

**INTERNATIONAL
FOOD
POLICY
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**NUTRITION-
RELATED
POLICIES
AND
PROGRAMS:
PAST
PERFORMANCES
AND
RESEARCH NEEDS**

**BY EILEEN T. KENNEDY
AND P. PINSTRUP-ANDERSEN**

WITH CONTRIBUTIONS FROM:

**RICHARD ADAMS
HAROLD ALDERMAN
DAVID FRANKLIN
ROBERT MUSCAT
OMAWALE
MARIAN ZEITLIN**

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**INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
1776 MASSACHUSETTS AVENUE, N.W.
WASHINGTON, D.C., 20036 U.S.A.
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FOREWORD

Government efforts to improve human nutrition range from the direct feeding of severely malnourished children -- often as part of a primary health care program -- to broad-based food and income transfers to the poor. Nutrition is also affected by government food price policies and agricultural and rural development programs and policies, even though nutritional considerations are not a part of their stated goals.

The degree of success in reaching stated nutritional goals varies among different types of programs and their locations. The performances of many programs have been disappointing and governments are groping for more effective approaches.

The formulation of new programs and policies and modifications of current ones should be based on a clear understanding of the processes and relationships that determine program and policy effectiveness as well as on sound empirical evidence regarding the degree of success of past and current government interventions to improve nutrition.

Recognizing the importance of such understanding and empirical evidence for the formulation of future nutrition-related government interventions, the Administrative Coordinating Committee/Subcommittee on Nutrition (ACC/SCN) took the initiative to facilitate a review of the existing knowledge on the subject, which would identify areas where additional nutrition-related policy research would be likely to be beneficial. The International Food Policy Research Institute (IFPRI) was invited to undertake such a review and to propose a research program that would help fill the most critical gaps in knowledge. Funding for the review was provided by the Ford Foundation, the United Nations Development Program, The United Nations Children's Fund, and the World Bank.

The results of the review and a proposed research program that includes a set of case studies and a proposal for organizing research was submitted to the ACC/SCN in January of 1982. Our judgment that large parts of the report are of considerable interest beyond the ACC/SCN resulted in the present report, which reviews the current state of knowledge and identifies areas where nutrition-related policy research is urgently needed and likely to be useful.

In our opinion this report presents the most complete and up-to-date review of the subject and identifies the most critical gaps in knowledge and research. It is our hope that it may contribute to an emphasis on nutrition-related policy research in the priority areas identified in order to improve the effectiveness of government intervention and, thus, to reduce hunger and malnutrition.

John Evans
Chairman, ACC/SCN

John Mellor
Director, IFPRI

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Finally, this monograph represents the collaborative efforts of numerous professionals from around the world. Letters were sent to more than 200 people, most of them nationals of developing countries, requesting advice and suggestions regarding ongoing research, program activities, and the most pressing research needs for nutrition-related interventions. The replies received, together with feedback from meetings and personal interviews, sharpened our insights into the issues and problems at hand and identified the knowledge gaps and the specific research needs for the effective design and implementation of nutrition programs.

Although the monograph reflects the contributions of a large number of people, the authors bear sole responsibility for any inaccuracies or omissions.

1. SUMMARY

There is an urgent need for research that will assist the governments of developing countries, international institutions, external assistance agencies, and other institutions in choosing, designing, modifying, and implementing effective and efficient nutrition-related programs and policies. On the basis of an extensive review of the literature and interaction with a large number of informed persons, we have identified the knowledge gaps and research needs believed to be most critical and have outlined research that should be given high priority and that should bring high returns.

Research is proposed on four types of programs and policies: agricultural and rural development programs and policies, food-price policies, income- and food-transfer programs, and integrated health and nutrition programs.

While the performance of each of the programs and policies should be addressed, the primary goal of the research effort described in this monograph is to increase understanding of the way key factors and relations influence the performance of various programs and program components within various socioeconomic and political environments and to suggest ways in which such an understanding can be used in the choice and design of effective programs and policies.

In order to reach this goal, four principal research issues, which cut across programs and policies, have been identified. These are: household food-acquisition and food-allocation behavior, food-market behavior, aspects of the implementation of programs and policies, and economywide implications. It is proposed that these issues be analyzed in relation to a multiplicity of programs and policies.

