal parasites in Kenya pre-school children in Machakos District", E. Afr. Med. J. 56 (1) 1-9: 1979.

^{8/} Kenya Marginal/Semi Arid Lands Pre-Investment Inventory Report No. 6.

MIDP was planned specifically to address the problems that were seriously affecting small farmers and agricultural productivity in the District. An integrated package of services was to be delivered to the area, through cooperative systems which would be developed as part of the Project. Project components included three specific agricultural programmes: crop development, soil and water conservation and livestock/veterinary services. To support the agricultural components, MIDP included plans for developing cooperative systems, water systems, forestry activities, workshop clusters, social services (including adult training), village polytechnic schools, roads and bridges, buildings, medical infrastructure and aerial photography. The basic approach of the Project was that it would alleviate poverty by raising household incomes.

The Desk Review

MIDP satisfied the FAO criteria for integrated development, with its strong emphasis on agricultural development, supported by plans for transportation, health and educational infrastructure. The Project had no specific, stated nutritional objective but a review of the plans indicated that the improvements in agricultural techniques, the efforts to increase food production, the investments in cattle and other livestock and the emphasis on soil and water conservation could be expected to improve nutrition in the region. Since the MIDP was aimed at the small farmers in Machakos, it would seem to benefit the rural poor.

The Project was already planned and approved and so it did not seem likely that FAO would be able to modify the concept or basic design. However, MIDP did present the opportunity to apply the methodology to an ongoing project. FAO nutrition investigators would be able to assess the effects of implementation on nutrition in the region, and it might also be possible for a nutritional assessment at this stage in the project cycle to influence priorities in terms of their nutritional potential.

The Desk Review concluded that it was still possible, using the methodology, to enhance the nutritional benefits of the Project, although it was recognized that integrating nutrition into the Machakos development would be more difficult and less effective at this stage than it would have been if nutritionists had been involved in the early phases of the planning. Experience with MIDP would also help FAO assess the potential for integrating nutrition into ongoing projects. As major integrated rural development projects can be extended over as many as 20 or 25 years, any possibility of adapting the methodology for ongoing projects was useful to explore.

The data available for use in the Desk Review included national nutrition surveys conducted in 1977 and 1979, a number of MIDP studies, health information bulletins and the Kenya Marginal/Semi-Arid Lands Pre-Investment Inventory (1978). The first national nutrition survey was conducted during February and March 1977 on the same sample as that used by the Kenyan Integrated Rural Survey II (IRS 2). The second national nutrition survey was conducted in October and November 1978 on the same sample as that of the fourth integrated rural survey (IRS4). In addition, there were qualified, responsive professionals willing to provide local qualitative information and advice.

Data for Machakos from both the national nutrition surveys of 1977 and 1978 indicated evidence of chronic malnutrition, although the figures from the two surveys differ immensely. According to the 1977 survey, 44 per cent of the children in the region were below 90 per cent height-for-age (HA). In terms of nutrition, Machakos was the worst District in the country. However, in the 1978

survey less than 20 per cent of the children were below 90 per cent HA, making Machakos one of the most nutritionally privileged zones in the survey. In 1977, the District was surveyed immediately following a period of drought and food shortage; in 1978, it was surveyed after a period of good rainfall and prosperous harvests. Even given the difference in the region at the time of the two surveys, it is unusual that such an indicator as average HA would change so dramatically over an 18-month period. Although the shift is within the range of statistical error for small samples, it suggests that changes from a year of drought and food shortages to a period of good rainfall and high productivity can strongly influence nutritional status. It demonstrates a significant aspect of the nutritional problem in Machakos arising from the year-to-year fluctuations in rainfall.

The period-to-period variability in Machakos children's nutritional status is also evident in data from two studies by the Medical Research Centre, for 1975-1976 in table 3.2 and for 1977 in table 3.3. The nutrition researchers concluded that the children's nutritional status was generally well-adapted to their environment. The children were small, however, reflecting long-term under-nutrition (table 3.2). They also noted distinct lean (September-December) and harvest (June-September) seasons. Their 1977 study showed a lower proportion of acute malnutrition (indicated by weight-for-height) but about the same amount of chronic malnutrition (height-for-age) as the other study.

In summary, the available data indicated that the most serious nutritional problems in Machakos are related to seasonal and year-to-year variations in food supply.

The seasonal aspects of food problems in the region were confirmed by the mortality figures. In general, the indicators of infant and child mortality are low compared with other parts of Kenya. According to Project studies, in 1978 infant mortality was about 50 per 1 000 live births and the death rate among 1 to 4 year olds was about 11 per 1 000. As 1978 was a year of good rainfall and harvests, these low mortality rates reinforce the relationship between nutrition and health and the impact of climatic conditions on food supply.

The incidence of diseases in the District did not seem to correspond to the same seasonal indicators, and did not appear to be directly related to environmental conditions.

The Initial Assessment

Although the Project design included a wide range of components, the nutritionist visiting the area discovered that, as yet, only two major activities - a watershed rehabilitation programme with a soil conservation element and a credit scheme for small farmers - were being fully implemented. The delay in many of the project components could mean that the nutrition study would stand a greater chance of having some influence on the final design. The Initial Assessment would concentrate on evaluating the impact of water rehabilitation and the credit scheme on nutrition in the region.

According to the evaluation done during the Desk Review, the Initial Assessment should concern itself with analyzing the nutritional and health status of the population, food production and consumption, factors affecting food security, farming patterns and Project strategies and activities in terms of their potential impact on nutrition.

In an effort to determine whether or not the amounts of food produced in

Table 3.2 Nutritional status of Akamba children, Machakos District, 1975-1976

Age group (months)	Size of sample	Average WA %	Average HA %	% < 90% HA "stunted"	% < 80% WH "wasted"
0 to 6	34	96	95	12	6
7 to 12	30	86	95	13	27
13 to 18	35	82	91	34	17
19 to 24	28	84	91	43	14
25 to 30	27	84	91	41	22
31 to 36	22	84	91	32	9

Source: Van Steenberg, W. M. et al. Machakos Project Studies IX. "Food intake, feeding habits and nutritional state of the Akamba infant and toddler". Trop. Geogr. Med. 30: 505-522, 1978, pg. 517.

Notes: WA = weight for age
HA = height for age
WH = weight for height

Table 3.3 Nutritional status of Akamba children, 1977

Age group (months)	% < 90% HA	% < 80% WH
1 to 3	16.7	0.3
4 to 6	6.5	0.4
7 to 9	6.0	1.0
10 to 12	12.9	1.5
13 to 18	31.5	1.5
19 to 24	40.3	0.9
25 to 36	36.2	0.4
37 to 60	36.2	0.4

Source: Coman, H. A. P. C., A. A. J. Jansen and W. T. Mannetje. Machakos Project Studies XIV, "Growth pattern of rural Akamba pre-school children". Trop. Geogr. Med. 31: 421-439, 1979.

Notes: Longitudinal data, based on a sample of 568 children at two locations in north-western Machakos District.

HA = height for age
WH = weight for height

the region were adequate to feed the population, the nutrition team looked at food production figures. Given that the population in 1976 was estimated as 869 000 and assuming that half the population was made up of children under the age of 15, the estimated total food production in 1976 of cereals, legumes and cassava alone should have been adequate to meet energy requirements. If livestock products in the same year are taken into account, the average supply in the region was even more than adequate. However, the data indicate that Machakos had a problem of undernutrition.

The nutrition team also used data on food consumption to judge the quality of the diet. The main diet consisted of maize, beans, pigeon peas, green leaves and milk. Most of the food consumed by families in Machakos was produced at home, with little dependence on the market for food items. According to the Project studies, measurements of food consumed by pre-school children (more than 6 months old) indicate that in 1978 this group received between 86 and 96 per cent of its energy needs and met or exceeded its protein requirements. The diets were found to be deficient in iron, calcium and riboflavin. It was not possible to determine any other nutrient deficiencies. The food produced in the region appeared adequate in both quantity and quality.

Because the basic diet of the region is nutritionally sound and Machakos seemed to have the potential to produce enough food to feed its people, other reasons for the incidences of malnutrition had to be sought. Consequently, the nutrition team examined more closely the seasonal variations in food supply, and the resulting fluctuations in food consumption.

An analysis of the production potential in different parts of Machakos indicates that food security was a particularly severe problem. Several aspects have already been mentioned: those of poor land communications and marketing, high crop losses and labour shortages. In addition, the shift from the traditional crops such as sorghum, millet and local white maize to the Katumani maize had increased yields, but the new maize was less drought-resistant. When the farmers grew sorghum, they could always rely on some yield. Also, even if marketing systems were more effective, it was unlikely that those in need of food would have the money to buy it. The integrated rural survey conducted in 1974-1975 found that the median income for the District was only 2 000 shillings (KSh). More than 10 per cent of the small farmers in Machakos reported incomes below 1 000 KSh; 38 per cent reported incomes between 1 000 KSh and 2 000 KSh. Even taking into account the consumption of home-produced food, it appears that close to 50 per cent of the population had incomes below the minimum required for adequate food consumption.

The nutrition data on the District, income information and details on food losses indicate that the average production and consumption figures for Machakos might be misleading. Although the traditional diet is adequate and the area could produce enough food to feed its population, most of the small farmers in the region had neither sufficient land nor money to feed their families year by year, season by season. It seems likely that the bulk of the food grown in the region was produced by a small number of wealthier farmers and was not available to the majority of the population.

Having completed a general assessment of the nutritional situation in Machakos, the nutrition team analyzed the potential impact of the two major Project components currently being implemented.

First, the watershed rehabilitation programme was designed to supply water to households in the District by means of subsurface dams. Within 20 years, the programme should provide for permanent domestic water sources

within 3 km for 80 per cent of the population of Machakos. A community must engage in soil conservation and appoint a local water management committee as a pre-requisite for the construction of a dam. This was designed to ensure the ecological stability necessary for water development and increased productivity and also encourage community cooperation in managing and developing the region's resources.

In general, the nutritional status of an area can benefit from an increase in water supply and from easier access to its source. It has been shown that the quantity of water available is often as important as the quality of water in improving hygiene. An improvement in hygiene is necessary for reductions in nutrition-related intestinal illnesses. Ease of access to water helps in reducing the amount of time women spend fetching water and increases the time for agricultural activities, child care and household maintenance. Livestock herds, too, benefit from the increase in water. With the prerequisite of soil conservation, crops may be less vulnerable to drought and soil depletion.

Although there are some negative aspects to water development whereby open water sources, such as streams, can become contaminated and spread gastrointestinal infections and parasites, the water rehabilitation component is likely to have a positive effect on the nutritional status of those near the water developments.

The other major component already being implemented was a credit scheme. Farmers were able to obtain loans if they agreed to plant 2 acres (0.8 ha) in a cash crop, usually cotton, as a loan security. In addition to the cash crop, the credit cooperative strongly urged the farmers to plant 1 acre (0.4 ha) in staple crops, usually maize, and 1 acre in "rescue" crops, usually beans, pigeon peas or cowpeas. It was the intention of the credit scheme to increase incomes through the sale of the cash crop. However, a review of the credit scheme revealed a number of problems in its design and operation that limited its income-generating and nutrition-improving impact.

First, the land requirement was a minimum of 4 acres (1.6 ha), which left out almost half of the smallholders in Machakos. Probably that proportion consisted of the farmers who did not hold enough land to participate in the scheme and were most in need of incomes, so the credit component would effectively ignore those most in need of the Project benefits.

Second, the cash crops which must be planted as security for the loan took land that was formerly used to grow food crops. In a District with a serious food security problem, the reduction in food crop production might exacerbate the problem because it was not certain there would be enough food for the farmers to buy in order to feed their families. Unless the Project could insure that adequate supplies of food could be brought into the region to replace those lost to cash crops, the policy of encouraging cash crops should be reconsidered.

Third, the scheme was operated inefficiently. The loan to the farmer took the form of agricultural inputs required for cultivating cotton, which often arrived too late. The crops might be lost and the farmers might end up with neither food nor income. The scheme was also plagued with loan defaults. After harvest, the cooperative was supposed to purchase the cash crop, but many farmers sold their crops to traders instead.

Fourth, labour requirements for cotton cultivation were very high and conflicted with the labour demands of the food crops. Food crops were often neglected in order that the cotton would not be lost, in spite of the efforts of the cooperative to encourage both cash and food crops.

Fifth, the other benefits of the scheme, including a range of intermediate technology, which should help food production as well as cash crop production, were available only to those farmers who had more than 4 acres of land.

In short, the credit scheme was failing to meet the MIDP objectives: to help the most disadvantaged farmers in the region. In Machakos, as elsewhere, the most disadvantaged tended to be less creditworthy. The credit component was not reaching the target group and also had the potential to worsen the precarious food and nutritional situation in the District. The credit scheme could complicate the problems it was designed to solve by diverting land from food to cash crop, and by increasing the gap between farmers with more than 4 acres and farmers with less land.

The nutritional assessment team suggested that the Project consider assistance to the small farmers in the form of extension services, since loans were difficult to administer and small farmers were not good credit risks. This assistance in farming practices and nutrition would not create a burden of debt for the farmer and would provide the kind of information needed to increase production, increase incomes and improve nutrition.

The Initial Assessment was based on existing secondary sources of information with no new analysis of available data. At the recommendation of the nutrition team, an In-Depth Study consisted of reanalyzing some of the data. This provided an opportunity to examine more closely the relationship between nutritional status and the variables likely to be affected by the two current MIDP activities.

The In-Depth Study

For the In-Depth Study, the nutrition team used IRS4 and the second national nutrition survey. (See comments on p. 36.) IRS4, carried out between May 1978 and May 1979, had collected data on agricultural production, livestock management and division of labour as well as descriptive information on household variables from a sample of 3 550 households. For the nutrition survey, 3 525 children from 1 550 households included in IRS4 were measured, using standard anthropometric techniques. Nutrition variables based on each individual child were combined with household variables, data on water availability and information on sewage disposal. Although it would have been useful to have had specific figures on labour force participation and income levels, the information was not available at the time of the new analysis.

The nutrition team broke down the sample of the two larger surveys in order to examine only the population in relevant parts of the Project area. In total, there were 13 clusters of sample households from the semi-arid regions of the District. Of the 261 households in the cluster, 133 had children for a total of 214 children. The anthropometric data were reduced to only two parameters: stunting, which is defined as less than 90 per cent of height-for-age, and wasting, which is defined as less than 80 per cent weight-for-height. Socio-economic and water-related variables were aggregated into different groups according to their distribution in the population.

The analysis included the cross-tabulation of nutritional status with socio-economic variables. Wasting and stunting were cross-tabulated with the following variables:

(a) Morbidity (defined by children who were reported to have been sick within the two weeks prior to the interviews);

- (b) Cattle holding (as a proxy variable for wealth);
- (c) Land area;
- (d) Distance to sources of wet and dry season water;
- (e) Income (defined as income from sale of crops);
- (f) Maize production and consumption;
- (g) Highest education grade attained by any male in the household.

The results of this analysis are presented in table 3.4. Over half the children of the sample, from the semi-arid parts of Machakos, were stunted, with 52 per cent below 90 per cent of the standard height-for-age. The figures for wasting were much less severe than those for stunting: only 12 per cent of the children fell below 80 per cent of the standard weight-for-height.

From the cross-tabulation of nutritional variables with the other variables, wasting was lower among children of cattle owners than among those who relied exclusively on agriculture. Stunting, on the other hand, appeared to have no relation to the wealth variable. In fact, stunting, though somewhat lower in those households which would be considered well off, was high regardless of landholding, landholding per capita in the household, income from the sale of crops and livestock and the amount of maize grown. The high percentage of stunting, regardless of the variable tested, tends to confirm the feeling expressed in the Initial Assessment that the national standard for height-for-age might not be applicable in Machakos.

The most distinct relationships discovered in the analysis were those between nutritional status and size of landholding and the landholding per capita in the household (see table 3.5). Among those households holding less than 0.25 ha, a significantly higher proportion of children was stunted. This relationship was maintained when landholding was standardized by household size. As for the wasting variable, wasting was a much more serious problem in those households with less than 1 ha of land. Any programme or project activity designed to focus exclusively on those with less than 0.25 ha of land would have significant nutritional results although it would reach only a small proportion of the undernourished population in the area. Instead of concentrating on such a small group, the recommendation of the In-Depth Study was that the target should be those households with less than 1 ha. The nutritional improvement that would result from an effective programme for this group might not be as dramatic but it would be more widespread, directly attacking the problem of wasting which, in the opinion of the nutritional investigators, was more acute than the apparent incidence of stunting.

The other variables covered in the cross-tabulation (table 3.4) showed only a tenuous relationship to malnutrition. Farm income, which was based only on the sale of crops and livestock, did appear to affect the prevalence of both stunting and wasting slightly. Farm production variables showed some sensitivity to nutrition. Monthly maize consumption appeared to be the strongest produce indicator with children in those families consuming more maize per capita per month being less malnourished.

The interpretation of the Study suffered somewhat from the small sample size. As table 3.4 indicates, from landholdings of less than 0.25 ha, there were anthropometric data available for only 23 children. It is difficult to make an informed assessment of the problem with so small a sample. From landholdings of less than 1 ha, there were data on a total of 69 children, which indicated that stunting and wasting were consistently more prevalent among children in this group than the 130 children from landholdings of more than 1 ha.

Table 3.4 Stunting and wasting of young children in Machakos related to selected socio-economic factors, October-November 1978

Socio-economic characteristics	Total no. in sample	Stunted children in sample		Wasted children in sample	
		number	percentage	number	percentage
Size of landholding (ha)	<u>214</u>	<u>111</u>	<u>52</u>	<u>26</u>	<u>12</u>
none	16	5	31	1	6
.01 to .24	23	21	91	6	26
.25 to .49	23	15	65	5	22
.50 to .99	23	12	52	5	22
1.0 or more	129	58	45	9	7
Cash farm income (KSh/month) ^{a/}	<u>184</u>	<u>95</u>	<u>49</u>	<u>20</u>	<u>3</u>
.001 to 11.9	43	28	65	9	21
12.0 to 39.9	51	27	53	6	12
40.0 to 129.9	52	25	48	2	4
130 or more	38	15	40	3	8
Maize consumption per person per month (kg)	<u>214</u>	<u>111</u>	<u>52</u>	<u>26</u>	<u>12</u>
none	2	2		0	
.001 to 5.99	65	38	58	12	18
5.00 to 7.99	27	18	67	3	11
8.00 to 12.99	82	38	46	10	12
13.00 or more	38	15	40	1	3
Number of cattle	<u>214</u>	<u>111</u>	<u>52</u>	<u>26</u>	<u>12</u>
0	74	43	58	14	19
1 to 4	89	39	44	6	7
5 or more	51	29	57	6	12
Morbidity ^{b/}	<u>187</u>	<u>111</u>	<u>59</u>	<u>26</u>	<u>14</u>
not sick	101	58	57	19	19
sick	86	53	62	7	8
Dry season water sources	<u>214</u>	<u>111</u>	<u>52</u>	<u>27</u>	<u>12</u>
off farm - open	88	33	38	7	8
off farm - closed	55	36	65	7	13
on farm - open	17	11	65	4	24
on farm - closed	28	18	64	5	18
pipd	26	13	50	3	12
Maize production (kg/month)	<u>207</u>	<u>111</u>	<u>54</u>	<u>25</u>	<u>12</u>
less than 25	37	21	57	7	19
25 to 50	55	36	65	10	18
50 to 95	55	25	45	5	9
95 or more	60	29	48	3	5

Source: National nutrition survey, Kenya, 1978.

Notes: a/ Excluding those without cash farm incomes.
b/ See text for definition.

Table 3.5 Specificity of landholding in determining nutritional risk in Machakos District

Area in hectares	Percentage of total households	Percentage of children stunted	Percentage of children wasted
Landholding			
≤ 0.25	13	91 ^{a/}	26 ^{c/}
≤ 0.50	25	78 ^{a/}	24 ^{b/}
≤ 1.00	38	70 ^{b/}	23 ^{c/}
> 1.00	62	45	7
<u>Per capita</u>			
landholding			
≤ 0.04	12	90 ^{a/}	24
≤ 0.08	24	70 ^{c/}	20
≤ 0.16	41	65 ^{c/}	21 ^{b/}
≤ 0.50	74	58 ^{c/}	16 ^{c/}
> 1.00	13	28	3

Notes: Significant differences in proportions of malnourished compared with those with more land:

a/ P < .001

b/ P < .01

c/ P < .05

The In-Depth Study confirmed the findings of the Initial Assessment. With respect to identifying the target groups for MIDP, those most in need were those with the smallest amount of land. They were also those least likely to benefit from the credit scheme currently in force in the District. Any positive impact from the credit scheme on nutrition would not be felt in this group and the nutritional gap between those farmers with less than 1 ha and those with more than 4 acres (1.7 ha) would only increase.

In terms of the potential of the water rehabilitation programme to improve nutrition, the In-Depth Study tested nutritional variables against distance from the types of water source. Among the sample households, most had water either on the holding or within 2 km during the dry season. There were, however, significant and consistent differences in nutrition based on the type of water source. (See table 3.4.) Open water sources were defined as streams, standing pools and small dams. Closed water sources include springs, wells, boreholes, subsurface dams and collected rainwater. The analysis revealed that nutritional status was better in households using open water sources located off the holding or piped water than it was among those households using wells. These findings suggest that there might be problems in the District with well maintenance or that wells might have become contaminated. The generally poor nutritional status associated with water sources on the landholdings probably related to inadequate sewage disposal practices.

Although the findings of the In-Depth Study contradict the concern expressed during the Initial Assessment that open water sources might lead to greater incidence of disease and increase in malnutrition, they do support the recommendation that water sources be monitored. The water rehabilitation programme had no system for monitoring water quality. If the programme was to achieve maximum benefit from the improvement in water availability, it would have to ensure that water sources were free from contamination. As the programme was constructing off-holding subsurface dams, i.e. closed water sources, the In-Depth Study recommended a more detailed examination of the interrelationships among water sources, distance to water and sewage disposal methods. An analysis of water samples from all types of sources, surveillance of how water was carried, stored and used in the homes plus information of the quantities of water taken from the different sources could be cross-tabulated against nutritional status of the households. Results of that assessment could be incorporated into the programme to avoid any negative impacts on health and nutrition in the project area.

3.3 CONCLUSIONS AND IMPLICATIONS FOR PROJECT IMPLEMENTATION

It was impossible for the nutrition team to predict to what extent its findings would be incorporated into alterations in the Project design or into implementation. The team was not involved in the initial planning stages and so it is unlikely that the nutritionists would be accepted as authoritative sources of advice to MIDP. In addition, the fact that the Project objectives made no specific reference to social and nutrition goals for the District made it easy for Project and local officials to ignore the findings of the nutrition team and implement the plans as they were initially intended.

The Project in its present form and method of delivery is not doing all that it could to improve the quality of life and nutrition in the District. In order to live up to its potential to improve nutritional status, MIDP should emphasize components that will directly help the smaller landholders in the region.

Of the two programmes currently being implemented, watershed rehabilitation could become more effective if it were concentrated in Yatta and the Southern Division, where the problems of drought, soil erosion and depletion are the most severe. The assessment recommended surveillance of water quality to ensure that water development is a positive and not a negative force in the District. The nutrition team also suggested that jobs from the programme be offered first to the small landholders, who are most in need of incomes, recognizing the potential for the construction demands of the water rehabilitation programme to create employment.

In terms of increasing employment opportunities in Machakos, the nutrition investigators recommended that the Project implement other components designed to create jobs. Any job opportunities should be timed to avoid conflicting labour demands, keeping in mind that food production in the region requires heavy amounts of labour for planting and harvesting. Creating employment in the District could actually reduce agricultural constraints by decreasing the need for males to migrate to find work.

Practical ideas, incorporated into MIDP, will cost little and may produce additional benefits for those most in need. In a review of the material available for analysis in the Machakos case study, the nutrition team noted some deficiencies. The sample size was small. Although food security was the main nutritional problem in the District, there was no information available on food storage. In order to (a) provide the area with food security, prevent further erosion and depletion of the environment and (b) improve the nutrition of those people most in need, i.e. the small farmer owning small tracts of land and earning less than 2 000 KSh per year, the Project could introduce the following intermediate agricultural technology: improved drought-resistant crops, fertilizer, manure, pesticides, semi-mechanized ploughing and crop storage facilities. The nutritional assessment team recommended that the Project consider expanding its planned programme for agricultural extension and giving priority to that programme. At present, there is one agricultural extension agent for every 500 farmers. Given the distances between communities in Machakos, the agent cannot begin to provide assistance to the farmers who need help. The extension system should be more efficiently managed, in order to reach more people, and should train and use "junior agricultural assistants". In conjunction with any effort to increase incomes, marketing and distribution systems for food must be improved. An increase in income will not be reflected in an improvement in nutrition if the food is not available to buy.

Although the case study may not have an appreciable effect on MIDP, it was a valuable exercise in the development of the methodology. From this experience in Kenya, the nutrition team was able to prove that it is possible to do a credible assessment of the nutritional situation in a region on the basis of very limited amounts of available data. There is no doubt that the kind of information gleaned from the available data may not provide as complete a picture as a survey designed specifically to research nutrition in the region. However, it is possible for a trained nutritional assessment officer to look at existing data and gain new knowledge about social and nutritional problems. This means that planners and funding agencies have an opportunity to incorporate a nutritional perspective into a project inexpensively. As long as sufficient data are available, there is no need for costly, time-consuming surveys.

