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**FINAL REPORT**

**AGRICULTURAL/NUTRITION  
LINKAGES**

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## INTRODUCTION

One of the main objectives of USAID Office of Nutrition is to reduce malnutrition and food insecurity in developing countries. In the 1960s and 1970s, a lot of attention was focused on very targeted types of interventions—weaning foods, nutrition education, food fortification—as a way to alleviate malnutrition in children. However, several reviews of targeted interventions in the early 1980s suggested that the benefits from many programs targeted specifically to the maternal and child population have been less than expected.

As a result of the lack of robust effects of some very targeted interventions, many policymakers began to pursue some broad-based development strategies, such as income-generating schemes and technological change in agriculture as a means of reducing malnutrition. However, here again, several recent pieces of research suggest that income increases alone may be insufficient to alleviate malnutrition.

Policymakers are now asking about the appropriate mix of strategies needed to have a significant effect on food insecurity and malnutrition in the short term. Unfortunately, most of the research that has been done to date on policies and programs to deal with food insecurity and malnutrition have concentrated on a single solution. Very little information is available on the complementarities across a range of programs.

Since the food insecurity/malnutrition problem is complex, it is unlikely that only one approach will provide the solution to the problem.

The purpose of the present project is to identify ways that agricultural policies and programs can be used more effectively to enhance the food security and nutritional status of vulnerable households. To this end, the present project has three phases of activity which, although separate, are linked.

Phase one provides a protocol for a nutrition/agriculture linkages project. To do this, first, a conceptual framework of the causes and potential solutions of food insecurity and malnutrition in developing countries is provided. While many types of nutrition interventions, both broad-based and very targeted, have had some success in improving nutritional status, there is little information available to guide policymakers as to the appropriate mix of interventions in a context-specific way. What is even more lacking is information on how nutrition and food security objectives can be integrated into a range of agricultural policies and programs.

In order to understand how to implement a nutrition/agriculture linkages activity, there needs to be a better understanding of the process of becoming malnourished or, as used in this report, "the process of becoming small." This is crucial in order to be able to identify specific points of intervention that are able to prevent this adverse process. In order to do this, a longitudinal data set from Kenya, covering 1984 to 1987, is used to summarize information on the determinants of malnutrition in children at various ages and, equally important, to use this information to identify combinations of

nutrition/agriculture approaches that may be effective in alleviating malnutrition.

Special attention is given in the report to the influence of household demographics on child health and nutrition. Much of the economic work on determinants of malnutrition tended to concentrate on the effects of income and wealth on nutritional status. While these factors are also examined in the section on the process of becoming small, the report also assesses the effect of gender of the head of household on child nutrition. This is the overwhelming impression that children from female-headed households do better nutritionally than those from male-headed households. However, there is little empiricism to prove this. Section 3 of the report explores the effect of household income and gender of head of household on preschooler nutritional status. The results provide some useful insights into the types of household behaviors that are associated with better health, even under conditions of constrained household income.

An additional activity was added to the project after its inception. An inventory of types of food and agricultural policies and programs in Asia, Africa, and Latin America was conducted. This inventory information is summarized in Section 4 of the report and provides a useful starting point for identifying potential areas for nutrition/agriculture linkages. The overwhelming impression reported by respondents was that most agricultural policies seem to have limited positive effects on food security and nutrition. The reasons for this are discussed.

A lot of attention has focused on evaluation of impacts of nutrition interventions, but much less attention has been given to the process of implementing the intervention. How a program and project is implemented is as important as the services that are provided. Yet, until recently, relatively little was known about the process of successful implementation. Section 5 of the report examines the factors associated with successful nutrition programs and projects and uses this information to summarize elements of successful interventions. In considering linking nutrition to agriculture, the elements of effective implementation must be stressed from the outset.

The issue of incorporating nutrition and food security concerns into agricultural planning is hardly new. One problem has been the failure to document "success stories." In considering nutrition/agriculture activities, one concern in this project was how to monitor and evaluate what was done. Section 6 of the report examines types of indicators that can be used to monitor and evaluate the food security and nutrition effects of a range of agricultural policies and programs. Suggestions for a prototype food and nutrition monitoring system are also provided in the report.

The final part of the report uses the information provided in the previous sections to summarize types of nutrition/agriculture linkage projects that could be used to address the malnutrition problem in women and children in developing countries.

## SECTION 1:

### CONCEPTUAL FRAMEWORK FOR CAUSES OF MALNUTRITION AND POTENTIAL SOLUTIONS

#### INTRODUCTION

A great deal of progress has been made over the past 30 years in our understanding of the nature and causes of malnutrition. Yet malnutrition continues to be a problem of staggering proportions in developing countries throughout the world. Estimates of the number of malnourished individuals vary, in part due to the lack of clear-cut definitions as to who are the malnourished. A conservative estimate of the magnitude of the problem, based on proportion of moderately and severely malnourished preschoolers, indicates that in 19 of 37 low income countries<sup>1</sup>, greater than 20 percent of children are malnourished (World Bank 1990). This is clearly an underestimate. If nutritional disorders in women and children, such as anemia and vitamin A and iodine deficiency, are included, the numbers would be much larger. In addition, if one uses a poverty-based definition as the yardstick to measure malnutrition, then approximately 20 percent of the world's population, or one billion people, are affected. Whatever definition is used, what is clear is that the magnitude of the malnutrition problem is intolerable.

A variety of approaches have been used by developing country policymakers and donors to alleviate hunger and malnutrition. These strategies range from broad-based economic development policies to

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<sup>1</sup> This is based on countries where data are considered reliable. Malnutrition is based primarily on weight-for-age. Moderate and severe is defined as children less than 80 percent weight-for-age.

interventions very specifically targeted to women and children. The effectiveness of the various approaches vary and depend on the nature of the malnutrition problem.

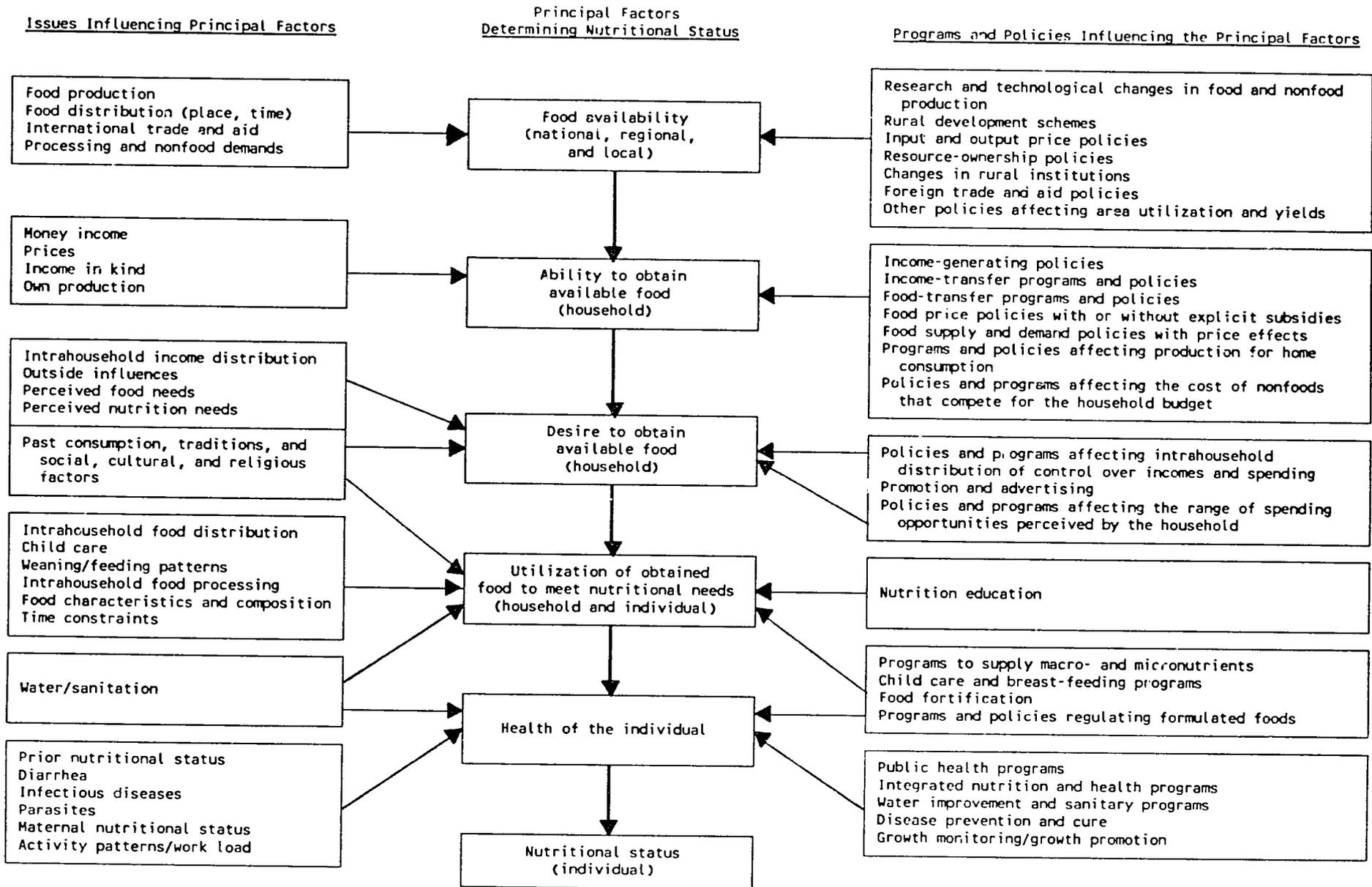
The purpose of this section is to provide a conceptual framework that identifies the complex causes of the food insecurity and malnutrition problem and also to summarize what we know about potential solutions to the problem.

### CONCEPTUAL FRAMEWORK AND TYPOLOGY OF NUTRITION INTERVENTIONS

Malnutrition manifests itself at the level of the individual but the causes of malnutrition are typically a combination of household, community, national, and even international factors. The schema presented in Figure 1.1 illustrates the range of causes of malnutrition and potential solutions.

Food availability at the national, regional, or local level is one factor that can affect household level food availability but it is generally not the most important. Until recently, an inordinate emphasis was placed by many developing country governments on food production self-sufficiency as a means of achieving food security for the population which policymakers, in turn, believed would alleviate malnutrition. There are two major flaws with this argument. First, food insecurity and malnutrition are primarily problems of distribution not production (World Bank 1986). It is common to have 20 to 30 percent of a country's population consuming less than 80 percent of caloric requirements even though national level food availability is at or greater than 100 percent (World Bank 1986). It

Figure 1.1--A schematic overview: factors influencing nutritional status and policy options



Source: Kennedy and Pinstrup-Andersen, 1983.

is the household's ability to obtain food that is critical in ensuring household food security. The ability to obtain food is related to the household's access to food. As the purchasing power of households increase, access to food increases.

The second flaw in the food production/household food security/nutrition argument relates to the links between hunger and malnutrition. Hunger and malnutrition are not synonymous. Food is only one of a series of inputs into the production of health and nutritional status. Factors such as the health/sanitation environment, including hygienic practices within the household, availability of health services, food distribution within the household, cultural practices related to weaning, and child feeding practices can have a greater influence on nutrition than simply the amount of food available at the household level.

This is not to argue that macro-economic policies are not important. Clearly, national level development policies have a direct effect on market prices, household income, and availability of publicly provided health and social services. These community and household level factors, then, have an impact on the health and nutritional status of individual family members.

In the schema in Figure 1.1, it is important to be able to identify the effects of each of these factors on the health and nutritional status of households and individuals, in order to identify the most important intervention. The type of intervention that will be most effective depends on which factor or combination of factors are the most limiting constraint in the production of good nutrition.

The lack of this type of empirical information in a context-specific setting has resulted in the implementation of interventions that have not addressed the underlying causes of the malnutrition problem. The choice of the most appropriate intervention will depend on who is malnourished and why. This sounds so obvious yet, over and over again, an effective nutrition program or project has been transplanted to a new setting and has failed. It may not be the intervention that is ineffective but, rather, it is not appropriate, given the nature and causes of the specific malnutrition problem in this new setting.

The list of nutrition interventions outlined in Figure 1.1 covers the range of types of approaches that have been used to alleviate malnutrition. Each of the interventions are based on different assumptions about who is malnourished and the causes of malnutrition. Part of the continuing controversy as to which type of nutrition intervention is most effective is due to the fact that policymakers are identifying different factors as the most limiting constraint in causing malnutrition.

There continues to be a tension between macro and micro approaches to alleviating malnutrition. Many policymakers believe that, in the ultimate analysis, problems of hunger and malnutrition will be eliminated by long-term sustained economic growth. Broad-based economic and agricultural policies, while not nutrition interventions in the traditional sense, are expected by many policymakers to result in improved household food security and nutrition. Evidence indicates that economic growth can lead to dramatic reductions in poverty which, in turn, lead to reductions in

hunger (Mellor 1990). However, while the links between increased household income and improved household food security are well established (Alderman 1986), the links between increased household income and an individual's nutritional status are less direct. Factors, such as intrahousehold distribution of food and other resources, education and motivation of the primary caretaker, and the health environment of the individual may be as important, or in some cases, more important, than national level policies in influencing nutritional status, at least in the short term. Even where development policies have been successful, there often are pockets of poverty left behind that require some targeted approaches to alleviating malnutrition (World Bank 1990). Thus, household-oriented or child-oriented nutrition interventions are often needed to deal with malnutrition rather than more general growth-oriented policies alone.

## **NUTRITION INTERVENTIONS TARGETED TO THE INDIVIDUAL**

### Supplementary Feeding Programs

Supplementary feeding programs are a common type of nutrition intervention in developing countries. Supplementation schemes provide supplementary food either on site or for take home, most commonly to preschool-aged children and, to a lesser extent, to pregnant women and school-aged children. Supplementation programs are based on the premise that food given directly to nutritionally vulnerable groups, such as women and children, will do more to improve their energy and nutrient intake than interventions directed to the household.

However, a review of over 200 supplemental feedings programs in developing countries came to the conclusion that these programs, as they are normally operated, have not been very effective in alleviating malnutrition (Beaton and Ghassemi 1982). Supplementation programs that were effective in improving nutritional status tended to have certain characteristics in common; successful programs provided a high level of calories (often close to 100 percent of requirements), were targeted to moderately and severely malnourished individuals, and had regular participation over a 3-to-12-month period (Kennedy and Alderman 1987).

These characteristics were not the norm for most supplementation programs. Rather, programs tended to have erratic participation and large leakages of the supplement to non-target individuals.

The modest impact of many supplemental feeding programs led to a rethinking of these schemes, with an emphasis on selective use of food combined with growth monitoring/growth promotion activities. The Tamil Nadu Nutrition Program in India is an example of where this approach has been used successfully. All children are weighted monthly but only one-third of the most vulnerable (those who failed to gain weight or those children who lost weight) are given supplemental food. Food is given only for a three-month period; those children who fail to improve during this 90-day period are then referred for more intensive care.

Although most supplementation programs are targeted to preschoolers, it is supplementation of pregnant women that is often the most cost effective. Energy supplementation of high risk pregnant

women, as was done in Narangwal, India, is associated with significant decreases in neonatal and infant mortality (Kielmann et al. 1979). More effort should be made to extend supplementary feeding to high-risk women, at least in the latter part of their pregnancy.

#### Weaning Foods/Formulated Foods

Formulated or blended foods were originally conceived of as low-cost, commercially available processed foods that could be used during weaning. A formulated food is a nutrient-dense dietary supplement based primarily on a mixture of a local staple and vegetable proteins. These commercial weaning foods come in a variety of forms, including beverages, pastas, and biscuits. Examples include Incaparina, a beverage available in Guatemala; Superamine, an Algerian pasta; and Wheat Soy Blend Flour, which is sometimes provided as part of PL 480 Food Aid.

Commercial weaning foods have had limited success. The cost has been the principal barrier to widespread use. On a nutrient per dollar basis, commercial weaning foods are between 8 and 40 times as expensive as home-made traditional foods (Kennedy 1983). Even with substantial subsidies from governments, the cost of these foods is prohibitive for many of the poorest households.

The acceptability of commercial weaning foods has also been low. In addition, there seems to be an urban bias in distribution because these foods are available through commercial vendors, and these channels are not as readily available in rural areas.

Most governments are now stressing the use of home-produced weaning foods; acceptable weaning foods can be produced at lower cost, with better acceptability, using indigenous household foods (Griffiths 1990).

The most successful weaning food interventions have been combined with nutrition education, using social marketing techniques.

There are instances, however, in which nutrition education regarding the needs of the weanling-aged child is not the limiting factor in providing adequate food for the child. Financial constraints within the household may preclude sufficient calories for the preschooler. In this case, a weaning food could be provided as part of an integrated health/nutrition intervention and distributed free to vulnerable households. If possible, such a weaning food should be one that is prepared locally in villages and not manufactured on a large-scale commercial basis.

### Fortification

Diets of low income households, particularly young children, are characteristically limited in variety in many developing countries. Staple grains, such as rice, wheat, and corn, are only occasionally supplemented with vegetables and small bits of meat or fish. These cereal-based diets are the major source of calories but also micronutrients. Countries in which a single grain supplies a disproportionate share of the total dietary intake consistently show a higher prevalence of micronutrient deficiencies (Kennedy et al. 1979).

Vitamin A, iodine, and iron-folate are the three most common micronutrient deficiencies in developing countries. As a result, fortification programs have focused on these three nutrients.

The most dramatic results have been obtained by the addition of iodine to salt. Iodination of salt has almost completely eliminated goiter and cretinism in the United States and some parts of Latin America and Asia (Austin et al. 1981). A country-wide program for goiter and cretinism eradication, using a variety of approaches, has been implemented in Bolivia.

The results of vitamin A fortification programs are less clear-cut. Vitamin A deficiency is associated with night blindness, xerophthalmia, and, if left untreated, eventual blindness. Vitamin A fortification of sugar in Guatemala and MSG in the Philippines has had some success in increasing serum vitamin A levels. The MSG fortification program also showed a reduction in the clinical signs of Vitamin A deficiency.

The success of fortification with any nutrient depends on identifying a food carrier that is consumed regularly by the target population. Where this is not feasible, a mass dose program is a possible alternative. A recent randomized clinical trial in India, involving 15,419 preschool-age children, was able to deliver mass doses of vitamin A weekly to children, using community health volunteers (Rahmathullah et al. 1990). There was a significant decrease in mortality among children receiving the vitamin A supplement; mortality was reduced 54 percent in the group receiving vitamin A.

These mass dose distribution programs have been less successful in other countries, particularly in Africa, in which coverage of the target population is poor. Some of the principal reasons for the poor coverage include irregular or short supply of the vitamin, lack of supervision by program personnel and lack of preparedness of the community. The India experience with weekly vitamin A distribution would be much more difficult to implement in parts of rural Africa, where infrastructure is poorly developed. The access to convenient distribution points is compounded by the long distances which people must travel in rural Africa.

Iron-folate supplementation programs have proved successful in some areas in improving the hematological status of pregnant women (Sood 1975). Programs for preschoolers have had less success.

The success in improving preschooler growth in some programs without the distribution of food reinforced the fact that lack of knowledge or lack of awareness was the limiting constraint to improving nutritional status in at least some households (Rohde 1975). Interventions under the general label of "nutrition education" have been used to address this knowledge or attitudes gap. However, the freestanding nutrition education interventions that were common in the 1960s and 1970s have been replaced by programs where nutrition education is provided in conjunction with other activities. Thus a weaning foods intervention uses nutrition education skills as part of the program. Similarly, the growth promotion coordinated with growth monitoring involves nutrition education activities.

## **NUTRITION INTERVENTIONS AIMED AT HOUSEHOLDS**

Although nutrition interventions targeted to specific individuals sometimes have been successful in alleviating malnutrition, these programs have often failed to achieve their stated objectives. As a result, many policymakers believe that interventions aimed at households may be a more cost-effective way of improving the nutritional status of vulnerable individuals. Berg (1981) has concluded that even if policymakers were interested in reaching only preschoolers, it would often be more cost-effective to reach them through programs that would affect households as a whole. Many of the interventions strategies outlined in Figure 1.1 have a household orientation.

### Targeted Consumer Price Subsidies

Targeted food price subsidies are a popular and common type of intervention aimed at increasing food consumption of poor households. Subsidized food items are provided at below market prices. Lower food prices increase the real incomes of the poor which generally results in higher expenditures on food. Subsidy programs are attractive policy instruments because they are highly visible and allow governments to reach a large number of poor people easily.

Most subsidy programs have been established to achieve broad social and political goals. Better nutrition may be a stated or unstated objective of these programs. A recent multicountry study of the nutrition impacts of subsidy schemes (Kumar and Alderman 1989) found that subsidy programs can have a significant impact on household

food consumption. The nutritional effectiveness of a specific subsidy program will be increased if it is aimed at those households with the greatest caloric deficits and, in turn, those individuals within the household who are most nutritionally vulnerable (Pinstrup-Andersen 1989). The potential nutrition effect of any food subsidy will be enhanced if the subsidy can be applied to a food normally consumed in large amounts by the malnourished population but that is not eaten by other income groups. This type of "self-targeting" food was used successfully in Pakistan and Bangladesh (Rogers et al. 1979; Karin and Levinson 1980).

#### Food Stamps

Food price subsidies—even well targeted schemes—have been criticized as being expensive. Food stamp programs have been viewed as an alternative to food subsidy schemes. In 1979, Sri Lanka switched from the ration system to food stamps and total government expenditures were reduced from 14 percent to 7 percent. Jamaica provides another example of a government's decision to dismantle a general food subsidy system and develop a food stamp program in its place. There were substantial savings in government expenditures.