Two features of the proposed research are essential to the assurance of a high level of utility for the choice, design, modification, and implementation of nutrition-related programs and policies: a set of common issues that are critical to the design of programs and policies should be studied in relation to a variety of programs, policies, and socioeconomic environments, and the research should emphasize not only by how much but also how nutritional status is influenced by the various programs and policies within the various environments and thus attempt to generate generalizable knowledge and principles that can also be used outside the particular environments in which the research is conducted.

2. INTRODUCTION

The persistence of malnutrition as a widespread problem with serious consequences for development and the well-being of people has been receiving increasing attention from public and private institutions throughout the world. It is a matter of great concern to the governments of many developing countries, to foreign assistance agencies and governments of the industrialized countries, to voluntary agencies, and to international institutions. Malnutrition and food deprivation were among the principal topics of the 1974 World Food Conference, from which a call was issued for action and research to attack the causes and consequences of nutritional deficiency in the context of poverty.

The international community and governments and institutions of developing countries have responded jointly with substantial efforts that include large programs involving considerable resources. Concomitant with these actions has been a marked increase in the research efforts of many disciplines on the subject of nutrition. Much has been learned about the multiple causes of malnutrition and about analytical methods of assessing nutritional problems and of planning nutritional strategies and programs. Nevertheless, there is still considerable uncertainty as to which of the many potential interventions are likely to be most effective within particular environments in costs, under program management constraints, and in scale of implementation. This lack of information can lead to wasted resources or delays in implementation and has been a primary contributor to the inability of many programs and policies in the past to produce the expected improvements in the nutritional status and health of the intended beneficiaries. Furthermore, little is known about the nutritional effects of government actions that are not focused directly on nutrition but are nevertheless likely to have significant nutritional implications -- policies and programs related to health, food, and agriculture, for example. As a result, it has been difficult to consider nutritional goals appropriately in the choice and design of these programs and policies. Opportunities for positive nutritional effects may have been overlooked and negative effects may not have been avoided.

The United Nations Administrative Coordinating Committee Subcommittee on Nutrition (SCN) and its member countries and institutions have paid a great deal of attention to the need for research and action programs to enhance the ability of governments to reach the malnourished. Government efforts have included reviews of nutrition intervention programs, identification of research needs, preparation of guidelines for action programs, and symposia on specific nutrition-related issues. As these efforts proceeded, it became clear that

reviews of past programs based on readily available data did not provide sufficiently solid guidelines for the choice and design of future programs and policies and modification of current ones. The evidence from the reviews was frequently conflicting, and the available data were insufficient for explaining the conflicts encountered. It became obvious that a better-integrated research approach was needed if solid guidelines were to be developed for use by policymakers in both developing countries and donor countries.

It was against this background that the SCN at its annual meeting in 1980 formed a small working group to explore the desirability of establishing a mechanism to support applied policy-related nutrition research. On the basis of the report of the working group and discussions at the 1981 meeting it was decided to pursue further the establishment of such a mechanism to undertake research aimed at clarifying the questions "what works, under what conditions, with what results, and at what costs?" Following the 1981 meeting, IFPRI was asked to prepare a brief outline for a proposal following guidelines provided by the SCN. On the basis of this outline, IFPRI was requested to develop a substantive research proposal, with financial support from the World Bank, the Ford Foundation, the United Nations Children's Fund (UNICEF), and the United Nations Development Programme (UNDP). This monograph has been drawn from a more detailed report prepared at the request of SCN and was discussed at its eighth session, in Bangkok, February 1982. In the present monograph we shall seek to identify the most significant gaps in current knowledge where further research is expected to have the greatest return and to suggest how such research could be most effectively implemented.

The principal objectives of the research outlined in this monograph are to facilitate or provide:

1. A better understanding of the mechanism by which selected types of programs or policies influence the nutritional status of individuals within various socioeconomic and political environments and how effective they have been in improving nutritional status.

2. A better understanding of the way individual elements of the aforementioned mechanisms are affected by the various programs and policies and how they in turn affect nutritional status.

3. Improved information for use in guidelines on the choice, design, and modification of programs, projects, and policies aimed at enhancing nutritional status, while costs and tradeoffs between the achievement of nutritional goals and the achievement of other social and economic development goals are also being considered.