THE KERICHO SMALLHOLDER TEA-GROWERS PROJECT

Compared with Machakos District, much of the land in Kericho District of Rift Valley Province in Kenya is rich and fertile. Farmers holding large tracts of land have successfully grown and marketed tea for several years and the Kenyan Government, having looked at the potential of the region, decided that there was an opportunity for smaller landholders to benefit from tea production. The Kericho Smallholder Tea-Growers Project (KSTGP), administered by the Kenya Tea Development Authority was started in 1964, and has expanded steadily since then. The Project's primary objective has been to bring small landholders into the cash economy with the hope that increased tea cultivation would create employment opportunities and higher incomes. Hence, the region would prosper economically and socially.

Kericho District lies along the southwestern edge of the Kenya Highlands, forming a hilly shelf between the main escarpment and the lowlands of Nyanza. Most of the region rises over 2 000 metres (m) above sea level, dropping sharply to below 1 300 m along the borders with Kisumu District.

The land in the District ranges from high agricultural potential to medium potential to marginal and semi-arid conditions, and covers an area of approximately 4 928 km². Average rainfall varies from 1 200 to 1 800 mm with good distribution. There is no period of the year without rain. Rainfall is highest in April and May and lowest in January and February. The temperature varies with the altitude, ranging on average between 20 and 28 degrees Celcius. On the whole, the District benefits from a fairly constant weather pattern.

3.4 THE AGRICULTURAL, SOCIAL AND ECONOMIC CONDITIONS

In 1979, the population of the district was estimated to be 635 000. The population density was only 145 persons per km², although most of the population was concentrated on the most productive, high-potential lands in the region. As the population continues to increase rapidly, land is growing scarce and the pressure of the available land has led many people to migrate into the drier parts of the District.

The main food crops grown in the Kericho District are maize, beans, finger millet, wheat, barley and potatoes. Significant amounts of land are devoted to livestock, with tea cultivated as a cash crop. Rain-fed maize is the staple crop of the District and grows in almost all parts of the region. Because of the constant weather pattern, maize is produced and harvested throughout the years, and is generally available in the markets at reasonable prices. In 1979 there were about 15 000 smallholders who were growing tea and about 39 000 who were not.

The largest area of arable land is devoted to maize (45 600 ha), tea (7 800 ha), beans (2 900 ha) and sugar cane (2 400 ha). It is a general tendency among the small landholders to devote more land to grazing than to crops.

Total food production in the District appears to be more than adequate to support the current population. It is assumed that each adult or equivalent (in these estimates, children under 15 make up approximately 50 per cent of the

population and are considered to be equal to half an adult) requires 180 kg of maize, 150 kg of milk and 34 kg of beans per year. Current production should be able to feed at least 1 million adults, or over 300 000 more people than presently live in the District. Estimates indicate that inhabitants produce about 60 per cent of what they consume, and purchase the other 40 per cent.^{9/}

In the main tea-growing areas of the District (Sot, Buret, Kono Mosop, Waldai and Chepsir), about 12 per cent of the total land area is devoted to cultivating tea; maize and beans are the subsistence crops. Generally the tea is grown on areas that were previously used for subsistence agriculture or for pasture. In many cases, tea growers rent other land in order to produce subsistence crops. According to local officials overgrazing is becoming a problem because of the amount of grazing land that has been turned over to tea cultivation. In those parts of the District concentrating on tea, there is little new land available for grazing.

Although most people live within easy walking distance of a permanent source of water, the quality of the water which comes from rivers, streams and pools is low. These open sources of water are often dirtied by cattle and other animals and only about half the population has latrines, which may also contribute to poor water quality.

However, the District is generally well served in terms of health care. There is one health centre for every 5 500 people (one in every 43 km²) and a mobile health unit that delivers services to the more remote parts of Kericho. Major health problems in the District are reported to be parasitic and gastro-intestinal diseases, malaria, tuberculosis and venereal diseases.^{10/}

There are no current infant mortality figures available for the District. In 1974, infant mortality in the Rift Valley Province was estimated at 50 per 1 000 live births.^{11/} As the land and weather in Kericho are hospitable, it is likely that the infant mortality rate for the District is lower than that for the whole province. Poor sanitation and the high incidence of malaria are thought to be the major causes of infant mortality. Although there is no detailed information on income distribution, social and cultural mores of the smallholders (primarily the Kapsigis) ensure that no family is in dire need. The road system in the District is well-developed (0.4 km of roads per km²) as are the marketing and distribution systems.

3.5 THE SMALLHOLDER TEA-GROWERS PROJECT

KSTGP consists mainly of providing extension services and agricultural inputs for tea cultivation, and transportation and marketing services for the plucked tea.

The Project had no direct or indirect social or nutritional objectives beyond the unstated, but assumed, objective of improving the standard of living by increasing incomes. The assumption is that increased incomes and an increased participation in the cash economy will create a healthy social and economic environment for those involved in the Project. In economic terms, KSTGP has been successful.

^{9/} IRS. I, 1974-75, Basic Report, Central Bureau of Statistics.

^{10/} District Development Plan, 1979-83, Kericho District.

^{11/} Statistical Assistant, 1979

Working mainly with small landholders in the high and medium-potential land areas of the region, the Project has increased the area under tea cultivation from 631 ha in 1963/64 to 7 364 ha in 1979/80. The number of farmers growing tea has grown from 1 751 to 15 617 over the same 16-year period.

The Desk Review

The Desk Review confirmed the economic results of KSTGP. Income among tea growers had increased and as tea cultivation is labour-intensive and provides regular, year-round work for pluckers, the Project had created significant additional employment in the region. Each grower employs an average of three pluckers who earn approximately 120 to 200 KSh (\$16 to 37) per month. It was because the Kericho programme seemed so successful that FAO selected it as a case study for its new methodology.

KSTGP presented an opportunity to assess the nutritional impact of a programme that had successfully converted small landholdings for food crops to cash-crop cultivation. As cash-crop agriculture is an intrinsic part of development, an analysis of the effects of the Project on those involved in tea cultivation and on the rest of the population in the Project area could provide useful information to development planners.

The Project allowed FAO to test for the social benefit of increased incomes: whether a project with no stated specific social or nutritional objectives could bring about social improvements simply by increasing incomes. It was also an opportunity to measure the effects of development on those who live within the Project region but who are not directly involved in the Project, i.e. in the case of Kericho, those small landholders who are not growing tea.

A visit to the Kericho District confirmed that there were local officials willing to cooperate with the study, and that information was available for an adequate assessment of the Project. There appeared to be three major questions to be answered in assessing the situation: Have higher incomes among tea growers led to improved nutrition? Have higher incomes among labourers employed in tea cultivation led to improved nutrition? What positive or negative impacts has the Project had on other groups in the District?

The Initial Assessment

The nutritional assessment team analyzed the nutritional situation in the District, using information on the nutritional/health status of the population, on food production and consumption, on wealth and income distribution, on farming patterns and on Project strategies and implementation. The team identified four major groups within the region likely to be affected by the Project: smallholders who grow tea, smallholders who do not grow tea, local labourers on the tea estates and migrant, itinerant or landless labourers on the smallholdings. These groups encompassed the basic problems within the region of population pressure, small landholdings, poverty and undernutrition.

The nutritional investigators did not expect to be dealing with severe nutrition or health problems, given that Kericho is a fertile region and that food scarcity is not a problem. They were rather looking for indications as to whether or not nutrition and health were improving with the economic development of the District.

Statistics on wealth and income distribution revealed that about one fifth

of the total land in the District was held by large farmers with the remainder held by smallholders. The distributions of smallholders by size of holdings and incomes are shown in table 3.6. Comparisons with earlier data on landholdings appeared to indicate that there had been a significant decrease in the median size of landholdings. According to a 1969 agricultural sector survey conducted by the Government of Kenya and the World Bank, the average landholding was about 3 ha. The 1974 figures placed the average holding at 1.5 ha. The figures probably overstate the shift, but clearly the division of land by inheritance, rapid population growth and the minimal increases in the lands available for cultivation have all contributed towards smaller landholdings.

As part of the Initial Assessment the nutritional investigators used estimates of minimum food and other costs, in order to determine that about one third of the smallholders in the District fell below the "food poverty line", which was estimated as a total income of 1 870 KSh, assuming that 73 per cent of income was spent on food. But the social and cultural mores of the smallholders mitigated against severe nutritional problems which would otherwise have resulted because of lack of income.

Although no current dietary studies were available, the local diet appeared to be adequate. The nutritional investigators thought that as long as energy requirements were satisfied, protein needs would also be met. They noted the important role of milk in the diet, which represents 21.6 per cent of the money value of food produced for home consumption and is a vital source of protein and energy.

Anthropometric evidence from the 1977 and 1979 child nutrition surveys conducted by the Central Bureau of Statistics indicated that Kericho (defined as Tea, West of Rift Zone) is not significantly better or worse than the national average (see table 3.7). Between one quarter and one fifth of the children surveyed were chronically undernourished (less than 90 per cent of the standard height-for-age). A further analysis of the 1977 data showed that the children of tea growers appeared to suffer more from undernutrition than did the children of non-tea-growers, with an estimated 37.5 per cent of the children of tea growers being under 90 per cent of height-for-age while 16.1 per cent of the children of non-tea-growers were considered stunted. ^{12/}

This latter finding, which is rather surprising given the incomes of the two groups, was confirmed by local health officials who also believed that the nutritional and health status of children on the tea estates was significantly worse than that of other smallholders. In addition, their experience had led them to conclude that the children of labourers on the tea estates were more likely to have nutritional problems than those children of labourers who worked for smallholders who did not grow tea.

However, although District personnel recognized a nutritional problem among the children of those farmers cultivating tea, they still believed that tea cultivation was good for both the smallholders and the community. Incomes from tea were high and although hours were long, the tea estates paid good wages and rented good housing to the pluckers. The nutritional investigators were able to see other aspects of the tea project when examining the situation in Kericho. First, the children of tea growers appeared to be less well-nourished; second, tea was being grown on high-quality land that was previously used for food production; and third, incomes from tea were high, but people growing tea or working for tea growers were entirely dependent on the cash economy. On the other hand, labourers working for smallholders growing food crops worked

^{12/} Central Bureau of Statistics, Ministry of Economic Planning and Community Affairs, Child Nutrition in Kenya, pp. II, 3-7 and 3-9.

Table 3.6 Distributions of smallholders by size of holding and income, Tea West of Rift Zone, 1974-1975

Size of holding (ha)	Percentage of holdings	Amount of income (KSh)	Percentage of smallholdings
below 0.5	19.6		4.9
0.5 to 0.9	22.8	1 - 999	3.0
1.0 to 1.9	18.3	1 000 - 1 999	26.0
2.0 to 2.9	12.7	2 000 - 2 999	4.3
3.0 to 3.9	9.5	3 000 - 3 999	15.4
4.0 to 4.9	5.8	4 000 - 5 999	16.6
5.0 to 7.9	5.2	6 000 - 7 999	7.5
more than 8.0	6.2	more than 8 000	12.3

Source: Government of Kenya, Central Bureau of Statistics, Integrated Rural Survey 1974-75, Basic Report, Nairobi.

Table 3.7 Nutritional status, children of smallholders, Tea West of Rift Zone, 1977 and 1979

	Size of sample	Mean WA ^{a/} (sd)	Mean HA ^{b/} (sd)	Mean WH ^{c/} (sd)	90% or less of standard HA	80% or less of standard WH
Tea, West of Rift 1977	174	86.6 (11.6)	94.3 (5.7)	94.7 (10.0)	21	4
Kenya 1977	1 383	86%	93%	96%	29	4.5
Tea, West of Rift 1979	379	88.6 (11.7)	93.8 (5.9)	100.1 (11.2)	24	2
Kenya, 1979	2 586	n.a.	n.a.	n.a.	27	4

Source: Nutrition surveys of Kenya by the Central Bureau of Statistics

Notes: a/ weight-for-age.

b/ height-for-age.

c/ weight-for-height.

sd is standard deviation, which is given in parentheses in each case.

n.a. means not available.

shorter hours and were paid lower wages, often in kind as food, especially maize, meat and milk. Hence, they were less dependent on the cash economy.

Access to subsistence food might be preferable to high levels of cash income under the prevailing circumstances in Kericho. It was also possible that the foods purchased by those dependent on the cash economy were of a lower nutritional quality than the foods that made up the traditional diet. Perhaps sugar products, bread and snack foods were being substituted for the traditional maize, beans, meat and milk. Those smallholders who once grew their own food and were currently growing tea might not be spending their money to ensure proper health and nutrition for their families.

The nutrition team concluded that in the case of the small tea growers, i.e. the KSTGP direct target group, the Project was not achieving the maximum possible nutritional improvement. It recommended that the Project agency monitor the nutritional status of the children of tea growers, introduce a nutrition education component aimed at the target group, monitor the situation of labourers and encourage growers to provide food as part of the salary paid.

Although such proposals would not necessarily improve life for those groups in the population who suffered most from poverty or undernutrition, they would help the Project meet its unstated objective of improving the quality of life for those participating.

The report of the Initial Assessment necessarily recognized the limited mandate of the Kenya Tea Development Authority, and suggested that an In-Depth Study could identify those groups within the population most at need, assess the causes of poverty and undernutrition in the region by comparing the nutritional status of tea growers and non-tea-growers and assess Project impact on the economic and social environment of Kericho (e.g. food availability, prices, etc.).

The In-Depth Study

The In-Depth Study involved a new analysis of the 1979 data for Kericho District only. It revealed that, in general, nutritional status in Kericho is better than in many other parts of Kenya. Only 9.8 per cent of the children can be considered wasted (below 80 per cent of weight-for-height) while 16.2 per cent are considered stunted (below 90 per cent of height-for-age). This analysis shows little difference between the nutritional status of children from tea-growing families and other cultivators (see table 3.8), although there were significant differences in family farm incomes, farm area and maize consumption. Non-tea-growers had a high consumption of maize.

The analysis indicated that the size of area for cattle, the number of cattle held, and the per capita area devoted to food crops did not lead to improved nutrition. Also maize consumption, sewage disposal or tea growing were not directly related to improved nutrition. The one factor specifically associated with improved nutrition was the breed of cattle: holdings with "improved" cattle were always associated with better nutritional status for the children in the family.

Farm income had uneven effects on nutrition. Further analysis showed that households that earned from 12 to 40 KSh per month from the sale of produce and livestock had poorer nutritional status than the rest of the population. It is possible that this group was covering expenses by selling food and had no other source of income, and was thereby only marginally surviving.

Table 3.8 Comparison of nutritional and socio-economic status between teagrowers and non-teagrowers, Kericho District, 1979

Characteristic	Teagrowers	Non-teagrowers	Total sample
Number of households	99	104	203
Number of children	170	176	346
		percentages	
Stunted children	44.1	48.3	46.2
Wasted children	9.4	10.2	9.8
Sick children	26.5	36.9	31.8
Ownership of hybrid cattle	66.7	43.3 ^{a/}	54.7
<u>Per capita area holding of (ha):</u>			
less than 0.04	5.2	18.4 ^{b/}	11.8
less than 0.08	17.5	36.7 ^{b/}	27.2
less than 0.16	42.3	55.1	48.7
less than 0.5	88.7	82.6	85.6
<u>Farm income (in KSh):</u>			
less than 12	15.7	20.7	18.5
less than 40	27.1	37.9 ^{c/}	33.1
less than 130	35.7	73.6	57.7
<u>Per capita maize consumption (kg/month)</u>			
less than 6	46.4	16.7 ^{a/}	31.2
less than 8	66.0	36.3 ^{a/}	50.8
less than 13	92.8	75.5 ^{a/}	70.9

Notes: Levels of significance between teagrowers and non-teagrowers:

a/ P < 0 .001

b/ P < 0 .01

c/ P < 0 .05

Those with lower incomes from the sale of farm produce may be compensating with off-farm employment. More information on incomes is needed to determine a precise relationship.

The most important result of the new analysis of the data on tea-growers was the following: although they have more cattle, larger landholdings, higher incomes and are generally better off by every indicator, the nutritional status of tea-growers' children was very little better than those in the same area who were not growing tea. In this case, higher incomes did not indicate a concomitantly improved nutritional status. Also, those within the group growing tea who were also growing maize, had a lower risk of poor nutritional status than those growing only tea.

All of these findings relating income levels to nutritional status have to be interpreted with care. Overheads of tea production might have been high, leaving the tea growers with less income to spend on food. However, if incomes were higher among the growers, as they appeared to be, then either the tea growers were choosing to spend their money on items other than food, or they were purchasing an inadequate diet. In either case, the problem was probably not one of income but of education. The teaholders might need nutrition education on how to buy the food that would ensure proper nutrition for their families. They might also need to be encouraged to grow food crops as well as the tea, so that they would not be entirely dependent on the cash economy.

A major problem facing those smallholders not growing tea was that they could afford less food in a situation of rising prices. The Project agency would have to ensure that food production within the region stayed at a high enough level so that food prices would not increase dramatically and leave those outside the cash economy more vulnerable than they already were. In addition, with the potential for profit from tea cultivation, land values were rising steadily. An increase in land prices, combined with the growing population pressure on available land and the trend to smaller landholdings, might mean that smallholders were increasingly likely to be moved off their land and into the labour force. Clearly the cash potential of the region must be balanced against the needs of the people for food and the land to grow the food on.

In summary, the nutrition team recommended that the Kenya Tea Development Authority attempt to maintain a balance between tea and food production, ensuring adequate supplies of reasonably priced food for the region.

All those growing tea should also be encouraged to devote some of their land to food crops and to cattle. Labourers should, where possible, be paid in part with food. Education programmes in nutrition and in purchasing food to ensure a proper diet should be given to those growers and labourers who are dependent on the cash economy. The problems created by the prosperity brought to the region by the tea project such as migrant, itinerant workers, higher land prices, etc. should be monitored and addressed by those concerned with the integrated development of Kericho.

3.6 CONCLUSIONS

From the KSTGP study, FAO was able to show that economic improvement is not synonymous with social benefits or nutritional improvements. If a development project expects to bring about an improvement in the quality of life, those objectives should be stated explicitly and considered specifically in project planning.

The Kericho example also proved that a very inexpensive process of re-analyzing existing data can reveal information useful in a study of the social and nutritional situation in a project area. Even using very limited amounts of data, the nutrition team was able to identify those groups within the population who were most at risk of malnutrition, determine what factors are most directly related to nutritional problems and recommend ways and means for Project officials to enhance the social and nutritional benefits of tea cultivation.

In spite of the fact that KSTGP had no system for monitoring effects on the population, the FAO study demonstrated that it is possible to establish with considerable certainty what the Project impact will be in certain specific areas.

Although it is impossible to judge to what extent KSTGP will consider the recommendations of the study, the results strengthen the arguments that early consideration of the social and nutritional implications of development efforts can greatly enhance the effects a project can have within an area.

Had improved nutrition been a stated objective of KSTGP from its inception, the need for nutrition education would have been identified much earlier, and the Project could have compensated for any negative impact on food production and on the non-tea-growers in the region.

Still, even at a late stage in the Project life cycle, the nutrition study offered District officials the kind of analysis they needed to correct food-related inadequacies and avoid serious social problems in the future.

Chapter 4

PERU:

THE PUNO RURAL DEVELOPMENT PROJECT

Anxious to improve the living conditions of the rural poor in Peru and to increase agricultural production, the Government approached the World Bank in 1977 to ask for support for a rural development project. The World Bank, in turn, involved the FAO Investment Centre in assessing and planning the project.

In choosing the site for the project, planners considered ecological factors (such as climate, terrain and access to water) and the present agricultural, social and economic situation in a number of regions in Peru. In consultation with the Peruvian Government, in particular with the Ministry of Agriculture and Food, one of the poorest regions of Peru, Puno, was selected for the project.

4.1 ECOLOGICAL, AGRICULTURAL, SOCIAL AND ECONOMIC CONDITIONS

Puno is located in the ecological zone of Peru known as the sierra. The area is rugged, mountainous and high above the sea. Both the climate and the terrain of this zone are relatively harsh. Although temperatures vary little from season to season, they vary dramatically from night to day. Nightly frosts are common for much of the year, while by day the sun is scorching. Rainfall is very uncertain. The long, dry spells cause excessive evaporation, dry up the pastures, erode the soil and create salt deposits. For the most part, the soil is poor and vegetation sparse. Hailstorms are frequent and destructive. Because the rainfall decreases and the frosts become more severe from north to south, the southern part of the sierra is the poorest natural area for cultivation.

Because of the extremes of temperature, the lack of rain and poor soil, a large part of the land in the Puno region is suitable mainly for grazing. Beef cattle and sheep have displaced the more traditional herds such as llama and alpaca in the less hospitable parts of the region.

Land suitable for agriculture is confined mainly to the flat lands around the

basin of Lake Titicaca and to some small sheltered valleys in the region. As rainfall is so unreliable, farmers find it difficult to gauge the planting season. If planting is delayed too long, the growing season is too short for the crops to ripen; if done too early, sprouting seeds can be desiccated. Little use is made of fertilizers or green manure. Crops consist primarily of traditional cereals such as quinoa, pulses and tubers. Most of what is grown is consumed by the farming communities themselves: only large farmers can export a surplus of meat and potatoes to other parts of the country. Because of the frost and hailstorms, vegetables or fruits are only cultivated in the lowest part of the region.

The already severe problems of climate and terrain and the lack of agricultural technology are complicated by the Peruvian system of landholding. In the Puno region there are three kinds of farms: large, communally owned farms, medium-size private farms and small individual farms. The large farming enterprises, formed under the provisions of the Agrarian Reform, own large tracts of land and devote a large part of their resources to herding. Some of their land is potentially available for agriculture.

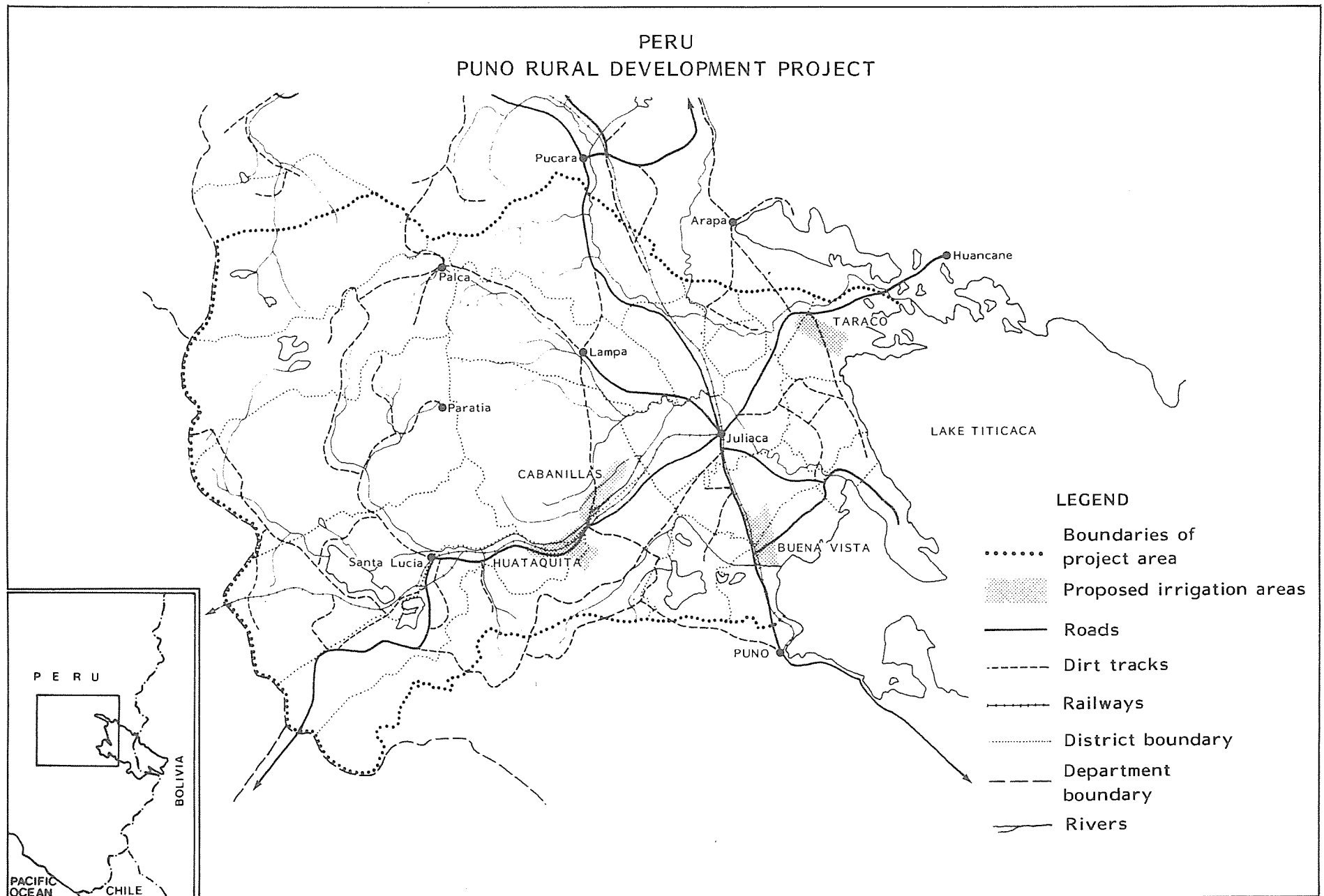
The small individual farmers own quite small tracts of land and work the farms with the help of their families. Often these small farms are made up of a number of tiny plots, no bigger than gardens. This is a result of the pattern of inheritance whereby land is subdivided with each generation. The average size of plot ranges from 0.1 to 0.6 hectares (ha) and the plots of one family combined will not usually be more than 3 or 4 ha. Because the amounts of land held by small farmers are so small, average family production and income are both very low.