For both food subsidies and food stamp programs, there is evidence that the food consumption of low income households increases as a result of participation in the program. Less evidence is available to document the nutrition effect as a result of the household's participation in these programs. This failure to demonstrate an observable effect is related in part to the complex set

of linkages between household food expenditures, household caloric intake, individual member caloric intake, and, ultimately, growth. A recent analysis of data from Kenya and the Philippines showed that even with a doubling of household income, preschooler growth as measured by weight-for-length increased only 4 to 9 percent in the respective country (Kennedy and Bouis 1989). The lack of a more significant impact of increased income and food expenditures on nutrition was due to the high load of parasitic infections and high prevalence of diarrhea and illness in children. A study of the Pakistan subsidy system comes to the same conclusion; halving the incidence of diarrhea would have a greater impact on malnutrition of preschoolers than a 50 percent increase in household income (Alderman and Garcia 1990).

#### SYNOPSIS OF NUTRITION INTERVENTIONS

Figure 1.2 summarizes some of the impact information for nutrition interventions that have traditionally been targeted to households and individual household members. What is clear from this figure and the preceding discussion is that most types of nutrition programs can be effective. However, to date, no one approach has been universally accepted as the most effective means of dealing with malnutrition in children and women. What is less clear from the research conducted to date is whether linking nutrition activities to agricultural policies and programs would be a more effective means of reaching a greater proportion of the food insecure households and households with malnourished members.

Figure 1.2--Summary of nutrition interventions

Program	Effectiveness	Constraints
Consumer food price subsidies	There is some evidence that subsidies improve family caloric consumption, but little evidence to suggest that subsidies are able to alleviate preschooler or maternal malnutrition. They are most effective as preventive strategy for improving nutrition.	Subsidies are difficult to implement on a small scale and expensive to implement on a large scale. They are administratively difficult to implement in rural areas. They are most cost-effective when combined with some type of targeting—either to lowest income groups or by use of self-targeting food.
Food stamps	Like subsidies, there is some evidence that food stamps can increase family nutrient intake, but no evidence to date that food stamps are effective in improving maternal or preschooler nutritional status. Focus is preventive rather than therapeutic.	Food stamps are feasible only where households rely on the marketplace for food purchases; in this sense they are prone to urban bias.
Food-for-work	Information on nutritional effectiveness is limited. Given the focus of most programs (1 to 3 months participation), it is most effective in alleviating seasonal fluctuations in consumption.	Most programs rely heavily on food aid.
Supplementary feeding	As these programs have been typically operated, they are not very effective in improving preschooler malnutrition. They are most effective when targeted to high-risk individuals. Programs that offer a small ration (200-300 calories) to a large number of people are unlikely to show a measurable impact on growth.	The level of supplementation provided has not taken into account leakage to nontarget group individuals. As a result, net calories consumed by a child are not enough to cover the energy gap and/or improve growth. Also, programs are administratively intensive, requiring moderate amount of infrastructure and logistical support.
Integrated health/nutrition	An appropriate mix of health/nutrition services are effective in improving maternal and child health. Successful projects have targeted services to high-risk persons, used supplementary feeding selectively, and tailored program components to individual needs.	Program usually requires some health infrastructure and is very labor-intensive.
Formulated foods	Only limited success in improving nutritional status of preschoolers has been observed.	Cost is a primary barrier for commercially available weaning foods. Low consumer acceptability has also limited use of these foods.
Home gardens	Some evidence suggests an impact on increasing micronutrient intake, but the effect on increasing macronutrient consumption appears limited.	Land and labor is insufficient for cultivation of home garden by the most nutritionally needy families.

Source: Kennedy and Alderman 1987.

A starting point in the development of some potential approaches to linking nutrition and food security concerns to agricultural policies is to examine the epidemiology of becoming malnourished. This is presented in Section 2.

## SECTION 2:

### THE PROCESS OF BECOMING MALNOURISHED

As the discussion in the previous section highlighted, there are a complex set of factors that contribute to malnutrition in children. In order to design an appropriate intervention to deal with the malnutrition problem, there needs to be a better understanding of which factor or combination of factors are the most critical in causing malnutrition. Part of the ambiguity as to the most effective type of intervention is due to the fact that policymakers are given data on nutritional status often with little indication of what is causing the problem. Thus, data indicating that 30 percent of preschoolers have a weight-for-age that is less than 80 percent of standard are subject to many interpretations which could include inadequate food intake by the child and/or insufficient food availability within the household, poor weaning or child feeding practices, illness patterns, lack of knowledge, or a combination of these and other factors. Without a better understanding of what is the limiting constraint to the production of good nutrition, it is difficult to know how to proceed.

In order to elucidate the process of becoming malnourished or, as described by Beaton (1989), "the process of becoming small," a longitudinal data set containing information on household and child-level variables, covering the period 1984 to 1987, was used. The purpose of this section of the report is to provide a better understanding of what factors precipitate malnutrition in an initially healthy population and, then, to use this information to identify

points in this process where it is possible to intervene to prevent malnutrition from occurring.

#### STUDY DATA

The data that are used for these analyses derive from a study conducted in South Nyanza, Kenya, to evaluate the effects of the commercialization of agriculture on household production, income, expenditures, and consumption, as well as the health and nutritional status of women and preschoolers within the household. The study area is located in the southwestern part of the country and represents a community undergoing the transition from semi-subsistence maize production to commercial sugarcane production. The site was recommended for study because it was an area undergoing rapid expansion of sugarcane production. In addition, South Nyanza is the district in Kenya with the highest birth-to-two-year mortality rate—216/1,000—of any part of Kenya; national level data indicate that 30 percent of preschoolers in the area are stunted (Government of Kenya 1990).

The study design is described in detail elsewhere (Kennedy and Cogill 1987; Kennedy 1989). The study sample included a representation sample of agricultural and nonagricultural households living in the area served by the smallholder sugarcane outgrowers program; the research included two separate studies. The baseline study covered the period June 1984 to March 1985 and included 504 households. A follow-up study was conducted from December 1985 to March 1987 and included 617 households. The sample of households that

were included in both study one and study two are called the cohort households and it is these households which are emphasized in the present analyses. Preschoolers less than six years of age, who were included in both study one and study two, are labelled the cohort sample of preschoolers.

The types of information collected in both studies is described in Appendix 1.

This is one of the few longitudinal studies in which detailed information is contained on household income and consumption patterns as well as child-level health and nutrition information.

Even where longitudinal data are available on nutritional status, it is often not possible to link these with household level factors. While it is possible to observe that the nutritional status is improving, deteriorating, or staying the same over time, it is impossible to identify the range of factors contributing to this process.

In order to take advantage of the longitudinal nature of the health and nutrition data that were collected, the analyses concentrated on tracking the progress of children in the study, particularly the cohort sample of children, from the point at which they entered the study. Table 2.1 provides a breakdown of age of children at point of first measurement in the research. There were 92 preschoolers in the cohort sample on whom data were collected prior to two months of age. This is an important subset of children because it

Table 2.1--Number of preschoolers by study by age group at time of first measurement

	Less than 2 months	2 to 12 months	12 to 24 months	24 months and older	N
Cohort	92	165	187	333	777
Study 1	144	266	279	694	1,383
Study 2	144	287	290	966	1,687

allows the progress of these children to be monitored over a two-and-one-half-year period.

Children listed in study one and study two are non-cohort children who only participated in one study. The majority of preschoolers who were in study one but not included in study two were eliminated because they had reached their sixth birthday. The age classification of children at point of entry into the research is the category in which they remain for the present analyses; therefore, a child who is first measured at less than two months of remains in that category despite the fact that the child is clearly aging over the 1984/1987 period.

Table 2.2 provides a breakdown of selected indicators of cohort preschoolers by age category. For children less than two months of age, weight is a good proxy for birth weight and indicates that birth weights are similar, on average, to international norms. The majority of births take place at home and it was, therefore, not possible to validate these data based on clinic or hospital records. The weight-for-age measurement for children under two months of age is 104 percent of the NCHS standards.

If one compares weight-for-age across the four age categories, there is a steady drop in weight from two months to 12-to-24 months, which then appears to level off for the older preschoolers. The pattern of drop in weight coincides with a rise in the prevalence of overall illness, which is due mainly to increases in febrile illness and diarrhea.

Table 2.2--Selected indicators of preschoolers at time of first measurement, by age group, Study 2

	Age Group			
	Less Than 2 Months	2-to-12 Months	12-to-24 Months	24 Months and Older
N	144	287	290	966
Weight (kg)	4.28	7.19	9.31	13.85
Weight-for-age Z-score	.32	-.64	-1.50	-1.11
Height-for-age Z-score	.	-.88	-1.90	-1.56
Weight-for-height Z-score	.	-.24	-.51	-.19
Weight-for-age %	104.22	93.02	84.19	88.29
Birth order	4.23	4.07	3.75	3.79
Sex				
Male	46.5%	49.5%	47.9%	49.9%
Female	53.5%	50.5%	52.1%	50.1%
Percent total time ill	16.45	37.01	31.33	28.77
Percent time ill fever	2.70	10.57	7.52	6.43
Percent time ill diarrhea	2.94	10.17	9.32	2.62
Number of meals	1.35	2.67	3.20	3.08
Age (months)	.96	6.98	17.88	45.16

Source: IFPRI, South Nyanza Survey 1985/87.

This type of cross-sectional analysis is typical of the way most nutrition evaluations are done. The assumption is that children in the older age groups are representative of how children in the younger age groups will fare nutritionally as they age.

Table 2.3 analyzes the data longitudinally; nutrition and health data for children in each of the age categories are presented for the cohort sample at the beginning and end of the multi-year study. Within these age categories, children are further subdivided into whether they lost weight during any round in the study vs. preschoolers who maintained or gained weight in each round.

Preschoolers at each age level who gained weight or at least did not lose weight, are able to maintain weight-for-age. In the under-two-month-of-age category, children who gained weight start with a weight-for-age of 108 percent of standard and are at 103 percent of standard at the end of the multi-year period. There are similar weight patterns for children in the other age categories, who continue to gain weight.

This counters the argument often put forth that a deceleration in growth is inevitable in low income areas of developing countries. Not all children in this sample deteriorate nutritionally.

The pattern of growth is different for children who have lost weight in any round. Of particular interest are the children in the less-than-two-month age category. These preschoolers are at the 96 percentile of weight-for-age at first measurement, but only 83 percent by the end of the study.

Table 2.3--First and last measurements of selected indicators of preschoolers by age group, cohort preschooler

	Less than 2 mos.				2 to 12 mos.				12 to 24 mos.				24 mos. and older			
	No Change /Gained Weight		Lost Weight		No Change /Gained Weight		Lost Weight		No Change /Gained Weight		Lost Weight		No Change /Gained Weight		Lost Weight	
	First	Last	First	Last	First	Last	First	Last	First	Last	First	Last	First	Last	First	Last
N	41	41	21	21	98	98	57	57	120	120	65	65	238	238	82	82
Weight (kg)	4.35	6.51	3.79	5.72	7.56	9.21	6.12	7.50	10.14	11.56	7.83	9.18	13.60	14.76	11.00	12.12
WA Z-Score	.61	.18	-.26	-1.31	-.11	-.64	-1.76	-2.38	-.85	-.60	-2.75	-2.41	-.74	-.62	-2.40	-2.15
WA %	108.45	103.09	95.53	83.31	99.38	93.23	79.87	74.70	91.03	94.28	70.92	75.37	92.39	93.44	74.58	76.56
% Total Time Ill	18.27	25.60	25.95	25.99	30.47	29.40	35.71	30.87	32.96	27.21	41.25	23.94	33.06	22.85	38.36	27.41
% Time Ill Fever	3.30	12.09	3.81	9.52	13.49	13.35	11.35	12.37	14.89	11.80	17.36	12.31	11.60	11.69	16.72	10.89
% Time Ill Diarrhea	.00	6.32	.95	7.62	8.08	8.23	14.03	14.80	7.45	7.57	14.40	4.62	4.25	2.14	5.05	4.27

Note: Preschoolers are classified under the "Lost Weight" category if they have lost weight in any one round.

Source: IFPRI, South Nyanza Surveys 1984/85 and 1985/87.

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If one looks at children who have lost weight, who are 2-to-12 months when the study began, they are already at 80 percent of the standard of weight-for-age at the time of first measurement. These data indicate that growth faltering begins at an early age.

There is no clear-cut pattern that distinguishes children who maintained/gained weight from those who lost weight. The prevalence of illness is higher in some, but not all, groups of children who lost weight. One striking difference is in the 2-to-12-month age group; the prevalence of diarrhea is approximately 80 percent higher in children who lost weight compared to those who did not. The data in Table 2.4, for the non-cohort children, show a similar pattern.

The data were analyzed in one final way. Children within age categories who were moderately or severely malnourished (less than 75 percent weight-for-age) in any round were compared to the other preschoolers in the study (Table 2.5). Data were analyzed to identify factors that differentiated the malnourished from the well-nourished preschoolers. The total prevalence of illness is higher in the preschoolers with the lower weights. More dramatic is the length of time ill with diarrhea; the prevalence of diarrhea is two-to-three times longer in children with lower weight-for-age.

The data were also analyzed to try to identify household level factors that could differentiate children more likely to have a lower weight-for-age (Table 2.6). Household expenditures per capita (food and nonfood) were used as a proxy for income. Expenditures tend to

Table 2.4 - First and last measurements of selected indicators of preschoolers by age group, preschoolers in Study 1 and Study 2, except cohort children

	Less than 2 mos.				2 to 12 mos.				12 to 24 mos.				24 mos. and older			
	No Change /Gained Weight		Lost Weight		No Change /Gained Weight		Lost Weight		No Change /Gained Weight		Lost Weight		No Change /Gained Weight		Lost Weight	
	First	Last	First	Last												
N	174	174	21	21	315	315	67	67	188	188	65	65	652	652	71	71
Weight (kg)	4.43	6.46	4.14	6.52	7.22	8.77	5.79	7.18	10.19	11.50	7.94	9.01	14.51	15.72	11.42	13.07
WA Z-Score	.36	-.30	.00	-1.76	-.16	-.83	-2.16	-2.76	-.72	-.50	-2.61	-2.50	-.80	-.64	-2.72	-2.19
WA %	104.91	96.36	99.57	79.55	98.63	91.12	74.26	71.02	92.45	95.05	72.68	74.22	91.61	93.32	70.65	75.92
% Total Time Ill	15.65	26.57	26.02	62.24	35.76	32.08	38.95	45.59	30.32	27.17	37.87	33.90	26.06	21.67	21.87	22.97
% Time Ill Fever	2.58	9.50	2.55	3.57	10.38	8.66	13.35	11.12	8.75	9.93	7.27	13.30	7.64	7.98	8.37	6.25
% Time Ill Diarrhea	1.82	4.26	6.12	12.76	10.73	6.01	11.36	13.70	7.00	3.97	17.98	5.91	2.21	1.89	3.57	5.47

Note: Preschoolers are classified under the "Lost Weight" category if they have lost weight in any one round.

Source: IFPRI, South Nyanza Surveys 1984/85 and 1985/87.

Table 2.5--Selected indicators of preschoolers at time of first measurement by weight-for-age cutoffs\*, by age group, Study 1 and Study 2

	Age group							
	Less than 2 mos.		2 to 12 mos.		12 to 24 mos.		24 mos. and older	
	WAX >= 75%	WAX < 75%	WAX >= 75%	WAX < 75%	WAX >= 75%	WAX < 75%	WAX >= 75%	WAX < 75%
N	236	51	410	137	305	136	891	167
Weight (kg)	4.32	3.81	7.50	6.04	10.13	7.86	14.30	11.15
WA Z-Score	.44	-.50	-.23	-1.91	-.81	-2.70	-.74	-2.53
WA %	106.08	91.99	97.80	77.96	91.50	71.58	92.31	72.97
Birth Order	4.10	5.13	4.03	4.33	3.66	3.79	3.61	3.89
Sex								
Male	46.6%	41.2%	48.0%	55.5%	51.8%	48.5%	49.9%	53.3%
Female	53.4%	58.8%	52.0%	44.5%	48.2%	51.5%	50.1%	46.7%
Pct Total Time Ill	17.43	25.41	35.66	38.90	32.98	38.82	29.06	32.13
Pct Time Ill Fever	3.94	.81	13.24	12.03	11.72	12.56	9.03	13.78
Pct Time Ill Diarrhea	2.94	6.33	9.74	13.68	8.27	15.84	2.89	5.62
Age (mo)	.95	.99	6.82	7.10	17.93	17.19	43.61	41.75

-2.11-

\*Figures above were obtained at the time of first measurement in the research. A preschooler is classified as under "WAX < 75%" if his/her WAX falls below 75% in any round during the survey.

Source: IFPRI, South Nyanza Surveys 1984/85 and 1985/87.

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Table 2.6--Selected household indicators of preschoolers by weight-for-age cutoffs by age group, Study 1 and Study 2

	Age group							
	Less than 2 mos.		2 to 12 mos.		12 to 24 mos.		24 mos. and older	
	WAZ >= 75%	WAZ < 75%	WAZ >= 75%	WAZ < 75%	WAZ >= 75%	WAZ < 75%	WAZ >= 75%	WAZ < 75%
N	236	51	410	137	305	136	891	167
Weight (kg)*	4.32	3.81	7.50	6.04	10.13	7.86	14.30	11.15
Expenditures/Cap (KSh)								
Study 1	2018.75	1974.59	1879.50	1716.78	2178.38	1914.43	1864.15	2207.79
Study 2	2691.83	2604.87	2671.97	2684.32	2776.81	2689.33	2674.48	2362.87
Food Exp/Cap (KSh)								
Study 1	950.14	947.70	932.94	1028.26	963.71	891.86	903.34	946.43
Study 2	2039.21	2229.54	2040.95	2178.68	2120.18	2238.73	2098.57	1928.85
Health Exp % of Total								
Study 1	1.92	.90	2.25	2.92	1.98	5.09	2.94	4.09
Study 2	3.62	5.60	4.02	3.97	4.10	3.78	4.00	7.90
Household Size	12.39	9.40	12.58	11.11	11.86	12.03	12.55	11.90
Time to get water (Hr)	.54	.31	.50	.58	.47	.56	.53	.50
Landholdings (Ha)	4.29	3.16	4.27	3.50	3.87	4.17	4.55	3.33
HH Calories/AEU**	2665.23	2804.83	2558.85	2642.45	2555.84	2500.81	2517.19	2490.38
HH Caloric Adequacy**(%)	93.52	98.42	89.78	92.72	89.68	87.75	88.32	87.38

\* A preschooler is classified as under "WAZ < 75%" if his/her WAZ falls below 75% in any round during the survey.  
 \*\* First measurement.

Source: IFPRI, South Nyanza Surveys 1984/85 and 1985/87.

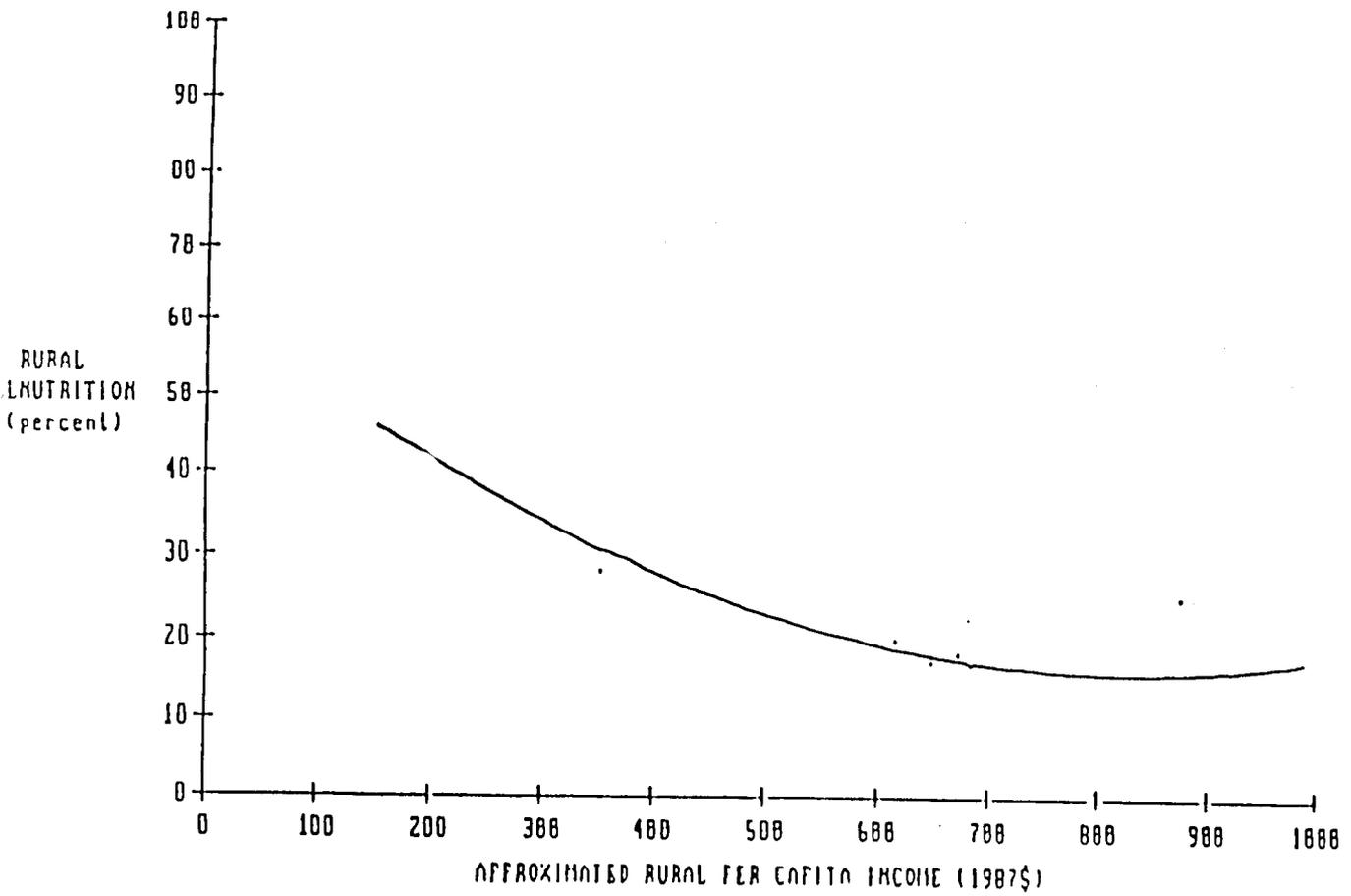
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fluctuate less than income particularly in communities where there are lump sum sources of income, such as large payments for cash crops.