4. Empirical estimates of the performance and effectiveness of selected programs, projects, and policies.

Given these objectives, the monograph is limited to issues related to the design, implementation, and evaluation of programs,

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projects, and policies that are either aimed directly at achieving nutritional goals or have significant implications for the achievement of such goals. Thus, a comprehensive agenda for nutrition research per se is not offered, but only an agenda for that part which is of most immediate relevancy to the choice and design of policies or programs. Therefore, because of the specific focus of this monograph, certain important research topics are noticeably absent. A discussion of research related to the absorption, metabolism, and excretion of nutrients, for example, has not been considered. Similarly, although basic research related to the function of nutrition in cognitive development, productivity, and levels of activity is of obvious importance, it is outside the scope of the monograph.

Having excluded certain research areas, we focused our attention on the establishment of priorities among those research topics that fell within the scope of the monograph -- that is, those that are of immediate and direct relevance to the design, modification, and implementation of nutrition-related policies and programs. The most important knowledge gaps and the most urgent research needs regarding the effectiveness and costs of nutritional intervention programs were identified, as were other programs and policies expected to have significant nutritional implications. A set of research priorities is proposed that is expected to provide additional knowledge in the areas and on the issues most critical for the choice, design, modification, and implementation of nutrition-related programs and policies in developing countries.

The research proposed in this monograph has the purpose of developing better information regarding the interventions that are likely to be successful under various conditions and settings, so as to help develop programs and policies that are likely to achieve self-sustaining nutritional improvement at community and national levels.

A brief account of the nature and causes of and possible solutions to malnutrition is presented first in order to set the stage for the conceptual framework for assessing the effectiveness of the various approaches to the reduction or elimination of malnutrition. This leads into a review of information on the effectiveness of interventions that either directly or indirectly may affect nutritional status. The review of the literature was based initially on several extensive reports on various nutrition interventions that had recently been completed.^{1/} These reports were supplemented by additional articles not reflected in their synopses. All the sources were analyzed critically to summarize what is known about the effects of nutrition interventions and to identify research gaps. Additionally, meetings and correspondence with more than 200 people, primarily nutritionists and others involved in nutrition-related activities for developing countries, served as the basis for identification of high-priority research areas. The monograph concludes with a summary of the high-priority issues, approaches, and specific goals of research that must be addressed if a better understanding of the way malnutrition can most effectively be alleviated is to be reached.

FOOTNOTE

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3. THE NATURE AND CAUSES OF MALNUTRITION

Research leading to the development of effective nutrition programs and policies must be based on an understanding of the etiology -- that is, the nature and causes -- of malnutrition. The design and implementation of interventions require information on what nutritional problems affect whom and with what severity and how prevalent they are. Furthermore, there needs to be an elucidation of the mechanisms by which the present state of nutrition evolved.

To ensure against blind attempts to test interventions that are inextricably linked to a given environmental context, it is essential to map out the etiology of malnutrition before specific interventions are implemented. While the proximate causes of malnutrition, such as food deprivation, parasites, and infections, have similar effects on people of any culture, the environmental and socioeconomic conditions that give rise to these proximate causes may differ. This variability has contributed to an inability to recommend solutions that can be relied upon as generally applicable. If research is to provide empirical information on what works best, the context in which projects are to be implemented must first be defined.

WHAT ARE THE PROBLEMS?

Malnutrition is defined as any disorder of nutrition including deficiencies, excesses, or imbalances in the intake of nutrients. Malnutrition related to overconsumption is common in many industrial countries; obesity, atherosclerosis, and hypertension, for example, are some of the more prevalent types of nutrition-related disorders in developed countries. While these types of malnutrition are important, they are not the primary subject of this monograph. Here we shall emphasize the problems of malnutrition that are typically found in developing countries -- protein-calorie malnutrition (PCM), iron-deficiency anemia, and vitamin A deficiency.^{1/} Deficiencies of other micronutrients -- iodine, folate, vitamin C, some B vitamins -- are also prevalent in some areas.

An inadequate intake of food for a prolonged period will eventually lead to overt signs of malnutrition. Evidence of retardation in growth has routinely been used to diagnose PCM, of which kwashiorkor and marasmus are the extreme manifestations. However, the clinical profiles of kwashiorkor and marasmus are quite different. Kwashiorkor tends to be seen in children one to three years of age who have been weaned from the breast to a starchy diet consisting primarily of roots and tubers.^{2/} Failure to grow, wasting of muscles, edema, apathy, irritability, changes in the hair and skin, anorexia, and fatty infiltration of the liver are some of the symptoms of kwashiorkor.^{3/} Kwashiorkor is found principally in Africa.