In the mid-1970s the small farming units in Puno produced 80 per cent of the crops and owned 20 to 30 per cent of the cattle grazing land. Depending on the size of the family and its landholding, the small farmers were about 80 per cent self-sufficient in food production. Any excess food produced was sold for cash to buy non-local foods such as rice and bread and other essential consumer goods. Those who had no excess for sale had to seek work wherever and whenever it was available (mostly as seasonal labour in coastal towns or farms) in order to earn the income to buy non-food supplies.

The poverty of this area of Peru has been exacerbated by neglect. Settlements are often difficult to reach because of the steep slopes in the region. The location hinders the development of market systems and community services. Roads are expensive to build. Government investment in development and agriculture has tended to focus on the coastal regions and on the more northerly parts of the sierra. Until recently, relatively little thought had been given to the effects of national policies on the economy of the region. To date, Government efforts to encourage agricultural development through credit schemes are being greeted with reluctance because farmers fear eviction and loss of farm tools that might result from the inability to repay loans.

4.2 THE RURAL DEVELOPMENT PROJECT

It was decided to concentrate the development project in a small area, a micro-region, with the intention to duplicate the same development activities in neighbouring regions at a later stage. The Committee for the Development of Puno and the Ministry of Agriculture and Food chose as the micro-region the area around Juliaca. In the extreme south, bordering Lake Titicaca, Juliaca



is typical of the sierra in climate, soil and level of agricultural technology.

Other advantages in selecting this area were that the Project group could make use of available studies on the natural resources in the area and of a well-developed infrastructure with good road and rail links from Juliaca to Puno, the capital of the region, and Arequipa, the most important industrial centre in the south of Peru. Moreover, good cooperative relationships had already been established between the Project group and other technical groups working in the area.

The Project inputs were expected to include assistance in farming technology, such as the introduction of improved strains of seeds and genetic improvements in cattle stock; general improvements in agricultural technology by training in the construction and maintenance of irrigation systems; improvements in the soil through the use of animal manure, compost, nitrogen-fixing crops and seeding pastures. The construction of irrigation systems was considered to be the major factor in increasing productivity. Both large and small landowners were to be invited to take part in training courses. The Project intended to encourage the farmers to work in groups for mutual support and assistance.

The Ministry of Agriculture and Food planned to support the Project by providing extension services and opportunities for research through the universities and technical colleges.

The Committee for the Development of Puno gave also priority to an improvement of the availability of health services and water supply in the micro-region.

It was the intention of the Project team to involve fully the local people (participants in and beneficiaries of the intended rural development project) in the process of the Project, from planning through to evaluation.

The Desk Review

In many ways, the Puno Rural Development Project (PRDP) was an ideal case study for integrating nutrition into development. The Project met almost all the criteria FAO had set for identifying projects with potential for nutritional input and nutrition benefits. PRDP plans included an emphasis on increasing agricultural production and improving technology which was consistent with FAO's philosophy of improving nutrition within an environment of real social and economic change. Placing of extension services and research efforts within the universities and technical colleges indicated to FAO the country's commitment to continuing agricultural development and education.

The Government of Peru expressed its intention to improve the living conditions of people in the Puno area. The micro-region selected for the development confirmed that the Project was trying to reach poor, needy groups within the population.

Health centres and clean water - two other objectives of the PRDP - signalled the kind of ecological and environmental changes that would support improved nutrition and health.

Another reason for the selection of this Project as a case study for the newly formulated methodology was that FAO had already analyzed the food and nutrition situation in the region. In 1976, with funding from SIDA, FAO had

analyzed the data from the 1971-1972 Peruvian national food consumption survey (ENCA) in an effort to advise the Government on how to respond to nutritional problems identified in the survey. Working with the newly established Ministry of Food (currently the Ministry of Agriculture and Food), FAO looked at ways in which the country could reverse the growing dependence on imported foods and ease the pressure those imports were putting on the country's foreign exchange.

The Peruvian Government wanted a national food plan - a new policy strategy for food production, supply, distribution, marketing and pricing - and asked FAO to help with its development. As was the case with the rural development project, FAO recommended forming and testing the national plan in one part of the country: the southern part. The FAO food plan team was already at work in the region around Puno when planning for the rural development project began. It seems likely that the Peruvian Government's work in the area of nutrition and food planning shaped the expectations they had for the rural development project.

The Initial Assessment

In assessing the nutritional problems and the potential impact of PRDP on the people within the Project areas, FAO was fortunate in having data from the 1971-1972 Peruvian national food consumption survey. Those planning the Project itself also made extensive use of information from that survey.

The sample for the survey, a total of 8 000 families, had been designed to enable the Government to do regional and departmental analyses. The survey data included statistics on 500 families in the Puno region. Although 500 is not considered a large sample, it was felt that the information provided by the survey was representative of the social, economic and nutritional status of the people of Puno.

Survey data included general family characteristics, sex and age, level of education, anthropometry, migratory history, geographical location, family income and expenditure, and home production and consumption of food. To determine the adequacy of the diets, enumerators had weighed the food in each household before it was consumed over a period of a week and noted the number of people present at meals.

Family food intakes were analyzed to identify variations in nutritional adequacy. Using the data on seven days' consumption, each family's total intake of food energy was compared with its estimated requirement. The estimate of the requirement took into account the number of meals at which each person was present and the food energy requirement of each person. Total intake compared with total requirement gave a percentage level of satisfaction at the family level.

Families were grouped together by levels of satisfaction for calories, protein and other nutrients. The cross-tabulation of families by levels of calorie and protein satisfaction is summarized in table 4.1.

Table 4.1 Levels of satisfaction of caloric and protein requirements among sample families in rural Puno, in percentages

Level of satisfaction of protein requirement	Level of satisfaction of caloric requirement		
	< 60	60-99	≥100
< 80	10.3	0.8	1.4
80-99	12.9	10.9	7.1
≥ 100	2.6	6.2	47.7

Source: Informe del Proyecto Sobre Estrategia para Alimentos, Peru, Organización de las Naciones Unidas para la Agricultura y la Alimentación, Roma, 1979.

According to the survey analysis, about half of the rural families in Puno had diets adequate in both energy and protein. Nearly all households that reported adequate energy intake had also adequate protein intake. Of those families with inadequate protein intake, about one third were consuming diets that supplied less than 80 per cent of the recommended protein requirement. Of those households with inadequate energy intake, almost two-thirds were consuming diets that supplied less than 60 per cent of the recommended energy requirement. In addition to protein and energy deficiencies, the data identified a widespread dietary shortage in vitamin A, due to low consumption of fats, fruit and vegetables. The data also indicated some deficiency in calcium. There were no significant, widespread deficiencies in iron, vitamin C, thiamin or riboflavin. Identification of families by such deficiencies led to the conclusion that 40 to 45 per cent of rural families in the Puno area had serious dietary deficiencies. An analysis of anthropometric data, height and weight also confirmed that a substantial number of children in Puno were undernourished.

Having determined that a significant percentage of the population of Puno were at nutritional risk, the assessment officer could conclude initially that the region, because of the need for nutrition improvement, appeared to be a good choice for the rural development project.

To establish that the benefits of PRDP would reach those most at risk and most in need, the data analysis had to identify the socio-economic characteristics of the malnourished in the region. A factor analysis yielded the following information about family income, nutritional deficits and the areas of land farmed (table 4.2).

Clearly those families with less than 3 ha of land to farm, dependent on their own production for their food and with (as would be expected) lower incomes, were those most at risk of nutritional deficit.

Table 4.2 Typology of the malnourished population

	Average <u>per capita</u> annual income (soles)	Nutritional deficits	Land farmed per family (ha)
1. Members of cooperatives (Agrarian Reform)	$\geq 9\ 000$	no deficits	
2. Private farmers	$\geq 9\ 000$	no deficits	> 20
3. Private farmers	7 000 to 9 000	calcium and vitamin A	3-20
4. Private farmers (less than 3 ha) and home consump- tion greater than 80% of total expenditure	4 000 to 7 000	protein, energy, vitamin A and calcium	2-3
5. Labourers and private farmers	< 4 000	deficits in energy and most major nutrients	< 2

Source: Informe del Proyecto Sobre Estrategias para Alimentos, Peru, Organización de las Naciones Unidas para la Agricultura y la Alimentación, Roma, 1979, p. 16.

Note: \$1 = 45 soles in 1974

It was estimated that at least 16 000 families in the region suffered from some form of under or malnutrition.

Given the detailed data available from the survey, the nutritional assessment officer was able to analyze the information in a number of different ways and identify the strength of association among a number of variables (income, occupation, size of farm, food consumption patterns) in determining those people in the region most likely to be at nutritional risk. In addition to being able to relate occupation, income and size of farm to the probability of nutritional deficits, the data allowed for a close examination of food consumption patterns and an analysis of rural versus urban food patterns.

Rural diets consisted mainly of local cereals, tubers, animal fats and beans, while urban diets were made up of rice, bread, milk, meat, sugar, vegetable oil and onions. Within the micro-region of the Project, rural diets predominated except in the town of Juliaca. Looking more closely at food consumption patterns in relation with nutritional deficits, it was obvious that the relatively well-fed rural families were, for the most part, self-sufficient producers of traditional foods (see table 4.3). The poorly-fed rural families had small amounts of "urban" foods in their diets, indicating that they used more of their available cash for non-traditional foods. Although the urban diet was found to be higher in protein than the rural diet (because it included more meat, milk and eggs) it tended to provide less than the adequate amount of energy.

The difference between rural and urban diets reflects the gradual shift to imported foods which had taken place over the past few years in Peru. Traditionally there had always been an exchange of food products among the various regions of the country via complicated systems of kinship and trading partnerships. But, starting in the early 1970s, demand for imported foods had grown. Instead of being content with foods grown in various parts of Peru, the people, particularly those in urban areas with more access to a wider range of foods, tended to spend increasing amounts on imported foodstuffs.

The demand for imported food affected local production to the extent that llama and alpaca herds were being partly replaced by cattle and sheep. Whereas the people of the sierra used to be able to trade the traditional cereals, pulses and tubers, there was now less demand for their products in the other regions of the country and less opportunity for them to trade profitably. The growing dependence on imported foods had created three problems for the people of the region: (a) it threatened the nutritionally balanced traditional diets; (b) it decreased the demand for the traditional crops grown in the region; and (c) it cut into the country's foreign exchange, limiting Peru's capacity for economic growth.

After a thorough assessment of the survey data and the nutritional situation in the region, the nutrition officer was able to summarize the nutritional problems as follows:

(a) Food intake was insufficient owing to lack of land, lack of irrigation, and lack of employment to supplement incomes.

(b) Rural diets were unbalanced because of a shortage of fats, meat and dairy products. In urban areas, there were shortages of fats, vegetables and energy.

(c) The lack of sanitation affected the health of the population and its ability to use available food effectively.

Table 4.3 Average consumption of calories per capita, per day, of selected foods by level of self-sufficiency in food consumption for rural Puno

FOODS	Levels based on index of self-sufficiency ^{a/} (calories <u>per capita</u> per day)	
	Level I	Level II
	up to two thirds of food supply is home-grown low level of self-sufficiency (high level of market dependency)	from two thirds to all of food supply is home-grown high level of self-sufficiency (low level of market dependency)
Rice	40	12
Quinoa ^{b/}	294	369
Barley	402	508
Bread	40	23
Pasta products ^{c/}	21	10
Chuno ^{d/}	371	351
Potato	364	568
Sugar	45	32
Dried broad beans	83	81
Lamb/mutton	23	2
Animal and vegetable oil	73	56
Fresh milk	16	15
All vegetables	8	6
Other foods	504	397
Total calories from home production	1 827	2 188
Total purchased calories	475	242
Total calories	2 284	2 430

Source: Informe del Proyecto Sobre Estrategia para Alimentos, Peru, Organizaci6n de las Naciones Unidas para la Agricultura y la Alimentaci6n, Roma, 1979, p.85.

Notes: a/ Index of self-sufficiency is calculated by dividing the market value of home-produced food by total expenditures, a statistic designated as A/G.

b/ A locally grown grain, Chenopodium quinoa.

c/ Such as spaghetti, macaroni.

d/ A traditionally frozen and dried potato product.

(d) There was a severe lack of clean water.

(e) The shift to imported foods which could not be produced locally was a threat to the traditional diet.

(f) The harshness of the climatic conditions, overpopulation and inadequate levels of food production due to poorly developed agricultural technology, inadequate investment and lack of Government support all contributed to the precarious nutritional status of the people of the region.

(g) Those most seriously affected by nutrition problems were the agricultural labourers and those farmers owning less than 3 ha of land.

On the basis of the nutritional problems thus identified, the nutritional assessment officer made a number of recommendations to the PRDP to help them direct the benefits of development to those most in need.

First, it was suggested that some of the agricultural development efforts be geared towards the small private farmer. Employment opportunities should be part of PRDP, making it possible for agricultural labourers and small farmers to supplement their incomes and, thus, provide more food for their families.

The nutrition officer also suggested that part of the flour for making bread and noodles (which is all imported) could be replaced with a locally grown grain, lessening the import cost for wheat and increasing the demand for local grain to benefit farmers.

Research into the introduction of fish farming was recommended. Although fish was not a traditional part of the diet in Puno, it had been found that people adapt very quickly to fish when it was available. If a method of preserving fish could be found, it would improve the diet of protein-poor rural communities and provide employment in the region.

Reforestation in the region would lessen the severity of the frosts and their effects on local crops, and would provide employment.

Irrigation together with the use of plastic coverings to encourage and protect vegetable production was suggested as a means of providing a wider variety of foods in the diet, and supplying the much-needed vitamin A.

In addition, the nutritional assessment officer pointed out that traditional small plots of land on high slopes or terraces which were not cultivated could be brought back into cultivation by those farmers whose families were subsisting on the production of very small areas of land.

Ancient canal systems could be reconstructed to prevent widespread flooding in the rainy season, and to retain water for the dry season. Any form of control over water supply in Puno would make food production more secure and the people of the region less vulnerable to the environment.

To improve rural food consumption and to help the Government lessen the dependence on food imports, native crops should be developed. The cultivation of improved types of potatoes should be encouraged as they would survive the rigours of the Puno climate and at the same time produce a higher yield than the traditional small tuber.

The nutritional value of local foods and the importance of breastfeeding should be communicated to the people of the region through community

education campaigns.

The nutritional assessment officer also recommended that any particularly severe nutritional problem in the PRDP area be dealt with through direct nutritional intervention programmes such as food aid or food supplements.

All of these recommendations were felt to be within the scope of PRDP. Many of the recommendations, such as irrigation systems and the development of agricultural technology, were already part of the initial Project plan. It should be noted that most of the recommendations dealt with means of focusing the benefits of the Project on those population groups most in need, and with encouraging local crop production and consumption.

Nutritional implications of the final design

There was excellent cooperation among the Peruvian planners, the FAO Investment Centre planners, the Peruvian nutritionists and the FAO nutrition investigators. The recommendations made by the nutritional assessment of the Puno region, along with information on agriculture and ecology provided by the earlier FAO/SIDA investigators, were taken into consideration in the development of the PRDP plan.

The Puno rural development planners worked with the following two broad objectives, both of which reflected nutritional considerations:

(a) To increase food production in the micro-region through raising standards of agricultural technology by means of extension services and the injection of capital

(b) To improve the quality of life of the poorer sections of the population by raising income levels with job creation schemes, improved social infrastructure and an expanding economy in the region and by improving environmental health.

To enable the small farmer to become more self-sufficient in production, specific technical assistance was planned. Provisions were made to ensure the irrigation developments would benefit the small farmers and the nutrition investigator's suggestion about protection for vegetable crops was accepted.

Because of the high yield of potatoes per hectare of land, and their high price in 1978, project planners decided to encourage potato production. With an increase in production, farmers growing potatoes would be able to increase their home consumption or to sell more of their crops at a good price, and use the income to buy other food items. The production of other traditional foods were also encouraged.

Following suggestions included in the FAO/SIDA report on integrated development planning, PRDP made provisions for improving cattle farming in the micro-region. An increase in the production of cattle and sheep would lead to more wool, fibres, milk and meat to supplement food supplies for home consumption and to supply products for sale and trade, producing more income in the area and stimulating the development of markets and trade with other regions. Project planners also wanted to encourage the raising of guinea pigs because they have traditionally been an important source of meat for highland Peruvian families.

In addition to its plans for increasing food supplies, PRDP took seriously

the recommendation to improve incomes in the area, particularly for the landless agricultural labourers. Various infrastructural works were designed to be labour-intensive; priority for employment was given to the poorest families. The jobs created included planting trees, working on road construction and maintenance, putting up telephone lines and building telegraph offices to improve communications in the region and building health centres, first aid posts and water stands. As is obvious from the list of work projects, they were designed not only to provide jobs, but to produce changes in the region that would improve the socio-economic situation and lead to further development. Tree planting would improve the soil and environmental conditions, as well as providing firewood. Roads and communications would encourage marketing, trading and distribution systems. Health centres would mean improved health care for the people of the region, particularly women and children.

Project planners also made provisions to support about 70 small artisans and small businesses through technical assistance and credit, giving priority to those with potential for processing agricultural products.

To improve living conditions and sanitation, an increased water supply from local windmills would be available for household as well as agricultural use.

In addition, Project planners also suggested that nutrition education be disseminated through the health centres, and that each centre have its own vegetable plot which would not only help feed those at the centre, but show them how the vegetables could be grown and used.

It was clear to the nutritional investigators that the Project team had successfully incorporated their nutritional concerns into the basic plan for the Project.

Part of the PRDP plan included measures for monitoring and evaluating the progress of development. Because of the number of PRDP activities designed to improve the food consumption, health and nutritional status of the population, Project planners intend to use indicators such as maternal, infant and child mortality and anthropometric measurements on children from 1 to 5 years in their monitoring system.

4.3 NUTRITIONAL IMPLICATIONS OF PRDP, AND CONCLUSIONS

The PRDP began implementation in 1979. By 1983 the main activities related to agricultural production were underway. Potato production had increased as had, to a lesser extent, cereals and cattle and sheep raising. Food availability in the area already showed a marked improvement over pre-Project levels. Not all specific nutritional components (rural water supply, health centres, small gardens) were implemented.

It is impossible to measure the effect of PRDP on nutrition in the region until the Project has had the time to develop to its full potential. It is anticipated that, by 1985, some evaluation data will be available.

With the Peruvian Project, FAO benefitted greatly from being on site and being involved early in the planning process. This effort marked the first time in Latin America that rural development project planners gave so much priority to nutrition in development.

As with the other case studies using the methodology, nutritionists were able to identify target groups for the Project. Because of their early involvement, the nutritional assessment officers were afforded the luxury of making the best possible recommendations for nutritional improvement, rather than warning against dangers in Project components already planned and underway.

Again it should be stressed that much of the effectiveness of the nutritional contribution to a development project depends on the commitment of government and project officials, and on the quality of the working relationships formed between the nutritionists and other project personnel.

From the Puno experience, FAO has been reminded of the importance of having trained, local people available to help with the nutritional assessment and with implementation of nutritional components. It is the feeling of those involved in PRDP that the delay in implementation of the nutrition-related activities is due specifically to the lack of adequately trained local personnel.

Chapter 5

THE PHILIPPINES:

THE PALAWAN INTEGRATED AREA DEVELOPMENT PROJECT

Through the 1970s, the province of Palawan in the Philippines, despite an immense resource potential, suffered an unbalanced dualistic development. Large corporations had been moving into the province, exploiting the potential of the region for mining, logging and some large-scale farming. The large, well-financed companies bought up the better land, and the local inhabitants - mostly lowland paddy farmers - were pushed onto narrow strips of the upland where they continued their marginal farming activities.

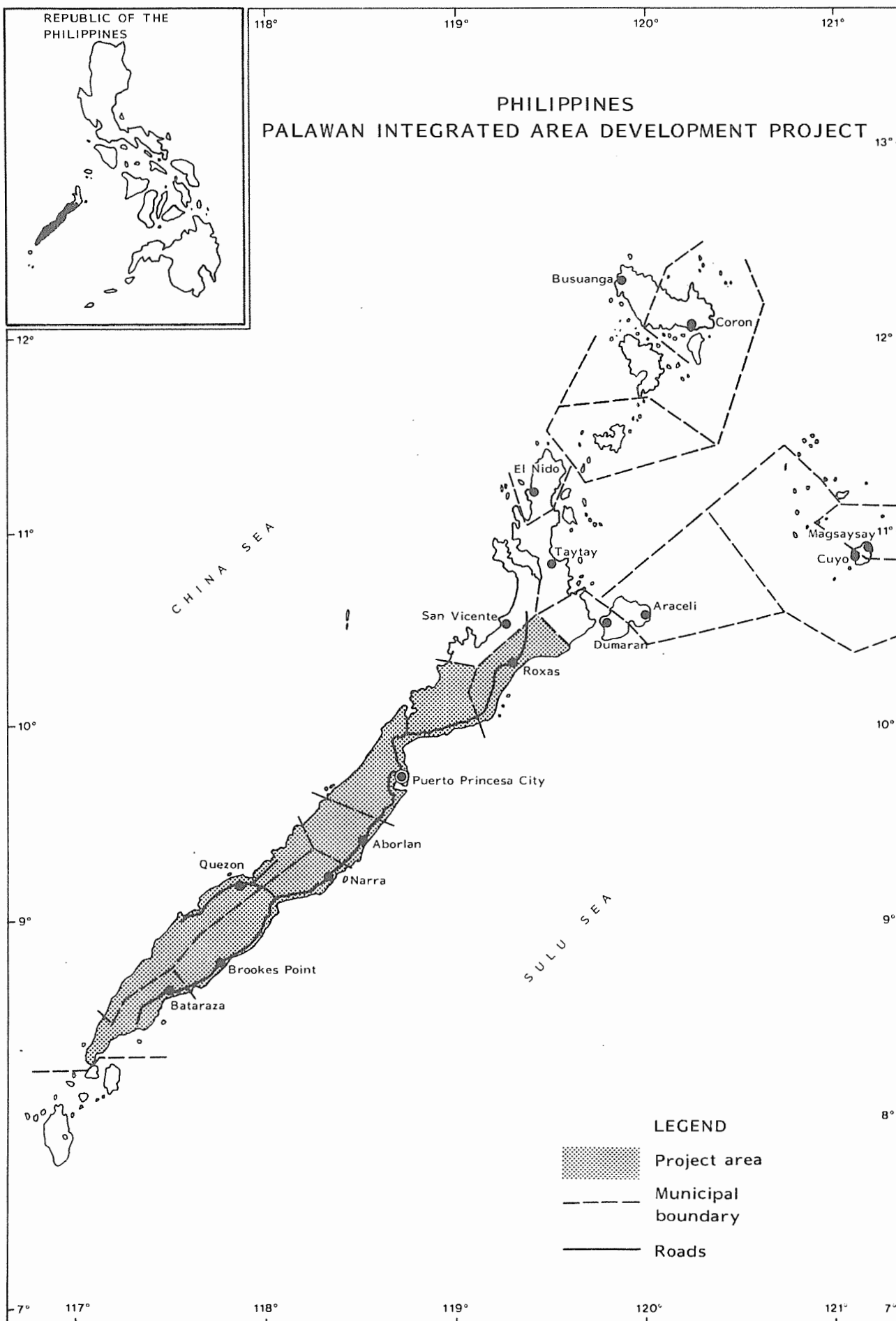
In addition to the pressure from corporate investment and development, the 1970s saw heavy immigration of people from other parts of the Philippines into the province. This large influx increased the strain on the available land and food resources, aggravating economic, social and ecological problems.

In an effort to ensure a more balanced, integrated approach to economic and social development in Palawan, the Government of the Philippines decided to undertake an integrated development project in the area and turned to international funding agencies for assistance in planning and implementing the project.

5.1 ECOLOGICAL, AGRICULTURAL, SOCIAL AND ECONOMIC CONDITIONS

Palawan is the largest province in the Philippines, with a total land area of 1.48 million hectares (ha), made up of one large island (known as the Palawan mainland) and 1 767 smaller islands. The long narrow mainland consists of a range of hills forming the central axis which slopes steeply down to narrow coastal plains.

The climate is tropical and monsoonal; more rain falls on the west coast and in the northern and southern parts of the mainland (2 920 millimetres per year, mainly from June to November) than on the east coast (1 672 mm per year, mainly from July to October). There are several small, perennial rivers and a large number of small intermittent streams. The island is rich in forests, minerals and fish. The lowlands have good soil and the greatest potential for agricultural development, whereas in the hilly areas the soil is shallow.



Given the predominantly mountainous terrain of the province of Palawan, agriculture is practised only on the lowlands, the inland valleys and the uplands. It is estimated that of the total surface area of Palawan, 58 per cent is forested; most is operated under logging concessions. Of the area that is unforested, about two thirds is considered suitable for agriculture and one third for pasture. The area of the land under permanent cultivation (about one half of the potential) is some 110 000 ha, while another 200 000 ha are subjected to shifting cultivation.

Of the land in the province under permanent cultivation in 1975, less than one sixth was irrigated. The major crops were rice, corn, coconuts and cashews. Yields of all crops were low and neither corporate farms nor other agricultural development schemes were living up to production expectations.

Compounding the problem of low yields, shifting cultivation, widely practised in upland areas, has extensively degraded the soil in several large areas of the southern part of the province.

In addition, the adverse effects of intensive logging and mining operations threaten the ecological balance in the province. Although the Government has encouraged some reforestation, the programme has not been systematic enough to afford adequate protection for the environment.

Although there is much scope for constructive development of Palawan's natural resources, the economic and social development of the region has been constrained by inadequate transportation systems. Improvement of roads and communication is needed in Palawan to provide better access to markets though the main port of Puerto Princesa and to encourage commercial agriculture and resource development in the province.