The data in Table 2.6 indicate that household expenditures per capita are not significantly different in the groups of well-nourished vs. malnourished children. Similarly, neither household food expenditures per capita nor the percent of household caloric adequacy are good in discriminating the preschooler likely to be malnourished.

This issue is taken up in another way in Figure 2.1. Here the relationship between household income/capita and preschooler malnutrition (based on weight/age) is shown for 33 countries combined (von Braun and Pandya-Lorch 1990). At low levels of income, as household income increases, there is a sharp decrease in the prevalence of malnutrition. However, once household income approaches approximately \$600/capita, the rate of decrease in malnutrition falls and, between \$600/capita and \$1,000/capita, there is very little difference in the prevalence of malnutrition. There are several explanations for this. Below \$600/capita, for many households, income is the limiting constraint to improving nutritional status in children. By increasing household income up to a point, preschool malnutrition declines. However, once the household income constraint is removed or once the income constraint is no longer the primary obstacle to improving nutritional status, other factors come into play. These include breast-feeding and weaning patterns, health/sanitation environment faced by the individual, morbidity patterns, nurturing behavior of the primary caretaker(s), a range of

Figure 2.1--Rural income and rural malnutrition in developing countries with GNP per capita of less than \$1,200



Source: von Braun and Panya-Lorch 1990.

social and demographic factors such as household size, birth order of the individual, parents' formal and informal education, birth weight (this is most important in the early years of life in influencing nutritional status) and time availability of the mother.

The income/malnutrition relationship shown in Figure 2.1 is also reflecting another underlying phenomenon. Countries or areas of a country in which households have a low per capita income tend to coincide with areas where there is poorly developed infrastructure including inadequate health/nutrition infrastructure. There is low investment in social/welfare services, limited accessibility of primary health care facilities, and the overall health/sanitation environment is poor. The drop in levels of malnutrition concomitant with increases in household income are undoubtedly also due to a simultaneous increase in the improvement in rural infrastructure. The improvement in availability and accessibility of services need not occur with increase in income, but it usually does. There are examples such as Costa Rica, Cuba, and Kerala, India, where nutrition levels improved, despite an absence of growth in income, but with a concerted commitment on the part of government to improving health. However, one normally observes that income growth occurs with growth in public and private health, nutrition, and social services.

What these data suggest is that growth faltering begins at an early age. It is difficult to identify children likely to be "at risk" of growth faltering based on household characteristics. Section 3 examines the impact of some noneconomic factors on the nutritional status of household members.

**SECTION 3:**  
**INFLUENCE OF GENDER OF HEAD OF HOUSEHOLD  
ON FOOD SECURITY AND CHILD NUTRITION<sup>1</sup>**

**INTRODUCTION**

The analyses in the previous section concentrated in linking preschooler nutritional status and health to household-level variables. A strong theme running through these analyses is that household economic variables would have a significant influence on child health. This issue is explored in a different manner in this section. The effect of household structure, in particular gender of the head of household, on food security and nutrition is examined.

The growing number of female-headed households in developing countries poses significant challenges in designing policies to improve household food security and, especially, child nutrition. In general, female-headed households tend to be poorer, own less land, and have less access to land, labor, and government services, including credit (Rosenhouse 1989). However, the influence of gender of household head and income on food security and nutrition often seem to conflict. While many female-headed households are poorer than their male-headed counterparts, there is often the impression that household food security and the nutritional status of individual household members is significantly better in households headed by women.

This ambiguity is due to two factors. First, many studies on gender, food security, and nutrition fail to control for household

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<sup>1</sup> This section was prepared by Eileen Kennedy and Pauline Peters.

income. In those studies, the behavior of poorer, female-headed households is compared to that of better-off, male-headed households. Therefore, it is not clear whether observed differences are due to differences in gender of household head or to differences in household income levels. Secondly, most research has treated female-headed households as a homogeneous group, drawing simple comparisons to male-headed households. On the contrary, as will be made clear in this paper, female-headed households are a heterogeneous group. Simple comparisons between male- and female-headed households mask complex processes that distinguish various types of female-headed households.

The present section evaluates the effects of gender of household head on income, food consumption, and nutrition, using data sets from Kenya and Malawi. The two study areas are quite different. The Kenya case study represents an agricultural system with high quality land, low population density, and a maize/sugarcane production mix, while the Malawi case study represents a system where land is scarce and production is a mix of maize and tobacco. Although direct comparisons will be made only between male- and various types of female-headed households within each country, a synthesis of findings across countries provides some initial scope for generalization.

#### DEMOGRAPHIC CHARACTERISTICS OF HOUSEHOLDS

In the present analysis, households are disaggregated by gender of household head. In addition, female-headed households are further subdivided into two groups:

De jure female-headed households are those in which a woman is considered the legal and customary head of household. In Kenya, de jure households are usually headed by widows, who are often the grandmother of the children in the household; in Malawi, de jure households include unmarried women, those who are divorced or separated, as well as widows. Typically, in de jure households, the female head of household is likely to have control over most household income and assets.

De facto female-headed households are those where the male is absent for more than 50 percent of the time. Labor migration studies suggest that this type of de facto female-headed household is becoming increasingly common in Africa (Buvinic and Youseff 1978; Buvinic, Lycette, and McGreevey 1983). In these households, husbands or other male relatives often still play a role in basic decision-making and make varying contributions to household incomes. In Malawi, because of substantial differences in household income levels, de facto households are further divided into typical de facto households and those in which the absent husband is employed specifically in South Africa. These latter are termed migrant female-headed households.

Data in Table 3.1 indicate a number of differences in household demographics, both between male- and female-headed households and within the subgroups of female-headed households. In both Kenya and Malawi, male-headed households are slightly larger than the aggregate of female-headed households, by nearly 5 percent in Kenya and 10 percent in Malawi. As expected, male-headed households in both countries also have significantly more adult male members than female-

Table 3.1--Demographic characteristics and expenditure patterns of households in Kenya and Malawi.

	KENYA				MALAWI				
	Males	Females			Males	Females			
		All Female	De jure	De facto		All Female	Migrants	De jure	De facto
Household size	9.55	9.10	8.62	10.09	6.26	5.64	6.21	5.10	5.90
Adult males	2.00	1.43	1.41	1.45	1.29	0.40	0.21	0.31	0.57
Adult females	2.28	2.46	2.43	2.52	1.46	1.64	1.57	1.69	1.63
Children	5.28	5.22	4.78	6.12	3.51	3.60	4.43	3.10	3.70
Preschoolers	2.20	2.15	2.09	2.28	1.76	1.75	2.14	1.48	1.83
Dependency Ratio	1.23	1.34	1.24	1.54	1.28	1.76	2.49	1.55	1.68
Expenditures per capita <sup>a</sup>	2854.00	2561.00	2736.00	2200.00	81.07	71.66	114.09	63.51	59.74
Percent food	76.00	80.00	77.00	85.00	62.00	66.00	58.00	68.00	67.00
Percent nonfood	24.00	20.00	23.00	15.00	38.00	34.00	42.00	32.00	33.00

<sup>a</sup> In Kenyan shillings (p.a.) for Kenya data and Kwacha (per 10 months) in Malawi.

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headed households. On average, male-headed households have nearly 29 percent more adult males than female-headed households in Kenya, while in Malawi, the difference is over 70 percent. In fact, nearly all female-headed households in Kenya include at least one adult male, compared to about one-third of those in Malawi.

Much of the difference in household size and composition between Kenya and Malawi is due to the fact that households in the Kenya sample are typically polygamous. This accounts for the fact that there are males present in some of the female-headed households. This situation contrasts sharply to that of typical female-headed households in Asia and Latin America.

Within female-headed households in Kenya, de jure households are the smallest. The number of adult female household members in Kenya does not vary significantly between male- and female-headed households, nor does the number of children. However, there are substantive differences between subgroups of female-headed households, with de facto households having proportionately more adult women and children than either de jure households or male-headed households.

In Malawi, de jure households are again the smallest, while the size of migrant households is similar to that of the male-headed households. There are also proportionately more females and children in female-headed households as compared to male-headed households. Among female-headed households, migrant households have, by far, the largest proportion of women and children, followed by de facto households.

These demographic characteristics influence household income-earning potential. In both countries, male-headed households have proportionately more potential income-earners than do female-headed households. In Kenya, each adult supports 1.23 children in male-headed households compared to 1.34 children in female-headed households (Table 3.1). In Malawi, each adult in male-headed households must support 1.28 children, compared to 1.76 children in female-headed households. In both Kenya and Malawi, de jure households have by far the lowest dependency ratio among all female-headed households.<sup>2</sup>

#### DIFFERENCES IN INCOMES AND EXPENDITURE

Given the differences in household composition presented above, it is not surprising that male-headed households, on average, earn higher incomes than the aggregate of female-headed households in both countries. Per capita expenditures—used here as a proxy for incomes—in male-headed households are 11 percent higher than in female-headed households in Kenya and 13 percent higher in Malawi (Table 3.1).

However, when female-headed households are disaggregated, the data indicate that, contrary to expectations, not all female-headed households are among the poorest. In Malawi, the highest per capita

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<sup>2</sup> Interpretation of dependency ratio is complicated in the case of de facto households in both countries and migrant households in Malawi by the fact that absent males, who are not counted in total household size, may contribute remittance income to their households. Where migrants remit part of their income, dependency ratios underestimate the income-earning potential of households.

expenditure levels are among the female-headed, migrant households. Per capita expenditures in migrant households are 41 percent higher than those in male-headed households. This is primarily due to remittances of income from male household members working in South Africa. In Kenya, de jure households also have per capita expenditures that are not significantly different than those in male-headed households.

In both Kenya and Malawi, the poorest households are the de facto female-headed households. Shortages of land in Malawi force men in de facto households to look for wage employment, usually in other rural areas; job opportunities and wages tend to be low. In de facto households in Malawi, per capita expenditures are 6 percent below those in de jure households and 48 percent below those in migrant female-headed households. In addition, with the exception of migrant households, the dependency ratio of de facto households is the highest among the other household groups in Malawi. Similarly in Kenya, per capita expenditures for de facto households are 20 percent below those in de jure households.

A number of studies have found that women tend to spend a greater proportion of their incomes on food, compared to men (Guyer 1980; Engle 1988). As illustrated in Table 3.1, female-headed households in both Kenya and Malawi also allocate a higher proportion of expenditures to food than male-headed households. That male-headed households spend proportionately less on food is also consistent with their higher expenditure levels. The income elasticity of demand for

food has been found to decline as incomes and overall expenditures rise in a number of countries (Alderman 1986).

Similarly, when female-headed households are broken down by subgroup, differences in expenditure levels also explain basic differences in expenditure patterns. In Malawi, female-headed, migrant households allocate a lower proportion of expenditures to food than even male-headed households, a fact which primarily reflects their higher total expenditure levels. And, in de jure households in Kenya, with expenditure levels comparable to those of male-headed households, the proportion of expenditures going to food are also roughly equivalent to those in male-headed households. The largest shares of total expenditure allocated to food are in Kenya's de facto households and both de facto and de jure households in Malawi, precisely those households with the lowest overall levels of expenditure per capita in each country.

In the Malawi case, a more detailed comparison of expenditure patterns (see Peters 1989) shows that, while most female-headed households allocated a larger share of their budgets to food, they spend between 25 and 50 percent less on beverages than do male-headed households. Even among higher income, migrant female-headed households, whose overall budget allocations reflect more closely those of male-headed households, proportionately less is spent on beverages as well. In terms of nonfood purchases, male-headed households and migrant households also spend a greater proportion of their incomes on productive inputs, such as fertilizers, than do other female-headed households in Malawi.

The evidence presented seems to indicate that differences in overall incomes are highly, but not strictly, gender-specific. Differences in the availability of household labor and access to remittance income from abroad also influence the allocation of resources across households. Similarly, differences in expenditure patterns between households seem more a function of the interaction of income and gender, rather than strictly one or the other. As will be discussed below, these findings have important implications for household food security as they determine differences in the quantity and type of calories obtained by each household, and, especially, how those calories are distributed within a particular household.

#### HOUSEHOLD-LEVEL FOOD SECURITY

As seen in Table 3.2, caloric intake per adult equivalent is, in general, very low in Malawi, constituting only 56 percent of basic requirements for an average household. By comparison, households in Kenya are able to achieve 94 percent of caloric adequacy. Again, as might be expected, given differences in income levels, average caloric intake is higher for male-headed households than for the aggregate of female-headed households in both countries. In Kenya, male-headed households are able to achieve 94 percent caloric adequacy compared to 89 percent for all female-headed households. Meanwhile, in Malawi, male-headed households have 57 percent caloric adequacy versus 54 percent for female-headed households.

The difference in caloric intake between male- and de jure female-headed households in Kenya is negligible, with each receiving

Table 3.2--Household caloric intake and child caloric adequacy.

	KENYA				MALAWI				
	Males	Females			Males	Females			
		All Female	De jure	De facto		All Female	Migrants	De jure	De facto
Caloric intake per AEU <sup>a</sup>	2691	2546	2639	2360	1626	1484	1870	1484	1423
Average household caloric adequacy (percent)	94	89	93	83	57	54	66	52	50
Percent households below caloric adequacy	26.7	37.4	34.8	42.4	90.5	90.4	78.6	93.1	93.3
Child caloric adequacy	58.36	57.2	56.22	58.88	70.5	70	75.3	68.4	69
Child/household caloric adequacy	0.66	0.67	0.64	0.72	1.31	1.37	1.19	1.36	1.48

<sup>a</sup> Adult Equivalency Units.

just under 2,700 calories per adult equivalent per day. This similarity reflects primarily their similar income levels. Daily consumption levels of de facto households remain significantly below both male-headed and de jure households at 2,360 calories per adult equivalent. In Malawi, and consistent with income, migrant female-headed households consume more calories per adult equivalent (1,870 per day) compared to male-headed households (1,626 calories per day). As was the case for Kenya, households with the lowest per capita incomes in Malawi, de facto households, also have the lowest caloric consumption levels.

However, differences in the level of caloric intake between male- and female-headed households are not wholly explained by these differences in income. Gender also plays an important role. A number of studies have also found that, over and above the effect of household income levels, the degree of women's control over household income can have an important impact on household caloric consumption as well. For example, in Rwanda, holding income constant, female-headed households consume 377 more calories per adult equivalent per day than male-headed households (von Braun et al. 1990). This effect is most pronounced in the lowest income groups. In the Gambia, the share of cereal production under the control of women adds 322 more calories per adult equivalent per day to household energy consumption (von Braun et al. 1989).<sup>3</sup>

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<sup>3</sup> According to these and other studies, the influence of female control of income on household caloric intake seems to be most consistent and dramatic in Africa, where income streams and expenditure responsibilities are still most highly differentiated by gender.

In the Kenya example, a far greater proportion of income is controlled by women in female-headed households than in male-headed households. In de jure and de facto households, respectively, 64 and 46 percent of household incomes are controlled by women. By comparison, only 43 percent of incomes are controlled by women in Kenya's male-headed households. A prior analysis of the Kenya data also found that, for all households in the sample, the proportion of female-controlled income has a significant and positive effect on household caloric intake, an effect in addition to that of total household income (Kennedy 1989).<sup>4</sup>

#### CHILD NUTRITION

In Table 3.3, health and nutritional status data for preschoolers are presented for the different types of households. The data presented show that, in spite of lower incomes and lower caloric intake at the household level, preschool children from female-headed households do at least as well as, or significantly better than, children from male-headed households, according to the longer-term measures of nutritional status—height-for-age and weight-for-age. Average Z-scores<sup>5</sup> in Kenya are -1.07 for male-headed households in the weight-for-age measure, compared to -0.87 for female-headed households. In Malawi, male-headed households have an average Z-score

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<sup>4</sup> The percent of female-controlled income was not a significant determinant of caloric intake in an analysis based on data from the Malawi study.

<sup>5</sup> Z-scores are defined as the deviation of an individual child's measurements from the mean of a reference population, divided by the standard deviation of that reference mean.

Table 3.3--Nutritional status and morbidity of preschoolers.

	KENYA				MALAWI				
	Males	Females			Males	Females			
		All Female	De jure	De facto		All Female	Migrants	De jure	De facto
Z-scores:									
Weight-age	-1.07	-0.87	-0.84	-0.91	-1.45	-1.38	-1.53	-1.23	-1.42
Height-age	-1.66	-1.41	-1.40	-1.44	-2.41	-2.31	-2.64	-2.16	-2.24
Weight-height	-0.06	-0.01	0.01	-0.06	0.06	0.05	-0.06	-0.16	-0.04
Percent w/Z-scores less than -2:									
Weight-age	18.6	15.5	16.0	14.6	28.4	23.5	36.0	17.7	20.9
Height-age	39.9	32.8	33.1	32.1	62.3	55.9	64.0	55.9	51.2
Weight-height	1.9	4.6	4.5	4.8	0.9	0.0	0.0	0.0	0.0
Percent of total ill									
Ill with diarrhea	4.14	4.00	3.97	4.05	1.84	1.90	1.63	2.39	1.63

-3.13-

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of -1.45 in the weight-for-age measure, versus -1.38 for female-headed households. There are no significant differences in the short-term nutritional status measure, weight-for-height, between male- and female-headed households in either of the countries.

More important than the average Z-scores of preschoolers is the prevalence of malnutrition among each group of households. For example, the proportion of children with Z-scores less than -2.0—those considered to be moderately to severely malnourished—in both the weight-for-age and height-for-age measures is significantly lower among children in de jure and de facto households in Kenya than among those from male-headed households. Preschoolers from the de facto households have 14.6 percent below the -2.0 Z-score for weight-for-age compared to 18.6 percent of preschoolers in male-headed households. Preschoolers in de jure households fall in-between with 16 percent below -2.0 Z-score for weight-for-age. Differences in the prevalence of stunting, as measured by height-for-age, are even more impressive. In de facto households, the prevalence of stunting is 32.1 percent, compared to 39.9 and 33.1 percent in the male-headed and de jure households, respectively.

There is a similar trend in malnutrition rates in the Malawi data. In the de jure households, the prevalence of low weight-for-age is 17.7 percent, compared to 20.9 percent in de facto households and 28.4 percent in male-headed households. Similarly, the prevalence of stunting is 62.3 percent in children from male-headed households versus 55.9 percent in all female-headed households. Children from de

facto households in Malawi have the lowest rate of stunting, at 51.2 percent.

The lower level of malnutrition among female-headed households, particularly among de facto female-headed households, is striking, given those households' significantly lower incomes. Part of the reason that children from poorer, female-headed households do better than would have been predicted by incomes alone is provided by the descriptive data in Table 3.3. First, in Kenya, preschoolers from each type of female-headed household have a slightly lower prevalence of illness than those in male-headed households. Also in Kenya, preschoolers from de facto and de jure households have significantly lower prevalence rates of diarrhea than children from male-headed households. These findings conform to those of other studies that show morbidity patterns to be a key determinant of preschooler nutritional status (Kennedy, forthcoming).

Preschooler morbidity, however, has also been found to have very weak links to household income (Kennedy, forthcoming). In the case of Kenya, one explanation for the higher prevalence of disease could be differences in food preparation techniques. Poorer, female-headed households more often use a mixed-grain porridge in their meals, which is less expensive, but must be soured before use. The souring process produces a product which actually preserves the food longer, leaving it less susceptible to bacterial contamination.

However, the lower prevalence of illness seen in Kenya does not apply to the Malawi example. In Malawi, one possible reason for the lower prevalence of malnutrition among the poorer, de facto households

may be that they, in addition to their generally higher proportionate expenditures on food, tend to allocate a higher proportion of their total food calories to their children. Although their per capita expenditures are only 74 percent of those of male-headed households, de facto households provide a level of household caloric adequacy that is 88 percent of the male-headed households'. More significantly, these households are able to ensure a level of child caloric adequacy that is 95 percent of the male-headed households' (Table 3.2).

In fact, children in de facto households in both Malawi and Kenya receive a higher proportion of total household calories than children in other household groups. The ratio of child caloric adequacy to overall household caloric adequacy, as indicated in Table 3.2, is 1.48 for de facto households in Malawi, versus 1.19 and 1.31 for migrant female-headed and male-headed households, respectively. In Kenya, as well, children from de facto households also do significantly better than children from other household groups in the proportion of calories obtained.

These findings suggest that, as household incomes increase, there is not necessarily a direct effect on the caloric adequacy of preschooler diets. For example, preschoolers from the migrant female-headed households in Malawi, despite higher household incomes and higher levels of household caloric adequacy, do not themselves have the highest caloric intakes nor the best nutritional status, compared to preschoolers from other household groups. The proportion of calories obtained by children in these higher income, migrant female-headed households is below even that in male-headed households.