In contrast to kwashiorkor, marasmus is typically found in children under the age of one who have been weaned at an early age from the breast to a nutritionally inadequate diet. Marasmic children exhibit wasting of the muscles, a drastic decrease in the amount of subcutaneous fat, growth retardation, anemia, and frequent diarrhea.^{4/} Kwashiorkor and marasmus were originally thought of as two separate diseases with different etiologies; more recent evidence suggests that kwashiorkor and marasmus are two facets of the same disease;^{5/} kwashiorkor represents unsuccessful adaptation to physiological stress whereas marasmus is a successful adaptation pushed to pathological limits.

Although kwashiorkor and marasmus have received a great deal of attention, only 1-3 percent of the preschool population in developing countries is usually affected by this severe form of PCM. The inordinate emphasis placed on severe PCM has masked the more pervasive problems of mild and moderate malnutrition. Mild and moderate malnutrition affect up to 60 percent of the preschool population in developing countries.^{6/} It is important to note that only 5 percent of the cases of PCM can be diagnosed visually. Most of the mildly and moderately malnourished children appear to be perfectly normal. The more prevalent forms of PCM will be left undiagnosed unless specific nutritional status assessment techniques are used to screen the "at-risk" population.

Most of the interventions to be discussed in this monograph are aimed at alleviating the problems of mild and moderate PCM. In conditions conducive to PCM, however, the intake of other nutrients such as vitamins and minerals may also be low.^{7/} It has often been assumed that if caloric intake is increased, consumption of other nutrients will also increase. While this is generally true, there are instances in which micronutrient deficiencies exist without the presence of PCM. Some interventions, therefore, such as fortification programs, address specific micronutrient deficiencies.

Iron-deficiency anemia is the most widespread form of malnutrition throughout the world.^{8/} The anemia may be found alone or in conjunction with PCM. Xerophthalmia is the principal cause of blindness in children under the age of four in developing countries and is related to inadequate consumption of vitamin A.^{9/} Goiter is found in areas where intake of iodine is insufficient.^{10/} Prevention of anemia, xerophthalmia, blindness, and goiter has been the specific goal of several nutrition interventions.

WHO ARE THE MALNOURISHED?

Malnutrition is most commonly found in low-income groups. Even within the low-income group, however, some individuals are at a greater risk of suffering from malnutrition than others. As a general rule, requirements for nutrients increase during periods of rapid growth and during periods of illness. Pregnant and lactating women, infants, and preschoolers one to five years of age all have greater

needs for nutrients than the rest of the population. Therefore, except in times of famine, when it is the elderly that are the most dramatically affected, it is generally in these maternal and child groups that malnutrition is most severe. Although many other low-income individuals in developing countries have nutritional needs that are unmet, these needs are usually less debilitating than the nutrition-related problems of mothers and young children. Older children and adults are physiologically better able to cope with nutritional deficiencies, but such deficiencies can affect performance in school or work adversely. Certain deficiencies, such as iron and folate anemias, are particularly detrimental to productivity, and they deserve attention.

WHY ARE THEY MALNOURISHED?

The etiology of malnutrition is multifaceted. A combination of individual characteristics, family factors, and macrolevel variables contribute to poor nutritional status. While inadequate food intake may be one cause, it is not necessarily the only cause nor, in some cases, even the most critical determinant of malnutrition.

Individual Factors

Morbidity patterns, prior nutritional status, food intake, and food practices and beliefs all affect a person's current nutritional status. The synergistic relationship between malnutrition and infection has been detailed in several thorough reviews.^{11/} Nutritional status is the key to the ability to resist infection. It has been demonstrated that in well-nourished children the effects of infections are milder than in malnourished children;^{12/} low-grade fever, anorexia, and general malaise are typical symptoms. In a child whose nutritional status is poor or even marginal, however, the capacity of the body to resist infections is decreased.^{13/} As a result, infections in malnourished children can lead to further deterioration of nutritional status. Catabolism of body tissue is common in response to infection, causing loss of weight, wasting of muscles, and negative nitrogen balance.^{14/} In addition, febrile illnesses increase the calorie requirements of an individual, while the anorexia that generally accompanies fever causes a decrease in food intake. The net result of these metabolic changes is that the malnourished are often unable to cope with even common childhood diseases. In one area of Africa, the death rate from measles was 400 times as high as the mortality rate from measles in developed countries.^{15/} Similarly, diarrhea is more prevalent in malnourished children, and episodes take longer to cure than in well-nourished children.