The population of Palawan, estimated at about 300 000 in 1975, is projected to be 508 000 in 1986. The population is concentrated in the southern part of the mainland where the annual growth rate is higher (4.7 per cent) than in the rest of the province because of immigration, and where superior lands are located. In 1975, the median family income was 58 per cent of the national figure. Eighty per cent of the population depends on agriculture - for the most part subsistence farming, or fishing for survival. About 20 per cent of the population is made up of economically deprived ethnic minority groups, who live in the southern part of the mainland and who practice shifting cultivation on marginal lands in the uplands and mountains. Although there is great scope for agricultural development in Palawan, supporting services and institutions for development have been very poor. Health and education facilities are also lacking in the area. Malaria and gastroenteritis, the prevalent diseases in Palawan, are attributed to environmental conditions and poor sanitation. Drinking water facilities are few and inadequate except in the city of Puerto Princesa.

Government agencies responsible for development programmes have been handicapped by an absence of realistic and coordinated programmes and the lack of financial resources and logistic support.

One other major deterrent to an integrated approach to agricultural development in Palawan is the system of land tenure. Only 10 per cent of the land cultivated is titled. Most farmers are considered squatters on public lands. This is a particularly severe problem in light of the fact that most of the people in Palawan depend on subsistence farming for their survival; they have no guaranteed right of access to the land. When public lands were granted to corporate farms and other agri-business concerns, many small farmers were displaced, in spite of the fact that they had occupied the land for years. With

the growing number of immigrants and, consequently, the increasing demand for the available land, the need for land tenure has become more serious, and the problem is likely to worsen. The struggle for land has aggravated racial tensions and has had a particularly adverse effect on the ethnic minorities.

5.2 THE INTEGRATED DEVELOPMENT PROJECT

Planning for the Palawan Integrated Area Development Project was initiated in 1978 by the National Council on Integrated Area Development (NACIAD), the agency created by the Government to prepare, implement and monitor all integrated area development programmes. Consistent with the integrated development policies of the Philippine Government, the Palawan Project was intended to include programmes for production (agriculture, livestock, forestry and fishery) supported by the requisite infrastructure (feeder roads, ports, irrigation) and necessary support services (extension, health, credit, village water supplies). The total budget for the first five years of implementation was estimated at US\$ 85 million (US\$ 34 million in foreign exchange, the rest in local currency).

In choosing priority areas in the province for the development, NACIAD looked at the resource potential of the different parts of Palawan, at population concentrations, at existing infrastructures and at social and ecological needs. Based on the fact that 75 per cent of the Palawan population lives in municipalities south of Puerto Princesa, central and southern Palawan was selected as the Project area. (See map.) This part of the province had an established, if underdeveloped, road system and high potential for integrated development. It was the area of the province that had suffered most severely from earlier trends in unbalanced development; it displayed the kinds of social and ecological problems that the Government of the Philippines was anxious to solve through the integrated area development projects scheme.

The Project planned for Palawan stressed the importance of helping the most depressed social and economic groups such as marginal and small farmers and fishermen, and sought to benefit the maximum number of people in the area through improved agriculture, fisheries, transportation and by other services that would for example eradicate malaria, supply clean water and improve nutrition.

The Government's commitment to a basic improvement in life style for the people of Palawan was demonstrated by the early involvement of the National Nutrition Council (NNC) in the project planning. In 1979 the NNC was appointed full member of the steering Committee of NACIAD.

The Desk Review

Because of the high awareness of the importance of nutrition in the Philippines and because of the recent emphasis within FAO on integrating nutrition into rural and agricultural development projects, the Philippine Government approached FAO in October 1979 to cooperate in the preparation of nutritional aspects of the Palawan Project. The Project plan had the stated objective of improving social and economic conditions for those in need, and included provision for infrastructure such as roads, health centres and water supply and offered many opportunities for improving the agriculture base on which the majority of the population were dependent. Because of the Government commitment to nutrition and the willingness of planners to take into account a nutritional assessment of the Project components, FAO felt there was

a good opportunity to contribute to the Palawan Project and great potential for nutrition benefits from the proposed integrated area development.

The Desk Review of the Palawan Project was not as structured and analytical as it would have been for a country less familiar to FAO. Nutrition officers and nutrition consultants had been involved in work in the Philippines throughout the 1970s. The food and nutrition situation was fairly well documented and local nutrition institutions were experienced. FAO had earlier assisted the Government of the Philippines in formulating its national food and nutrition plan.

The Initial Assessment

An FAO nutrition officer discussed the FAO methodology with local people who had the expertise and administrative skills to support a nutritional assessment of the project area. A multidisciplinary Nutrition-Oriented Development Planning (NORDPLAN) team formed at NNC, comprising an economist, a nutritionist, a regional planner and a sociologist, spent two weeks in October 1979 assessing the food and nutrition situation in Palawan. The work benefitted greatly by the fact that one member of the team had worked on the initial preparations for the Palawan Project. The team based their initial findings on available data.^{1/} This Initial Assessment led to the following conclusions and recommendations.

It was estimated that 27 per cent of the children under 6 years of age were moderately or severely malnourished (i.e. below 75 per cent of the Philippine reference weight-for-age).

Although reliable data on child mortality were not available, a report from the provincial health office indicated that the under-5 mortality rate was high.

According to the Ministry of Health, malaria is the most frequently reported disease in Palawan, affecting particularly young children and contributing to anemia, malnutrition and child mortality. Gastroenteritis is another major cause of mortality and malnutrition in children. Tuberculosis and respiratory tract infections are also widespread.

Food consumption data for Palawan in 1978 yielded a mean of 1 813 kcal/head/day, equal to 93 per cent of the recommended daily allowance. The protein/calorie ratio of 10.8 per cent was adequate and indicated that, on average, if energy requirements were being met then protein requirements would also be met - even for young children. Intakes of vitamin A and riboflavin were particularly deficient. The average Palawan diet in terms of weight consisted of cereals (50 per cent), fruits and vegetables (33 per cent), fish, meat and poultry (14 per cent), roots and tubers (4 per cent) and fats and oils (1 per cent).

^{1/} (a) Operation Timbang, a nation-wide child-weighting programme conducted annually, provided weight-for-age data for 17 out of 20 municipalities in the province. (b) The National Food and Nutrition Survey of 1978 provided food consumption data for 138 Palawan households. (c) The National Grains Authority provided food production figures. (d) The NACIAD office was able to supply information on the physical characteristics and farming patterns in Palawan. (e) A 1975 provincial survey gave details on income.

Since 1978 the province had been self-sufficient in rice production, and had exported the equivalent of 2 250 metric tons to other parts of the Philippines. Although the province was producing a surplus of rice, average food consumption appeared to be inadequate to meet nutritional needs. It appeared that the deficit was due to: (a) a low economic demand (many occupation groups were unable to earn enough income to purchase the foods they needed); (b) farming families did not retain enough rice for home consumption; and (c) food preferences were such that the demand for rice was not increasing (income elasticity for rice was around zero).

Palawan produced 2 500 tons of corn in 1979. Corn and cassava supplement the food needs of the average Palaweno and contribute at least 8 per cent of total food energy intakes. Less than 1 per cent of Palawan's agricultural land was devoted to roots and tubers, most of which were produced for home consumption.

Among protein foods, there were shortfalls in eggs, milk, milk products, legumes and, to a lesser degree, fish, meat and poultry. Total meat (pork, poultry, beef) production in 1979 was only 2 360 tons, substantially below the total requirements for the province.

There were significant shortages in green, leafy and yellow vegetables (which are the main source of vitamin A). The province of Palawan is virtually dependent on external sources (i.e. Manila) for vegetables such as cabbage, beans and carrots. In 1979, the province produced about 5 300 tons of vegetables including beans, eggplant, squash, pechay, okra, cucumber and watermelon, much of which was grown for home consumption.

Municipalities located on the higher terrain slopes and in the northern municipalities (El Nido, Taytay, Busuanga, Coron, Araceli) had higher rates of malnutrition than those on the lower slopes and in the southern and central municipalities (Bataraza, Brooke's Point, Narra, Quezon, Puerto Princesa, Roxas, San Vicente), indicating that topography and accessibility contributed to malnutrition. The best rice-producing areas (Bataraza, Brooke's Point, Narra and Quezon) had the lowest rates of malnutrition.

Although the northern Palawan municipalities suffered higher levels of malnutrition than those in southern Palawan, the decision had already been taken that the Project would focus on the central and southern municipalities where the largest percentage of the population lived and where development potential was greater.

The Initial Assessment identified several economic groups which had a relatively greater risk of malnutrition (see table 5.1).

In terms of occupation, the available data indicated that calorie intake in farming and fishing households was 12 per cent below and protein intake 5 per cent below recommended levels, while professional and other workers had sufficient levels of intake.

Low-income groups in Palawan, such as subsistence fishermen, small farmers and landless farm labourers, had lower food consumption and poorer sanitary conditions than the average.

It was the assessment of the FAO/NNC team that income was not the only factor that affected nutrition. They suggested that poor communications, poor access to markets, lack of agricultural inputs and services, lack of education and

Table 5.1 Initial Assessment; tentative classification of occupational groups in terms of extent of malnutrition

(3 = high, 2 = medium, 1 = low)

Main occupation	<u>General location</u>			
	far north	north	south	far south
<u>Farmers (by type of agriculture)</u>				
slash and burn	3	3	3	3
rainfed upland	3	2	2	3
rainfed lowland	3	2	2	2
irrigated (lowlands)	2	1	1	2
<u>Fishermen</u>				
subsistence	3	2	2	3
commercial	2	1	1	2
<u>Wage-earners</u>				
low/medium income	2	2	2	2
high income/professional	1	1	1	1

health care - all factors likely to be aggravated by distance from major centres - were likely to have an effect on nutrition.

Thus, people in the more remote villages, such as in the far north and south, in the highlands and on certain islands, appeared likely to be the most nutritionally vulnerable.

Another factor to be considered in the identification of those population groups most at risk was the prevalence of disease. The multidisciplinary team noted that those living on the coastal plains, especially those near bush and swamp lands, were more likely to suffer from malaria and, as a result of the disease, from malnutrition.

The assessment team attempted to identify as target groups for the Project those who were most in need of the Project benefits, since the Project plans at the time of the nutritional assessment included components that would improve productivity, employment and income which in turn were expected to improve food consumption and the health environment and thus the nutrition of the beneficiaries. Based on the nutritional situation described by the information available, the team recommended that certain occupational and geographical groups be given priority attention in terms of participation in Project activities. These target groups included (a) those living in the more inaccessible barangay (villages), (b) the smaller and less efficient farmers, and (c) subsistence fishermen.

The Initial Assessment suggested modification of certain Project components so that income and food would accrue preferentially to those in need and certain services such as malaria control, health services and potable water supplies in the most affected areas would be improved.

The Initial Assessment also included the warning that some development components could have adverse effects on the food consumption and health of groups in the Project area. Changes in cropping patterns, shifts from food to cash crops, or improvements in marketing could induce farmers to produce less food and to keep less of what they produced for home consumption. Irrigation schemes could increase the risk of malaria. Changes in employment and income could lead to alterations in food habits and child-rearing practices.

Not only was there some concern about possible adverse effects on beneficiaries, but also about people outside the Project area. The nutrition team felt that the diversion of resources (water, land, fuel, agricultural inputs, services) and possible ecological side effects from increased production (erosion, flooding, increased malaria) could potentially harm non-target groups. Planners were asked to look carefully at this aspect of Project components.

The Initial Assessment concluded with recommendations that, during Project preparation, some attention be given to food production and marketing so that food would be more available in remote areas. Given that the province was producing a surplus of rice, it was thought that adjustments in the marketing system could help close the gap between average consumption and nutritional requirements.

Recognizing that Project activities would create much-needed employment and income for target groups, the nutritional investigators asked that opportunities for employment not conflict with the seasonal demand for traditional farming labour. The benefit of increased income would be lost if that income were earned at the expense of family food production.

With regard to further increasing the nutritional impact of the Palawan Project, the Assessment suggested that the design of other interventions such as (a) inputs into food production and marketing and into opportunities to increase income, (b) inputs into existing production and into service-oriented Project components, (c) inputs into the Philippines Nutrition Programme and (d) inputs into health services and environmental sanitation could be improved after further information was gathered on the nutritional problems of the Project area.

The FAO/NNC team felt that they had gone as far as they could in assessing the nutritional problems of the region and the potential for nutritional improvement of the Palawan Project from an analysis of available data. In order to define the nutritional situation more clearly, they recommended a survey of the Project area that would provide, at the barangay level, information on geographical location, ecological characteristics, available services and sanitation; at the household level, information on production, consumption, technology, occupation and income; and the nutritional and health status of the family including morbidity and mortality of children.

Because an in-depth nutrition survey of the Palawan Project area was subsequently approved and undertaken, it is difficult to judge objectively how effective the Initial Assessment itself was in shaping Project planning. Certainly, in two weeks' time, the nutrition investigators were able to get a fairly clear picture of the kinds of nutritional problems the Project should be addressing, and the target groups of particular importance for nutrition.

Based on what was established and recommended from the Assessment, and given the Government commitment to improve nutrition, it is conceivable that nutritional considerations could have been integrated into Project design and implementation without information from a special survey. However, the conclusions were recognized as tentative and more precise definition of problems was desirable for inputs into project design.

The Initial Assessment served to define the kind of data needed for the In-Depth Survey. As well, some of the concerns raised during the Assessment were used by the Project planning officers in drawing up the Asian Development Bank's terms of reference for the feasibility study. The issues to be considered in Project preparation included those food and nutrition problems identified in the assessment stage.

The In-Depth Study

The plans for the In-Depth Study were discussed in detail with Palawan Project planners to ensure that the Study would not only provide data of interest to nutritional analysts, but information that would contribute to Project planning as a whole.

Timing was felt to be of ultimate importance. The In-Depth Study was conducted at the same time as the Project team was carrying out their feasibility study: April through July 1980. These two parallel studies were to complement one another, and those working on the nutrition survey kept in close contact with those involved in the feasibility study, guarding against duplication and taking advantage of information gathered during the course of each investigation.

The most critical phases for integrating the nutrition findings into the Palawan Project were at the Project identification (June 1980) and preparation

(September 1980) stages.

(a) The survey design

The purpose of the survey was to measure the prevalence of malnutrition and the variations in malnutrition among various population groups in the Project area and to identify, to the degree possible, the causes of these variations. The data collected to meet the objective were: nutritional status of pre-school children, household food consumption, health status (morbidity and mortality), and sanitary conditions (drinking water, waste disposal). These indicators were to be related to information on geographic location and topography and to data on occupations, size of farms, housing and proxies of income.

The data were obtained through a survey of 969 households, randomly sampled to represent various population groups in the different agro-ecological (e.g. upland, lowland) environments in Palawan. The survey was conducted in the six municipalities (Puerto Princesa, Brooke's Point, Narra, Aborlan, Quezon and Bataraza) of the central and southern parts of the Palawan mainland - the areas in which the Project would be focused. Seventy-five per cent of the total provincial population lives in these six municipalities.

A two-stage sampling procedure was undertaken. Twenty-five barangay were selected out of a possible 125 and provided the following distribution: 9 lowland, 4 upland, 3 coastal, 1 island and 8 mixed topography. Five of the 25 barangay were town centres, while the rest were rural. Within each barangay, sample households were randomly chosen from a list of residents provided by the "barangay captain". Approximately, 40 households were selected from each barangay. There was weighting at the municipal level, but not at the household level.

One questionnaire, designed for interviews with the barangay captains contained questions about the area: topography, agro-ecological zoning, distance to market centres and health facilities, the presence of irrigation systems and electricity and the prevalence of malaria. The second questionnaire was designed for use in household interviews, to gather information on income, consumption, sanitation, health and the nutritional status of children.

The pre-survey preparation, interviewer's training and data collection took place in November and December 1979, three months prior to the feasibility study of the Palawan Project. Thirty-two enumerators, all residents of Palawan and fluent in at least two local dialects, worked in four supervised teams. The group leader of the NNC supervised the entire survey operation with assistance from an economist, a senior nutritionist, a senior urban-regional planner, a project analyst and a sociologist who were on staff with NNC. Most of the enumerators were college graduates; about 34 per cent of them had had field experience in socio-economic surveys. This greatly enhanced the competence of the survey team.

To ensure the quality of data, several checks were made to validate each interview: immediately after the interview (by the interviewer), at field headquarters (by the supervisor), at the editing stage in Manila (by the supervisor) and as part of data processing.

Survey supervisors provided some preliminary findings for the project selection stage in June 1980. Computer processing was done in July 1980.

For most of the analysis, households were subdivided according to their main source of income (occupation), topographical location and, for farmers, the size of the landholding. Farming groups were also subdivided into slash-and-burn, rainfed and irrigated agriculturalists, and those groups were divided again into types of crops produced, tenurial status and the degree of subsistence. Fishermen were classified into commercial and subsistence groups. (See table 5.1.)

Anthropometric measurements (weights) and ages provided information on the nutritional status of children, 0 to 83 months, in the surveyed households. Subsequently children below 75 per cent of the median weight-for-age (WA) were defined as malnourished. The Philippine growth standard was used to evaluate weight-for-age.^{2/} It is based on the Philippines Food and Nutrition Research Institute (FNRI) classification of WA (1977), and its application in the Palawan survey analysis makes the results comparable with other nutrition surveys in the Philippines. Children with protein-energy malnutrition have typically low WA. Thus, comparison of WA values with the reference growth standard provided an indicator of the nutritional status of the population groups being surveyed.

In order to describe variations in food consumption and nutrient intake and relate those variations to location, occupation and topography, household food consumption data were collected.^{3/} Using the FNRI 24-hour food recall procedure, the mother or the person in the household who usually prepares the meals was asked to recall the quantities of foods eaten by the household over the past 24 hours. Based on the FNRI Food Composition Tables, the amounts of the various foods eaten were converted to nutrient values.

Comparing actual nutrient intake with recommended dietary allowances allowed the nutrition investigators to determine the nutritional adequacy of the diets of the various population groups. Enumerators also collected information about food prices which were validated through a market survey of the barangay to permit some analysis of typical food expenditure.

The household survey also collected data on the mortality rates of children under 5 years of age over the previous 5 years, and details of morbidity (fever, cough, diarrhoea) during the three-day period prior to the interview.

In order to determine the possible effects of sanitation on nutritional status and, ultimately, on the nutritional implications of the Project, the household survey included questions about the type of potable water supply (piped, artesian well, spring, rain) and its distance from the home along with the type of toilet facilities and garbage disposal systems used.

Details about housing, livestock ownership and children's education were taken as indicators of wealth. Family size, sex and age composition provided the demographic data for the household survey.

2/ The Philippine growth standard follows the Harvard growth norm for the first two years and then declines to about 90 per cent of the international reference at age 60 months.

3/ Although FAO methods did not include the collection of food consumption data in the case studies, the NNC team believed that these data could be crucial in influencing project planning towards nutrition goals. Furthermore, the survey team had the capacity and experience to handle, process and analyse food consumption information.

(b) The survey findings

Of the total of 1 034 households surveyed, 969 were included in the final data file, the remainder having been deleted during data checking and cleaning. These households included 7 710 persons, 1 361 of whom were children under 7 years of age. The findings of the survey are presented in tables 5.2 to 5.7. ^{4/}

The over-all findings showed that WA of the children in the sample averaged 86 per cent of the national standard, with a standard deviation of 12 per cent. Twenty-four per cent of the children in the sample had WA below 75 per cent of the standard (see table 5.2). This was below the 27 per cent estimate which was based on the Operation Timbang (OPT; see reference in footnote 1, this chapter) measurements used in the Initial Assessment. (As the OPT survey involved very large-scale data collection, rather than the sampling used in the nutrition survey, it was thought that the OPT figure was probably more representative.)

The under-5 mortality rate of 8.4 per cent (84 per 1 000 live births) was higher than the available Philippine figure of 65 per 1 000. Of the households surveyed, 15 per cent reported at least one young child suffering from fever and/or diarrhoea during the three days prior to the interview. The figure for diarrhoea, affecting 1.3 per cent of young children, was surprisingly low.

The mean per capita energy intake (1 764 kcal per day) was about 90 per cent of the Philippines Recommended Daily Allowance and close to the national average (1 804 kcal per day). Survey results indicated that, with the exception of iron, the Palawan diet supplied less of all major nutrients than did the average diet of the Philippines. For example, protein intake was only 88 per cent of the Recommended Daily Allowance as opposed to the national average of 102 per cent and vitamin A intake was 32 per cent as opposed to 68 per cent.

In terms of sanitation variables, data indicated that 42 per cent of all households in the sample had no toilet or had open-pit facilities, and confirmed that the sanitary conditions of the general population were poor. In addition, the data showed that the economic situation was also quite depressed, with more than half of the respondents living in one-room dwellings.

Cross-tabulations also revealed wide, inconsistent variations in the food and nutrition situation of the municipalities and topographical locations and demonstrated the complexity of the causal relations. Narra, Aborlan and Bataraza warrant priority status, with approximately one third of the children in these municipalities having WA of less than 75 per cent.

Food consumption, morbidity and housing indicators confirmed the severity of problems in these municipalities. Reported food consumption was lowest in the municipalities of Narra, Aborlan and Brooke's Point where 39 per cent, 41 per cent and 40 per cent respectively, consumed less than 1 500 kcal per day. Child mortality and morbidity were highest in Puerto Princesa; 53 per cent of the households in this municipality used open pits for toilets. In Aborlan 31 per cent of households had no pure water supply, and in Bataraza, over 80 per cent lived in one-room dwellings.

^{4/} Subsequent analysis of variance of the survey data undertaken at Cornell University, USA are reported in the Cornell Nutrition Surveillance Programme Report Series No. 12, September 1982.

Table 5.2 Nutritional status of the population and related factors in the Palawan Project area, by municipality

	Total	Puerto Princesa	Brooke's Point	Quezon	Bataraza	Aborlan	Narra
Sample size (households)	969	267	254	112	109	106	121
no. of children in sample	1 361	380	358	159	133	144	187
<u>Child nutrition status</u>							
percentage weight-for-age <75%	23.9	22.4	18.7	11.7	30.0	34.0	34.8
nutrition priority ratio (NPR)	1.0	0.94	0.78	0.50	1.26	1.42	1.46
<u>Child mortality</u>							
percentage of children born and died over past 5 years	8.4	12.3	8.2	6.2	6.3	6.3	5.4
<u>Child morbidity</u>							
percentage with fever over past 3 days	13.5	22.1	11.8	9.8	4.6	8.5	14.0
percentage with diarrhoea over past 3 days	1.3	2.2	1.6	1.8	0	0	0.8
<u>Household food consumption</u>							
percentage < 1 500 kcal/person/day	35	36	40	31	19	41	39
mean kcal/person/day intake	1 764	1 773	1 767	1 741	1 951	1 622	1 716
<u>Household sanitation</u>							
percentage with open pit or no toilet	42	53	40	47	43	32	28
percentage dependent on spring or river for domestic water supply	16	11	10	27	28	31	4
<u>Wealth</u>							
percentage with one-room house	56	45	54	62	82	59	50

Nutrition investigators hypothesize that poor communications and inadequate infrastructures, characteristic of remote areas, and difficult terrain have an adverse effect on nutrition because of poor access to markets, lack of agricultural inputs and services, distance from health facilities and educational facilities. However, bivariate analysis of the data showed that topographical location had no consistent effects on nutrition (see table 5.3). While malnutrition was higher in coastal and lowland areas (28 per cent) than in upland (19 per cent) and urban (18 per cent) areas, child mortality was significantly higher in the uplands (128 per thousand) than in the lowlands (57 per thousand) or the coastal areas (85 per thousand). Upland areas had the poorest water, sanitation and housing facilities.

The nutritional planners turned next to the occupational variables in their analysis of the malnutrition problems of Palawan. The sample distribution had provided data in the following proportion: 52 per cent farming households, 10 per cent fishing households and 38 per cent service/self employed households. WA measures for farming families revealed common patterns of undernutrition (see table 5.4): 20 per cent for rainfed, upland farmers, 26 per cent for rainfed, lowland farmers. Children of slash-and-burn farmers had higher morbidity rates (fever rate of 18.5 per cent) than children of other farmers. The percentage of households with low energy intakes among rainfed lowland farmers was similar to that among slash-and-burn farmers. Households of farms on irrigated land and in upland areas had a better food consumption profile.

Among fishing families, subsistence fishermen who did not own boats, were at greater nutritional risk than other fishing families. The mean energy intake for subsistence fishermen was computed at 1 491 kcal per day which is dangerously low. Their low economic status limits their consumption of food, particularly cereals (rice), the main source of energy in the Palawan diet. Subsistence fishermen had the highest child mortality (16.1 per cent) and fever (35.5 per cent) rates of any occupational group. Eighty-one per cent lived in one-room houses.

Although those working in the service sector and those who were self-employed had incomes which were higher and more regular than those of farming and fishing households, they did not show a better nutrition and health situation. In fact, children of these wage-earners suffered as much malnutrition and morbidity as did children of most farming families.

Although nutrition planners concluded that higher wages did not automatically lead to better nutrition, in the case of the subsistence fishermen of Palawan, it was thought that any increase in income would probably be used to purchase the rice and other foods needed in their diets and would likely improve their nutritional status.

Land ownership and the size of landholdings were found to be important determinants of nutrition, particularly in rural areas (see table 5.5). Farmers with landholdings of less than 3 ha had more malnourished children than those with 3 ha or more. Of those farmers with less than 3 ha, 63 per cent lived in one-room dwellings while only 50 per cent of farmers with 3 to 12 ha lived in dwellings which were that small.