Similarly, in the Kenya example, de jure households, whose expenditure levels are about equal to male-headed households, also allocate a slightly lower proportion of total calories to their children than do male-headed households.

The reason for the preference of children in the allocation of calories in lower income, de facto female-headed households is not clear. It could be that, given limited resources, investment of income in the form of food for children brings the highest return among poorer households' few alternative investment options. By investing in their children, these poorer households may best be able to ensure their long-term security. Such an explanation is consistent with the data presented above on the declining share of expenditures to food as incomes increase. It is also consistent with the observation that male-headed households and wealthier female-headed households spend a higher proportion of incomes on other productive assets, such as inputs into cash crop production, including fertilizers. The consumption needs of adult household members and investments in land, hired labor, and other productive resources may compete with children's consumption for a share of the budget in households where incomes are sufficiently high to allow those additional investments.

An additional explanation for the negative relationship between household income and the proportion of calories going to children may be that, at higher levels of income, money is spent on more expensive calories rather than more calories per se. Children simply may not share proportionately in those additional, more expensive calories.

Also, it may be that, in spite of higher cash incomes and larger household food supplies overall, the perception of need to allocate more food to preschoolers is somehow obscured.

Finally, the Kenya example also points to the importance of nurturing behavior in determining the quality of child nutrition. According to a detailed, ethnographic study conducted as part of the Kenya research (Rubin 1988), female-headed households often have a greater number of eating occasions for their preschool-aged children. Analyses have shown that a child's caloric adequacy increases in proportion to the number of daily meals (for example, Kennedy 1989).

In the case of de jure households, the higher prevalence of disease and lower proportion of calories allocated to children, compared to de facto households, may partly reflect the relationship of the household head to the children in the household. In Kenya, and to a lesser extent in Malawi, many of the female household heads in de jure households are the grandmothers of children in the household. In terms of the impact on child health and nutrition, the fact that a woman heads the household may be less important than the relationship between the household head and the children in the household. The degree of authority mothers have in decisions over their own children's well-being may have an overriding importance on allocations of income for additional health care or food for children. Intergenerational conflicts over the value of modern health and nutrition practices that limit their adoption may also affect child well-being.

## CONCLUSIONS

Understanding of the impact of gender and income on household food security and child nutrition has been obscured by the tendency to treat all female-headed households as a homogeneous group and to analyze their behavior in contrast to generally more wealthy, male-headed households. As the data presented above illustrates, however, not all female-headed households are alike. Nor are they in every instance poorer than their male-headed counterparts. Controlling for these factors, the analysis above indicates that household food security and child nutrition are influenced more by the complex interactions between gender of household head and income, rather than strictly one or the other.

The case studies from Kenya and Malawi found that male-headed households did have a higher average income than the aggregate of female-headed households. However, contrary to expectations, not all female-headed households are poorer than their male-headed counterparts. And, rather than behaving as a homogeneous entity, differences in demographic characteristics and access to remittance income, for example, lead to important differences in behavior among female-headed households.

The analysis illustrates that, while the aggregate of female-headed households allocate a higher proportion of their incomes to food compared to male-headed households, expenditure patterns may be quite similar between male-headed and certain subgroups of female-headed households at similar levels of income. Although this fact argues strongly that income is a major determinant of household food

security, it is also true that the level of income controlled by women has a positive impact on household caloric intake, an impact that is over and above the effect of income. This finding suggests that gender may influence the composition of diets within households, as was indicated in the Malawi case by the higher proportion of food budgets allocated to beverages by male-headed households.

Another important finding of the research presented above is that poorer, female-headed households are able to provide better nutrition to their children than better-off male- and even female-headed households. This is accomplished by allocating proportionately more of their incomes to purchasing food and then allocating proportionately more calories out of their total food supplies to their children. Clearly, however, it is not female-headedness per se that leads to this pattern of behavior, since not all female-headed households demonstrate low levels of malnutrition.

Again, that outcome can only be seen as a function of both income and gender. At higher income levels, households are able to obtain more total calories; however, the type of foods consumed and the quality of calories obtained often change. As incomes increase, and regardless of the household head's gender, children seem to benefit proportionately less from those changes. Differences in morbidity and nurturing behavior, which seem to be more closely linked to the gender of household head, also have an important impact on nutritional outcomes.

The findings of this study are important because they may point to alternative means to deal with health and nutrition problems in

developing countries. One important implication, especially relevant to the case of Africa, is that the targeting of interventions by gender of household head may not be the most effective in reaching the poorest households. The research also suggests that, where poverty alleviation through income generation, as is the goal of most agricultural policies and programs, is likely to be a long-term process, interventions that promote appropriate nurturing behaviors or that exploit incentives for household investment in their children may be quite effective in providing short-term gains in child health and nutrition. This finding again reinforces the need for nutrition/agriculture linkages.

**SECTION 4:**  
**INVENTORY OF AGRICULTURAL POLICIES AND PROGRAMS**  
**IN AFRICA, ASIA, AND LATIN AMERICA**

**INTRODUCTION**

A major objective of the current project was to identify ways in which the food security and nutrition effects of agricultural policies implemented in developing countries could be enhanced. A logical starting point was to document the range of policies and programs currently in place and to summarize the strengths and weaknesses of these approaches.

In February, 1990, a short questionnaire was sent to policymakers and researchers in Africa, Asia, and Latin America. (A copy of the questionnaire is included in Appendix 2). Questionnaires were sent to a total of 33 countries: 18 in Africa, 5 in Asia, and 11 in Latin America. Of these, 18 countries, or 55 percent, responded to date. The respondents represented policymakers from Ministries of Agriculture, Health, Planning, Office of the President, as well as National Universities. Appendix 3 lists countries contacted, those responding, and institutions represented.

This assessment was not meant to be a scientific exercise and, as such, is not based on a random sample of ministries or agencies. The list of people contacted relied heavily on current and former collaborating institutions in developing countries. However, IFPRI's contacts are wide-ranging. It seemed appropriate to summarize the experience of developing countries in achieving food security and nutrition objectives as a first step in recommending strategies that could be used to improve the agriculture/nutrition linkages.

This report synthesizes the information gleaned from these questionnaires. This information is used in the later part of the report to highlight agricultural approaches to household food security and nutrition that appear to offer a higher probability of success than strategies currently being used.

## RESULTS

The questionnaire was deliberately kept short. Since the survey forms were sent to key policymakers, it is unlikely that they would have responded to a lengthy form.

Question 1 asked about agricultural policies and programs currently in place. Table 4.1 presents the results summarized for Africa, Asia, and Latin America.

There are a large number of Africans responding, compared to Asia and Latin America.<sup>1</sup> This, in part, reflects IFPRI's concerted efforts in African research in the 1980s.

While agricultural policies and programs can be wide-ranging, the specific policies mentioned by the respondents are quite limited. Only seven agricultural strategies were mentioned consistently as important. These policies include cash crop production, hybrid varieties of crops, agricultural technology, irrigation, price support programs, credit, and agrarian reform. Other policies and programs

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<sup>1</sup> Although 18 countries responded to the survey, there were multiple respondents in some of the countries. In total, there were 29 responses: 15 from Africa, 5 from Asia, and 9 from Latin America.

Table 4.1--Agricultural policies and programs

	Africa	Asia	Latin America
Cash crop production	5	0	1
Food crop production	1	0	1
Cash and food crop production	8	1	1
Adoption of hybrid varieties/ crops/improved seeds	8	1	0
Provision of/change in technology	1	2	2
Irrigation development	7	1	3
Price support program	2	3	2
Credit accessibility/credit system	2	2	0
Agrarian reform	0	2	2

were mentioned, but generally by only one or two respondents (Table 4.1).

The African responses differ from Asia and Latin America. Cash cropping, alone or in combination with policies emphasizing food crop production simultaneously, is far more prominent in Africa than in either Latin America or Asia. Eighty-four percent of the Africans responding mentioned cash crop production as a common policy as compared to 20 percent in Asia and 33.3 percent in Latin America.

In contrast, price support policies were highlighted as more common in Asia and Latin America. Similarly, agrarian reform was listed as important for Latin America and Asia, but was not mentioned at all by the Africans in the survey.

Question 2 in the survey asked of those policies mentioned in Question 1 which ones did the respondent believe had been successful in reaching the smallholders and the rural poor. Here the list of answers is much shorter than what was shown for question one. There was the general feeling that policies, programs, and projects outlined in Question 1 have not been very successful in reaching the target groups (Table 4.2). The responses from Africa were more positive than those from Latin America and Asia. Respondents from Latin America and Asia felt that the full range of programs, as they have been implemented, have had little impact.

In Africa, only one-third of the countries responding felt that hybrid varieties programs had been successful, despite the fact that this is a commonly-promoted type of agricultural program. No Latin American or Asian respondent raised hybrid varieties as having been

Table 4.2--Successful policies and programs

	Africa	Asia	Latin America
Cash crop production	4	0	1
Food production programs	2	0	0
Hybrid varieties/improved seed	5	0	0
Improved/expanded agri-credit system	4	0	0
Improvement extension services	5	0	1

successful in reaching the smallholder or rural poor.

The African respondents identified cash crop production schemes, hybrid varieties, and extension services as the approaches that had been most effective in reaching the intended beneficiaries. Few examples of successful programs were given for Latin America and Asia.

Respondents were asked to identify the factors they felt contributed to the success of programs. Four answers were most commonly given: good management, access to credit, infrastructure, and good extension service. Funding was not a frequently given answer.

The survey had some specific questions about the food security and nutrition effects of the range of agricultural policies and programs being implemented in the respective countries. Here again, most respondents felt that the policies implemented had not been effective in improving food security or nutrition. Several countries mentioned specifically that national food self-sufficiency had been achieved but that access to food of the most vulnerable households had not improved. A word of caution. From the way the answers were reported, it is clear that most respondents, regardless of the ministry they represented, had very limited information on the food security and nutrition effects. Clearly, what is needed is some mechanism for monitoring the effects of ongoing policies on consumption and nutrition. Few countries currently appear to have this capability.

When asked how the current cadre of food and agriculture programs could be improved, few concrete suggestions were given. A limited

number of respondents indicated the following: increased financing, more resources devoted to infrastructure, development of simple and appropriate technology, better access to credit, strengthen extension, and better dissemination of research results.

Respondents were asked to identify potential new approaches that might be better in addressing the food security and nutrition needs within their country. An improvement in agricultural extension and infrastructure were the two most common answers. Somewhat related to this is the suggestion that women and youth be more involved in the activities of agricultural extension and in agriculture generally.

The general impression gained from an assessment of this short questionnaire, based on 18 countries representing 99 individuals, is that, although the type of agricultural policies and programs available to developing country governments is wide-ranging, the actual policies and programs adopted by specific countries is limited. There was a fair degree of overlap in the policies implemented in Latin America, Asia, and Africa. The most common type of agricultural policies included the commercialization of agriculture, technological change in agriculture (primarily use of hybrid varieties), and price support policies. There were strong opinions articulated that most of the common agricultural policies used in the specific country have not been particularly successful in reaching the smallholder or the rural poor. Primarily because of this perception, most respondents felt that the agricultural policies had not been effective in addressing the food security and nutrition needs of the most vulnerable groups.

The range of suggestions of new approaches that have the potential to improve food security and nutrition was rather limited.

Most respondents felt there was scope for improving the food consumption and nutrition impact of agricultural policies and programs. This issue is taken up again in the final section of the report, when discussing types of nutrition/agricultural activities that appear warranted.

**SECTION 5:**  
**IMPLEMENTATION ISSUES RELATED TO**  
**NUTRITION/AGRICULTURE PROJECTS**

**INTRODUCTION**

Implementation issues appear to be critical in the success or failure of nutrition interventions throughout the world. A 1989 meeting of the International Nutrition Planners Forum (INPF 1989) in Seoul, Korea, concluded that "how" a program is implemented may be as important, or, in some cases, more important than the type of activity in the intervention. Yet, until recently, relatively little was known about the process of implementing "successful" nutrition programs or projects. Even less is known about nutrition/agriculture implementation activities.

The purpose of this section of the paper is to review what is known from AID and non-AID programs and projects about elements of successful implementation. As a first step in this direction, a one-day workshop was held at IFPRI in November, 1989, to discuss with policymakers and implementors from AID and other institutions what is known about successful implementation. The next section summarizes the discussions of that workshop.

**COMPONENTS OF SUCCESS IN NUTRITION/AGRICULTURE**

The purpose of this workshop was to have professionals from a variety of disciplines discuss their experience in nutrition and agriculture with a specific focus on approaches that have been successful and why. (A copy of the agenda is contained in Appendix 4.)

Despite the fact that nutrition/agriculture linkages have been discussed since the 1970s, the examples of programs and projects that have worked are few. In low-income developing countries, agriculture is a prime determinant of food intake, food requirements, and health status. Yet the linkages between agriculture and the health components of nutrition policy are notoriously weak, even in developed countries.

Dr. Norge Jerome of AID, Office of Nutrition, indicated that nutrition should be seen as the bridge between agriculture and health. In order to bring about sustainable improvement in nutritional status, programs should focus on the food/nutrition links as well as the health/nutrition links. There has not been enough emphasis on this in the past.

Roberta van Hefton and William Goodwin discussed the thrust of prior nutrition/agriculture activities in AID; much of this past work in the agency was carried out under an umbrella project called the Consumption Effects of Agriculture Policies and Programs (CEAP). This was a major activity within AID that focused on evaluating the consumption effects of a range of agriculture policies and programs. The CEAP project was started in the late 1970s at a time when the predominant point of view in AID was that, in order to increase consumption, the main focus should be on increasing agricultural production in developing countries. Nutritionists and agriculturalists at the time had different opinions on methodology and research techniques.

The CEAP project, which received the major share of funding from AID, Office of Nutrition, was one of the main reasons AID began examining directly the ways in which consumption, including consumption of vulnerable groups, was affected by a variety of agricultural policies and programs. Much was learned from the series of studies. One limitation, however, of the complement of CEAP activities was the almost exclusive focus on food intake at the household level as the primary outcome measure.

While it is clear that many agricultural programs that effectively target smallholder producers can have a significant effect on household food intake, the impact on nutritional status of individual household members is less clear. Future work should put a major emphasis on analysis, not only of food consumption, but health and nutrition outcomes as a result of public policy.

Forging the links between nutrition and agriculture activities at the field level is hampered by a number of factors, including:

- lack of interdisciplinary skills of program designers and implementors;
- dearth of appropriate methods for the design, implementation, and evaluation of projects;
- lack of understanding of the important linkages between agriculture/nutrition in a specific context, including the most appropriate way to carry out given activities; and
- resources—financial and technical capacity.

There were a number of recommendations on factors that should be emphasized in future agriculture/nutrition projects. These include:

- targeting small farmers;
- seasonality, how this affects consumption and how, in turn, the new agricultural policy alleviates or exacerbates the problem; and
- possibility of providing credit and extension services more readily to women.

There was a lengthy discussion about the income/nutrition effects of a particular policy. More needs to be known about the whole process of transforming income into high- and low-nutritional status. Without this type of knowledge, projects which stress income generation at the household level, as the sole means of improving nutrition, will fall short of their goals.

Some recent work at IFPRI (von Braun and Pandya-Lorch 1990) indicates that 40 to 60 percent of total income in rural areas comes from nonfarm sources. This may be one reason why one cannot expect much of a "kick" for nutritional improvement only from changes in agriculture.

One common theme running throughout the day's discussion was the severe limitation of data to document what is actually happening in developing countries. Beverly Carlson from UNICEF indicated that one of the biggest problems is that information is always the last link in the process but, typically, the policymaker needs to use the information first. Implementors need to do a better job of empowering decision-makers to not only use data but, equally important, to want data.

There was a consensus that nutritional measurements need to be integrated into agricultural measurements, but there were very few examples of where this has been done successfully.

#### ELEMENTS OF SUCCESSFUL IMPLEMENTATION

As already mentioned, implementation issues appear to be critical in the success of programs. The present review started out with the objective of identifying elements of successfully implemented nutrition/agriculture projects. However, so few nutrition/agriculture projects—successful or not—exist, and those that are in place have very little detail on the elements of the implementation process, that the documentation of successful implementation was broadened to include all types of nutrition interventions. Although the information on implementation of nutrition programs and projects is more extensive, it is still limited.

One of the most comprehensive reviews of elements of successful implementation of nutrition programs comes out of the International Nutrition Planners Forum meeting in 1989. Critical elements of program implementation success were identified in six pre-established categories. These categories include:

- political commitment;
- community mobilization and participation;
- human resources development;
- targeting;
- monitoring, evaluation, and management information systems; and
- replicability and sustainability.

The conference then invited presentations from implementors of nutrition projects in Africa, Asia, and Latin America, to assess the extent to which these elements were critical in the successful implementation of specific projects. Not all programs and projects had each of these elements, but a consensus emerged from the conference that these elements were crucial in implementation.

A larger literature was reviewed, including individual project reports, in order to determine if these same elements were identified as key to successful nutrition program implementation (see Appendix 5 for the list of key references).

#### **COMMUNITY PARTICIPATION: A MULTILEVEL PERSPECTIVE**

There has been a lot of attention focused recently on the importance of community participation in nutrition and health interventions. However, there is not a consensus in the literature nor in projects that have been reviewed that community participation is absolutely necessary to program success. For example, the Bolivian Endemic Goiter Control Program, which has been responsible for dramatic reductions in goiter and cretinism, did not have community participation as a key element. The program reports that participation was not initiated by local communities at the inception of the program, but participation by the Bolivian population has been achieved through program activities (INPF 1989).

In general, the emphasis on community participation varies. Many of the examples where community participation was viewed as a critical

element by program implementors are ones that are subnational as opposed to country-wide programs.

Community-based nutrition programs of whatever kind tend to be small and often are organized and implemented by a nongovernmental entity. Shrimpton (1989), in a review of community-based nutrition programs worldwide, concludes that there are few examples of community-based programs that are government run. This is not easy to explain.

However, part of the explanation is provided from a review of the Iringa Nutrition Project in Tanzania. This community-based project was started as part of the UNICEF/WHO Joint Nutrition Support Program (JNSP) carried out in conjunction with the Government of Tanzania. This program was very effective in getting the program started at the grass roots level; a recent external evaluation indicated that the Iringa project has been associated with a significant decrease in the levels of malnutrition in preschoolers (UNICEF/WHO 1988). Although the active participation of the local community is credited to be one reason for success, the meaning of community participation goes beyond the village level. For community-based programs to be successful, even with active local level involvement, there needs to be an awareness and commitment of the leadership at higher levels of government (Yambi and Mtalo 1989).

In addition, the historical perspective is often lost in an evaluation of programs. The ease with which community participation was developed in Iringa relates to Tanzania's political history. President Nyerere's Arusha Declaration in 1967 emphasized that

people's participation in the development process is critical; this declaration was reinforced by a political ideology that supported a community orientation and, perhaps more importantly, an administrative structure (Yambi and Mtalo 1990). Primary health care committees were established throughout Tanzania in the 1970s. Thus, by the time the Iringa project was planned, there was a long, successful history of community involvement in health decision-making. Where this rich experience of villagers working together is absent, it is necessary to introduce participatory decision-making at all levels, including the highest level of government. The first step in getting this multilevel commitment to nutrition programs is to create an awareness that a malnutrition is a serious problem with implications for the economic development of the country. Since the 1960s, Tanzanian attention has been focused on the nutrition problem and aggressive community-based approaches to it.

Malawi went through a similar process. While Tanzania has had a very decentralized approach to policy and programs, Malawi, in contrast, has had a more centralized government. In the mid-1980s, attention was focused on the malnutrition problem in Malawi as a result of the mapping of malnutrition rates for different areas of the country. This information was brought to the attention of one key minister. As a result of this, the nutrition issue was discussed at a cabinet-level meeting and ultimately a Food Security Unit was established in the Office of the President. This is somewhat surprising because, for years, the government of Malawi tended to downplay any nutrition problems in the country. It is now routine for

ministers and permanent secretaries to discuss the food security and nutrition implications of a range of proposed and ongoing policies and programs.

The infant feeding program in Togo is another example, which reports that one of the reasons for the success of their country-wide program is because of interest at all levels, from permanent secretaries in government down to the mothers themselves. This multilevel community participation created a keen awareness of the malnutrition problem.

In order to sustain this high level of participation at senior levels, the awareness of the malnutrition problem must be followed up with successful implementation. This is exactly what happened, for example, in a Child Health Project in Macina, Mali (CARE 1989). The tribal chiefs/elders became convinced that the program was working because, as one elder commented, "we used to have 10 to 12 infants die each year in this village. Last year, we had none. This program is good." This is a very powerful statement. The evidence of success helps reinforce the initial commitment at all levels to the program.

The converse phenomenon usually happens. If key policymakers do not believe that malnutrition is a problem or do not see "success" stories in nutrition programs, it is unlikely that these senior officials will be supportive. Therefore, not only do there have to be programs that are effective, but equally important, senior officials need to be aware of these successes. The countries where the awareness of nutrition successes have been most pronounced tend to be ones where there is a specific entity in government charged with

dealing with food security/nutrition issues. Where nutrition issues are divided between ministries of health and ministries of agriculture, nutrition is typically a low priority on the policy agenda.