The nutritional status of infants and preschool children is also influenced significantly by prenatal factors. A number of studies have shown that malnutrition during pregnancy can affect both fetal and neonatal growth.^{16/} Chronic undernutrition before and during

pregnancy is one factor associated with a high incidence of low birth weight, which is defined as less than 2,500 grams. Babies of low birth weight are more likely than infants of normal birth weight to die during the first month of life. In addition, infants of low birth weight also suffer a disproportionate share of developmental abnormalities.

Conversely, improved maternal nutrition can contribute to increased birth weight.^{17/} Since birth weight is the strongest predictor of growth in term infants during the first seven years of life, whatever can be done to ensure normal birth weight will contribute to better infant and child nutritional status.^{18/}

Not all pregnant women are equally likely to deliver babies of low birth weight. Maternal age less than 18 or greater than 35, high parity, closely spaced pregnancies, preconception weight less than 38 kilograms, stature less than 60 inches, and a history of having low birth weight infants are factors that can be used to identify high-risk pregnancies.

In addition to food intake during pregnancy, infant feeding and weaning practices are significant determinants of nutritional status among infants and preschoolers. Breast milk is the optimal infant food until the age of four to six months, and until this time breast milk alone is usually sufficient to support growth. The faltering growth that typically begins to appear in low-income children is due in part to inappropriate weaning practices. The partial or total displacement of breast milk by nutritionally inferior foods, early or late introduction of complementary foods, improper preparation or storage of weaning foods, food taboos, and intrafamilial food distribution patterns have all been identified as contributors to weaning malnutrition.^{19/} In addition, the withdrawal of food during periods of illness further exacerbates malnutrition in a child six to thirty-six months old.

Family-Level Factors

It is artificial to look at the individual member of a family in isolation from the household. Decisions made by the family will have direct bearing on the nutritional status of each member. Thus, in order to understand how various programs might affect the individual, it is necessary to consider what factors affect family choices and use of food.

Low income is a basic cause of inadequate consumption of food by a family. This is further exacerbated by high prices of both food and nonfood items.

As would be expected, family size is associated with nutritional status. A number of studies have found that malnourished children tend to come from larger families. Morley and his colleagues found in Nigeria a higher incidence of kwashiorkor in families that had more

than seven children.^{20/} In India, researchers found that households having more than three children were more likely than smaller households to contain a malnourished child.^{21/}

There is other evidence of sex bias in family allocation of food. In Bangladesh, there was a significantly higher mortality rate in females than in males from birth through adolescence.^{22/} This difference in mortality was most dramatic in children one to four years old. This higher rate of mortality among females was concurrent with higher rates of severe malnutrition in female children.

The increased prevalence of PCM among the younger children of a family is related, in part, to the working status of the mother. When women enter the work force, breast-feeding and the amount of time devoted to child care and other nurturing activities are likely to decrease. In Project Poshak in India the severely malnourished preschoolers were all from households with working mothers.^{23/} Similar findings have been reported from the Philippines; there was a significantly higher probability of finding preschool malnutrition in a home with a working mother.^{24/} These findings of increased PCM occurred in spite of the fact that the family as a whole had increased its expenditures for food and more food was available within the household. The data indicate that even if the income constraint in poor families could be removed, nutritional deficits that arise from certain beliefs, practices, and patterns of child care might still exist. It is fairly common for malnutrition to be found in families with an adequate supply of food. This can be attributed in part to inefficient distribution of food within the household, in part to altered patterns of child care, and in part to the purchase of foods of higher status rather than of more of the traditional foods.

Macrolevel Factors

Environmental factors at the community or country level can act either as barriers or as facilitators in affecting nutritional status. An unfavorable health environment caused by inadequate water, sanitation services, and health care can increase the probability of infectious diseases and indirectly precipitate certain forms of malnutrition.

The nature of the food-distribution system, including what foods are available and at what price, has a direct bearing on the nutritional status of the family. At the country level, overall availability of food, its distribution, country infrastructure, food import-export policy, and public expenditure on water, sanitation, and health services all may directly affect the nutritional status of the population.