After the data analysis briefly summarized here, the nutrition team ranked population groups on the basis of nutritional status indicators. With this system, nutrition planners could list those population groups at nutritional risk in order of priority. (See table 5.6.) It was felt that this kind of ranking, based on the survey data, would allow the Project planners to target benefits to those groups most in need. Termed a "nutrition priority ratio" (NPR), it is the ratio of each group's

Table 5.3 Nutritional status of the population and related factors in the Palawan Project area, by topographical/geographical area

	Total	Urban	Coastal	Lowland	Upland	Islands
Sample size (households)	969	168	278	338	144	31
no. of children in sample	1 361	240	396	465	202	58
<u>Child nutrition status</u>						
percentage weight-for-age <75%	23.9	17.5	28.3	27.1	19.1	10.3
<u>Child mortality</u>						
percentage of children born and died over past 5 years	8.4	7.9	8.5	5.7	12.8	16.0
<u>Child morbidity</u>						
percentage with fever over past 3 days	13.5	15.8	10.8	11.6	16.2	16.1
percentage with diarrhoea over past 3 days	1.3	1.0	3.2	.7	1.3	3.2
<u>Household sanitation</u>						
percentage with open pit and no toilet	42	32	46	44	51	32
percentage dependent on spring or river for domestic water supply	16	5	11	19	27	90
<u>Wealth</u>						
percentage with one-room house	50	32	55	51	64	55

Table 5.4 Nutritional status of the population and related factors in Palawan Project area, classified by occupational group

	F a r m e r s				F i s h e r m e n			Regular wage-earner	Casual worker	Self-employed	Total
	irrigated lowland	rainfed upland	rainfed lowland	slash and burn (kaingin)	subsistence with boat	subsistence without boat	commercial				
Sample size (households)	102	59	205	135	57	31	(11)	129	140	100	969
no. of children in sample	153	75	286	164	84	50	(19)	190	208	132	1 361
<u>Child nutrition status</u>											
percentage weight-for-age < 75%	23.6	20.0	25.5	23.2	17.9	24.0	(32)	25.8	24.0	23.5	23.9
<u>Household food consumption</u>											
percentage <1 500 kcal/person/day	27	22	36	35	39	61	(40)	36	24	41	35
mean kcal/person/day	1 800	1 870	1 776	1 753	1 636	1 491	(1 850)	1 761	1 768	1 795	1 764
<u>Child mortality</u>											
percentage of children born and died over past 5 years	13.9	2.5	7.4	8.0	12.1	16.1	(0)	6.1	8.8	5.8	8.4
<u>Child morbidity</u>											
percentage with fever over past 3 days	8.9	13.6	9.3	18.5	10.5	35.5	(9)	16.3	13.6	12.0	13.5
percentage with diarrhoea over past 3 days	2.0	1.7	1.0	1.5	3.5	-	(9)	0.8	0.7	1.0	1.3
<u>Wealth</u>											
percentage with one-room house	53	64	61	58	53	81	n.a.	33	64	51	56

Notes: Data in parentheses should be interpreted with caution because of small sample size.

n.a. means data not available.

Table 5.5 Nutritional status of the farming population in the Palawan Project area and related factors, by size of landholding

	<u>Size of farm in hectares</u>				total
	0-3	3-6	6-12	over 12	
Sample size (households)	208	65	34	(10)	315
no. of children in sample	295	83	43	(16)	437
<u>Child nutritional status</u>					
percentage weight-for-age < 75%	25.7	19.3	20.9	(6.3)	23.9
<u>Household food consumption</u>					
percentage < 1 500 kcal/person/day	31	36	36	(30)	32
mean kcal/person/day	1 779	1 820	1 871	(1 700)	1 794
<u>Wealth</u>					
percentage with one-room house	63	48	54	(60)	59

Note: Data in parentheses should be interpreted with caution because of small sample size.

Table 5.6 Incidence of child malnutrition and nutrition priority ratio for selected population groups in the Palawan Project area, in percentages

Population groups	Incidence of child malnutrition <u>a/</u>	Nutrition priority ratio <u>b/</u>
<u>Narra:</u> rainfed lowland farmers	46.9	1.96
<u>Narra and Aborlan:</u> slash-and-burn farmers	40.7	1.70
<u>Aborlan:</u> self-employed and wage-earners	36.7	1.53
<u>Narra and Aborlan:</u> lowland areas	36.0	1.50
<u>Narra and Bataraza:</u> coastal areas	37.3	1.56
Subsistence fishermen	24.0	1.01 (1.18) <u>c/</u>
Tribal minorities	high	high

Notes: a/ Percentages of second and third-degree malnutrition (weight-for-age < 75 per cent) among pre-school children.

b/ Ratio of prevalence of malnutrition in each group over the provincial average.

c/ This ratio is based on calorie intake instead of weight for age.

nutritional status to the provincial average. Each group's NPR can then be adjusted to reflect the population size of the group, so that a small group with a high NPR is not allocated inappropriately large investments in comparison with a larger group with a somewhat lower NPR. This second adjustment ensures that Project investments can actually be targeted in proper proportion to the people in need.

With this priority listing of recommended target groups, the nutrition team also included the following specific comments to help guide planners in modifying Project components to maximize their impact on nutrition.

For the farmer beneficiaries, the effectiveness of Project efforts to improve nutrition would increase if components are selectively directed to lowland agriculture and to small landholders (i.e. those with less than 3 ha).

The slash-and-burn farmers, particularly those in Narra and Aborlan, need special attention.

The fishermen groups, particularly the subsistence groups, were found to have the lowest calorie intake among all occupational classes. Special attention with respect to Project activities is needed by this group.

Looking at the results of the survey, it appears that the In-Depth Study provided the hard data to confirm many of the other assumptions made in the Initial Assessment. In the province of Palawan, the nutritional status of the people seems to be affected not only by occupation and income but also by the lack of sanitation and the lack of access to health and other facilities. The survey also pointed out the strong influence that land tenure, or ownership of a boat in the case of the fishing households, has on a family's ability to meet its nutritional needs. It is clear that those portions of the population that have the least ability to maximize their earnings or their production - whether through fishing or farming - are those who are most likely to suffer from malnutrition.

Based on these findings, it was clear that any effort on the part of the Palawan Project to improve sanitation, health facilities and the general living environment of vulnerable populations would have a direct, beneficial effect on health and nutrition in the region. In addition, Project components relating to land tenure, which would increase the land available for cultivation and provide necessary agricultural and technological inputs for increasing production, would also yield nutritional benefits if directed at those farming groups most at risk. Regarding the nutritional problems of subsistence fishermen, any opportunities within the Project to create employment would provide the extra income for purchasing the foods that were lacking in their diets. For the self-employed and those working for wages, the problem is different: in spite of regular, adequate incomes, their diets are deficient. Perhaps Project components aimed at improving food supplies, marketing systems and the varieties of foods produced, would help improve the food supply available to households to cover deficits. Consideration might also be given to practical nutrition education which would induce people to make nutritionally wise food-buying decisions. Needless to say, the prices of foods would need to be within the reach of the wage-earners.

5.3 ANALYSIS OF NUTRITIONAL IMPLICATIONS OF FINAL PROJECT DESIGN

The In-Depth Study identified nutritional target groups for the Palawan Project. The nutrition team discussed the following four strategies with the Project planners, recognizing that any effort to maximize nutritional benefits of

an integrated area development project must be balanced against other Project objectives, such as economic efficiency and technical feasibility:

- (a) The means by which Project components could reach the target groups and areas, identified in the nutrition study, in order to increase their access to the means of production or to a source of income;
- (b) The means by which Project activities already aimed at increasing total food supplies in Palawan could be planned to provide the kinds of nutritious food in the quantities needed for food security in the province and to improve nutrition;
- (c) The means by which Project activities could be designed to avoid negative effects on the environment, sanitation, food consumption and nutrition;
- (d) The means by which complementary, immediate nutritional interventions could be provided for those population groups considered highly deprived or at risk.

Of the 12 components in the Palawan Integrated Area Development Project (i.e. lowland agriculture, upland agriculture, livestock, fisheries, forestry, rural and cottage industries, roads, irrigation, ports, settlements, village water supply and malaria eradication), the nutritional findings were directly relevant to four: lowland agriculture, upland agriculture, fishery development and village water supply. The considerations and the recommendations of the nutrition team for these four components were the following:

(a) Lowland agriculture

In lowland agriculture in Palawan, both land and water resources were being underutilized with the result that crops tended to be poorly diversified and to produce low yields. The main thrust of the lowland agricultural components was to improve the use of land and water by giving special attention to rice farming systems, irrigation management techniques, selective mechanization and crop intensification for corn and coconut development. The plan used the findings of the nutrition team in choosing the beneficiaries and the types and patterns of crops for the project. Also, the plans for irrigation were evaluated in terms of possible implications for malaria, since irrigation could create new breeding sites for mosquitoes.

The areas of high priority from the point of view of nutrition (i.e. Brooke's Point, Bataraza, Aborlan and Narra) were specifically covered in the plan for the lowlands. The 15 000 ha in south and central Palawan selected for this development included some 5 500 farm families. Based on the results of the nutrition study, which indicated that farming families with small landholdings were at greater risk of malnutrition, Project planners agreed to give priority for participation to those farmers having less than 3 ha of land. In theory, such targeting should have a direct and positive effect on nutrition in the lowland areas: more land or better use of land = greater productivity = more income = more food purchased = more food consumed. However, this orientation for the Project would need to be monitored carefully during implementation as there were Government bank policies restricting the extension of credit to farmers who were "not credit-worthy"; credit-worthiness was usually determined by the size of landholding. If project implementation involved any use of credit, a clear directive from the central authorities would be required to ensure that the project and its benefits developed as planned.

The lowland agriculture component was planned for concentration on three

traditional crops: rice, corn and coconut. Under the Project, the province should increase paddy production by about 50 000 metric tons a year, which would increase significantly the supply of rice and the incomes of rice farmers. Rice was an essential food in the Palawan diet: in 1980, rice provided 60 per cent of the per capita energy intake of the entire population. However, rice alone would be insufficient to solve such nutritional problems in the region as vitamin A and riboflavin deficiencies.

Within the plan for the lowlands, special attention was given to those farmers producing coconuts. Although coconut was the main source of cooking oil, most coconut products were being exported with only minimal quantities kept for local consumption. Those farmers growing coconuts tended not to retain the same proportion of their crop for home consumption as did other farmers. In addition, fluctuations in the world price of coconut products often affected the incomes and purchasing power of coconut producers. Therefore, small coconut farmers ran a higher risk of malnutrition. It was suggested that, during such adverse periods, rice and other foods could be subsidized to minimize the food problems of this particular group. However, strategies such as pricing - which can be so vital in terms of nutrition - were not within the terms of reference of the Palawan Project.

According to the nutrition survey, those barangay with a high incidence of malaria also had a correspondingly high incidence of child malnutrition. Therefore, during Project preparation, planners considered the possible adverse effects of irrigation systems on the incidence and prevalence of malaria. It was thought that expansion of irrigation canals could exacerbate the existing malaria problem through the spread of mosquitoes. To prevent any increase in malaria from any of the project components, planners decided to develop a more comprehensive malaria eradication component. With the apparent correlation between malaria and malnutrition, it was felt that efforts to eradicate malaria would contribute directly to improved nutrition.

(b) Upland agriculture

Some 500 000 of the 600 000 ha of agricultural land in Palawan province are classified as uplands. Because of the vast potential of these uplands, the Project included an extensive upland agricultural development component. The main goals were to develop production technology for the slash-and-burn farmers and cultural minorities that inhabit these regions and to stabilize the ecology which has suffered severely over years of shifting agriculture.

When the nutrition team examined the plans for the upland component, they looked specifically at the target groups, the crops selected and the proposed design for upland agriculture settlements. The nutrition survey had shown the slash-and-burn farmers to be a nutritionally deprived group. In fact, the upland component had been designed particularly for the marginal farmers so there was no need to adjust Project targeting.

Regarding crop selection, according to the original Project plans the main crops to be introduced in the uplands development were hardy tree crops: cashew, coffee and rubber. These crops were chosen on the basis of soil type, slope, erosion, climate, market prices and available markets. Although these crops would considerably increase the cash income of the farmers, they offered minimal scope for nutritional improvement and no food security. The nutrition study indicated that increased income is often not as effective as increased home production in improving a household's nutrition, thus the lack of food crops

in the uplands component was pointed out to the Project planners. The NNC team also presented information (see table 5.7) indicating the nutritional significance of various crops that could be grown in the upland regions.

Working with the Project agronomist, the nutrition team was able to adjust the plans to include some food and fodder crops. The revised crop selection included corn, cassava, mungbean and leafy vegetables along with provision for growing rice in terraced plots and wherever small-scale gravity systems of irrigation were technically feasible.

A part of the upland development component was devoted to settlement projects. It was felt that if the Project could improve agricultural production and technology, shifting cultivation would no longer be necessary. The inhabitants of the region could enjoy the benefits of stable, permanent settlements in the midst of the land they would farm. It was the intention of the Palawan Project to design these settlements to be self-sufficient communities. To that end, they asked for advice from the NNC team. The nutritionists determined the food needs of such settlements. The types of crops and the sizes of the typical model farms were chosen on the basis of the nutritional requirements for self-sufficiency.

(c) Fishery development

The fishing industry in Palawan has traditionally suffered from low productivity owing to poor facilities, inadequate technology and lack of access to markets. Although Palawan's waters are among the most productive fishing grounds in the Philippines, a substantial portion of the benefits of such a rich resource do not accrue to the province. Most of the fishermen exploiting the region are not from Palawan, and almost all of the catch is taken to Manila and other centres for sale or processing. The fishery component of the Palawan Project sought to develop the local industry by providing landing facilities, cold storage, auction markets and by offering technical assistance and credit to small fishermen to encourage improvements in boats, gear and nets.

Nutrition investigators looked specifically at the potential of this component to improve the living standard of subsistence fishermen and to provide more protein for the average Palawan diet by increasing the available supply of fish. The subsistence fishermen had been identified in the nutrition study as one of the more nutritionally deprived groups in the province, because they consume very low amounts of energy and have high rates of child mortality and morbidity. The nutrition team urged that provision be made to have this group participate in the fishery component, thereby increasing their productivity, their incomes and, hence, their food intake and nutritional status.

Nutritional considerations also stressed the importance of fish as a source of protein. If production, supply and marketing of fish could be improved, a stable protein food could be provided, particularly for those living in the coastal and lowland areas.

(d) Village water supply

In order to realize a substantial, continuing improvement in nutrition, it was necessary to improve sanitation and the home environment of deprived groups. The nutrition study considered supplies of potable water to be particularly important. This need had already been recognized, and construction of 150 artesian wells, rehabilitation of 40 existing wells and development of 10 springs had been planned in selected locations in the province.

Table 5.7 Nutritional significance and uses of selected agricultural crops produced in the Palawan Project area

Commodity group	Nutritional significance	Other important uses
<u>Cereals and cereal products</u>		
rice	provides 82% of local cereal consumption and highest proportion of energy and protein energy = 368 kcal/100g protein = 7.4 g/100g	rice, bran and other by-products can be used for livestock feed; the grain has good export potential
corn	provides 11% of local cereal intake and 8% of total energy intake energy = 188 kcal/100g protein = 4.9 g/100g	major animal feed crop
<u>Fats and oils</u>		
coconut oil	as a group provide 5% of total energy intake coconut (grated and processed as cooking oil) provides 92% of total fat and oil intake. High caloric density: 883 kcal/100g	good export crop
<u>Dried beans, nuts and seeds</u>		
	as a group are of considerable importance to protein intake of low income groups	important home garden crops
mungo beans	provide 50% of dried beans/seeds in local diet; protein = 21.0g/100g iron = 8.4mg/100g	
broad beans	protein = 24.4g/100g iron = 5.7 mg/100g	
red beans	protein = 21.9g/100g iron = 10.4mg/100g	
kadyos	protein = 21.8g/100g iron = 4.5mg/100g	
<u>Green leafy and yellow vegetables</u>		
	rich in vitamin A vitamin A (I.U.)/100g	important home garden crops
kamote tops	5 565	
kangkong	4 825	
malunggay	12 450	
alugbati	6 390	
pechay	3 600	
<u>Fruits</u>		
	rich in vitamins A and C (content/100g: A (I.U.) C (mg)	important home garden crops
mango (ripe)	2 580 36	
papaya	425 73	
melon	2 140 38	

The various water supply sites were chosen from a list of 310 possible barangay. In making the selection, Project planners used nutritional status as one of the criteria. Barangay with child malnutrition rates (weight-for-age less than 75 per cent of reference) greater than 30 per cent (based on the nutrition survey and OPT data) were given the highest priority for potable water supplies.

Over the long term the Project components (particularly the four described here as having the most potential for improving nutrition) were considered to be the most effective ways to improve the quality of life for deprived groups in Palawan. However, in the short term, the nutrition team felt that specific interventions could address serious, immediate problems of malnutrition among specific groups.

(e) Specific nutrition component

The NNC agreed to coordinate specific nutritional components through the Philippine Nutrition Programme. In order to increase the nutrition and health services in the most needy barangay, 120 Nutrition Scholars were to be hired as extension workers. Six "nutrihuts" were to be built: community centres for the rehabilitation of severely malnourished children and for education on proper nutrition, health, hygiene, family planning and backyard food production. Nutrition information, education and communication materials would be distributed to an estimated 21 000 mothers. It was thought that these services, besides filling an immediate need for better nutrition practices, would complement the activities of the Palawan Project.

In summary, the nutrition team was able to identify the potential and improve the impact of the Project on nutrition in Palawan through the process of the In-Depth Study of the food and nutrition problems of the region and the nutritional analysis of the strengths and weaknesses of the Project and its components in terms of a nutritional impact. They were also able to recognize the limitations of the Project, and design nutritional components that would supplement the Project benefits accruing to those population groups most at risk.

The draft report of the feasibility study, submitted to the Asian Development Bank and the Philippine Government in October 1980, included a 27-page annex on nutrition prepared by the NNC team. The annex specifically described the food and nutrition situation in Palawan, giving details of the problems and recommendations for solving them. In addition, nutritional considerations were covered within the body of the report, particularly with regard to those four Project components discussed earlier.

5.4 MONITORING AND EVALUATION

It is envisioned that an evaluation and monitoring system for nutrition will be included as part of the over-all Palawan Project monitoring and evaluation system. The nutritional measurements obtained by the NNC team during the Initial Assessment and the In-Depth Study form the baseline data to which Project effects, impact and results will be compared.

Although Project planners and the funding agency were not prepared to include nutrition as a measure of the effectiveness of the Project in any cost-benefit analysis, the nutritional team attempted to quantify the potential nutrition benefits of the Project. Using food consumption data, they estimated the nutritional benefits in terms of changes in food consumption (measured in calories) which would be brought about by the changes in income and production

of the target groups. On the basis of the projected incomes, calorie (kcal) intake projections were derived for various occupational groups and for various municipalities. Table 5.8 shows the results, with three alternative real income growth rates.

According to this projection, the Project would increase consumption by 88 kcal with an income growth rate of 5 per cent or by 176 with a growth rate of 10 per cent. Actual impact and increase in consumption would vary depending on the level of participation of each group in the Project. For example, an irrigated, lowland farmer participating in the Project and achieving a 10 per cent increase in income, would increase his calorie intake from 1 801 (1979 level) to 1 981 kcal per day in five years, which would be sufficient to meet the Recommended Daily Allowance. But a subsistence fisherman participating in the fishery component of the project and achieving a 10 per cent increase in income would still have a 150 kcal deficit in his diet. A 10 per cent increase in income alone would not be sufficient to bring his intake up to recommended levels.

This forecasting technique was used as one of the bases for identifying nutritional interventions. Groups and areas with substantial energy deficits - even if they participate in the Project - are expected to require supplementary nutritional services in order to bring their nutritional status up to recommended levels.

As actual implementation of the Palawan Project has had a very slow start, it is still not possible at the time of writing to measure the actual nutritional impact of the Project. With development projects of the size and scope of the one under way in Palawan, it is unlikely that measureable results could become available before five years of implementation.

5.5 CONCLUSIONS AND RECOMMENDATIONS

From the experience in Palawan, FAO has demonstrated the viability of its methodology for integrating nutrition into the early planning stages of a rural development project.

However, the effectiveness of the study and recommendation process depends not only on the merits of the methodology or even on the quality of nutritional assessment and analysis, but also on the commitment on the part of decision-makers to pursue nutritional objectives. In the case of the Palawan Project, in spite of strong support from the Government for nutrition activities, the lending institution, the Asian Development Bank, did not make a commitment to fund specific nutritional components in the Project. The Project would instead concentrate on "bankable" components which have a clear economic justification as well as a high potential for nutritional improvement. The Philippine Nutrition Programme would expand its activities to implement a package of nutritional intervention services.

In the case of Palawan, the early involvement of FAO and the National Nutrition Council in the planning process and their strong, cooperative working relationship with the Project planners increased the potential for nutritional benefits from the Project. The experience also demonstrated that, when nutrition issues are recognized early in project preparation, it is advantageous to have explicit nutritional objectives included in the terms of reference for the project. This binds the policy-makers, the lending institutions and, hence, the project planners to pursuing nutritional objectives. Moreover, decision-makers and lending institutions need to be convinced that nutritional benefits are

Table 5.8 Projections of calorie intake, by municipality and by occupational groups, in the Palawan Project area

Municipality/occupational group	Present kcal intake (1979)	<u>Projected kcal intake (post-project: after 5 years)</u>		
		(alternative assumptions on real income growth rates)		
		5%	10%	15%
Total Palawan	1 764	1 852	1 940	2 046
Puerto Princesa	1 773	1 862	1 950	2 057
Brooke's Point	1 767	1 856	1 945	2 051
Quezon	1 741	1 828	1 915	2 020
Bataraza	1 951	2 050	2 147	2 264
Aborlan	1 622	1 704	1 785	1 883
Narra	1 716	1 802	1 888	1 991
Farmers				
irrigated lowland	1 801	1 891	1 981	2 089
rainfed upland	1 871	1 964	2 058	2 089
rainfed lowland	1 777	1 866	1 955	2 061
kaingineros	1 754	1 842	1 929	2 034
Fishermen				
subsistence boat owners	1 636	1 718	1 800	1 898
subsistence fish workers	1 492	1 567	1 641	1 731
commercial boat owners	2 050	2 152	2 255	2 378
commercial fish workers	1 650	1 732	1 815	1 914
Regular wage-earners	1 764	1 885	1 974	2 082
Casual labourers	1 762	1 850	1 938	2 044
Self-employed	1 795	1 852	1 940	2 046

important in themselves and need not be seen as inhibiting the economic effectiveness of agricultural and rural development efforts.

Regarding nutritional indicators, the Palawan Project used food consumption as a criterion in identifying population groups in terms of nutritional deprivation and in predicting future nutritional benefits. At the stage of project evaluation, food consumption offers an effective way to measure the nutritional benefits and even the over-all effectiveness of a project. With the Palawan Project, income elasticities and resulting changes in calorie consumption were used to give a quantitative measure of the benefits expected from Project implementation. While calorie changes may not capture all the dimensions of benefit, its use as a measure of benefits appears to be more practical and specific than nutritional status, which because it is affected by a number of intervening factors is best used as a comprehensive indication of longer term development.

The use of the calorie measure as an indicator of nutritional benefits also helps in identifying the need for nutritional components within development projects. By predicting the future energy intake of a particular population group participating in a project, planners can forecast adequacy levels and gaps in energy intake (e.g. subsistence fishermen in the Palawan Project) and so establish the need for direct nutritional intervention. The projected calorie gap can be used both in determining the need for intervention and calculating the scale of intervention required.

The nutrition investigators involved in the Palawan Project felt that the kind of precise, quantitative measure provided by changes in calorie consumption would eventually be recognized by Project planners as the key to monitoring and evaluating the social and economic aspects of development projects. Such a projection of calorie changes can supplement the usual project investment criteria such as rate of return, employment generation, effects on foreign exchange and effects on environment.

Chapter 6

SRI LANKA:

THE MAHAWELI BASIN DEVELOPMENT PROJECT

Sri Lanka is a beautiful island, rich in forests and rivers, with a tropical climate. But for the rapidly growing population of Sri Lanka, the country is not always a paradise. Poverty is all too common, diseases are prevalent and many of the people struggle just to produce enough food to feed their families.

Concerned about the quality of life, particularly for those people living in rural areas, the Government of Sri Lanka approached international aid agencies in 1965 for development assistance.

Recognizing that the country had vast, undeveloped water and land resources, an FAO/UNDP specialist team helped the Government survey and study the irrigation and hydropower potential of the country's largest river, the Mahaweli Ganga and its adjoining river basins. Harnessing the power of the river system would increase the land available for cultivation, improve crop yields and cropping intensity, and enable Sri Lanka to become self-sufficient in rice. Out of this study came a master plan for the Mahaweli Basin Development Project. It consists of various components including dams, large water reservoirs, an intricate system of major canals and irrigation and the settlement of a number of areas called Systems. Through the Project, by the year 2000, approximately 900 000 acres of land are expected to be developed and reservoirs along the river should produce 507 Mw of hydroelectric power. Moreover the newly expanded lands should provide employment opportunities much needed in the country.

The Sri Lankan Government began implementation of the Project in 1968. The Project, which was originally to span over 30 years, is the largest in terms of capital investment and scope in the history of the country. In 1977, the decision was made to accelerate work so that almost half of the scheme would be completed by 1983. Seventy per cent of the funding is provided by a number of international and bilateral agencies.