There are some "rules of thumb" that emerged for effective community participation:

- 1) At the village level, it is easier to get community participation if you can work through an existing community institution. This may not be the "ideal" structure, but it may be preferable to creating a new, but possibly more suitable, organization which lacks a constituency and bureaucratic know-how. The Iringa project relied on preexisting village health committees even though nutrition had not been their primary focus. It helps if the community group that is selected to begin planning and implementing a nutrition project has a history of working together. If there is not an obvious group with which to work, community participation will take longer. Areas where existing groups do not exist also tend to be areas where community participation is difficult. As a caveat, donors are often not willing to wait the amount of time necessary to get community participation started in areas without a tradition of local-level involvement.
- 2) NGOs seem to be better than governments in mobilizing the community. It is not atypical to find programs with a strong community component to also be ones with a strong tie to an NGO. However, there is a concern that, although the NGOs seem to be

effective, their activities are not ones that are self-sustaining in the long run, without government involvement. Much can be learned from NGOs about the process of mobilizing the community. Linking NGOs activities with a government counterpart would provide one mechanism for transferring this information to ministries. This could be done in a variety of ways, including seconding government staff to NGOs and/or involving government and NGO staff jointly in project design and implementation.

- 3) Successfully-implemented nutrition programs have developed ways to uncover and respond to the felt needs of intended program recipients. A project in the Kintempo District of Ghana added a credit component as a result of input from the community. The community residents viewed this as an indication that their input was important.
- 4) Effective community participation generally results in pooling of public, private, and foreign aid resources for the project and the communities assuming responsibility for the project. For example, the village health workers in Iringa are paid with funds generated from the village.

There seems to be a renewed interest in community participation. In part, because community participation is in vogue, many donors are encouraging this as a component of new health and nutrition projects. However, donors often use community participation to mean cost sharing. Governments use community participation as a synonym for local-level government involvement. Community participation is defined by many others as active participation (fiscal responsibility,

program design, selection of personnel and/or local-level evaluation) by the intended program recipients in the planning and implementation of programs (Greiner 1989). This type of community participation is much harder to develop but is the type that is more typically associated with program success.

Clearly genuine community participation involves more than providing financial support (in cash or in kind). Effective community participation seems to depend on strong organizations that are capable of carrying out programs and project activities. Technical assistance from donors and sponsors may be needed in many areas to facilitate community participation as a key component of program design and operation.

#### **PROGRAM FLEXIBILITY**

Effective nutrition programs appear to be ones that have the ability to change over time in response to changing needs and/or community feedback. One of the most dramatic examples of this is the Togo Infant Feeding Program. A 1986 evaluation (Government of Togo 1990) of the program reported that many of the clinic-based activities were having little impact on the nutritional status of children. As one official indicated, "the growth monitoring in the clinics was awful."

Clinic staff were overburdened. As a result, mothers had to wait to have their children weighted; little feedback was given to the mother once the child was weighed. The average education encounter

with the mother was 50 seconds (Government of Togo 1990). Most mothers had no idea how the child was doing.

There was poor supervision of the clinic staff. The initial training of the health workers was insufficient for the tasks they were asked to do.

If this program were evaluated in 1986, it would hardly have been called a success story. What changed?

Because of a commitment at all levels to deal with malnutrition in children, there was an interest in correcting the deficiencies in the program. As a first step in finding out what was wrong, mothers were involved. Changes were put into place to make the program more responsive to the articulated needs of mothers and children. As part of this process, selected mothers have been trained as home visitors.

Ghana has had a similar experience with its applied nutrition program. Because the government was interested in making the program more effective, they were receptive to issues raised by the community. One common concern raised by the mothers throughout the country was that income, in addition to information, was needed in order to improve infant weaning practices. Thus a credit component was added in a pilot project in Kintempo District.

Another example is the Imo State Child Survival Project in Nigeria, which has had three overhauls of the project since it began. Initially, the project was intended to be a home visitation program. However, because of long distances, the health workers were reaching only a few households. Based on feedback from participants, the orientation changed from a home-based program to one where activities

are delivered during community meetings. The addition of an income-generating component as part of this project is now being explored.

The Macina Project in Mali has had the opposite experience (CARE 1989). The focus of the program changed from a community-based clinic structure to a home-based approach. The main premise of the program is to empower the household so that the gains that have been made in nutrition and health improvement can be sustained. The community organizers indicated that, "even if the program stops, the mothers have learned what they can do" (CARE 1989).

The Imo State/Macina comparison points out the danger of transplanting a project without understanding the context in which it needs to operate. The Imo State Program changed from a home-based to a community-based approach, while the opposite happened in Macina.

Health budgets in many developing countries will continue to be insufficient to meet the needs of the population and, thus, governments and donors need to think beyond the classical clinic-based model for delivering health and nutrition services. The Macina, Mali, and Imo State, Nigeria, projects are just two examples of activities that are attempting to push services beyond the clinic.

One basic message from this new review is that new approaches for delivering health/nutrition services, particularly in rural areas, need to be tested. Some will work, others will not. Programs and projects have to respond to failures by changing the approaches used. Design and testing of nutrition activities linked to agriculture could be part of this process.

## INSTITUTIONAL STRUCTURE: GOVERNMENT VERSUS PRIVATE INSTITUTIONS

Donors are interested in ways to build technical capacity so that national institutions have the capability of implementing health and nutrition activities. However, many nutrition programs have a strong NGO link. A legitimate concern is whether NGO-linked projects are sustainable in the long term without formal ties to government.

The primary sponsor of projects such as the Macina Child Health Project in Mali and the Kintempo Program in Ghana and Imo State, Nigeria, is an NGO. However, in each of these cases, there is a link to government which is sometimes less apparent; the government in each of these three cases has funded project staff. In Macina, Mali, the health promoters responsible for most of the health/nutrition services are seconded from government. Similarly in Ghana, the project director, based at the Freedom From Hunger Foundation, is a Ministry of Health employee seconded to the program. In Nigeria, the director of the project is an employee of the District Government, based at Africare in Imo State.

Many of the other projects have similar types of secondment arrangements. It is more than a financial incentive that entices governments to enter into these arrangements with NGOs; it is the flexibility of working with an NGO that is the key feature of this type of arrangement.

NGOs may have a particular role to play; NGOs seem to be better skilled at generating community participation. NGOs may also play an essential role in training in community participation techniques. However, NGO projects tend to be small and limited to a discrete

geographic area. If the ultimate goal of policymakers is to have new approaches to nutrition interventions adopted nationally, NGO activities have to be linked to structures that will reach poor people on a widespread basis. These are generally government structures—agricultural extension, public health care facilities, public education institutions.

### Training and Staff Qualifications

Training/staff and good supervision are always suggested as essential components of successful programs of any type. In analyzing the implementation process, however, it is important to get to a greater level of specificity than simply saying "training is necessary." Two very similar programs might have different training needs dictated by the level of staff involved in the program. This seems so obvious that it is hardly worth stating, except that, over and over again, training for workers with little formal education was done on a one-time basis only. Periodic retraining seems warranted in all cases, but particularly where formal training and literacy are low. Few projects and programs provide details on how training updates are managed.

Canned training packages don't work well. In addition, a common sense, but sometimes ignored, issue is that the exact tasks that the workers will be required to do should be decided upon before the training and curriculum are developed. These staff functions should also be limited in number and tasks prioritized.

The most effective training seems to be where:

- the training has been kept simple;
- there are regularly scheduled follow-up sessions to reinforce earlier training;
- if possible, it is more effective to provide training and technical assistance to staff that are already in some structure. For example, village health workers who already were part of primary health care, such as in Iringa, were easier to train in new functions than were staff who were totally new. This finding, however, might not be universally true. In Asia, some experience from the World Bank-funded Tamil Nadu project suggests that new workers were easier to train, presumably because there were fewer entrenched values and attitudes. This may not be true for other parts of Asia. Here again, this speaks to the need for having training approaches including selection of staff generalized to local needs.
- Certain types of skills seem to be important in any type of program, specifically communication skills that will assist workers in interacting more effectively with the community.

The issue of paid versus volunteer staff comes up frequently in discussing nutrition and health programs. It is tempting to use volunteers to carry out a lot of the activities, particularly if operating budgets are limited—as they almost always are. However, volunteers may not endure on the job long-term. The Imo State Child Survival project in Nigeria has been using volunteers since 1987 to conduct most of the growth monitoring/nutrition activities. Although the volunteers have been relatively stable on the job, after this long

a period, it is becoming increasingly difficult to keep them. The program is trying to locate funds to revert volunteers to paid status. Volunteer turnover has implications for training needs within programs.

Health/nutrition workers may be willing to be paid in kind—for example, agricultural commodities, or labor on their fields. Some type of payment—cash or in kind—also sends a signal to the person that the community values the work. While it is tempting to think the idea of volunteerism is a solution for lack of funds for salaries, this approach does not appear feasible in the long term.

One other element which appears critical in the implementation of successful nutrition programs is the "charismatic personality factor." In so many of the programs which have been effective, there often are one or two enthusiastic people who manage the programs. Projects probably cannot create these people but bad programs can stifle them. Where good managers have been identified, appropriate support services should be provided to allow them to carry out program operations.

### Infrastructure

Programs and projects are more likely to be effective in areas where there is physical infrastructure and a service delivery mechanism. It was not an accident that the Iringa Region in Tanzania was chosen as the site for the JNSP project in that country. Iringa was chosen as the first location for the program, specifically because of the existence of a good institutional infrastructure (Yambi 1990).

When programs of a similar type are expanded to new areas with less developed infrastructure, one cannot expect the same results.

The dilemma for policymakers is, "Which comes first, the program or the infrastructure?" The more dire health and nutritional needs are typically found in areas with little or no infrastructure. In many parts of the developing world, particularly Africa, it may be years before even a minimal type of physical/service delivery infrastructure is in place.

The development of infrastructure needs to be viewed as a long-term goal. In the short and medium term, programs and projects have to be creatively designed so that they can fit in where infrastructure is poor. Here again, this may be where NGOs can be helpful; NGOs seem to be able to get services out to the rural areas in places where infrastructure is weak. In the longer term, NGO-type activities should be channeled through government structures.

Program implementation seems to be more effective when done through existing groups. Again, the message seems to be to build on the existing infrastructure, however imperfect. A longer-term goal should be to improve the existing infrastructure.

In working through existing groups, it also helps if the project picks a "winning" institution. For example, in Swaziland and Cameroon, nutrition success in a weaning foods project resulted from working within the agricultural extension system (Griffith 1989). In other countries, other institutions may be more important in getting services out to the communities. The type of institution chosen will be very country-specific; however, these "winning" institutions seem

to have certain characteristics in common. First, effective institutions have a lot of political clout. This does not imply that these need to be government institutions; in some countries, private voluntary organizations (PVOs) have the potential to get things done.

Secondly, successful or effective institutions seem to have a multi-disciplinary or multi-issue focus. In many places, for example, nutrition is tied to food security in a Ministry of Planning or in the Office of the President in a particular country.

Ministries of Health tend not to be seen as a "winning" institution. Ministries of Health tend to have a poor track record of getting nutrition prominently placed on the national agenda and an even poorer record in implementing community-based nutrition activities. There are, of course, exceptions. The Kintempo Credit/Nutrition Program in Ghana is a program started by the Ministry of Health. However, it is unusual to have a MOH project tied to an income-generating type of activity. The flexibility of the MOH in Ghana in trying new approaches to the nutrition problem was seen as one key reason for success.

#### TARGETING AND PROJECT FINANCE

Targeting almost always improves the cost effectiveness of a given intervention (Kennedy and Alderman 1986). However, the types of targeting used can vary from:

- household targeting—as in the Jamaica Food Stamp Program, which targets to low income households;

- targeting to individuals—this is common in many maternal and child-oriented interventions;
- targeting of services—the Tamil Nadu Integrated Nutrition Program in India does this. There is selective use of food. Only about one-third of the preschool participants receive food;
- geographic targeting—concentrating a program on "high risk" areas of a country or region. A pilot food subsidy project in the Philippines selected areas based on high rates of preschool malnutrition (Garcia and Pinstrup-Andersen 1985);

The type of targeting that is needed depends on the vulnerable group to be reached and the prevalence of the problem.

The degree to which a project should be targeted depends on local circumstances. In areas where malnutrition is prevalent, targeting to specific families and individuals is unnecessary. In this situation, geographical targeting can be effective in reaching the nutritionally needy population. In a pilot subsidy scheme in the Philippines, it was possible to use geographical targeting effectively because areas with large numbers of calorie-deficient households and malnourished children could be identified. This is not often possible. As the rates of prevalence of malnutrition fall, more attention must be given to methods of screening families or individuals.

The decision whether to target to families or to specific members of the household should be dictated largely by the objective of the program. If the goal of a program is to improve the diets of calorie-deficient households, strategies aimed at identification of vulnerable families should be adopted. Alternatively, if the goal of a project

is to reach preschoolers or pregnant and lactating women, additional screening methods are needed. Thus, it is difficult to talk about targeting outside a local environment and without an appreciation of the goals of a program.

If the objective of a program is to alleviate malnutrition in the preschooler population, targeting to nutritionally vulnerable children increases the effectiveness and lowers the cost. The strategy of targeting the benefits of a program to children who are already malnourished emphasizes a curative approach. The data from the review of Timmons et al. (1983) suggest that screening based on anthropometry—weight-for-age—is effective if the primary focus of a program is therapeutic. If an intervention is focused on prevention, however, age, particularly below 36 months, is the most effective means of identifying the population that is at risk. Note also that the process of monitoring growth has a prevention function.

Cost containment is usually one major reason targeting strategies are employed. However, even with successful targeting, financing an intervention can be problematic. One of the most contentious issues highlighted in many project reports is that of covering recurrent costs.

Most nutrition programs and projects fall into one of two categories:

- those which began with external financing and continue to do so. This is true even where projects or governments had originally proposed that the recurrent costs would be taken over by local funding.

projects where the recurrent costs have been covered through cost sharing from the very beginning.

The general trend seems to be that either the cost sharing is there from the beginning or it never materializes. The Iringa project, for example, had the recurrent staff costs paid for with local funds from the beginning of the project. The Macina Health Project in Mali, on the other hand, which is considered by the government to have been very successful, has not yet found a way of financing the recurrent staff costs.

This issue will continue to be a problem and affects the long-term sustainability of programs. Many local and national level budgets are inadequate to meet the nutrition needs of the population. This will continue for many countries in the short-to-medium term.

The issue of recurrent costs is linked to community participation. Community mobilization of financial as well as human resources may be a way to tackling the problem. For example, a child nutrition project in Kinshasa, Zaire, finances program costs from the sale of commercial weaning foods.

#### SUMMARY

Much of the nutrition literature of the 1960s to mid-1980s was dominated by technical nutrition factors and economic aspects of programs. The third perspective, that of the implementation process, was left out of the assessment of effective programs (Pyle 1987). As a result, systematic information on effective implementation is rare.

This section of the paper was an attempt to provide information on some of the factors that appear to be associated with implementation of successful nutrition programs. Two caveats should be clearly stated. This is not a scientific exercise; one cannot argue cause and effect.

Secondly, reading project reports and summary documents is no substitute for observing what is actually happening in the field. For both of these reasons, it would be useful to validate the information provided in this section on a larger number of more systematically identified projects throughout the developing world.

A number of issues were identified by project reports and reviews as important: community participation, program flexibility, institutional structure, targeting/recurrent costs recovery, training and supervision, and infrastructure. These factors are not hard and fast rules but should be used as guidelines when implementing a program. It would be unwise to simply copy a particular program and implement it in a new area. The ability of an area to implement a program depends on local infrastructure, which can vary tremendously even within a given country. Health care systems are weak and infrastructure often inadequate. While governments are examining ways to strengthen the public health care systems, interim vehicles for delivering nutrition activities have to be identified. This may include linking nutrition activities to agricultural policies and programs. A key to this process is effective implementation.

A greater level of specificity in describing the process of implementation for nutrition interventions is needed. Although some

new insights have been gained about factors found in successful projects, there still is much to be learned about the generic issues of successful implementation. In order to improve our knowledge of the process of implementation, programs and projects must be encouraged to provide this information as part of ongoing reporting as well as in final reports. In addition, evaluations—including external evaluations—should focus on process as well as outcomes. This issue is taken up again in the discussion on indicators. Until this is done, we will continue to miss key elements for successful nutrition programming.

**SECTION 6:**  
**INDICATORS FOR IDENTIFYING THE FOOD INSECURE  
AND NUTRITION INSECURE<sup>1</sup>**

**INTRODUCTION**

The identification of valid and reliable indicators is one key part of any monitoring and evaluation system. Several recent reviews provide some insights into the lessons learned about indicators for assessing the nutrition effects of agricultural policies (Dawson and Kennedy 1987; Rogers 1989; Kramer and Rubey 1989; Andrews 1989; Tucker et al. 1989).

Much of the research in the Consumption Effects of Agricultural Policies and Programs (CEAP) focused on food consumption effects of policies. Several conclusions about key indicators include:

- Assessing the consumption effects of policies requires disaggregation of food into individual foods rather than simply using a food group approach (Rogers 1989). The level of food group disaggregation affects the analyses and has a significant effect on results (Dawson and Kennedy 1987).
- Household consumption adequacy does not guarantee the individual household member's caloric adequacy nor does individual food intake guarantee improved nutritional status (Rogers 1989).
- Much of the prior surveillance activities have focused almost exclusively on child-level outcomes without any indication of the causality of the problem. So, although a policymaker was aware that malnutrition was going up or down, there was little idea of

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<sup>1</sup> This section was prepared by Eileen Kennedy, Pauline Peters, and Howarth Bouis.

why. Anthropometric indicators need to be linked to broader policy issues to be relevant for most decision-makers.

It is unlikely that any single indicator will be sufficient to identify the food insecure and nutritionally at risk individuals as well as serve to monitor and evaluate program outcomes.

This section attempts to look at links between household- and individual-level food security and nutritional status. The analyses provide some information on who are the food insecure and nutrition insecure and to use this information to suggest indicators that might be used in a food and nutrition monitoring system.

A Food and Nutrition Monitoring System serves two important functions:

- 1) providing a mechanism for identifying the food-insecure/nutrition-insecure households and/or individuals
- 2) assessing changes in these population groups over time.

There has been much debate recently about the type of indications that should be incorporated in a monitoring system. The present section provides information on the utility of a series of indicators for identifying food-insecure households and nutrition-insecure individuals. Data from three countries—Kenya, Malawi, and Philippines—are used. All three data sets have detailed information on household as well as child characteristics.<sup>2</sup> This allowed a

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<sup>2</sup> A list of the variables contained in each of the data sets is contained in Appendix 1.

comparative analysis of the same indicators in different country and agro-ecological settings.

The choice of data sets was guided by the schema presented in Figure 1.1. It was important to include data sets that had household as well as child- and women-level indicators. These type of data sets are few.

The three case studies were originally initiated to evaluate the income, food-security, and nutrition effects of the commercialization of agriculture. The study protocols that were used were similar but not identical.

The Kenya case study was carried out in South Nyanza, Kenya<sup>3</sup>, an area undergoing a transition from maize to sugarcane production. The Malawi work was conducted in the southern region of the country, in a maize/tobacco growing area. The Philippines research was conducted in Mindanao, in a maize/sugarcane producing area.

#### WHO ARE THE FOOD INSECURE HOUSEHOLDS?

In this report, we define "food security" as access by all people, at all times, to sufficient food for an active and healthy life (World Bank 1986). In order to operationalize this definition, food-insecure households are defined as households consuming less than 80 percent of caloric requirement.<sup>4</sup>

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<sup>3</sup> For more details on the sampling and research design, see: For Kenya, Kennedy (1989); for Malawi, Peters and Herrera (1989); for the Philippines, Bouis (1990).

<sup>4</sup> While households consuming between 80 and 100 percent of calorie requirements might also be food insecure, we have chosen the more conservative cut-off of 80 percent. In Kenya and the

Table 6.1 presents data on the characteristics of households consuming above and below certain cut-off points. A word about Malawi: Adequacy levels in Malawi are very low—62 percent of the sample households consume less than 60 percent of caloric requirement. Therefore, for Malawi, households are classified as consuming less than 60 percent, 60 to 80 percent, and greater than 80 percent caloric requirement. For Kenya and the Philippines, the categories are less than 80 percent, 80 to 100 percent, and greater than 100 percent.

As already mentioned, Malawi has a very skewed distribution with regard to household calorie adequacy; only 9.5 percent of households consume even more than 80 percent of requirement. Whereas in Kenya and the Philippines, 37 percent and 29 percent, respectively, consume greater than 100 percent of caloric requirement.

Data in Table 6.1 indicate that landholdings/capita do not differ significantly between the lowest and middle consumption groups. In fact, in Malawi, there is no variation in land/capita across the three consumption categories. This is worth emphasizing, since landholding is repeatedly suggested as a good proxy for household welfare in agricultural communities. The data from the three countries would suggest otherwise.

Income/capita does differentiate food-insecure from food-secure households. In each of the three countries, there is a significant difference in income/capita between households in the lowest and highest calorie adequacy category. This income/capita does not

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Philippines, caloric intake was derived from a 24-hour recall. In Malawi, from weighed food intake.