Not all the linkages involved in the etiology of malnutrition are yet understood, but we do know that the relations between individual, family, and community factors are complex. Many prior interventions

and related evaluations were designed without proper attention to this intricate causal model of malnutrition. As a result, knowledge of what type of intervention works best in a given situation is inadequate.

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4. THE CAUSES AND POSSIBLE SOLUTIONS: A CONCEPTUAL FRAMEWORK

A simplified conceptual framework based on the foregoing analysis of the etiology of malnutrition, which links the nature and causes of malnutrition to the approaches to its reduction or elimination, is shown in Figure 4.1. While there are a number of interactions among the factors presented, only those expected to be most important are shown in the figure.

The nutritional status of an individual is affected by the amount and kinds of food available in the market or on the farm, the ability of the individual's household to obtain the food that is available, the desire of the leading members of the household to obtain food to which they have access, the use of the obtained food by the household and by the individual to meet nutritional needs, and the health status of the individual.

Malnutrition may be a result of deficiencies in any one or more of these five factors. Thus, efforts to alleviate malnutrition or avoid its future occurrence should include an analysis to determine which of these five factors is the direct cause of malnutrition. Is it a general shortage of food? Is it lack of access on the part of the malnourished to the available food? Is it a lack of desire to obtain food to which households have access? Is it a problem of poor use of the food obtained by the household or consumed by the malnourished? Or is it a health problem? The five factors are interrelated. Changes in one may be ineffective unless others are changed simultaneously. Efforts to expand the availability of food will have no nutritional effect if the additional food is not made accessible to malnourished people. Similarly, efforts to improve the ability to obtain food may be of little use if its availability is strictly limited or if households having malnourished members do not desire to take advantage of greater ability to obtain food, but translate this ability into the purchase of nonfood commodities instead.

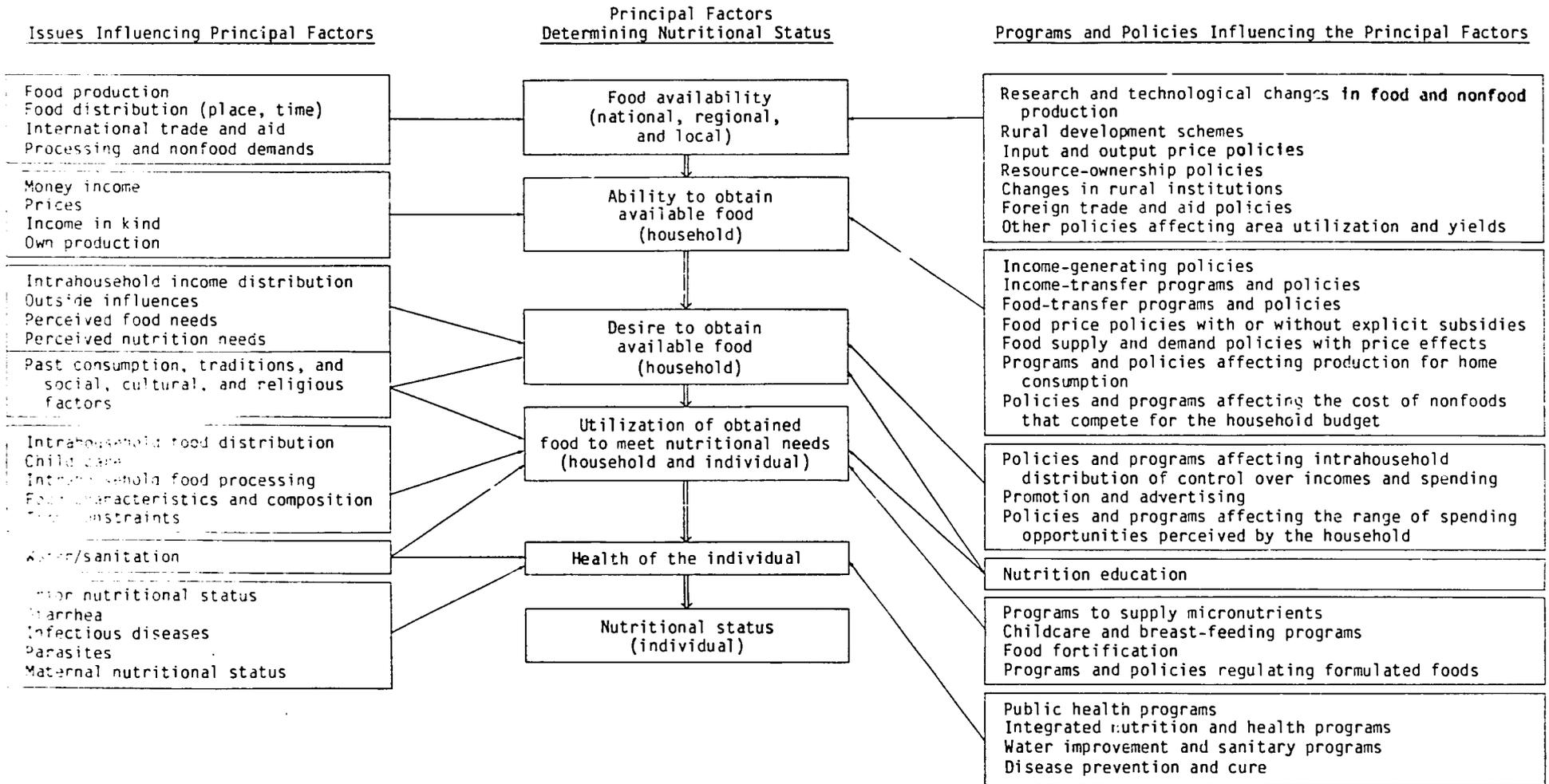
Figure 4.1 lists some of the principal determinants of each of the five previously mentioned factors and some possible programs, projects, and policies that influence each of these factors.