6.1 THE ENVIRONMENTAL SETTING

The Mahaweli Ganga, in the central mountains of Sri Lanka (see map), drops about 8 000 feet in its flow down to Koddar Bay on the east coast of the

island country, south of Trincomalee. About 207 miles long, it is the largest river in the country. The annual mean runoff is 6.4 million acre-feet, being over 10 per cent of the total runoff of all the rivers on the island of Sri Lanka. In spite of its immense size and potential, the Mahaweli has remained one of the least exploited rivers in the country. The importance of its development becomes particularly meaningful when it is realized that the Mahaweli is the principal source of water for the Dry Zone which covers the northern and eastern parts of the island. Many of the problems in this region of low productivity, hunger and poverty are due to the lack of water and irrigation.

The climate of the region is marked by distinct dry (April to September) and rainy (October to March) seasons. The soil in the river basin is particularly rich and fertile and, with proper irrigation, could be very productive.

Of the 900 000 acres scheduled for development under the project, improved irrigation will be provided to 246 000 acres of existing farm land, and irrigation will be introduced into 654 000 acres of new land, to be reclaimed from the forests and jungles in the region.

6.2 THE AGRICULTURAL, SOCIAL AND ECONOMIC CONDITIONS

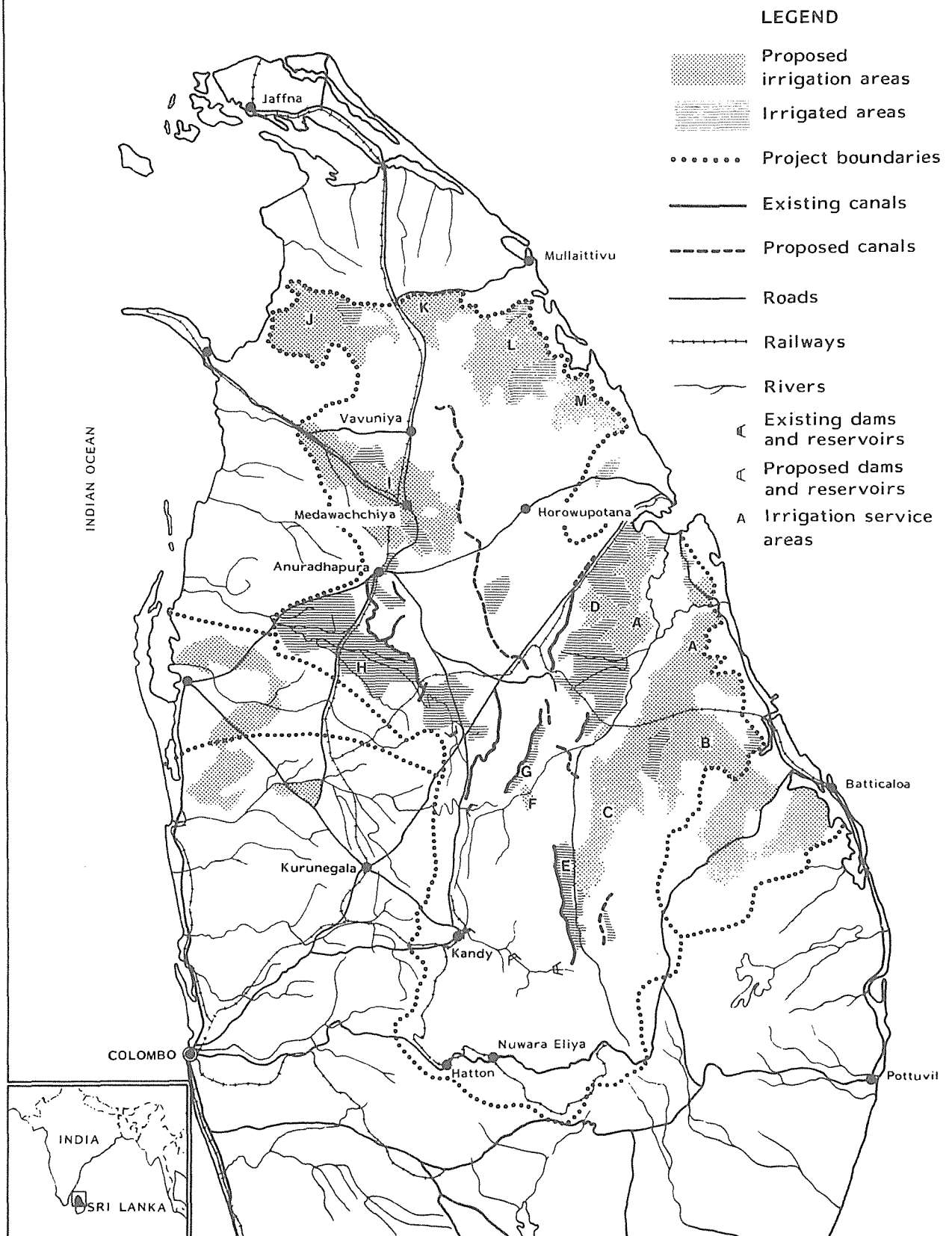
People living within the Mahaweli Project area practise basically three types of cultivation. The first is paddy production, which is either rainfed or linked through village reservoir tanks to one of the recent (circa 1950) irrigation schemes in the region. Those villages cultivating rice under assured irrigation produce two crops a year, both of higher yields than those relying on rainfall. The second type of cultivation is chena, or slash-and-burn. Farmers practise these techniques on marginal lands such as encroached crown land and forests. The third type of cultivation is highland or dryland farming. This land is above the level of the village irrigation tanks and receives generally less rainfall than the basin areas. Crops grown by slash-and-burn or highland farming consist of tree crops, chillies and vegetables.

Within the region, it is to the advantage of the farmer to grow rice. There is a guaranteed price for rice and a developed rice marketing system. Chena and highland crops are subject to variable prices and an inadequate, poorly organized, private-sector marketing system. Income from paddy is at least twice that of chena per unit land. Although few farmers practise one type of cultivation to the exclusion of the others, some 30 per cent of the farmers work only chena or highland crops during the main rainy season, which indicates that they have no access to good paddy land.

Around these three distinct types of agriculture, the society is organized into purana villages. The village water storage tank, paddy fields and the homes made of mud walls and thatched roofs make up the main area of the village, with the highland area and the chena land located some distance away. Purana villages are the traditional settlements of the region, and usually support about 50 to 60 families, for a total of 300 to 400 people. Although about 20 per cent of the village labour force is employed outside agriculture, the main occupation of the purana is subsistence agriculture. Farm incomes are low. Approximately one third of the families derive all their income from the family farm.

A second social group within the region was established through Government irrigation schemes between 1946 and 1965. During that time, the Government developed about 20 000 acres of paddy land and 15 000 acres of

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highland which are worked by relatively recent settlers to the area. Virtually the only crop grown on these irrigation scheme lands is rice. Full use is not made of the highlands.

Recent immigration into the region has resulted in a third grouping of residents. These settlers, who are not particularly welcome in the traditional, established villages, settle on and work the public lands. They cultivate only chena and highland crops.

Landholding and land operation is extremely inequitable. Over 40 per cent of the land is owned by 10 per cent of the population, over 50 per cent of the land is operated by only 20 per cent of the population. The traditional villagers own more lowland than the "outsiders" who have moved recently into the area. Of the lowland available in the region, approximately one quarter is rented or leased on a half/half share-cropping basis.

The vast majority of the population of the Mahaweli Basin lives in conditions that are substandard. Less than one third of the people have their own wells or lavatory facilities. Shared wells are the source of most drinking water. The village tanks are used for bathing.

Social infrastructures such as schools and medical centres, are scattered throughout the area. Those colonists who have settled in the more developed lands, under the recent irrigation schemes, are better served than those living in the traditional purana villages.

Within the region, there are seven small urban centres. The largest, Kekirawa, has a population of 4 000.

Diseases common to the region include diarrhoea, parasites, fever and, particularly common, malaria. Most of the illness is associated with environmental factors such as the quality of drinking water, sanitary practices, health services and housing.

6.3 THE DEVELOPMENT PROJECT

Although the basis for the Project is the development of the potential of the Mahaweli Ganga, Project plans go much beyond the construction of reservoirs and irrigation systems. Other objectives of the Project are specifically agriculture-related with the goals of irrigating 654 000 acres of new land and increasing the amount of water currently available to 246 000 acres. The hydroelectric power produced by the new facilities should lead to more mechanized and efficient agricultural techniques and help meet some of the growing energy needs of the country.

It is the aim of the Project, through the irrigation systems, to create an agricultural environment that will support about twice as many people as are currently living in the region. A total of 100 000 of the indigenous population will be resettled onto new land and assured a consistent water supply. In addition, about 260 000 new settlers will be brought in from outside the region. The increase in agricultural activity, production, trade, marketing and transportation that will result will create other employment opportunities.

The Project area consists of several development regions. A typical region includes a township with cooperatives, storage, milling plants, a school and a medical centre which will serve 8 to 10 rural village centres.

The Mahaweli Development Board, which has the status of a Ministry within the Government of Sri Lanka, is the body responsible for implementing the Project.

The Desk Review

Although nutritional improvement is not a specific objective of the Project, certain social goals - such as resettlement - are Project components. With its present emphasis on increasing the land available for agriculture and improving agricultural production, it seems likely that the Project will create the kinds of social and economic changes that encourage a better quality of life for people in the region. However, since a large influx of settlers into the area will mean greater pressure on available food resources, issues of food supply and food security were quickly seen to be important to the general success of the Project. Increased incomes from new employment opportunities provided the opportunities needed for improved nutrition in the region. These characteristics and the Project plans for a supportive system of infrastructures meet the FAO criteria for integrated social and economic development.

For the phasing of the development, the Mahaweli Basin area had been divided into 14 irrigation systems, designated A through M. Of the 14 different project areas, System H, in the Kala Oya Basin, the most westerly area to be developed, was selected for the case study. Within System H (see map) 35 000 acres are irrigated under existing irrigation schemes, while 71 000 acres are to be irrigated under the new development project. Currently System H is home to about 11 230 families, or a total population of 70 000. At full development, it is estimated that the region will support about 40 000 families, or approximately 207 000 people.

Investigations revealed that there were a number of surveys and studies that could be used in assessing the nutritional situation within the project area. Although there was no up-to-date information on nutritional status, data available from a 1975-1976 survey which included some of the Project region were available. It was thought that these data would give an indication of the nutritional status of the indigenous population and possibly the status of those poor families from nearby districts who satisfied the criteria for selection of new settlers.

In addition to data that were specifically nutrition-related, there were also socio-economic data available from baseline surveys conducted in 1978 in several System H blocks by the Agricultural Research and Training Institute (ARTI). Commissioned specifically for the Mahaweli project, these data provided statistical information about landholding, land usage, yields, income, institutional support, social structure and the prospects for social change. It was hoped that a 1979 national household income and expenditure survey from the Central Bank of Ceylon, would be processed early enough to be of use in the assessment. Reports from the previous survey (1969) were available.

Since interest in the Project was widespread, the proposal for a nutritional evaluation was welcomed. The Food and Nutrition Policy Planning Division (FNPPD) of the Ministry of Plan Implementation, the Medical Research Institute (MRI) and ARTI were particularly interested in the potential for integrating nutrition into the project. It was felt that a nutritional assessment would be particularly valuable with regard to the management of resettlement, the selection and screening of new settlers, community settlement design and institutional support. Moreover, MRI and ARTI had the professional ability and experience to contribute both to an Initial Assessment of the nutritional

situation and to an In-Depth Study of the area. There were qualified personnel available to undertake data collection and analysis. It was agreed that FNPPD would manage and coordinate the nutrition evaluation of System H.

The Initial Assessment

The Initial Assessment of the Mahaweli H area addressed the following three groups of issues: (a) the nutritional situation in Sri Lanka and the Project area from available data; (b) the likely impact of the Project on the nutritional situation in the Project area; (c) recommendations for redressal programmes and action.

(a) Food and Nutritional situation in Sri Lanka and the Project area

Nation-wide data on food consumption were collected in 1969-1970 and in 1979, but the 1979 data were not yet available at the time of the Initial Assessment. National food balance sheets for 1978 indicated that, on a national scale, the food supply situation has not changed appreciably since the earlier study, so inferences were made on the basis of these 10-year-old data. The diet is cereal based, with slightly more than half of the calories provided by cereal foods (approximately two thirds of which is rice).

On a national basis, the 1969-1970 data (see table 6.1) showed that average food consumption in Sri Lanka was just adequate in terms of calories and protein, although the rural population consumed slightly less protein than the national average. Among low-income rural groups, however, there were deficiencies in both protein and calories. In particular, for those with incomes below 100 rupees (Rs) per month (9 per cent of the rural population) energy and protein intakes were 89 per cent and 85 per cent of recommended levels, respectively.

Taking into account the characteristics of the Mahaweli H-area, some 25 per cent of the population could be assumed to have inadequate diets, based on the 1969-1970 data. The situation may have deteriorated since 1970 because of increasing food prices and the withdrawal of a rice ration scheme which formerly provided up to 50 per cent of the rice consumed by the lowest income groups. The Food Stamp Scheme was introduced in 1979 and was targeted toward income groups below 300 Rs per month. It provided the purchasing power needed for an amount of rice equivalent to that amount given under the previous ration scheme.

Tentative conclusions about the nutritional status of the population in the Project area were based on data from a 1975-1976 island-wide survey which involved anthropometric measurement of children between the ages of 6 months and 6 years. Two of the 15 health service districts in the survey were partly in the Mahaweli H-area (Anuradhapura and Kurunegala). A large number of the new settlers in the Project area were drawn from a third district, Kandy, which was also included in that study.

Table 6.1 Energy and protein consumption and adequacy, 1969/70 - Sri Lanka

	National average	Rural average	R u r a l i n c o m e	
			< 200 rupees per month	<100 rupees per month
Energy intake (cal)	2 264	2 268	2 099	1 941
Energy coverage ^{a/} (%)	103	103	95	89
Protein intake (g)	53.8	51.2	46.5	40.2
Protein coverage ^{a/} (%)	112	107	97	85

Note: ^{a/} recommended intakes: energy 2 200 kcal, protein 48g

The results of that survey (table 6.2) indicated that, compared with national average figures, both chronic (stunting) and acute (wasting) malnutrition in Anuradhapura and Kurunegala were at or about the national average. Children in Kandy, however, the area from which most new settlers were selected, showed significantly higher rates of chronic and combined chronic and acute malnutrition.

Table 6.2 Stunting and wasting among children in Sri Lanka and in three of its health districts (in percentages)

	Sri Lanka average	Anurad- hapura	Kurunegala	Kandy
Children stunted	35	32	30	50
Children wasted	7	7	6	8
Simultaneous stunting and wasting	3	3	2	6

From these data it was reasonable to conclude that, within the Project area, some 30 to 40 per cent of the children were malnourished, with a possibility of significantly worse problems among the children of new settlers since many of them came from the relatively depressed area of Kandy.

The health and environmental characteristics of an area play a role in the nutritional problems of the population. Diarrhoea, parasites and fever (especially malaria in the Project area) affect the ability of people to absorb or utilize food. These diseases are related to such environmental characteristics as quality of drinking water, sanitary practices, health services, housing and child care.

The pattern of infant mortality in the Project area, like the anthropometric findings, appeared to be slightly less favourable than the national average, with the exception of Kandy which showed the second highest rate of any district of the country. There was no basis to assume that health and environmental characteristics in the Project area were anything more than marginally better than elsewhere, and the irrigation works planned could contribute to increased incidence of malaria unless careful precautions were taken.

In attempting to identify the nutritionally worst-off groups in the Project area, the nutritional investigators relied on socio-economic data collected prior to resettlement in a 1978 survey in the H4 and H5 areas of Mahaweli. Malnutrition is known to be more prevalent among poorer socio-economic groups, including those who are unable to grow enough food to meet their requirements and those who are unable to earn sufficient income to meet their needs. Typically, these groups are also the most disadvantaged in terms of housing, sanitary environment and health all of which contribute to the problems of undernutrition.

Living conditions in the area were substandard for the majority, according to the 1978 data. Approximately 80 per cent of the homes were mud walled with thatched roofs; less than one third had their own wells or any lavatory facilities. Village reservoirs were used for bathing; 95 per cent of the households reported using well water for drinking. Approximately 50 per cent of the households had such consumer durables as a radio and/or a bicycle, a plough, a buffalo and a few poultry.

On the basis of this information, the nutrition investigations made preliminary assumptions about the household characteristics of the most malnourished groups among the current population of the Project area. In descending order of cause or association, these characteristics were:

- (i) Landlessness;
- (ii) Cultivation highly dependent on chena or highland farming;
- (iii) Sharecropping;
- (iv) Poor dwellings, sanitary conditions, water supply;
- (v) Paddy cultivation dependent on rainfall;
- (vi) Settlers who were brought into the area in the 1950s and 1960s.

(b) Likely impact of the Project on the nutritional situation.

The Project provides a very high potential for improving the nutritional situation and the general standard of living of the poor and malnourished people already living in the area, and of the new settlers who are brought in.

The Project provides, on an equal basis, to both former area residents and new settlers, the following inputs:

- (i) Land (a mix of 2.5 acres of lowland and 0.5 acres of highland) per household;
- (ii) Assured water supply through a vast irrigation network;
- (iii) Assistance in the establishment of a house and provision for clean water;
- (iv) A variety of community services;
- (v) Agricultural services (seed, fertilizer, credit, education and training provided through a system of contact farmers);
- (vi) A water management scheme (based on a system of one leader for each 10 to 12 lowland farmers).

The Project will also provide livelihood to the estimated 20 per cent of the population who will be non-agriculturists: tradesmen, craftsmen, skilled workers, whose services will be needed in the community. These families are also to be provided with a homestead plot.

In total, these inputs address directly the major characteristics thought to be associated with nutritional risk in the population. The target groups for the Project include those thought to be worst off - the landless, chena cultivators, etc. If the Project does achieve increased production of food by these households, and if an adequate proportion of the food grown is retained for home consumption and if sufficient income is devoted to the purchase of other necessary foods and to the improvement of housing and living conditions, the nutrition investigators considered that the social and nutritional outcomes of the Project would be exemplary.

The actual achievement of these returns, however, will be affected directly by a range of project implementation decisions. A number of factors suggests the need for careful monitoring and quick corrective action to ensure that the potential of the Project is, in fact, realized.

Although all settlers will be provided with equal shares of land, water, and other inputs, it is important to the success of the Project to recognize that some settlers will start from a better financial, material and physical base than others. For example, a number of groups participating in the Project will begin with certain assets or advantages deriving from their earlier situation. These groups include (i) purana villagers and other former landowners who received compensation for land reclaimed by the Project; (ii) farmers already owning draught animals or farm machinery, and those with large numbers of household members of an age able to contribute to the productivity of the household; (iii) farmers already experienced with water management and cultivation of irrigated lowlands; (iv) those who were already relatively healthy and well-nourished.

Conversely, less advantaged groups - the poor, new settlers with little or no farming experience, former chena farmers, share-croppers, young families with several small children and those who were already most malnourished - begin at a comparative disadvantage and could slip back to their former impoverished state unless their special needs are recognized and responded to by the Project.

A small grant and thatched roofing (cadjan) is provided to each settler for the construction of a house. Those with the least resources will build small homes of mud and cadjan, with few amenities. The Project originally was to provide one well for each 20 to 25 homes. But the inadequacy of this provision in terms of sanitation has been recognized and efforts are underway to provide one well for each 4 to 6 households. Lavatory facilities were not provided and, although the Ministry of Health has recently provided a squatting plate to each settler household, the majority have not been installed due to the shortage and cost of cement. Thus, particularly for those households who began at a relative disadvantage and with few external resources, the exposure to disease from poor sanitary conditions is high. For these reasons, there is a need to monitor and improve the Project's activities affecting the sanitary environment of participants.

The planned construction of buildings for health services is seriously behind schedule. Mobile health teams from neighbouring areas provide some services in already settled areas, but these are insufficient to meet the needs of the population. The inadequacy of health services is of particular significance to infants and children, and to those who were most undernourished at the time of

settlement. The control of malaria in particular, and of other diseases that can debilitate the labour force, needs particular attention.

Little attention has been paid to the involvement of women in the Project although women's contribution to agricultural production is considerable (trans-planting and harvesting in particular are regarded as women's responsibility) and they play a critical role in the management of the home, in food preparation and in child care.

There also appears to be potential for less than optimum Project outcomes with respect to food consumption - the factor which acts most directly on nutrition. The food consumption of the participants in the Project will depend both on the amount and quality of food produced that is retained for home consumption, and the food that is purchased. Higher yields, with resulting higher incomes, should lead to improved consumption among all groups, including those who were formerly most undernourished. For some of the reasons discussed already, those who were previously worst off will be least likely to achieve maximum yields, at least in the early years of their life on the new homesteads.

In recognition that it will require a period of time to make the new land productive, the Project provides to each homestead a food ration through the World Food Programme (WFP) during the first 15 months of settlement; settlers are also eligible for the Food Stamp Scheme until their incomes reach 300 Rs per month.

But among the Project activities, none addresses the need for prudent decisions about retaining food crops for home consumption, about purchasing food, about household or money management - areas in which those who were previously worst off will tend to have the least experience or established competence. None addresses the importance of producing a good mix of crops, from a nutritional point of view. And the food ration component does not discriminate between groups of settlers on the basis of their degree of nutritional disadvantage, poverty, or farming experience prior to settlement, although it is precisely those who were most disadvantaged to begin with who tend to face the greatest difficulties in efforts to produce enough food to meet their requirements (even with Food Stamp Scheme support) in the first 15 months on the land.

In brief, the results of the assessment showed that the Project does provide for a variety of essential inputs to the most nutritionally disadvantaged groups in the Project area (and those who are brought into the area for resettlement), but there are weaknesses in components affecting health, sanitary environment and the involvement of women. In addition, there were no specific efforts to identify and respond to the particular needs of those who were previously most disadvantaged. These weaknesses and absences of effort may erode some of the nutritional gains which would otherwise be possible from this Project.

(c) Initial recommendations for redressal programmes and action

Based on this Initial Assessment, five specific areas where action could increase the likelihood of the Project achieving the maximum nutritional improvement for its participants were identified. These were:

- (i) Strengthening of Project services to particular groups;
- (ii) Additional attention to health services, housing, and sanitation;
- (iii) Addition of family-oriented programmes;
- (iv) Revisions to the food assistance component;
- (v) Monitoring and evaluation of nutritional outcomes.

The rationale for recommending the strengthening of project services to particular groups is based on the fact that particular groups of settlers - those without initial advantages and those who were previously most disadvantaged in economic, health and nutritional terms - can be expected to face more difficulties with start-up than others. It is estimated that this group will comprise about 25 per cent of the total settler population. Additional assistance will be important to these groups in such forms as:

- (i) Credit, seeds, fertilizer;
- (ii) Training in good agricultural practices;
- (iii) Guidance with proper water management
- (iv) Labour inputs during peak periods;
- (v) Marketing services, notably storage, transport, fair prices.

Since the Project has not attempted to differentiate these settlers from others, there may be significant practical problems involved in the delivery of such additional services. However, if "turnout groups" of these kinds of settlers could be established within easy reach of service centres (although preferably not all in one location) such additional services could be provided with reasonable efficiency. Additional agriculture extension staff would be required -possibly in the order of one additional extension worker for each 20 turnout groups of such families (200 to 250 families). Special types of credit may also be needed with lending rates and limits flexible enough to help these people overcome the comparative difficulties under which they will operate.

In terms of health services, housing and sanitation, the Project is behind schedule. The health centre construction programme should be brought up to date as a priority, and programmes of surveillance for malaria (always a possible risk in areas undergoing irrigation development) installed. The well-drilling programme should also be accelerated to provide adequate supplies of clean water for drinking and sanitation. In addition, the Project should provide cement for the installation of squatting plates.

The Project could also benefit from the addition of family-oriented programmes for guidance in the home management of income, and for the involvement of women in the Project. As the Project is currently operated, contact farmers and turnout leaders receive and disseminate information on water management and agricultural methods. It is recommended that this training be extended to address such additional concerns as:

- (i) the necessity of retaining and storing properly over the year sufficient rice for the family's needs. (If rice is to provide 50 per cent of the caloric needs of families, some 130 kg or 10 bushels of paddy should be retained and stored per person per year.)
- (ii) the importance of including certain food crops (legumes, vegetables, etc.) for consumption by the family in the homestead plots. (It will be important to monitor whether proposed floor prices for such crops will reduce the amounts that are kept for home consumption);
- (iii) prudent use of the family's increased income to purchase a diet which meets nutritional requirements and to buy items which will contribute to improved standard of living.

The existing chain of communication through contact farmers and turnout leaders should make it possible to transmit this kind of information without significant additional costs to the Project.

In order to achieve a greater participation by women in the Project, and to develop the important contribution they can make, it is recommended that an analogous chain of communication be established, based on "contact women" in each turnout, to provide a training mechanism for women. The women selected by each group should receive training and disseminate information to the other 10 or 12 women in the turnout. Particular emphasis should be placed on the following:

- (i) Good agricultural and water management practices, particularly for those tasks that are the women's responsibility;
- (ii) The importance of specific legumes, fruits, vegetables and local cereals in the garden plot and in meal preparation; the practice of parboiling rice should be reinforced; also fish should be encouraged since fingerlings will be fed into village reservoirs;
- (iii) The proper feeding of infants and young children with particular attention to the early introduction (at 4 to 6 months) of cereals and other foods into their diets;
- (iv) The importance of additional quantities of food for themselves and other members of the family when doing heavy work such as ground preparation, transplanting, harvesting, road work, etc.;
- (v) The proper management of money and the home (similar training should be given to men);
- (vi) Participation in community development and services, health care, care of young children, sanitation, education, etc.

The In-Depth Study

Although the Initial Assessment had accomplished a fairly thorough analysis of the nutritional situation in the area, it must be stressed that all the data used in the Initial Assessment were from the pre-development stage. At the time that nutritionists first became involved with the Mahaweli development, the Project was well underway.