Table 6.1--Household characteristics of the food insecure by household caloric adequacy groups

	Kenya			All	Malawi			All	Philippines			All
	Household Caloric Adequacy				Household Caloric Adequacy				Household Caloric Adequacy			
	LT 80%	80-100%	GT 100%		LT 60%	60-80%	GT 80%		LT 80%	80-100%	GT 100%	
Landholdings/cap (ha.)	.33*	.39	.55*	.43	.25	.25	.25	.25	.19*	.25	.35*	.26
Household size	11.42*	9.62	8.00*	9.53	6.25	6.55	7.35	6.44	7.60*	7.35	6.17*	7.09
Number of adult men	2.35*	1.93	1.58*	1.92	1.20	1.42	1.50	1.23				
Number of adult women	2.71*	2.30	2.05*	2.32	1.59	1.42	1.80	1.56				
Number of children	6.36*	5.38	4.37*	5.29	3.45	3.72	4.05	3.59	4.94*	4.46	3.49*	4.32
Total household income	25887.9	28815.7	28026.8	27664.7	399.8*	531.3	772.2*	472.82	243.8	261.5	325.7	275.0
Household income/cap	2388.10*	3134.85	3592.64*	3079.67	67.6*	87.8	113.9*	77.78	32.4*	35.1	47.2*	37.2
Household nonfarm income %	42.23%	39.89%	37.89%	39.86%	37.5%	38.0%	42.5%	38.1%	52.8%	47.9%	45.5%	48.7%
Household farm income %	11.21%	13.35%	13.24%	12.68%	30.8%	27.9%	29.7%	29.9%				
Household semi-subsist income %	46.56%	46.76%	48.88%	47.47%	31.7%	34.1%	27.8%	32.0%				
Household female income %	47.30%	46.51%	46.01%	46.57%	55.1%	49.9%	55.4%	54.3%				
Total Household expenditure	23362.7	25171.3	25155.9	24646.8	368.0*	528.6	595.7*	435.57	269.8*	330.0	365.2*	321.2
Household expenditure/cap	2098.31*	2087.79	3334.58*	2796.92	68.95	92.58	90.99	77.80	36.7*	44.5	57.5*	45.2
Household food exp/cap	1659.69*	2131.17	2525.80*	2140.24	43.32	52.15	50.94	46.57	25.7*	29.9	38.3*	31.1
Household food exp/cap-purchase	767.11*	966.45	1168.65*	983.22	20.65	22.13	24.23	21.54	16.7*	19.0	24.8*	20.0
HH food exp/cap-own produced	892.58*	1164.72	1357.15*	1157.02	22.48	30.02	26.71	25.03	9.0*	10.9	13.5*	11.1
Household nonfood exp/cap	438.62*	676.63	808.78*	656.68	25.42	39.57	37.93	30.65	11.0*	14.6	19.2*	14.9
Head of HH schooling (yrs)	4.89	5.45	4.71	5.01	1.74	1.70	1.60	1.71	5.4	5.7	6.1	5.7
Women in HH schooling-ave (yrs)	3.78	3.98	3.86	3.88					6.0	6.1	7.3	6.5
Mother's nutritional knowledge									7.4	7.5	8.1	7.7
N	171	209	222	602	130	60	70	210	138	178	132	448
%	28%	35%	37%	100%	67%	28.5%	9.5%	100%	31%	40%	29%	100%

\*T-test between lowest and highest adequacy group (p<0.05).

Notes:

1. Income and expenditure figures are annual KSh for Kenya, 10-month Kwacha for Malawi and weekly Peso for the Philippines.
2. Number of children refer to children less than 15 years for Kenya and Malawi and less than 17 for the Philippines.
3. Mother's nutritional knowledge is a score from 1 (lowest) to 10 (highest).

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depend, necessarily, on landholdings. As already mentioned, in Malawi, income/capita increases steadily from the lowest to the highest calorie adequacy category, but land/capita does not. Also, somewhat counterintuitively, the percentage of income from production used for own consumption is lowest in the food-secure households and highest in the most food-insecure households.

In Kenya, the proportion of income provided by semi-subsistence production varies little from the lowest to the highest adequacy category. While in the Philippines, households consuming more than 100 percent of energy requirements have the lowest proportion of income provided by nonfarm sources.

From the data shown in Table 6.1, there is no clear relationship between female-controlled income and household food security in Kenya or Malawi. However, a different picture emerges when we look at the household consumption function shown in Table 6.2. The percent of female-controlled income has a very positive, significant effect on household caloric intake in Kenya. This effect of female income is above and beyond the effect of household income.

The descriptive statistics on female income in Table 6.1 may mask some subtle interactions between female-controlled income and total household income. For example, in Malawi, while the percent female-controlled income is higher for the least and most food-secure groups, the absolute amount of female income per capita is much higher for the most food-secure group. Yet this highest consumption group spends an amount on food that is not significantly different

Table 6.2--Regression for household caloric consumption for Kenya

Independent Variable	Total Daily Household Caloric Intake		
	$\beta$	t-Statistic	Coefficient
Women's income (percent)	18.6	2.69	0.007
Round 2	-1,139	-2.89	0.037
Round 3	-1,975	-3.59	0.0003
Round 4	-1,824	-3.27	0.0011
Schooling of head of household	-93	-1.7	0.08
Adult equivalent units	2,278	46.1	0.0000
Income per capita	2.2	6.2	0.0000
Income squared	-1.43E-04	-4.2	0.0000
Percent of nonfarm income	-31.4	-2.89	0.004
Relocated households	50	0.08	0.936
Percent of sugar income	-5,974	-2.54	0.011
Constant	-665	0.67	0.498
R <sup>2</sup>	0.62		
Analysis of variance			
Regression	11		
Residual	1,366		
F	204		
Sig F	0.0		

from the most food-insecure households. This suggests that a high percentage of female-controlled income in households where total income is low is less important for household food security than a situation where a significantly large enough amount of absolute income is in the hands of women. We hypothesize that this latter situation is where food security will improve. Unfortunately, in most cases, as total household income increases, the proportion of income controlled by women tends to decline dramatically.

The proportion of total expenditures allocated to food, although slightly lower in the highest category, does not decrease dramatically in any of the three countries. In all three countries, the percentage of expenditures on food is the same from the middle and upper groups. In the food-insecure as well as the food-secure households, the lion's share of total expenditures is allocated to food. This reflects the overall poverty in each of the countries.

From the analyses presented here, results suggest that income/capita is the indicator which best differentiates food-secure from food-insecure households. It should be noted that income in each of these data sets was collected over several rounds to arrive at annual. Income in the case of Malawi is income over 10 months. Recall of annual income from one interview is notoriously inaccurate.

The next section looks at these same relationships for food-insecure individuals.

### WHO ARE THE FOOD-INSECURE INDIVIDUALS?

The easy answer to the question, "Who are the food-insecure individuals?," is people from poor/food-insecure households. However, the very robust relationship between household income/capita and household food security shown in Table 6.1 does not hold up as consistently when we examine consumption patterns of preschoolers in Table 6.3. Here again, food insecurity for preschoolers is defined as less than 80 percent adequacy.

Although household income/capita is higher for food-secure preschoolers in each of the three countries, this difference is significant only for the Philippines. The source of income also does not vary between food-secure/-insecure preschoolers.

In Malawi, preschoolers consuming greater than 80 percent of energy requirements come from households where a higher proportion of income is controlled by women. This difference, however, is not significant. This relationship does not hold true for Kenya.

In Malawi, landholdings/capita is not a good predictor of preschooler caloric adequacy. This is similar to the household caloric adequacy results shown in Table 6.1.

Surprisingly, for Kenya, preschoolers in the greater than 80 percent adequacy category come from households with significantly lower land/capita. In Kenya, neither household income nor assets (land) are good predictors of preschooler food security. In the Philippines, on the other hand, both household income/capita and

Table 6.3--Characteristics of preschoolers by caloric adequacy groups

	Kenya			Malawi			Philippines		
	Preschooler Caloric Adequacy		All	Preschooler Caloric Adequacy		All	Preschooler Caloric Adequacy		All
	LT 80%	GE 80%		LT 80%	GE 80%		LT 80%	GE 80%	
Household income/cap	2992.84	3157.37	3021.99	75.7	82.2	77.4	34.4*	44.4*	37.6
Household nonfarm income %	40.45X	40.85X	40.53X	38.5X	37.8X	31.0X	45.6X	49.2X	48.0X
Household farm income %	11.95X	12.05X	11.97X	29.4X	29.8X	29.5X	54.4X	50.8X	52.0X
Household semi-subsist income %	47.59X	47.09X	47.50X	32.1X	32.4X	32.2X			
Household female income %	47.80X	47.57X	47.76X	51.8X	58.0X	53.5X			
Household expenditure/cap	2653.66	2818.58	2682.67	73.3	87.2	77.4X	42.0*	51.7*	45.1
Landholdings/cap (ha.)	.40*	.34*	.39	.25	.25	.25	.21*	.37*	.25
Household size	11.35	10.99	11.29	6.31	6.26	6.46	7.2	7.1	7.2
Gender of Head of Household									
Male	906	201	1107	95	37	132			
Legal female	114	23	137	22	5	27			
De facto female	70	10	80	19	9	28			
Migrant female				9	4	13			
Birth order	3.88	3.78	3.86						
Total time ill %	28.45X	27.35X	28.26X	20.6X	22.6X	21.2X	11.6X	10.6X	11.7X
Age (mo)	38.93	40.45	39.20	38.61	40.09	39.00	43.6	44.1	43.8
Head of household schooling (yrs)	5.06	5.35	5.11	1.7	1.7	1.7 <sup>b</sup>	5.5	6.2	5.8
Mother's schooling (yrs)	4.03	3.52	3.94	1.8	1.7	1.8	6.1	7.4	
Mother's nutritional knowledge							7.5	7.8	7.6
Age solids introduced (mo)	5.68	5.69	5.68				5.6	5.3	5.5
Age breast-feeding stopped (mo)	18.56	18.09	18.46				14.7	14.9	14.8
Mother's hrs/day time away	6.05	6.04	6.04	3.38	3.48	3.41	4.4	3.8	4.3
Mother's hrs/day child care	.99	1.01	1.00	0.33	0.34	0.34	1.2	1.3	1.2
Mother's hrs/day getting wood	.43	.44	.44				0.12	0.10	
Mother's hrs/day getting water	.84	.86	.84	3.30	3.33	3.31	0.11	0.13	0.12
Mother's hrs/day other housework	6.12	5.92	6.08			4.0	4.1	4.0	
N	1094	234	1328	145	55	200	257	124	381

\* T-test between two-groups (p<0.05).

Notes:

1. The breakdown for head of household does not add up to the N for Kenya because the gender is not identified for some households; in the case of Malawi, the residual comprise a different type of female-headed household.
2. The variable for mother's schooling in Malawi is a class variable: 1-Never attended, 2-Primary school, 3-Secondary school.

land/capita are useful for discriminating food-secure from food-insecure preschoolers.

The household income/preschooler food security issue is taken up in another way in Table 6.4. Here, a model for children's caloric adequacy is presented.<sup>5</sup> The results of the three countries are summarized in Table 6.5.

In Kenya, the consumption function results indicate that income/capita does not result in an improvement in the child's caloric adequacy. On the contrary, increasing income has a marginally negative effect on the proportion of calories captured by the preschooler. One reason for this is that increased income tends to be spent in Kenya on more expensive sources of calories (meat, fats) which are not generally part of the child's diet.

Households in Kenya and Malawi consuming less than 80 percent of requirements allocate a greater share of incremented calories to preschoolers.

There is no consistent gender effect on the child's food security. In Kenya and Malawi, boys and girls are not differentiated as far as proportion of the household food going to children. In the Philippines, boys do better than girls. While gender of the child might be used as a risk indicator in a context specific way, these data suggest it cannot be generalized across cultures.

One of the biggest determinants of the child's caloric adequacy

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<sup>5</sup> Regression coefficients shown only for Kenya and Malawi.

Table 6.4--Preschooler's caloric adequacy as a percentage of household caloric adequacy

Variable	Kenya		Malawi	
	$\beta$	T-Statistic	$\beta$	T-Statistic
Number meals	14.14	6.41	-	-
Gender (1=Boy)	-1.99	-.983	-.10	-1.13
De facto, nonsugar (1=yes)	10.1	-1.91	.18 <sup>a</sup>	1.48
Number of preschoolers in hh	-1.25	-1.95	-	-
Legal, nonsugar (1=yes)	-1.96	-.46	-	-
Weight-age Z-score	.25	.26	.11	2.5
Hours mother away	-.60	-1.1	-.04	-1.01
HH caloric adequacy (1= <80%)	25.2	11.21	.597	4.26
HH income/capita	-9.9004	-1.69	-.0005	-.92
Education			.13	2.37
R <sup>2</sup> =	.16		.20	
Analysis of variance				
F =	20.41		5.16	
Significance of F =	.0000		.0001	

<sup>a</sup> Includes all female-headed households for Malawi.

Table 6.5--Summary of selected determinants of preschooler food security<sup>a</sup> for Kenya, Malawi, and the Philippines

Variables Explanatory <sup>b</sup>	Kenya	Malawi	Philippines
Number of meals	+		
Gender (1=Boy)	NS	NS	+
Time away from home by mother	NS		-
Father's education		+	+
Income	NS	NS	NS
HH caloric adequacy less than 80 percent	+	+	
HH caloric adequacy			+
De Facto female hh (1=yes)	+	NS	

<sup>a</sup> Variable expressed as Preschooler Caloric Adequacy/Household Caloric Adequacy.

<sup>b</sup> Not all of these variables were available in each study.

+ = Significant, positive

- = Significant, negative

NS = Nonsignificant

Blank = not included in the model

Washington, D.C.: Report submitted to Agency for International Development, Office of Nutrition.

Yambi, Olivia, and Calister Mtalo. 1989. The Iringa nutrition programme: Case study prepared for the World Bank. Washington, D.C.: World Bank.

Yambi, Olivia, Urban Jonsson, and Ljungquist Bjorn. 1989. The role of government in promoting community-based nutrition programs: Experience from Tanzania and lessons for Africa. PEW/Cornell Lecture Series on Food and Nutrition Policy. Ithaca, New York: Cornell University.

UNICEF/WHO. 1988. Final evaluation of Iringa joint nutrition support program. New York: UNICEF.

in Kenya is number of meals eaten. At similar levels of income, a child with five meals vs. a child with three meals will capture 30 percent more of the household calories.

The variable on number of meals was not available for Malawi or the Philippines. However, in the Philippines, the time mother spends away from home may be a proxy for this. As shown in Table 6.5, as the time spent by mother away from home increases, child caloric adequacy decreases. One interpretation is that children receive less attention and, quite possibly, fewer meals when mother is away from home.

The summary statistics in Table 6.5 suggest few generalizable indicators that can be used to identify the food-insecure preschoolers. While some household-level indicators were useful in differentiating food-secure from food-insecure households, these same variables were less useful in identifying food-insecure preschoolers.

#### **WHO ARE THE NUTRITION-INSECURE PRESCHOOLERS?**

Table 6.6 presents the results for households with and without malnourished preschoolers. In this example, we are defining malnutrition as a weight-for-age of less than 80 percent, which corresponds to moderate and severe malnutrition. However, results are similar using height-for-age or weight-for-height.

Household income is not a good discriminator by itself of malnourished vs. adequately-nourished children. In addition, the

Table 6.6--Characteristics of households with malnourished children (Households with at least one child less than 80 percent weight-for-age vs. households with all children above 80 percent weight-for-age)

	Kenya		All	Malawi		All	Philippines		
	Number of Children Lt 80% Weight-for-Age			Number of Children Lt 80% Weight-for-Age			Number of Children Lt 80% Weight-for-Age		All
	At Least 1	None		At Least 1	None		At Least 1	None	
Household income/cap	2910.77	3194.14	3076.41	68.05	84.75	77.86	32.9	39.4	37.0
Household female income %	48.86%	45.15%	46.66%	52.2%	54.9%	53.8%	.	.	.
Household nonfarm income %	41.03%	38.86%	39.76%	39.5%	37.3%	38.2%	48.4%	49.0%	48.6%
Household farm income %	11.01%*	14.19%*	12.87%	29.4%	29.8%	29.6%)			
Household semi-subsist income %	47.97%	46.95%	47.37%	31.1%	33.0%	32.2%)	51.6%	51.0%	51.4%
Household caloric adequacy %	91.31%	94.10%	92.95%	55.3%	56.4%	56.0%	87.8%	91.0%	90.4%
Landholdings/cap (ha.)	.37	.44	.41	.22*	.27*	.25	.21	.28	.25
Gender of head of Household									
Male	199	279	478	58	77	135			
Legal female	24	39	63	11	18	29			
De facto female	13	19	32	12	17	29			
Migrant female (Malawi)				4	9	13			
N	238	337	575	85	121	206	266	154	420
Child caloric adequacy % (Calories/AEU - Philippines)	54.32%*	59.22%*	58.17%	62.98%*	75.46%*	70.47%	1764%	1934%	1876%
Total time ill %	33.31%*	27.20%*	28.52%	23.9%	21.8%	22.7%	14.9%	12.3%	13.2%
Time ill w/diarrhea %	7.44%	3.18%	4.11%	2.6%	1.4%	1.9%	0.4%	0.2%	0.3%
Birth order	4.00	3.78	3.83						
Age solids introduced (mo)	5.44	5.68	5.63				5.4	5.4	5.4
Age breast-feeding stopped (mo)	18.64	18.34	18.40				13.8	15.0	14.6
Mother's schooling (yrs.)	3.34*	4.16*	3.97	1.8	1.8	1.8	6.5	6.4	6.5
Mother's hrs/day child care	1.03	.99	1.00	.4*	.3*	.3	1.5*	1.1*	1.2
Mother's hrs/day time away	5.95	6.06	6.03	3.3	3.5	3.4	4.0	4.3	4.2
Mother's hrs/day getting wood	.47	.42	.43				0.12	0.09	0.10
Mother's hrs/day getting water	.83	.84	.84	3.26	3.34	3.31	0.12	0.12	0.12
Mother's hrs/day other housework	6.40*	6.01*	6.09						
N	317	1142	1459	58	121	206	109	272	381

T-test (p<0.05).

- Notes:
1. Income figures are annual KSh for Kenya, 10-month Kwacha for Malawi, and weekly Pesos for the Philippines.
  2. The breakdown for gender of head of household does not add up to the N for Kenya because the gender is not identified for some households.
  3. The variable for mother's schooling for Malawi is a class variable: 1-Never attended, 2-Primary school, 3-Secondary school.

\* Significant

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amount of female-controlled income per capita is also not useful in identifying malnourished children.

The percent of household caloric adequacy does not vary significantly between households with and without malnourished children although there is a slight increase in the household energy adequacy in the households with no malnourished children.

Child caloric adequacy is significantly higher in better-nourished children in each of the three countries. Given that we have already seen that household caloric adequacy does not differ significantly between the malnourished/not malnourished children's households, this finding says something about the allocation of calories to children. There is something that is causing households to allocate more food to children in certain types of households. This was shown in the preschooler consumption function in Table 6.4. Certain types of female-headed households in Kenya allocate a larger share of incremental calories to children. In addition, households in Kenya and Malawi, with less than 80 percent of caloric adequacy, also allocate a higher share of incremental calories to children.

In each of the three countries, there is a higher prevalence rate of diarrhea in malnourished preschoolers. This clearly has a negative effect on the preschoolers' weight for age. In all three countries, well-nourished children are sick only half as much with diarrhea when compared with malnourished preschoolers. In addition, in Kenya and the Philippines, but not in Malawi, malnourished children have a higher prevalence of total illness.

Landholdings per capita is not significantly different between households with and without malnourished children.

These data on characteristics of malnourished vs. well-nourished children are summarized in Table 6.7. Only total illness in Kenya and the Philippines and the percent time ill with diarrhea are significantly different between the two groups of children.

Table 6.8 presents data on the characteristics of children who are ill more often than average (for the specific sample) compared to children who are ill less often than average.

Morbidity affects children irrespective of household income. This is a powerful message, since it implies that something as well as increasing household income must be done in the short term to improve a child's nutritional status.

In Malawi, there is somewhat higher female-controlled income in households where children are sick less often.

In households where children are sicker, there is more time devoted to child care. This is easily explained by the fact that, in households where children are ill, mothers must spend more time with the child. It is probably more relevant to look at the quality of child care rather than the absolute amount of child care.

Unfortunately, this cannot be done with the present data sets (or for that matter, most data sets).

#### WHO ARE THE NUTRITION-INSECURE WOMEN?

Very little attention has been paid in the past to nutritional

Table 6.7--Summary of selected determinants of preschooler weight-for-age for Kenya, Malawi, and the Philippines

Explanatory Variables	Kenya	Malawi	Philippines
Percent time ill	-	NS	-
Percent time ill with diarrhea	-	-	-
Gender (1=Boy)	NS	-	-
Age	+	NS	-
HH income	NS	+	NS
Landless	-		NS
Mother's education	+	NS	NS
Number of children	-	NS	
Mother's BMI			+

+ = positive, significant at  $p < 0.05$

- = negative, significant at  $p < 0.05$

NS = nonsignificant

Table 6.8--Characteristics of preschoolers by duration of illness

	Kenya			Malawi			Philippines		
	Percent Time Ill		All	Percent Time Ill		All	Percent Time Ill		All
	LT Mean	GE Mean		LT Mean	GE Mean		LT Mean	GE Mean	
Household income/cap	3005.41	3035.40	3018.75	77.70	79.56	78.48	37.5	36.6	37.0
Household nonfarm income %	40.35%	40.79%	40.54%	35.3%	40.8%	37.6%	49.1%	48.0%	48.6%
Household farm income %	12.29%	11.61%	11.99%	30.6%	28.3%	29.6%	50.9%	52.0%	51.4%
Household semi-subsist income %	47.36%	47.60%	47.47%	34.1%	30.9%	32.7%			
Household female income %	48.22%	47.68%	47.47%	50.4%*	55.2%*	52.4%			
Household expenditure/cap	2671.61	2681.39	2675.95	78.99	79.35	79.14	44.1	45.8	44.9
Landholdings/cap (ha.)	.38	.39	.39	.25	.24	.25	.26	.24	.25
Household size	11.48	10.97	11.26	6.63	6.36	6.52	7.1	7.0	7.1
Gender of head of household									
Male	666	534	1200	73	51	124			
Legal female	90	66	156	11	12	23			
De facto female	51	37	88	15	10	25			
Migrant female (Malawi)				8	4	12			
Birth order	3.69*	4.01*	3.83						
Total time ill %	12.09%*	49.21%*	28.43%	14.5%*	33.6%*	22.5%	3.4%*	29.1%*	15.5%
Age (mo)	38.14	36.29	37.33	39.9	37.6	39.0	37.2*	28.8*	33.2
Head of household schooling (yrs)	5.22	4.97	5.11	1.72	1.76	1.74	5.6	5.8	5.7
Mother's schooling (yrs)	4.14	3.82	3.99	1.78	1.89	1.83	6.6	6.3	6.5
Mother's nutritional knowledge							7.6	7.6	7.6
Age solids introduced (mo)	5.70	5.57	5.64				5.7	5.0	5.4
Age breast-feeding stopped (mo)	18.39	18.32	18.36				15.5	13.3	14.6
Weight-Age Z-Score	-.90	-1.21	-1.03	-1.33	-1.53	-1.41	-1.41	-1.48	-1.44
Height-Age Z-Score	-1.47	-1.83	-1.63	-2.30	-2.42	-2.35	-2.02	-2.05	-2.04
Weight-Height Z-Score	.02	-.13	-.05	0.09	-0.01	0.05	-.49	-.55	-.52
Mother's hrs/day time away	5.95	6.12	6.03	3.39	3.35	3.38	4.4*	4.0*	4.2
Mother's hrs/day child care	.98	1.04	1.00	.33*	.42*	.36	1.05*	1.46*	1.24
Mother's hrs/day getting wood	.44	.42	.43	3.46	3.33	3.41	0.11	0.09	0.10
Mother's hrs/day getting water	.83	.84	.84				0.12	0.12	0.12
Mother's hrs/day other housework	6.03	6.18	6.10				3.9	4.1	4.0
N	811	638	1449	107	77	184			420

\* t-test for two groups (p<0.05).