To test the projected nutritional effects identified by the Initial Assessment, and to determine whether or not the Project, in implementation, lived up to its social and nutritional expectations, personnel from MRI, ARTI and the FNPPD with the help of officers and consultants from FAO, carried out an In-Depth Study in System H.

(a) Methodology

A field survey began in June 1980, and all the data were collected within two weeks. For purposes of the survey, System H was divided into 14 parts, consisting of a mixture of existing irrigated lands, and those lands newly irrigated under the Mahaweli irrigation plan. The survey covered only those six subdivisions which were new land. Most of the settlers were new; in some areas the process of settlement was still going on.

A 5 per cent sample was initially drawn. Using a two-stage random sampling procedure, 100 villages were selected from the Project area, the number of villages being proportional to the population of the subdivisions. From each village, 15 households were selected. The pattern of settlement resulted in

there being approximately the same number of households in each village. Constraints of time and cost limited the final sample to 2.5 per cent (700 households). Thus, of the 15 households selected in each village, questionnaires were completed for 7. Only households with children between the ages of 6 months and 6 years were surveyed so that the survey data could be compared with data collected from similar households in the 1975-1976 survey.

Development Officers familiar with the Project area were selected to work on the survey. Trained and equipped with a manual and tested questionnaires, they surveyed the selected areas in eight teams of four. June was selected for the timing of the survey because, being the end of the cultivation season, it was felt the farmers would have more time to devote to the survey.

The questionnaire included inquiries about the settler household, the length of settlement, the amount of land under cultivation, the mix of crops being grown, the former activities of the household (before resettlement), income-earning activities, the number of members in the household, children's illnesses the previous week, the source of drinking water, lavatory facilities, the construction materials of the house, the number of meals served, the frequency of consumption of certain foods in the three days before the survey and the ownership of certain household possessions and agricultural implements. General information on household expenditure and the receipt of WFP food rations and Food Stamps was sought.

Anthropometric measurements of the children were taken by trained Public Health Inspectors. The heights of all the children between the ages of 6 months and 6 years were measured in centimetres using a portable wooden height/length measuring board, and the children were weighed to the nearest 100 gm using a Salter hanging scale.

Analysis of the data was undertaken on a Commodore micro-computer with a 32K capacity. Separate programmes for input, amendment, bivariate analysis and testing of differences were used to analyze nutrition and health status of children in households characterized according to the main socio-economic variables collected in the survey. During data input all entries appeared on the computer screen and allowed for a second verification of data; the first was done in the field by the enumerators and their supervisors.

(b) The results

A total of 630 households were included in the processed data; 713 children from 6 months to 6 years lived in these homes.

The data on height, weight and age in table 6.3 indicate that 30.4 per cent of all the pre-school children surveyed were below 90 per cent of the standard height-for-age, a criterion which identifies chronic undernutrition. That figure approximates the national figure in the 1975-1976 survey of 34.7 per cent. However, 19.6 per cent of the children surveyed in the Mahaweli area in 1980 were below 80 per cent weight-for-height which indicates that acute under-nutrition (wasting) was much more severe in this settlement area than in the national sample of 1975-1976 (6.6 per cent). The rather alarming apparent increase in acute malnutrition may be a reflection of the low income level of almost all the families involved in the resettlement of System H. Nutrition was thus a problem requiring priority attention in the new settlements.

Living conditions in the Mahaweli project area and the health environment were substandard. From the survey, it was reported that 84 per cent of the houses were of mud walls and thatched roofs. Only a small fraction of the

settlers had their own wells (18 per cent). A single well was used by at least 6 to 8 persons. Only one third of the settlers had toilet facilities. The result of the Project's provision of toilet facilities to those new settlers coming from outside Mahaweli, but not to the villagers being resettled within the area, is evidenced in the data on sanitary facilities.

Data in table 6.3 also indicate that the type of settler household had a bearing on nutritional status. Both chronic (37.8 per cent) and acute (22.9 per cent) malnutrition are more severe among new settlers' children than among the children of purana villagers (28.9 per cent and 14.4 per cent respectively).

Tables 6.4 to 6.6 present these nutritional, health and socio-economic data disaggregated according to householders' length of settlement, farming experience and quantity of paddy produced and stored for home consumption.

Farming households with experience in lowland, irrigated farming in general had better nutrition than those who had worked only lowland-rainfed, slash-and-burn (chena) or highland areas (table 6.4). Morbidity did not differ significantly between these groups.

The nutritional status of children was slightly better among families who had settled for over two years as compared with those settled for shorter periods of time (see table 6.5). This is particularly the case for families that were brought into the area from outside and those which had had no previous experience with lowland farming.

Farming families with the largest production of rice had better nourished children than those who produced smaller amounts. The amount of paddy stored by families did not show a consistent relation with nutrition variables (see table 6.6).

Because of the crowding in households, the poor construction of many of the houses and the inadequate sanitary conditions, the size of the household was also related to the risk of malnutrition.

In summary, the In-Depth Survey of System H made it possible to identify more specifically the vulnerable nutritional groups in the Project area. Those new settlers with less than two years in the Mahaweli region and without experience in lowland irrigated agriculture were likely to suffer most from both chronic and acute undernutrition.

The survey indicates that almost everyone settled within the region was poor, with low incomes and relatively inadequate housing and sanitary facilities. Because they did not even possess the farming implements that would help them to a faster start on their new farms, new settlers are in need of greater start-up support than is already provided. Food aid and food stamps should be continued until their agricultural production is sufficient to support their families. The 15-month ration does not appear to be long enough.

Thus, the In-Depth Study confirmed a number of the findings of the Initial Assessment. As the first nutrition investigators indicated, the new settlers need more support, and more flexible support, than provided for in the Project design. In order to guard against increasing problems of malnutrition and disease, the Project should consider increasing the support especially to new settlers. The additional services and facilities proposed in the Initial Assessment were again put forward as a means of improving the situation for these settlers.

Table 6.3 Nutrition, health and socio-economic profile of total sample and of farming households according to three selected classifications of former residency (percentages of groups)

Variable	Total sample	Farming households		
		former <u>purana</u> villages	former landless residents	new settlers from outside area
Number of households	630	141	213	128
Number of children (age 6 months to 6 years)	713	138	286	148
Height for age <90% reference ^{a/}	30.4	28.9	29.0	37.8
Weight for height <80% reference ^{a/}	19.6	14.4	21.3	22.9
Morbidity among children previous week	14	9	15	17
Households with wells	18	15	18	14
Households with toilets	39	23	24	68
Houses of mud walls/thatched roof only	84	70	86	98

Note: ^{a/} Harvard standard from The Assessment of the Nutritional Status of the Community, WHO Monograph Series N. 53.

Table 6.4 Nutrition, health and socio-economic profile of farming households according to former farming experience (percentages of groups)

Variable	Former farming experience of head of household				
	lowland irrigation	lowland rainfed	<u>chena</u>	highland	non-farming
Number of households	209	179	157	17	33
Number of children (age 6 months to 6 years)	198	223	214	15	30
Height for age <90% reference ^{a/}	25.2	34.0	31.3	33.3	36.6
Weight for height <80% reference ^{a/}	16.1	20.6	20.5	13.3	30.0
Morbidity among children previous week	15	12	15	0	17
Households with wells	20	17	17	33	19
Households with toilets	34	44	30	67	67
Houses of mud/thatched roof only	79	85	91	78	71

Note: ^{a/} Harvard standard from The Assessment of the Nutritional Status of the Community, WHO Monograph Series N. 53.

Table 6.5 Nutrition, health and socio-economic profile of settler households according to length of settlement (percentages of groups)

Variables	Length of settlement		
	4 months	4 months - 2 years	2 years
Number of households	75	204	351
Number of children (age 6 months to 6 years)	91	232	390
Height for age <90% reference ^{a/}	29.6	36.6	26.9
Weight for height <80% reference ^{a/}	25.2	21.1	17.4
Morbidity among children previous week	14	12	15
Households with wells	5	15	24
Households with toilets	59	40	33
Houses of mud walls/thatched roof only	90	91	78

Note: a/ Harvard standard from The Assessment of the Nutritional Status of the Community, WHO Monograph Series N. 53.

Table 6.6. Nutrition and health profiles related to paddy production and retention for home consumption, Maha season (percentages of groups)

Variables	Paddy production (bushels)				Paddy stored (bushels)	
	None	1-75	76-150	> 150	< 35	> 35
Number of households	290	120	144	74	584	46
Number of children (age 6 months to 6 years)	351	120	173	68	662	51
Height for age <90% reference ^{a/}	30.4	40.0	32.9	22.0	29.1	47.0
Weight for height <80% reference ^{a/}	21.3	27.5	21.9	4.4	19.7	17.6
Morbidity among children previous week	14	20	11	9	14	12

Note: a/ Harvard standard from The Assessment of the Nutritional Status of the Community, WHO Monograph Series N. 53.

6.4 IMPLICATIONS OF THE NUTRITION SURVEY FOR PROJECT DESIGN

Given that, in the case of the Mahaweli Project, the FAO process of integrating nutrition into rural development was started long after the initial Project design and several years into implementation, it is difficult to measure what effect the nutritional analysis will have on the future of the Project.

In fact, both the Initial Assessment and the In-Depth Study were able to confirm that the Project as a whole had great potential for improving the quality of life for those settled or resettled within the region and benefiting from the irrigation systems.

Over time, those who make a success of the opportunities given will come to achieve a better standard of living. Of concern to the Project planners and administrators are those who do not make a success of the opportunity. Clearly different groups from different backgrounds react differently to the resettlement process. To ensure that the standard of living of these settler groups does not suffer over the short term, the planners need to be sensitive to the needs of such different people. The necessary inputs and supports are there; they need only to be distributed in order to provide specific help to specific groups.

Had a nutritional evaluation been undertaken early in the planning stages, it would likely have been possible to project some of the problems and weaknesses revealed by the methodology and to correct for them. It would have been possible to avoid the sudden increase in acute malnutrition and allow for a smoother transition for the new settlers.

Recognizing that many of the problems faced by the nutritionally vulnerable groups are problems of education and experience, the In-Depth-Study recommended that Project officials consider some special training and education programmes for the settlers. Not only do they need assistance with irrigated agriculture techniques, but they should be taught the advantages of growing and retaining a balanced mixture of crops, and of installing wells and toilets. This training and education should apply equally to men and women.

6.5 CONCLUSIONS AND RECOMMENDATIONS

From this application of the methodology, FAO was able to illustrate the value of available data in making a nutritional assessment of likely Project effects. When a project involves major resettlement of people, it is difficult to get a true picture of the likely needs and status of the new community. However, it was clear that an initial nutritional assessment could be used to predict the characteristics of the vulnerable groups and to identify related potential shortcomings of the Project. The In-Depth Study revealed that such shortcomings were important to the well-being of those settlers who were relatively at a greater disadvantage.

An issue that did not receive appropriate attention in the In-Depth Study related to a possible scarcity of locally produced food which, by pushing up local prices and eroding settler families' purchasing power, could cause, at least over the short term, reduced food consumption and a worsening of their nutritional situation. The periodic collection of local food prices and the nutritional and socio-economic variables which were correlated with malnutrition should be included in the on-going monitoring and evaluation systems of the Project in order to help prevent further negative effects.

The long-term effect of the Project on national food supply was foreseen to be positive since it was estimated that at full development the Project would allow Sri Lanka to become self-sufficient in agricultural products.

The Study also did not address the indirect effects of the channeling of approximately one third of the national budget into one large project. The issue is nevertheless one of importance, because many smaller projects in other regions of the country could not be financed because of the considerable demands made by the Mahaweli Project.

The nutritional impact of the Mahaweli Basin Development Project was more a question of emphasis than intent. Clearly the Project did intend to benefit those resettled onto the new land, both in terms of agricultural production and the income which should lead to an improvement in nutrition. However, there was not enough emphasis on start-up support and social programmes that would have ensured a positive nutritional impact from the outset, particularly for new settlers, with little relevant farming experience or equipment, few health services and minimal food aid. It was clear from the case study that agricultural extension, re-education, sanitary facilities, housing, health services and food aid are essential parts of such support.

The involvement of so many different sectors in this nutrition case study is an encouraging sign for the future of nutrition in the Mahaweli area. As long as the varied groups - Government, management, health and agriculture - continue to stay committed to improving nutrition, the recommendations of the nutrition study are likely to be integrated into the continuing development of the Mahaweli region.

Chapter 7

ZAMBIA:

THE INTEGRATED RURAL DEVELOPMENT PROGRAMME FOR KALICHERO AND LUANGWA VALLEY

The Government of Zambia has been committed to the development of the Kalichero region for over 10 years. Zambia's first national development plan (1966-1970) included the Intensive Development Zone (IDZ) programme which was implemented in Kalichero. By stressing intensive investment in small-scale agricultural projects, this programme aimed to improve rural conditions in those parts of the country that had strong, but unexploited, potential for increased agricultural production.

In 1978, the IDZ programme was replaced by the Integrated Rural Development Programme (IRDP) which is a joint undertaking between the Zambian Ministry of Agriculture and the Swedish International Development Agency (SIDA), the donor agency. The new programme has a much wider scope than the original IDZ plan, and stresses the inclusion of supportive measures - such as health care, transportation and other infrastructures - to promote the general effectiveness of the development. At the time that IRDP was developed, the Luangwa Valley region was included in the development plans, with operations in the area to begin in 1980. In both areas, the intended programme beneficiaries are the farmers, who range from the traditional subsistence farmers to well-equipped emergent and commercial farmers.

IRDP was already planned and under way when FAO nutritionists were brought in to assess nutritional aspects. Although the FAO methodology for integrating nutrition into development stresses the importance of being involved at the pre-planning stages of a project, the Zambian IRDP offered the opportunity to discover if the methodology could influence the course of a project which was already being implemented.

7.1 ECOLOGICAL, AGRICULTURAL, SOCIAL AND ECONOMIC CONDITIONS

The Kalichero IRDP region in Zambia is some 25 kilometres north-west of Chipata, the capital of Eastern Province, and covers approximately 734 square kilometres (km²). Climatic conditions vary from a relatively long dry season

(May to October) to a rainy season (November to April). Wells and boreholes provide a year-round access to water, provided there is no severe drought. The IDZ programme constructed and maintained additional wells in the region to promote security of water supply. The soil, sandy loam and rich in humus, is particularly good for growing cotton, groundnuts and maize.

Total population in Kalichero is about 15 000 (20.4 persons per km²). The region is connected to the capital by an all-weather road with daily bus service. Approximately two thirds of the population live within 1 km of all-weather roads. During the IDZ programme, 40 km of new feeder roads were built. Another 600 km of roads are being maintained and upgraded.

In 1975, a total of 15 570 hectares (ha) were being farmed in the Kalichero region. Of those 15 570 ha, 2 500 ha (i.e. 16 per cent) were devoted to cash crops, mainly cotton, and the rest were producing food, mainly maize and groundnuts with some sorghum, beans and rice. From 1974 to 1977, cultivated maize area increased almost 10 times, from 142 to 1 364 ha. The marketable surplus of maize increased from 19 000 bags of 90 kilograms (kg) each to 30 000 bags.

The region, with its long rainy season, is highly vulnerable to infestations of the tsetse fly and other diseases that are particularly hard on animals. As a result, animal production and fish farming have not been successful, although many farm families raise poultry.

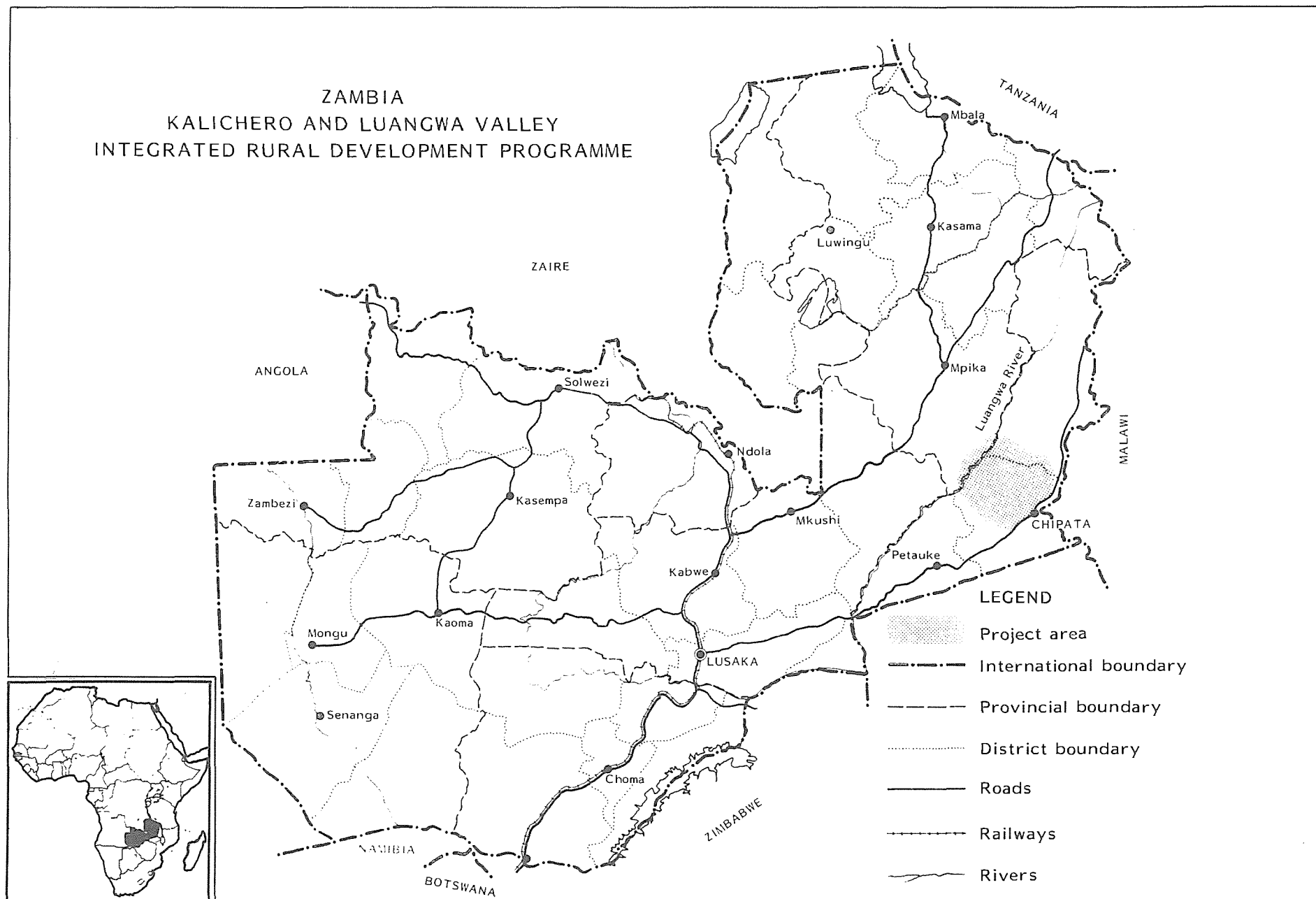
The Luangwa Valley IRDP region is approximately 100 km from Chipata, covering an area of about 1 084 km². With an average temperature of 29 to 38 degrees Celsius, the climate in the area is slightly hotter than most other parts of the province. Average annual rainfall is approximately 960 millimetres, most of which falls between November and April. The major source of water in the area is the Luangwa River and its tributaries. Since only a fraction of the people live adjacent to the river, it provides a limited agricultural benefit and villages obtain water from shallow wells.

Total population in the Luangwa Valley was approximately 10 000 in 1976 (9.2 persons per km²). Road conditions in the area are poor, with most roads being impassable during the rainy season. There is bus service to the capital. Although there are three rural health centres in the region, they are not easily accessible to the majority of the people in the valley, because of poor transportation.

In the Luangwa Valley, the major cash crops are cotton and rice, the major food crops sorghum, maize, groundnuts and beans. As in Kalichero, no cattle or goats are raised because of inadequate disease control, and problems with animal diseases also explain the absence of draft animals in the Valley. All the work in the fields is done manually so that agriculture in both development areas depends on large amounts of human labour.

To encourage agricultural production for the market, there are 10 Eastern Cooperative (ECU) market depots and two National Agricultural Marketing Board (NAMBOARD) depots in the area. Many of the villages have market sheds, 11 of which were constructed under the IDZ programme. There are only two rural health centres in the area which are situated about 10 km apart.

In general, throughout both development areas, people prefer paid employment and non-agricultural work to agriculture. As a result, many men leave their villages in search of employment in the towns. During the 1970s, this urbanization trend has caused labour shortages in the agricultural sector which



has contributed to low average crop yields, particularly among subsistence farmers.

The farmers in the two project areas can be classified, for practical purposes, as follows:

- (a) Subsistence - cultivating up to 2 ha;
- (b) Emergent - cultivating 2 to 10 ha;
- (c) Medium Scale - cultivating 10 to 40 ha; and
- (d) Commercial - cultivating about 40 ha.

About 65 per cent of the farmers in the Kalichero area are subsistence, 20 per cent emergent, 15 per cent medium scale and only 1 per cent (a total of four farmers) could be classified as commercial. In Luangwa Valley, 90 per cent of the farmers would be classified as subsistence, and 10 per cent as emergent farmers.

Although it had been the intention of the IDZ programme to increase maize production in Kalichero, farmers in the region reported that maize production was constrained by shortages of labour, lack of capital, lack of transportation, poor road conditions, scarcity of agricultural inputs and late payment for maize crops from the marketing boards.

In terms of increased agricultural production in the Luangwa Valley, most farmers felt that there was more potential for increased income in growing cotton.

7.2 THE INTEGRATED RURAL DEVELOPMENT PROGRAMME

At the time of the nutritional assessment, the Kalichero IRDP included components to encourage maize, cotton and groundnut production, cattle breeding, pig and poultry raising, and fish farming. To support the agricultural production components, the programme included plans to improve the supply and marketing systems by building market depots, village market sheds and input storage houses, and by providing transportation. These components were consistent with the stated Government policy of broadening the scope of development efforts and providing the support services that should encourage real social and economic improvements.

Oxen were to be trained and supplied to the farmers to relieve the pressure of heavy demands for farm labour, with veterinary services and programmes to control the tsetse fly (spraying, dip tanks and diagnostic services) being designed to address the serious problem of animal diseases that had limited the potential of the region to raise livestock.

Extension services and training programmes were also part of the development plan; one of the education programmes was designed specifically for the women in the region. Project planners hoped to use the women's club as a vehicle for demonstrating gardening techniques and recipes and for distributing information about nutrition.

The Luangwa Valley had not had the benefit of the earlier IDZ programme. Therefore, the IRDP plan for that region stressed a more basic production-oriented project with components to increase cotton and rice production, improve access to a clean water supply for more people in the region, provide marketing channels, upgrade road systems and supply extension and training

services.

The Desk Review

The involvement of the Swedish International Development Agency (SIDA) in integrated rural development in Zambia had brought the two programmes to the attention of the Food Policy and Nutrition Division at FAO. SIDA had asked that the projects be considered as test cases for the application of the FAO methodology for integrating nutrition into agricultural and rural development projects. A review of the history of the development efforts in the region and the stated Government policy on integrated rural development indicated that there was some potential for nutritional benefits in planned programmes. The FAO nutrition assessment officer recognized that it was too late to influence the planning or the choice of programme components. Therefore, the officer approached the Projects with a view to analyzing the nutritional impact of Project implementation and to recommending adjustments and alterations in the Projects that would increase their nutritional and, possibly, related social benefits.

A visit to the area of the Projects gave the nutrition assessment officer an opportunity to brief Government officials on the methodology, and to discuss the potential for integrating nutrition into the development programmes with responsible Project officials. It was also necessary to search for existing information relating to nutrition that could be used in the Initial Assessment.

During this visit, the officer was able to confirm the potential of the Projects to provide some nutritional benefits. He was also able to determine that it was feasible to recruit and train local people to help with a nutritional assessment in the region. Preliminary research indicated that there was some information available on food production and farming patterns, nutrition and health problems, patterns of food consumption and the project strategies that would be useful in the Initial Assessment of the Projects' impact on the local nutritional situation.

The Initial Assessment

Very few of the data available in the Initial Assessment were specific to either project area. The primary data sources were the 1970-1971 Nutritional Status Survey ^{1/} and the 1969-1972 Food Consumption Survey of Zambia. ^{2/} The information dealt with the Eastern Province as a whole. However, the food consumption data were collected during a period of widespread crop failure and near famine conditions in the Province. In an effort to improve the accuracy of the picture of the nutritional situation in the project areas, the nutrition assessment officer supplemented these basic data sources with qualitative information from local and project officials and with recent data supplied by the rural health centres.

Data available from the Chipata Hospital and the rural health centres indicated that the occurrence of protein-energy malnutrition was often seasonal,

^{1/} FAO, National Food and Nutrition Programme, Zambia. Nutrition Status Survey, Rome, 1974.

^{2/} FAO, National Food and Nutrition Programme, Zambia. The Food Economy of Zambia, Rome 1974.

with malnutrition tending to be high from December to April. This coincided with the beginning of the planting season and probably reflected the low level of food supplies at the start of planting, the poor environmental conditions of the rainy season and the high demand for food energy associated with the heavy labour required for preparing the fields for planting.

According to 1978 statistics on out-patients at the Chiparamoa Rural Health Centre in Kalichero, the most common children's diseases were upper respiratory infections, malaria, unspecified fevers and diarrhoea. Statistics from the three rural health centres in the Luangwa Valley confirmed that diarrhoea, malaria, measles, upper respiratory tract infections, other fevers, bilharzia, hookworm and malnutrition were common health problems. The 1970-1971 Nutrition Status Survey found malaria, hookworm and bilharzia to be the most common afflictions.

Recent national figures (1978) for infant mortality range from 140 to 160 per 1 000 live births, although some estimates are much higher. The five leading causes of death in children have been reported to be measles (20 per cent), pneumonia (6.1 per cent), diarrhoea (11.4 per cent), malnutrition and anemia (11.3 per cent) and malaria (10.2 per cent). According to 1978 statistics from the rural health centres, child mortality rates in the Project areas were similar to the national figures.

The nutrition assessment officer noted that much of the morbidity and child mortality was nutrition-related. In general, the mortality pattern indicates that malnutrition and diseases associated with malnutrition - including measles, diarrhoea and pneumonia - were responsible for approximately 55 per cent of total childhood mortality in the two project areas. Even in the absence of other data, these figures alone are sufficient to demonstrate how serious nutritional problems were in the project areas.

The next step in the Initial Assessment was to attempt to analyze food consumption patterns in order to identify specific nutritional problems and deficiencies. Although there were no data taken directly from the Project areas, food consumption information from Eastern Province indicated that the local diets were primarily energy-deficient and only secondarily protein-deficient. Therefore, the people in the two regions were not consuming enough food to meet their energy requirements. If they were to have a sufficient quantity of the foods currently in the diet to meet their energy requirements, they would also meet their protein requirements.

As might be expected, the data indicated that those families earning higher incomes tended to consume a more nutritious diet, while subsistence farmers - those who consume the food they produce - appeared to have lower per capita food consumption and were more likely to suffer from seasonal food deficits. Therefore, the Initial Assessment recommended that this group be considered a priority in the economic and social development of the regions.

The stated strategy of IRDP in the two regions was to improve life for the farmers in the Project areas. As the majority of the farmers in the regions were subsistence farmers, logically they would be expected to benefit from Project components. Through the plans to generate rural employment, increase agricultural production of both food and cash crops and provide nutrition education, it seemed likely that the nutrition of the priority target group would improve.

An analysis of the progress of the Projects indicated that some components such as the infrastructural facilities and the provision of fresh water supplies, were successfully starting to create the kinds of social and economic changes

that would benefit everyone in the regions. In practice, however, a number of factors involved in Project implementation and the effect of certain Government policies were inhibiting the ability of the Project components to benefit subsistence farmers. These smaller farmers were finding it difficult to participate in the Projects because of resource constraints - shortage of labour, lack of agricultural inputs and inadequate financing.

For example, one of the main inputs in the Luangwa Valley IRDP was the provision of tractor services for cotton and rice cultivation. Generally, however, such services are uneconomic on the smallest landholding and the subsistence farmer is unable to pay the cost of this service. In addition, administration and operational problems further reduce the potential benefit of the tractor service. Breakdowns are common, and a shortage of spare parts makes this particular input unreliable and ineffective.

Although it was the intention of the development programmes to encourage substantial increases in maize production, low prices for maize as a result of government pricing policies and the late payment for maize crops by the marketing boards drastically inhibited the ability of the Projects to meet their objectives in maize production. Farmers in the regions were unenthusiastic about growing maize in the absence of appropriate incentives. As a result, land was increasingly being devoted to cotton which had higher returns and for which payment would be prompt. The implications of such conflicting results of agricultural and pricing policies do present a problem to the nutritionist. Excessive reliance on a cash crop such as cotton, and reduction in the number of acres under food crops could mean that regional food supplies drop. In an area that has exhibited clear signs of severe nutritional problems, such a potential trend, away from food crops, means that malnutrition would probably increase, and/or the area would become increasingly dependent on imported food supplies. In the Zambian case, in short, because of the nature of the inputs supplied by the Projects and the financial and political constraints, the emergent, medium-scale and commercial farmers had so far derived considerably more benefit from the two development programmes than had the subsistence farmers.

With this Initial Assessment of the nutrition problems and the effects of Project implementation, the nutrition assessment officer recommended that Project planners intensify their efforts to provide inputs and services specifically to the subsistence farmers. Special attention should be given to prompt payment for crops and, wherever possible, public works projects such as roads and water supply systems should employ subsistence farmers and give them the opportunity to earn additional income. The outcome of the Initial Assessment also stressed the importance of planning the employment to correspond with those times in the agricultural year when there was little demand for labour, such as the post-harvest season. Conflicts in labour demands could be avoided with careful timing of the employment opportunities.

In terms of specifically addressing the health problems in the regions, the Initial Assessment recommended an increase in the health infrastructure and health training provided by the programmes. If special attention were paid to sanitary and disease control measures and if immunization programmes could be strengthened and expanded, the risk of diseases which are related to and which aggravate problems of malnutrition could be greatly reduced.

For the longer term, the Initial Assessment proposed that the Project planners consider the possibility of the following negative effects on the Project beneficiaries: (a) a shift from food to cash crops; (b) a possible decrease in the food kept for home consumption as a result of improved marketing; and (c) any changes in food consumption habits that result from changes in production or

employment, particularly the increased employment of women.

The review of the available data carried out for the Initial Assessment also led to the conclusion that a more detailed survey was needed to specify the current extent of malnutrition and the nature of its incidence among potential Project participants as indicated by their geographical location, agro-economic characteristics and socio-economic status. On the basis of this conclusion the next methodological step, the In-Depth Study, was undertaken.

The In-Depth Study

A nutritional assessment team planned and executed the In-Depth Study in order to supply the IRDP officials with current, specific and reliable information on the health and nutrition situation in the Project areas. Data and analytical information generated by a survey at this stage would permit the nutrition team to (a) identify those groups within the population who are economically and nutritionally most at risk, (b) confirm the observations and conclusions of the Initial Assessment, (c) determine the characteristics and patterns of under-nutrition in the two regions, (d) assess the effect of other area-specific factors on nutritional problems and (e) examine the potential impact of the IRDP projects on the population.

Three of the six chief areas in Kalichero and the Luangwa Valley IRDP regions were covered in the survey. Thirty villages were selected using a two-stage random sample method and a 1979 village list of the survey areas (Chikuwe, Jumbe and Kakumbi). Ten family units with children between the ages of 1 and 5 years from each village were chosen as the primary unit for the survey. The final survey results included a total sample of 1 123 children under 5 years old contained in 799 family units, which represented 15 per cent of the total population of Chikuwe, Jumbe and Kakumbi.

The questionnaire was based on a broad outline suggested by FAO, pre-tested in a local clinic in Lusaka and in the village of Kapini and finalized with the development of computer software for analysis of the results.

The questionnaire dealt specifically with: (a) such area characteristics as access to administrative centres, roads, health centres, shopping centres; (b) the nature of endemic diseases; (c) household characteristics; (d) main source of income; (e) details about land use such as the size of landholdings, the crops being cultivated, estimates of past trends in crops and cultivation and access to agricultural loans and extension services; (f) the quality of housing, sanitation and the water supply; and (g) specific nutritional indicators that included the heights and weights of children of ages 1 to 5, morbidity owing to diarrhoea and fever in children of 1 to 5 years and the presence or absence of clinical oedema.

It was the intention of the nutrition team to supplement the quantitative survey data with qualitative observations and information recorded by the survey teams. That was a vital part of the investigation. In addition, the team met with officials from the Ministry of Agriculture and discussed at length agricultural loans and extension services, the marketing of farm produce, the administration of the credit system, the types of credit available to the farmers, the role of women in rural agriculture and labour constraints in the project areas.

The data were collected by five separate survey teams, each headed by a team leader. Four of the team leaders were staff members of the National Food and Nutrition Commission (NFNC) who had been trained in interviewing tech-

niques in rural areas. The fifth team leader, an FAO consultant, acted as general supervisor for the survey. Enumerators were recruited from villages in the Project areas and trained in the appropriate methods to enumerate families, weigh children and transport the survey equipment from village to village. The local recruits were particularly helpful in translating questionnaires and responses from English into the local language.

Each sample village would be notified through the traditional local leader, the Headman, at least one day before the survey team arrived. The team leader would explain the purpose of the survey to the Headman and ask his help in locating sample families. The group leaders were personally responsible for filling out the questionnaires and for verifying all measurements. Enumerators prepared the children for weighing. The weighing scales and measuring boards used to weigh and measure the children were checked regularly throughout the survey for accuracy.

Analysis of the data was carried out at NFNC in Lusaka with computer software designed to process both categorical and interval-scale variables. A bivariate analysis indicated the frequency of families considered "at risk" on the basis of the weight and height of children (ages 1 to 5), morbidity in children (ages 1 to 5), sanitation and wealth.

Results of the In-Depth Study

Data are presented here on the nutritional status of the under-5-year-old group in order to describe the magnitude of malnutrition. This is done in two ways: by describing the extent of malnutrition by child and then by a family basis, the latter referring to those families which had at least one child below the nutritional status standard. The extent of the malnutrition problem is described in these two ways because the first method is the conventional means of describing the problem, while the second is thought to be more meaningful to policy-makers who use the family as the basic economic unit. Data are also presented on the socio-economic status of the surveyed families.

The relationship of these family indicators of malnutrition to socio-economic characteristics was explored in the analysis. By describing the location of malnutrition in these terms here, it is hoped to build linkages between the impact of the project on different families and hence its impact on malnutrition.

The data in table 7.1 show that 37 per cent of children were stunted (below 90 per cent of reference median of height-for-age) and 2.2 per cent were wasted (below 80 per cent of reference median of weight-for-height). About 30 per cent were below the 80 percent value of the reference weight-for-age. When referring to that proportion of household that contains at least one child below the standards, obviously these figures are higher. Just over 40 per cent of the surveyed children had suffered an episode of fever or diarrhoea during the three days prior to the survey.

Information collected on the socio-economic status of the families, as presented in table 7.2, shows them to be quite poor. About 90 per cent live in houses with pole and dagga walls, grass roofs and clay floors. A similar proportion was classed as subsistence. About 39 per cent obtained water from what might be regarded as clean sources (by pipes or windlass) and the source of water for most was within 500 m.

The data were analyzed so that any differences in nutritional status

Table 7.1 Kalichero and the Luangwa Valley: nutritional status indicators (standard deviations in brackets) as percentages of the reference median and proportions considered malnourished, by child and by family

Indicator	Status by child	Status by family
<u>Height for age</u>		
mean %	91.9 (5.6)	91.8 (5.0)
% < 90% reference (stunted)	37.0	44.8
<u>Weight for age</u>		
mean %	86.0 (11.5)	85.7 (10.5)
% < 80% reference (undernourished)	29.8	37.4
<u>Weight for height</u>		
mean %	98.0 (9.0)	97.8 (8.3)
% < 80% reference (wasted)	2.2	3.0
Sample size	1 123	799

Table 7.2 Kalichero and the Luangwa Valley: selected indicators of socio-economic status of survey families (in percentages of sampled families)

Sanitation		Wealth	
<u>Water supply</u>		<u>Housing material - wall</u>	
pipd	6.5	concrete blocks	0.3
windlass	39.0	burnt bricks	5.3
stream/river	32.5	Kimberley bricks	6.9
covered well	5.1	pole and <u>dagga</u>	87.6
open well	16.8		
<u>Distance to water</u> (metres)		<u>Housing material - roof</u>	
0 to 100	23.7	corrugated iron	6.0
100 to 500	59.4	asbestos	1.8
500 to 1 000	16.9	thatch/grass	92.2
over 1 000	0	<u>Housing material - floor</u>	
		cement	6.8
		clay	93.2
<u>Toilet type</u>		<u>Farmer category (n = 641)</u>	
pit latrine	32.2	subsistence	87.9
other	67.8	emergent	10.8
<u>Garbage disposal</u>		medium scale	1.3
open pit	25.9		
outskirts of village	74.1		

between different types of families could be detected and subsequently linked to Project components. In this analysis the study concentrated on two indicators: the proportion of families which had at least one child below the standard of 80 per cent of the reference median of weight-for-age and the proportion that contained a child below the standard of 90 per cent height-for-age. The latter is more indicative of longer-term nutritional status than the former. Reference to the family rather than the child is thought to be more useful, not only for policy-making but also for illuminating differences between families. However, the previous comments about its exaggeration of the extent of child malnutrition should be borne in mind.

The analysis of the data in this case study is extremely useful in showing the difficulties of linking the incidence of child malnutrition in families to functional characteristics. Differences between types of families were observed in a few cases, but in general it appears that the population was relatively homogeneous in economic terms (see table 7.2) and that several important variables, such as off-farm income, were too complex to be collected on a single visit. In such situations a larger sample size is not the answer either; in many African countries, it has been found that socio-economic differentiation is not so marked as to indicate clear nutritional differences.

Nevertheless, several important factors did emerge which, when linked with qualitative data, suggest important implications of the IRDP projects for nutritional impact.

The incidence of malnutrition was slightly greater in Kalichero as compared with Luangwa District and was also greater for the more remote families in terms of distance from an administrative centre. Little difference was seen for families in terms of their distance from a rural health centre, all-weather road or village accessibility. However, those families closer to health centres reported less morbidity. No differences were observed between families of different household size.

However, some differences were observed in characteristics related to farm operation. Malnutrition was slightly greater among those families farming on the plateau, as compared with those in the Valley. Children of farmers growing predominantly cotton and maize had lower weight-for-age, as compared with children of sorghum farmers. This finding is explained by relatively adequate stature (height-for-age) but low mean weight-for-height, an indicator of acute malnutrition. The incidence of malnutrition was greater among subsistence farmers as compared with emergent farmers. However, there was no difference in the incidence of malnutrition in respect of cropping patterns, that is, the proportion of food crops to cash crops. These results are all summarized in table 7.3, together with selected quality-of-life indicators.

It should be noted here that the differences in nutritional status based on the type of crop grown are small and could be within the error of the sample. However, with more and more farmers in the regions expressing a desire to shift from food crops to cash crops, the possible negative impact of this shift on nutrition should be of concern to IRDP officials. The choice of crops is, of course, largely influenced by ecological factors, but the selection of crop by the farmers would also reflect ease of access to credit, prices offered for the crop, availability of inputs, transportation, marketing facilities, Government subsidies and the prevailing market demand. If Government policies and project components encourage cash crops (through credit, pricing, subsidies) and do not compensate for the decline in food crops produced locally, or do not provide the kind of nutrition education that would allow the farmers to spend the income earned from the crops on food for their families, it seems likely that the already

Table 7.3 Kalichero and the Luangwa Valley: farmer characteristics, nutritional status and quality-of-life indicators

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Type of farm family	Sample size <u>a/</u>	Nutritional status: percentages of children <u>b/</u> having		Morbidity <u>c/</u>	Water supply and Sanitation			Housing assets	
		< 80% weight/age	< 90% height/age		unimproved source of water	>100m distant from source	percentage of families without pit latrine	pole and dagga (wall)	thatch and grass (roof)
<u>Geographical</u>									
plateau (Kalichero)	251/367	40.6	49.8	39.8	56.3	85.7	82.9	88.0	92.4
valley (Luangwa)	390/537	35.9	44.0	37.9	54.7	72.3	61.0	91.0	96.4
<u>Main crop</u>									
sorghum	211/288	34.1	43.6	37.4	54.0	69.7	63.5	93.8	96.7
maize	348/502	39.7	48.9	39.9	58.9	81.3	75.0	88.5	95.1
cotton	45/62	40.0	40.0	43.0	44.0	82.0	56.0	82.0	84.0
<u>Economic type</u>									
subsistence	562/775	39.0	46.6	38.4	53.6	76.5	71.3	90.4	95.7
emergent	69/111	31.9	47.8	40.6	65.2	85.5	60.9	90.9	91.3
Notes: <u>a/</u> number of families/number of children <u>b/</u> family basis <u>c/</u> percentage of children with fever or diarrhoea on day of survey (family basis)									

precarious nutritional situation in the project areas would become even more grave.

Close examination of agricultural production in the region yielded the estimate that 50 to 60 per cent of all the maize produced in the Project areas was being sold for cash through official market channels. Although those farmers growing sorghum bartered and sold their crops locally, there were no official market channels for sorghum. This difference in marketing systems for maize and sorghum meant that there was greater incentive for those farmers producing maize to sell their crops, meaning that they might retain less of what they grew for home consumption. Sorghum farmers, on the other hand, with no official means to sell their crops, appeared to retain more of what they produced for their families.

Maize farmers would, of course, still produce a food crop and have access to food for their families. Those cultivating cotton might have less access, and therefore might even be more at risk nutritionally. Labour constraints, along with the size of landholdings, made it difficult for a farmer to grow both food crops and cotton, so that farmers who grew cotton tended to grow only cotton. They might have higher incomes, but more of their children seemed to be vulnerable to poor growth and morbidity.

Having confirmed the priority target group, i.e. subsistence farmers, and determined that nutritional problems in the regions were associated with the size of landholding, distance from villages, and the type of crop grown, the In-Depth Study nutrition team went on to review project implementation to date, and its potential for improving nutrition.

7.3 IMPLICATIONS OF STUDY RESULTS FOR PROJECT DESIGN AND IMPLEMENTATION

The In-Depth Study indicated that subsistence farmers were not sharing as extensively in the Project benefits as were emergent and commercial farmers, although subsistence farmers were considered a direct target group in project strategy.

IRDP components were designed to provide supplementary resources in order to increase agricultural production in the regions. The main stimuli for production were loans and extension services, which were delivered through established Government channels. Interviews with officials from the Ministry of Agriculture and with the farmers indicated that although the Project objectives were to increase maize and groundnut production, loans and extension services were easier to obtain for cotton production than for the other crops. In addition, the form of the loans and services provided for cotton was more effective than that for loans provided for maize or groundnuts. Subsistence farmers are not considered as creditworthy as larger farmers and were less likely to receive loans or extension services because of the Government credit system.

As if the practical problems involved in maize loans were not enough of a disincentive to the local farmers, the producer price for maize was much lower than that offered for cotton, in spite of the strong market demand in Zambia for both maize and cotton. In 1976, the producer price for maize was 6.30 kwacha (k) per 90-kg bag; for cotton it was k48.60 per 90-kg bag. The price difference makes cotton much more attractive to farmers even when taking into account the extra labour required to cultivate cotton. Information gathered during the In-Depth Study showed that 73 farmers in the three areas had received loans. Of

them, 69 farmers had received loans for cotton; only 4 farmers had received loans to grow maize.

The pricing and loan policies of the Zambian Government in effect worked to undermine the development programmes. In spite of the stated objectives of the Projects, under those policies maize production in the two regions is not likely to increase and subsistence farmers are not likely to benefit from the Government-SIDA investment. The inability of the Projects, to date, to increase maize and other food crop production or to reach the subsistence farmers has strong implications for the nutritional situation in the regions.

The position of maize farmers is made even more vulnerable by Government marketing practices which encourage them to sell their entire crop, and buy back maize meal to feed their families. But as payment for maize is routinely late, the farmers have no money with which to buy the maize meal. Family food security is extremely precarious for those farmers who concentrate on, as encouraged by the Project, cultivation of maize. As most subsistence farmers are forced to rely on seasonal loans, they are almost chronically in debt and are therefore likely to suffer more from the other factors that affect agricultural production, such as drought and the distance from market centres.

The nutritional situation for cotton farmers is not much better, in spite of their increased income. There is a clear incentive for those farmers to plant fewer food crops, and increasingly to devote their land to cotton because of their potential to earn income from cotton. In producing less food, they should become more dependent on a market source for maize meal, thereby increasing the local demand for maize. However, as already indicated, maize production in the regions was in fact not increasing and, given current pricing, loan and marketing policies, it was not likely to increase. It would appear that the food security of the region was at risk.

This situation was particularly ironic because the average farmer in Kalichero was cultivating some 2 ha of land which - if he planted sorghum - would guarantee food security for his family and the region.

In order to create the kind of climate that would encourage production and marketing, and provide enough food to feed the people of the IRDP regions, the Government should develop a clear and consistent agricultural policy to help subsistence farmers enter the market economy. Through the IRDP and other Government programmes, the subsistence farmers must have access to (a) a well-managed credit system; (b) efficient extension services; (c) effective marketing channels, including additional market depots, village market sheds and input storage houses, to the existing marketing components; (d) regular means of transport; and (e) an efficient village-based network for distributing both agricultural inputs and food supplies at reasonable prices. Something must be done to counter the disparity in economic advantage between cotton cultivation and maize cultivation.

In short, the Study confirmed that IRDP did, in fact, have the correct approach to development in the region, but had not allowed for the negative impact of external factors (pricing, loan policies etc.) on Project components.

The IRDP extension and training services could increase their effectiveness with very little adjustment. Extension officers, supplied with clear guidelines as to what type of farmers to visit and what services to provide, should have means of transportation such as motorcycles. If the extension officers were mobile, their services could become available to more farmers in the Project areas.

Clearly, the most serious constraint to the success of the Projects is the credit system. The team recommended that Project officials (a) experiment with a trial loan scheme for subsistence farmers; (b) develop precise but flexible criteria for loan recipients; (c) establish and maintain records on all those farmers who receive loans; (d) ensure that agricultural inputs are available when needed and (e) consider implementing a loan scheme managed and administered by the Projects themselves. Such a credit scheme could serve as a demonstration model to the Government and encourage changes in current credit policies.

The nutrition team also suggested that a craftsmanship training centre component be added to the Kalichero and Luangwa Valley projects, in recognition that many of the people living in the IRDP areas do not aspire to a life of farming, but would prefer different occupations and income-generating activities. A centre could be established in either of the two regions and would provide training in the manufacture of farm implements (hoes, watering cans etc.) and in skills such as bricklaying, masonry and carpentry. This kind of programme would provide alternative sources of income in the regions, and a local source for farm implements. It also has the potential of slowing down the heavy migration to urban centres.

The Initial Assessment showed that all matters of health had been left to the Ministry of Health, with no consultation or coordination with either IRDP region. It was the opinion of the nutrition team that issues of health should not be isolated from the Project activities. A variety of health problems were eroding the potential benefits of the project: the prevalence of bilharzia, malaria and gastroenteritis reduced the ability of people in the area to work and contributed to nutritional problems. The final report from the In-Depth Study included the recommendation that the Project team work with the Ministry of Health to design a component to control infectious diseases. Such a programme would include the provision of safe drinking water and other improvements in sanitation.

It was also recommended that IRDP officials should consider a simple but systematic form of monitoring the progress of Project implementation. The concept of an integrated rural development programme includes relating new development initiatives to ongoing governmental activities. In order to do that, project personnel should (a) monitor changes in the socio-economic and nutritional status of various groups affected by projects, (b) assess effectiveness of Project components in addressing the issue of rural poverty, (c) evaluate the efficiency of governmental support structures for the Projects and (d) evaluate the effects of governmental policies on Project objectives and strategies. In the case of Zambia, such monitoring might seem threatening to other Government agencies, but it is essential to the general effectiveness of the IRDP approach. The data generated by the In-Depth Study can provide information useful in designing a comprehensive monitoring system.

To tackle specifically the question of nutrition and food security, the nutrition team recommended that IRDP try to ensure adequate food supplies at village level by (a) milling locally the maize grown in the region, (b) retaining sufficient quantities of the milled maize for local consumption, (c) distributing the milled maize to shops in rural areas and (d) paying maize farmers promptly, in cash, for their crops. Some effort should also be made to evaluate the local demand for sorghum. If a strong demand exists, incentives similar to those for maize and cotton should be offered to farmers growing sorghum. If these and other programmes reach their target group, the subsistence farmers, the nutritional situation in the regions should improve.

It is difficult at the current stage in project implementation to assess the degree to which nutritional considerations will be integrated into the two Zambian development Projects. Had nutritionists been involved early in the planning stages for the integrated rural programmes, it is possible that some of the problems encountered to date in Kalichero and the Luangwa Valley could have been avoided. The potential negative impact of pricing policies, credit schemes and incentives on the subsistence farmers (the target group) would have been recognized early. With a nutritional perspective on the situation in the region, planners could have been able to make the adjustments necessary to ensure that Project benefits reached those farm families most in need. Food supplies for the region might not be as short as they did become.

The recommendations submitted by the nutrition team were discussed and endorsed by national decision-makers and local chiefs (from the two IRDP regions) in a workshop that was held at Chipata in March 1981. It is significant to note that, following the workshop, the Government of Zambia with the assistance of the World Bank, took steps to implement a number of the FAO and National Food and Nutrition Council recommendations, although it is not certain to what extent the work done by the nutritionists will be incorporated into the continuing process of the development Projects. The commitment of the Zambian Government to the report from the nutrition team is a hopeful sign.

7.4 CONCLUSION AND RECOMMENDATIONS

The experience in Zambia enabled FAO to attempt to bring nutritional considerations into projects that had already been planned, approved and implemented.

Although there are many difficulties involved in efforts to modify or reorient project components at a late stage in the project cycle, the nutritionists were able to make a number of recommendations and suggestions on ways to reinforce the impact of the Project. Such an analytical effort introduced in midstream of a project in order to improve socio-economic conditions (including nutrition) gives planners the opportunity to correct or adjust for any weaknesses. If the project can incorporate the modifications suggested by the nutrition team, the project increases its chances of success.

In the case of Zambia, the nutrition study called for some decisions that cannot be made at the Project level, but are the responsibility of the Government itself. Implicit in the nutritional recommendations is development of the relationship between IRDP and other operations of the Government within the Project areas. If the Government is truly committed to integrated rural development, it must support the Projects with appropriate policies and efficient administration.

In effect, the Zambian study was a strong argument in favour of the FAO philosophy of integrating nutrition early in the process of project planning. If IRDP had been armed with the nutrition team analysis before final design of Project components, it is likely that there would already be an appreciable improvement in the quality of life of subsistence farmers in the regions.

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