Notes:

- Income and expenditure figures are annual KSh for Kenya, 10-month Kwacha for Malawi and weekly Pesos for the Philippines.
- The variable for mother's schooling for Malawi is a class variable: 1-never attended, 2-primary school, 3-secondary school.
- Mother's nutritional knowledge is a score from 1 (lowest) to 10 (highest).

risk in women. Therefore, the literature is filled with monitoring systems of child-level outcomes, but not for women. Table 6.9 presents data on women stratified by Body Mass Index (BMI) categories. BMI's in the range of 20 to 24 are considered normal, BMI's above 24 are an indication of obesity, and BMI's below 20 are considered inadequate. As with preschooler nutritional status, there is some controversy over the functional significance of mild and moderate malnutrition in women (BMI of 18 to 20). In the tables, therefore, the BMI's are divided into those less than 18, 18 to 20, and greater than 20. We had few women with BMI's above 24. Obesity is not a problem in these three rural communities.

Household income per capita does not differentiate women in different BMI categories in any of the three countries. In addition, it is only in Kenya that landholdings per capita are significantly different between households with women in the low and high BMI classes.

More surprising is the fact that in Kenya and the Philippines, there is no significant difference in the household caloric adequacy between women in the low and high BMI category. In Malawi, this difference is significant.

The woman's schooling is not a significant predictor of women's nutritional status.

In Kenya, data were available on the energy expenditure of women in the household. Curiously, women in the highest BMI category have the highest energy expenditure. This seems somewhat counter-

Table 6.9--Nutritional status of women: selected women indicators by BMI groups  
(Includes mothers of preschoolers only)

	Kenya				Malawi				Philippines			
	BMI			All	BMI			All	BMI			All
	LT 18	18-20	GE 20		LT 18	18-20	GE 20		LT 18	18-20	GE 20	
Household income/cap	2768.70	3078.02	3072.03	3064.04	83.65	65.05	82.27	78.66	36.64	30.4	42.5	37.8
Household nonfarm income %	39.95%	34.50%	40.43%	39.28%	38.0%	37.7%	38.6%	38.3%	52.6%	48.1%	48.0%	48.7%
Household farm income %	8.99%	14.13%	12.26%	12.49%	34.6%	29.7%	29.1%	29.6%	47.4%	51.9%	52.0%	51.3%
Household semi-subsist income %	54.06%	51.37%	47.31%	48.23%	27.4%	32.6%	32.4%	32.0%				
Landholdings/cap (ha.)	.23*	.45	.42*	.42	.27	.24	.24	.24	0.28	0.20	0.29	0.26
Household expenditure/cap	2939.48	2778.02	2669.69	2696.20	73.55	67.48	80.36	77.04	43.4	39.7	50.1	45.9
Household food exp/cap	2453.00	2199.83	2069.60	2103.17	43.71	44.55	45.96	45.47	30.6	28.3	32.7	31.1
Head of hh schooling (yrs)	3.65	4.86	5.05	4.97					6.3	5.2	5.8	5.7
Household caloric adequacy %	95.88%	93.36%	92.40%	92.67%	50.7%	51.5%	58.7%*	56.5%	90.3	90.0	91.7	90.9
Female income/cap %	63.78%	52.59%	47.52%	48.87%	57.3%	55.6%	55.3%	55.6%				
Women schooling (yrs)	3.06	3.55	3.73	3.68	1.72	1.87	1.85	1.84	6.9	5.7	6.8	6.5
Women's nutritional knowledge									7.8	7.4	7.8	7.7
Total time ill %	25.39%	25.01%	22.21%	22.79%	25.8%	22.6%	22.9%	23.1%	7.8%	6.4%	6.9%	6.9%
Age (mos)	343.00	354.41	346.23	347.56					390.0	394.0	395.2	394.1
Hr/day child care	.95	.92	.99	.97	.28	.29	.36	.33	0.99	1.27	0.19	1.17
Hrs/day getting wood	.65	.50	.43	.45	3.16	3.18	3.24	3.22	0.10	0.14	0.08	0.10
Hrs/day getting water	.79	.88	.84	.85					0.12	0.13	0.11	0.12
Hrs/day in domestic activities	6.59	6.11	6.10	6.12					4.09	4.39	4.14	4.21
Hr/day in nonsugar farming	2.36	2.08	2.32	2.28					2.58*	2.06	1.98*	2.07
Hr/day in sugar farming		.12	.05	.06								
Total energy expenditure/day	2329.04*	2413.47	2617.21*	2573.09								
N	20	121	555	696	19	52	170	241	65	140	243	448

\* t-test for two groups (p<0.05).

Notes:

1. Income and expenditure figures are annual KSh for Kenya, 10-month Kwacha for Malawi and weekly Pesos for the Philippines.
2. The variable for mother's schooling for Malawi is a class variable: 1-never attended, 2-primary school, 3-secondary school.
3. Mother's nutritional knowledge is a score from 1 (lowest) to 10 (highest).

intuitive, since it is often assumed that nutritional status improves, in part, because of decreased energy expenditures. What the data in Table 6.9 imply is that better nourished women are able to do more work; better nutrition leads to women who are more productive.

This issue is taken up in another way in Table 6.10. Since the Kenya data were collected over a multiyear period, it was possible to look at some of these issues from a longitudinal perspective. Women's nutritional status (BMI) in 1984 was used to predict energy expenditure in 1986/1987. What the regression analyses in Table 6.10 indicate is that women who are better nourished in the earlier 1984 period are women who are more active in the later period. There is a nutrition/economic productivity link.

#### SUMMARY AND CONCLUSIONS

Food and nutrition monitoring systems serve many functions. One key purpose of many of these information systems is to provide a way to identify households and individuals who are food-insecure and malnourished.

What is apparent from the present three-country analysis is that no one of the indicators tested here seems to be universally satisfactory in identifying all types of risk. The household-level indicators of food insecurity are different from the individual member indicators of food insecurity. The oft talked about "perfect" indicator may not, in fact, exist.

Table 6.10--Relationship between women's BMI and energy expenditure in Kenya

Independent Variable	Total Energy Exp./Day (Kcal/Day)		
	$\beta$	T	Significance of T
Female hh (1=yes)	-22.4	-.71	.48
Landholdings/capita	97.3	3.2	.00
BMI - Study 1	32.3	7.94	.000
Total time ill (70)	-.13	-.23	.82
Household size	.65	.30	.77
Agricultural hh (1=yes)	162	4.49	.000
R <sup>2</sup> = .20			
Df 456			
F statistic 18.9			
Significance F = .0000			

What is even more problematic is that even if an information system were only interested in monitoring child-level outcomes, there does not appear to be one indicator that will suffice. As was shown in the table, the characteristics of children who are calorie deficient are different than the characteristics of children who are malnourished (based on weight-for-age).

This is not a very palatable message for policymakers who are looking for information systems that can easily be integrated into already existing monitoring systems. This was the major impetus for the many rapid rural assessment techniques that have been tried. More needs to be known about the types of qualitative data that can easily be incorporated into an information system. How do these qualitative data complement the more quantitative types of indicators?

Unless some of these questions are resolved, policymakers will continue to have problems mounting a useful food and nutrition information system.

#### **FRAMEWORK FOR A FOOD AND NUTRITION MONITORING SYSTEM**

Much has been learned about food and nutrition monitoring systems in the 1970s and 1980s. Future initiatives in food and nutrition monitoring can build on this valuable knowledge base. There are certain "lessons learned" that will provide the starting point for future work.

First, as point out in the review by Tucker et al. 1990, nutrition surveillance cannot be seen as solving technical bottlenecks in setting up a surveillance system. The goal of future work should be to critically evaluate the strengths and weaknesses of various surveillance activities already in place in developing countries. As a general rule, viable surveillance systems are more likely to be established using existing structure, albeit sometime imperfect, than trying to create new structures for monitoring and evaluation.

In order to be able to identify which institutions and systems are potentially useful for food and nutrition monitoring, there needs to be an inventory of what currently exists in country. The AID-funded Health Information System is currently compiling a list of AID-financed food and nutrition monitoring systems. In addition, under the new ISTI/IFPRI Food and Nutrition Monitoring Project, an inventory of non-AID-sponsored monitoring system is being developed. These two inventories will assist in the identification of entry points of monitoring systems.

Having identified structures for monitoring and evaluation, it is important to help develop a set of "user friendly" indicators. Unfortunately, most of the past indicator work has tended to concentrate on measures of impact. Much less is known about indicators of inputs into a system and indicators of process. Some of these issues were discussed in Sections 3, 4, and 5. New initiatives on monitoring must give more attention to monitoring

inputs and the process of implementation. Figure 6.1 outlines the types of variables that might be included in this inputs/process monitoring system. Clearly, as more insight is gleaned from research on the important elements of the implementation process, this list will change.

Figure 6.2 summarizes the utility of various indicators, both for identification of the food insecure and nutrition insecure and for monitoring impact. Systems which monitor food and agricultural policies generally do not have health and nutrition indicators collected as a routine part of the reporting system. Therefore, work must be done on some nontraditional indicators that might be incorporated as proxy measures of health and nutrition. The analyses in this section provide some suggestions on what are potentially useful alternative indicators. However, successful indicator work cannot be conducted in a vacuum. Some of the "user friendly" indicators need to be tested in a variety of field settings in order to determine how useful these are in a variety of different settings. Clearly, the list of alternative indicators also needs to be expanded. Relatively little is known about qualitative indicators and how these can be incorporated into food and nutrition monitoring systems.

A key point that emerges out of the discussion in this report is that much of the traditional nutritional surveillance information was based heavily on child-level anthropometry but with little idea of what was causing the nutrition problem. Information on health and

Figure 6.1--Input and process indicators

Input Indicators

Staff

Educational Background  
Number  
Employee/Supervisor Ratio  
Paid vs. Volunteer

Financing

Amount  
Capital vs. Recurrent Costs

Training

Type  
Number Sessions  
Amount Follow-Up

Technical Assistance

Process Indicators

Management

Who  
Which Institutions

Type of Infrastructure

Program/Project Activities

- How Determine
- Delivery System
- Type of Infrastructure used

Evaluation

- Who
- How
- How is information used to revise the process

Community Participation

What Groups  
How Identify  
Roles

Source: Adapted from S. Gillespie (1990).

Figure 6.2--Summary of indicators for identifying the food insecure and nutrition insecure

Variable	Type of Indicator	Limitations	Possible Proxy Measures
Household Food Insecurity	Income per capita	Difficult to collect accurately in a survey with only one round; also problems in communities with lump sum sources of income. Respondents tend to "telescope" answers remembering only recent income. Income is more reliable where regular wage income is the major source.	Expenditures per capita but need to use flexible period of recall; landholdings per capita only in certain circumstances; useful only for agricultural households; for agricultural households, landholdings per capita combined with dependence ratios—number of adults/number of children (less than 15 years of age).
Individual Food Insecurity	Individual Caloric and Nutrient Intake	Preschool caloric intake by either 24-hour recall or weighted food intake very difficult to collect. 24-hour recall of child's intake tends to underestimate snacks and other nonmeal eating by older preschoolers. Respondents often have difficult time estimating portion sizes.	Number of separate eating occasions. This needs to be tested on a larger number of sample countries.
Nutrition Insecure Individuals:	Weight-for-age less than 80 percent; Child's Caloric Adequacy.	Anthropometric data not routinely part of many monitoring systems. Also, measures such as weight-for-age are N-stage indicators. nutritional status has already deteriorated.	Growth monitoring offers a valuable device for monitoring changes over time; need to identify ways to carry out growth monitoring outside the health sector.
a) Children	Percent time ill with diarrhea.		
b) Women	Body Mass Index (BMI)—less than 18 for moderate, less than 16 for severe.	Child's caloric intake, problems outlined above.  BMI may not be particularly useful in communities where women spend a disproportionate share of their lives either pregnant or lactating.	Mid-Upper Arm Circumference recommended as more reliable in defining women's nutritional risk. However, takes extensive training and good supervision to implement. MUAC not part of most monitoring systems. Time women spent in home production activities may be a proxy for nutritional risk. Need to test out in a variety of settings.

nutrition—direct or proxy measures—must be linked into a system that allows an assessment of the causality of the problem, including an indication of the impact of policies and programs. Without this, policymakers have little idea of how to change policies in order to make them more responsive to the food security and nutrition needs of the population. This came out clearly from the inventory contained in Section 4. There was the general impression on the part of policymakers that many of the agricultural policies and programs, as implemented, have not been very successful in improving food security and nutrition. However, the responses in the inventory revealed that there was little indication of why this was so. It, therefore, was difficult to ascertain how policies and programs should be changed to make them more responsive to the needs of the population. Food and nutrition monitoring systems must be designed to provide this capability.

**SECTION 7:**  
**APPROACHES TO LINKING AGRICULTURE AND  
NUTRITION PROGRAMS AND PROJECTS**

**INTRODUCTION**

Great progress has been made since the 1950s in dealing with problems of hunger, in large part due to improved agricultural technologies. For example, the Green Revolution has markedly reduced poverty in Asia (Mellor 1990); its effects have been direct through increased agricultural employment, as well as indirect, through low food prices and increased nonagricultural employment stimulated by increased farmers incomes.

Despite such breakthroughs, food insecurity continues to be a problem for a large number of people throughout the world. Using data generated from the Fifth World Food Survey, it is estimated that 700 million people in developing countries survive on grossly inadequate diets (Mellor 1990). The problem is most critical in Africa and South Asia: of the estimated 700 million people worldwide who are food insecure, 350 million will be in South Asia, 140 million in Africa, and 75 million in China (Mellor 1990). The remaining 135 million are spread throughout Latin America, East Asia, North Africa and the Middle East.

The links between income generation, poverty alleviation, and improved food intake are clear. Strategies which increase the incomes of the poor will result in significant reductions in hunger. The majority of the poor and thus, food insecure, are in the rural areas of developing countries. Thus, a continued and increased emphasis on agricultural policies and program which reach the food insecure

smallholder offer one the most effective means of reducing hunger. In addition, agricultural policies which are labor intensive and thus generate employment for the rural landless also offer an effective strategy for reaching the vulnerable nonagricultural households.

Although the income/household food security links are strong, the links between income and improvement in nutritional status are less robust. An accumulating body of evidence suggests that income generating schemes by themselves may be insufficient to alleviate malnutrition at least in the short to medium term (von Braun and Kennedy 1991; Kumar 1989; Alderman and Garcia 1990). Thus policymakers need to explore ways to improve the food security and nutrition impact of income-generating policies, such as the range of agricultural policies and programs that are being implemented in developing countries throughout the world.

The traditional approaches for addressing the malnutrition problem, particularly in children, have been to implement direct nutrition interventions. As shown in Section 1, interventions, such as weaning foods and growth monitoring and growth promotion, have had success in improving nutritional status. However, these types of interventions have not been effective in all cases, because of limited coverage, lack of appropriate infrastructure, insufficient funds, poor implementation, and failure to account for the time cost to women in order to participate in these interventions. The 1980s were a particularly difficult time for many countries because of substantial cutbacks in government expenditures on health and social services.

The theme running through this report is the possibility of identifying ways to link nutrition activities to agricultural programs and projects. This needs to be done in a way that does not create the expectation that the agricultural sector will become a substitute for primary health care delivery. Clearly, it will not. However, given what appears to be the continuing problem with health care service delivery in rural areas, coordinating nutrition activities with agricultural programs and projects already in place seem to be an attractive alternative for improving nutrition.

The idea of linking food security and nutrition components into agriculture is not new. Ten years ago, this issue was highlighted. Effective approaches for incorporating nutrition goals into agriculture and rural development projects were recognized as necessary but the effective approaches for doing so in an operationally acceptable way were not available (Pinstrup-Andersen 1981).

The flagship project within AID, Consumption Effects of Agricultural Policies and Programs (CEAP), concentrated on identifying the ways in which a range of policies and programs affected consumption. The most significant effects of agricultural policies on household consumption have been through their effects on household income; this income effect has operated mainly through impact on food output and/or food prices. However, in order to influence nutritional status through these same policies, something else needs to be done. The question is what?

The analyses in Section 2 suggest that growth faltering of children occurs at an early age. This is true even for children of normal birth weights. While the phenomenon of growth faltering has been known for awhile, recent evidence suggests that this occurs much earlier than was once assumed. This is apparent from the data from Kenya but is also substantiated by data provided from the Office of Nutrition CRSP three-country study (Calloway et al. 1989). This is of concern because evidence suggests that the possibilities for catch-up growth are very limited once a child reaches three-to-five years (Martorell 1985). Malnutrition in children is associated with a higher prevalence of illness and an increased risk of mortality.

In addition, malnourished children have a high probability of a small body size as adults. Small body size in adults limits the income earning capacity of the individual (Sahn and Alderman 1988; Bouis and Haddad 1990) and thus has a major negative effect on household income. Malnutrition in preschoolers, since it translates into poorer nutritional status in adults, is having a negative effect on the available human capital in a country. In many developing countries, particularly in Africa, labor is the major constraint to increased agricultural production. Malnutrition creates a vicious cycle which has long-term negative consequences for the economic viability of a country.

Many developing countries are enthusiastic about the possibility of achieving nutrition goals through the agricultural sector. The difficulty, as it has always been, is in identifying the combination of nutrition/agriculture approaches that offer the potential for

success. Thus, this report examined the key factors contributing to malnutrition and offered some suggestions about what could be done.

Some "rules of thumb" have emerged:

- 1) Successful nutrition/agriculture programs, of whatever type, are more likely to be ones that are implemented through the existing infrastructure and through programs and projects already in place. Thus the inventory of agricultural policies and programs was conducted to ascertain what types of policies and programs are now operational in Africa, Asia, and Latin America.

The policies and programs that were reported by respondents were limited. Even more limited were the types of programs and projects that respondents believed had been successful in achieving a food security or nutrition goal. Five types of agricultural programs were the most common:

- Cash Crop Production
- Hybrid Varieties
- Extension
- Credit
- Food Crop Production

The degree to which the policies were used varied by region. African respondents, in general, were more positive about the impacts of these policies on food security and nutrition. What was clear was that most of those interviewed had little empirical information about the actual impacts of agricultural policies on nutrition. This speaks to the need for systems that allow at least a minimum level of monitoring and evaluation of nutrition effects.

2) For household food security and nutrition objectives to be achieved via a particular agricultural program or project, certain impacts are critical:

- an increase in household income is important for an improvement in household food consumption
- women's control of income and other resources has an additional positive effect on household food security
- intrahousehold issues are important in understanding the linkages between income generation at the household level and production of good health and nutrition at the individual level.

Increasing income at the household level is not enough to alleviate malnutrition. Intrahousehold allocation of not simply food but other resources, including the time of the primary caretaker, is important in influencing child nutritional status. Factors, such as increasing the number of eating occasions of children, which are significant in improving preschooler nutritional status, are time intensive. It is important to understand how income generation strategies at the household level affect the time intensity of activities directed toward children.

In addition, it is also important to elucidate the specific behaviors in households in which children do not lose weight over a multiyear period. Obvious factors, such as household income or household expenditures on food or health care, do not differentiate the well-nourished from the poorly nourished.

Surprisingly, children who maintain weight in some cases seem to have similar prevalences of illness as children who lose weight.

There appear to be subtle behaviors which positively influence child health and nutrition which are not directly income mediated. In Section 3, results suggest that preschoolers in Malawi and Kenya, from the lowest income, de facto female-headed households, had lower rates of stunting than preschoolers from higher income, male-headed households. There appear to be low cost/low technology ways of investing in children that have high nutritional payoffs. It would be useful to understand these nutrition-coping strategies and use this information to facilitate the development of approaches to integrate in a participatory way into agricultural programs.

- 3) Agriculture/nutrition approaches are often abandoned because of the excessive data requirements (Pinstrup-Andersen 1981). Programs need to be able to structure a food and nutrition monitoring system where "user friendly" indicators can be integrated into an ongoing reporting system. There is a desperate need to implement these systems at the local level.

#### PROTOTYPE OF NUTRITION/AGRICULTURE PROGRAMS AND PROJECTS

Using the guidelines presented above, there are certain types of nutrition/agriculture approaches which appear to offer the potential to improve food security and nutrition.

- 1) Credit schemes for women in rural areas where nutrition activities are developed, using participatory and social

marketing techniques. These types of programs offer the potential of increasing women's income and building on nurturing behaviors which will improve child nutrition. An example of this type of approach, already referred to in Section 5, is the credit/nutrition project in Ghana.

- 2) Cash crop production schemes in combination with health/social services as part of the scheme. In the recent comparative analysis of cash cropping projects in six countries—Gambia, Guatemala, Kenya, Malawi, Philippines, and Rwanda—participation in the cash crop cooperative only in Guatemala was associated with a decrease in the incidence of illness. The health/social service activities that were provided to cash cropping households were financed from profits generated from the cooperative. Thus the issue of financing recurrent costs was addressed from the beginning. It would be useful to look at a similar approach in other projects to determine the elements that appear to be contributing to the improved health and, thus, improved nutrition.
- 3) Agricultural extension targeted to women. Agricultural extension is typically a large part of the agricultural sector budget in most developing countries. Yet extension activities typically have not done very well in reaching rural women. Since women are actively involved in food crop production, extension activities geared to women could result in increased food production benefitting household food security as well as increased women's income, resulting in improved child nutrition. Ways to use

extension to reach women need to be tested. Zimbabwe has determined that extension services targeted to women is a priority for the government. Agricultural services emphasizing women could be evaluated and compared to the more traditional types of extension services.

- 4) Cropping strategies that decrease seasonality in production, consumption, and labor requirements could be identified and tested. Increased agricultural labor demands, particularly for women, often coincide with periods of household food shortages and peaks in levels of illness. Smoothing out these seasonal cycles has a potential benefit for household food security and nutrition.

The next step in deciding on types of nutrition/agriculture approaches must be to identify and test strategies that are being used in developing countries. The expected outcomes vs. the actual outcomes are often quite different. Policymakers need to have some concrete examples of nutrition/agriculture "success" stories. Until this happens, there will continue to be skepticism about the viability of this approach.

Two related issues need much more attention in future research. The first is the impact of agricultural policies and programs on women. Relatively little information is available on the impact of policies and programs on women's income, women's energy expenditures, and women's health and nutritional status. It is quite plausible that the major positive effect on overall household food security and

nutrition may come about through an improvement in women's nutritional status.

Secondly, the discussion on the income/food consumption/nutrition links focused exclusively on calories. There is the implicit assumption in much of the development literature that as household energy intake improves, the consumption of other nutrients—vitamins and minerals—will also improve. This may not be true and there is some evidence that it is not true for children. Future work on nutrition/agriculture should focus on examining the impact of agricultural policies on both macro- and micronutrient intake.

The time is right to go beyond the theory to concrete examples of where and why nutrition/agriculture linkage projects have been effective.

APPENDIX 1

DATA COLLECTED IN THE SURVEY

Variables	Round				Method	Frequency of Collection/ Period of Recall
	1	2	3	4*		
Community-level variables						
Food prices	x	x	x	x	Observe	Every two weeks
Nonfood prices	x	x	x	x	Observe	Periodically during the survey
Population				x	Record retrieval	Population statistics collected for 1984
Services available	x	x	x	x	Observe	Periodically during the study
Household-level variables						
Socioeconomic information	x				Recall	Once, at initial visit in each study
Income by source (agricultural, nonfarm, loans, other types)	x	x	x	x	Recall	Round 1 for prior six months; other rounds for the prior two months
Income by individual earner	x	x	x	x	Recall	Same as above
Food expenditures	x	x	x	x	Recall	Each round for prior seven days
Nonfood expenditures	x	x	x	x	Recall	Each round, flexible period of recall for each of the items
Energy consumption	x	x	x	x	Recall	Each round for prior 24 hours
Water (source, distance)	x				Recall	Once, differentiated by rainy and dry season
Sanitation (presence of latrine)	x				Observe	Once, at initial visit
Agricultural production (inputs by crop, production by crop)	x	x	x	x	Recall	Round 1 for prior growing season; other rounds for prior two months
Storage of crops and agricultural inputs	x	x	x	x	Recall	Each round, report on what is in storage at time of visit
Labor input by crop and task, by household (adult and child), and by hired workers	x	x	x	x	Recall	Same as for agricultural production
Women- and child-level variables						
Reproductive history	x	x	x	x	Recall	Once at initial visit, changes (births and deaths) recorded on subsequent rounds
Age	x	x	x	x	Recall	Once, at initial visit
Time allocation	x	x	x	x	Recall	Each round for prior day
Weight, length, and weight-for-length	x	x	x	x	Actual measurement	Each round
Preschooler energy intake	x	x	x	x	Recall by caretaker	Each round for prior 24 hours
Breastfeeding history and weaning practices	x				Recall by mother	Once, at initial visit, recall of birth to age of weaning
Morbidity patterns	x	x	x	x	Recall	Each round for prior two weeks
Mortality	x	x	x	x	Recall	Once, at initial visit, deaths of any children during survey were recorded

Source: Kennedy 1989.

APPENDIX 2  
QUESTIONNAIRE

(1) What are the types of agricultural policies and programs being encouraged in your country or area (examples, cash cropping/export cropping, adoption of hybrid varieties, irrigation, etc)?

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(2) Which agricultural programs and projects have been most successful in reaching the smallholder and/or rural poor?

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(3) What do you think makes the programs described in question 2 effective? It would be helpful here if you could be as specific as possible since this type of information will be very useful.

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(4) Please indicate what is known about the food security and nutrition effects of the policies, programs and projects described in questions number 1 and 2.

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(5) Could you suggest ways that the activities described in questions one and two could be more effective in improving food security and/or nutrition?

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(6) Please identify any potential policies, programs or projects (national, regional or local level ) that might be used for a field case study to examine ways to improve the food security and nutrition effects of any type of agricultural strategy. Example might be, agricultural extension as a way to deliver a food security/nutrition message, improved infrastructure in an area, etc.

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APPENDIX 3

List of Countries Contacted and Countries/Institutions Responding to Questionnaire on Agricultural Policies and Programs

COUNTRIES CONTACTED	COUNTRIES RESPONDING	INSTITUTIONS
<b>Africa</b>		
Botswana Burkina Faso Cote D'Ivoire Egypt Ethiopia	Ethiopia	Office of the National Committee for Central Planning
Ghana Kenya	Kenya	Central Bureau of Statistics, Ministry of Planning and National Development; Kenyatta University College; Egerton University
Malawi Mozambique Niger Nigeria	Mozambique Nigeria	Ministry of Agriculturer Department of Paediatrics, University of Lagos
Senegal Swaziland Tanzania	Tanzania	Ministry of Agriculture, Marketing Development Bureau
Uganda	Uganda	Office of the Deputy Minister, Ministry of Cooperatives and Marketing
Zaire Zambia Zimbabwe	Zambia Zimbabwe	National Food and Nutrition Commission FAO; University of Zimbabwe; Department of Agricultural, Technical and Extension Services; Ministry of Lands, Agriculture and Rural Resettlement
Angola, Botswana, Lesotho, Malawi, Mozambique, Swazi- land, Zambia, Zimbabwe	) ) )	African Development Bank Group
<b>Asia</b>		
India Indonesia	India* Indonesia	Departemen Kesehatan, R.I. (Department of Health)
Pakistan Philippines	Pakistan Philippines	Ministry of Planning and Development National Nutrition Council, Ministry of Agriculture Food and Nutrition Research Institute

Latin America

Bolivia		
Brazil	Brazil	International Union of Nutritional Sciences; Coordenacao Nacional de Pastoral Da Crianca; Universidade Federal de Vicosa; Ministerio de Agricultura y Ganaderia
Costa Rica	Costa Rica	
Ecuador		
El Salvador		
Guatemala	Guatemala	Ministerio de Agricultura, Ganaderia y Alimentacion, Direccion General de Servicios Agricolas; Banco de Guatemala; Ministerio de Agricultura, Ganaderia y Alimentacion
Honduras	Honduras	Ministerio de Salud Publica
Mexico		
Nicaragua		
Peru		
Puerto Rico		

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\*Responded but did not answer questionnaire.

Notes: A response was also received from an unidentified country in Africa and another from an unidentified institution in Brazil.

APPENDIX 4

AGENDA

NUTRITION/AGRICULTURE LINKAGES  
November 30, 1989

*CHAIR: EILEEN KENNEDY, IFPRI*

10:00 A.M.      Welcome  
                  John Mellor, Director, IFPRI

                  Overview of Workshop  
                  Michael Lipton, IFPRI

10:10 A.M.      Agriculture as the Root of Nutrition  
                  Norge Jerome, Director, Office of Nutrition, AID

*CHAIR: ABRAHAM HORWITZ, Pan American Health Organization*

10:30 A.M.      A Framework for Nutrition/Agriculture Projects  
                  Eileen Kennedy, IFPRI

                  Unraveling the Puzzle - Open Discussion

11:30 A.M.      Macro-agricultural Policies and Nutrition  
                  William Goodwin, Office of Agriculture, AID

                  Nutrition and Agriculture - the CEAP Experience  
                  Roberta Van Heflon, Latin America Bureau, AID

                  Open Discussion

12:45 P.M.      Lunch - to be served at IFPRI

*CHAIR: JOYCE MOOCK, Rockefeller Foundation*

1:45 P.M.      Forging the Links Between Nutrition and Agriculture  
                  Panel Discussion

                  Marilyn Prehm - VPI  
                  Maarten Immink - IFPRI  
                  Kathleen DeWalt - University of Kentucky  
                  Pauline Peters - IIID

- 2:45 P.M. Information Needs for Food, Nutrition and Agriculture  
Policies and Programs  
Beverley Carlson - UNICEF  
Howarth Bouis - IFPRI
- 3:30 P.M. Food and Nutrition Refocused  
Frances Davidson, Office of Nutrition, AID  
IFPRI Nutrition/Agriculture Linkages Project
- 4:00 P.M. Adjourn

APPENDIX 5

REFERENCES

- Olayinka, Abosede, and Judith McGuire. October 1989. Improving women's and children's nutrition in sub-Saharan Africa: Issue paper. Washington, D.C: World Bank.
- CARE. 1989. Final evaluation report of the Macina Child Health project. New York: CARE.
- Drosin, Jay. (Undated). Combating malnutrition in urban Kinshasa.
- Government of Togo, CRS/Togo and Logical Technical Services. April 1990. Improving mothers' participation in growth monitoring and promotion. Final Project Report. Bethesda: Pricore.
- International Nutrition Planners Forum. 1990. Crucial elements of successful community nutrition programs. Report of the Fifth International Nutrition Planners Forum. Washington, D.C: Agency for International Development.
- Pyle, David. 1987. Client-provider interaction at the periphery. Boston: John Snow Inc.
- Shrimpton, Roger. 1989. Community participation in food and nutrition programs: An analysis of recent governmental experience.

## BIBLIOGRAPHY

- Alderman, Harold. 1986. *The Effects of Food Price and Income Changes on the Acquisition of Food by Low-Income Households*. Washington, D.C.: International Food Policy Research Institute.
- Alderman, Harold and Marito Garcia. "Community Factors in Childhood Nutrition: Explaining the Slow Rate of Improvement in Pakistan." Washington, D.C.: International Food Policy Research Institute (mimeo).
- Andrews, Margaret S. 1989. "Data Interpretation Techniques and Analytical Methods for Food Policy Analysis." Report prepared for the Nutrition Economics Group, OICD, USDA and Office of Nutrition, Bureau of Science and Technology, USAID.
- Austin, James E., Thomas K. Belding, David Pyle, Florentino S. Solon, Thomas L. Fernandez, Michael Latham and Barry M. Popkin. 1981. *Nutrition Intervention in Developing Countries Study III: Fortification*. Cambridge, Massachusetts: Oelschlager, Gunn and Hain.
- Beaton, George. 1989. "Small but healthy? Are We Asking the Right Questions?" *Human Organization* 48 N 1 (Spring): 30-39.
- Beaton, George, and Hossein Ghassemi. 1982. "Supplementary Feeding Programs for Young Children in Developing Countries." *American Journal of Clinical Nutrition* 34 (supplement, 1982): 864-916.
- Berg, Alan. 1981. *Malnourished People: A Policy View*. Poverty and Basic Needs Series. Washington, D.C.: The World Bank.
- Bouis, Howarth E. and Eileen Kennedy. 1989. "Traditional Cash Crop Schemes' Effects on Production, consumption and Nutrition: Sugarcane in the Philippines and Kenya." Paper presented at the IFPRI-INCAP workshop on "Commercialization of Agriculture and Household Food Security: Lessons for Policies and Programmes," March 9-11, Antigua, Guatemala.
- Buvinic, M. and N. Youssef. 1978. "Women Headed Households: The Ignored Factor in Development Planning." Report to the U. S. Agency for International Development. Washington, D.C.: U. S. Agency for International Development.
- Buvinic, M., M. Lycette and W.P. McGreevey (eds.) 1983. *Women and Poverty in the Third World*. Baltimore, MD: Johns Hopkins University Press.
- Calloway, Doris Howes, Suzanne P. Murphy and George H. Beaton. 1988. "Food Intake and Human Function: A Cross-Project Perspective of the Collaborative Research Support Project in Egypt, Kenya, and Mexico." University of California, Berkeley.

- Dawson, Anthony and Eileen Kennedy. 1987. "An Evaluation of the Tripartite Nutrition in Agriculture Project." Report to Science and Technology Bureau/Office of Nutrition/U. S. Agency for International Development, Education Development Center, Inc. (edc).
- Engle, P. "Women Headed Families in Guatemala: Consequences for Children." In the Population Council and the International Center for Research on Women, The Determinants and Consequences of Female Headed Households, Notes from Seminar I and II. Washington, D.C.: The Population Council and ICRW (December).
- Gillespie, Stuart. 1990. "Institution Building for Nutrition: Development of a Framework and Identification of Indicators for Evaluation." *Food and Nutrition Bulletin*. 12 N 2: 103-105.
- Government of Kenya and UNICEF. 1990. Socio-Economic Profiles: Kwale District, Kitui District, Embu District, Baringo District, Kisumu District, South Nyanza District, Nairobi City, Mombasa Municipality, Kisumu Municipality. Edited by John Odada and James O. Otieno. Nairobi, Kenya: Ministry of Planning and National Development and UNICEF.
- Guyer, Jane. 1980. "Household Budget and Women's Incomes." Working Paper No. 28, Boston, MA: African Studies Center, Boston University.
- Karim, R. and F. J. Levinson. 1980. "The Bangladesh Sorghum Experiment." *Food Policy* (February).
- Kennedy, Eileen. 1983. "Determinants of Family and Preschooler Food Consumption." *Food and Nutrition Bulletin* 5: 22.
- Kennedy, Eileen. 1989. *The Effects of Sugarcane Production on Food Security, Health and Nutrition in Kenya: A Longitudinal Analysis*. Research Report 78. Washington, D.C.: International Food Policy Research Institute.
- Kennedy Eileen. 1990. "Health and Nutrition Effects of the Commercialization of Agriculture: A Comparative Analysis." In *Commercialization of Agriculture: Poverty and Nutritional Effects*. Edited by J. von Braun and E. Kennedy. Washington, D.C.: International Food Policy Research Institute.
- Kennedy, Eileen and Harold Alderman. 1987. *Comparative Analyses of Nutritional Effectiveness of Food Subsidies and Other Food-Related Interventions*. Joint WHO-UNICEF Nutrition Support Programme. Washington, D.C.: International Food Policy Research Institute.

- Kennedy, Eileen and Bruce Cogill. 1987. *Income and Nutritional Effects of the Commercialization of Agriculture in Southwestern Kenya*. Research Report 63. Washington, D.C.: International Food Policy and Research Institute.
- Kennedy, Eileen and Pauline Peters. 1990. "Household Food Security and Child Nutrition: The Interaction of Income and Gender of Household Head." (mimeo).
- Kielman, Arnfried, C. E. Taylor and R. L. Parker. 1978. "The Narangwal Nutrition Study: A Summary Review." *American Journal of Clinical Nutrition* 31: 2040-2052.
- Kramer, Carol S. and Lawrence M. Rubey. 1989. "AID Food Policy Programming: Lessons Learned-An Assessment of the Consumption Effects of Agricultural Policies Project, 1978-88." Report prepared for the Nutrition, Economics Group, OICD, USDA and Office of Nutrition, Bureau of Science and Technology, USAID.
- Kumar, Shubh and Harold Alderman. 1989. "Food Consumption and Nutritional Effects of Consumer-Oriented Food Subsidies." Chapter 3 in *Food Subsidies in Developing Countries*. Edited by P. Pinstrup-Andersen Baltimore: Johns Hopkins University Press, 36-48.
- Martorell, Reynaldo. 1985. "Child Growth Retardation: A Discussion of its Causes and its Relationships to Health." In *Nutrition Adaptation in Man*. Edited by Sir Kenneth Blaxter and J. C. Waterlow. London and Paris: John Libbey.
- Mellor, John. 1990. "Ending Hunger: An Implementable Program for Self-Reliant Growth." In *The World Food Crisis: Food Security in Comparative Perspective*. Edited by J. Hans Bakker. Toronto: Canadian Scholars' Press, Inc.
- Peters, Pauline. 1989. "Cash Cropping and Food Production Among Smallholders in Malawi." Paper presented at the IFPRI-INCAP workshop on "Commercialization of Agriculture and Household Food Security: Lessons for Policies and Programmes," March 9-11, Antigua, Guatemala.
- Peters, Pauline and Guillermo Herrera (with Randolph Thomas). 1989. *Cash Cropping, Food Security and Nutrition: The Effects of Agricultural Commercialization Among Smallholders in Malawi*. Final report to the U.S. Agency for International Development. Cambridge, MA: Harvard Institute for International Development.
- Pinstrup-Andersen, Per. 1981. "Nutritional Consequences of Agricultural Projects: Conceptual Relationships and Assessment Approaches." World Bank Staff Working Paper No. 456, Washington, D.C.: The World Bank.

- Pinstrup-Andersen, Per (ed.). 1989. *Food Subsidies in Developing Countries: Costs, Benefits, and Policy Options*. Washington, D.C.: International Food Policy Research Institute.
- Rahmathullah, Laxmi, Barbara A. Underwood, Ravilla D. Thulasiraj, Roy C. Milton, Kala Ramaswamy, Rabeem Rahmathullah and Ganeesh Babu. 1990. "Reduced Mortality among Children in Southern India Receiving a Small Weekly Dose of Vitamin A." *The New England Journal of Medicine*. 3232 N 14 (October 4): 929-935.
- Rogers, Beatrice L., Cathrine A. Overholt, Eileen Kennedy, Federico Sanchez, Adolfo Chavez, Thomas K. Belding, Peter C. Timmer and James E. Austin. 1981. *Nutrition Intervention in Developing Countries, Study V: Consumer Food Price Subsidies*. Cambridge, Mass: Oelgeschlager, Gunn and Hain.
- Rohde, Joe E., D. Ismail and R. Surinso. 1975. "Mother's as Weight Watchers: The Road to Child Health in the Village." *Journal of Tropical Pediatrics* 21 (December): 295-297.
- Rosenhouse, S. 1989. Identifying the Poor: Is "Headship" a Useful Concept? Living Standards Measurement Study Working Paper No. 58, Washington, D.C.: The World Bank.
- Rubin, Deborah. 1988. The Interplay of Household Organization and Increasing Commercialization: A Comparative Analysis of Three Country Studies. Final Report to the U. S. Agency for International Development, Washington, D.C.
- Sahn, David and Harold Alderman. 1988. "The Effects of Human Capital and the Determinants of Labor Supply in a Developing Country." *Journal of Development Economics*. 29 N 2 (September): 157.
- Sood, S. K. et al. 1975. "WHO Sponsored Collaborative Studies on Nutritional Anaemia in India: I. The Effects of Supplemental Oral Iron Administration to Pregnant Women." *Quarterly Journal of Medicine*. 44: 241-258.
- Timmons, Robert J., Roy I. Miller, and William D. Drake. 1986. "Selecting Participants for Community Nutrition Interventions in Developing Countries." Section from book report on a workshop on "Nutritional Aspects of Project Food Aid," January 14-18, 1985, Annapolis, Maryland. Rome: SCN/ACC United Nations/FAO.
- Tucker, Kathryn et al. 1990. "Advances in Nutritional Surveillance: A Summary of Contributions made by the Cornell University Nutritional Surveillance Program (CNSP)." Cornell Nutritional Surveillance Program, Division of Nutritional Sciences Monograph. Ithaca, New York: Cornell University.

- von Braun, Joachim and Rajul Pandya-Lorch. 1990. *Income Sources and Strategies of the Malnourished in Rural Areas: A Synthesis of Case Studies and Implications for Policy*. Washington, D.C.: International Food Policy Research Institute (mimeo).
- von Braun, Joachim, Hartwig de Haen and Juergen Blanken. *Commercialization of Agriculture Under Population Pressure: Production, Consumption and Nutritional Effects in Rwanda*. Washington, D.C.: International Food Policy Research Institute, forthcoming.
- von Braun, Joachim, Detlev Puetz and Patrick Webb. 1979. *Irrigation Technology and the Commercialization of Rice in the Gambia: Effects of Income and Nutrition*. Research Report 75. Washington, D.C.: International Food Policy Research Institute.
- World Bank. 1986. *World Development Report, 1986*. Oxford: Oxford University Press.
- World Bank. 1990. *World Development Report, 1990*. Oxford: Oxford University Press.