THE AVAILABILITY OF FOOD

National, regional, or local availability of food is determined by food production and distribution, international trade and aid, processing, and the demand for food. The availability of food should be regarded from the points of view of place and time -- where and when

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Figure 4.1--A schematic overview



is the food available? Seasonal variations in local availability of food appear to be of great nutritional significance in many localities. Food shortages and correspondingly high food prices during parts of the year may cause severe malnutrition, even though average availability during the cropping season appears to be satisfactory.

The availability of food may be affected by a series of programs, projects, and policies, some of which are listed in Figure 4.1. Some will increase and others will reduce the quantity of food available. The nutritional composition of the available food may be changed either by changes in the relative amounts of the various commodities, such as crop substitution in production or trade, or by changes in the nutritional composition of the individual commodity. The nutritional effects of the substitution of cash crops for the food crops used primarily for household consumption among semisubsistence farmers is of particular interest.

Changes in the amount and kinds of food available need not cause corresponding changes in the degree of malnutrition. In fact, they probably would not. The amount of nutrients made available by a given project or policy is usually a poor indicator of the nutritional effects, and choosing among alternative projects on the basis of relative contributions to the quantity of available nutrients is not likely to be effective from a nutritional point of view. The nutritional effect of changes in food supply depends on the distribution of the change between malnourished and well-nourished groups and among groups with varying degrees of malnutrition. The distributional pattern depends, in turn, on how the change in supply comes about -- which commodities are affected, how prices are affected, and whether there are simultaneous changes in the incomes of malnourished or well-nourished groups.

THE ABILITY TO ACQUIRE FOOD

Changes in incomes and prices affect the ability of a given household to obtain food that is available. Decreasing food prices may reduce the incomes of producers while benefiting nonproducing consumers. On the other hand, increasing productivity and expanded production may benefit malnourished producers and consumers. The nutritional effects of changes in prices and incomes obviously depend on the way households having malnourished members are affected. Thus, the nutritional effects can be estimated only on the basis of disaggregated analysis, where disaggregation is done on the basis of nutritional status or some proxy for nutritional risk. Failure to perform such disaggregation is likely to result in useless, and in some instances wrong, conclusions regarding nutritional effects. But in order to perform such disaggregated analyses, undernourished groups must be clearly identified.

The ability of a household to obtain the food that is available may be influenced by changes in household money incomes, prices of

both food and nonfood commodities, and household incomes in kind. Examples of policies and projects that may cause such changes are given in Figure 4.1. Although different in nature, the nutritional effects of all these policies come about through changes in real purchasing power of the household, changes in relative prices of the various foods and nonfoods, or both.

THE DESIRE TO ACQUIRE FOOD

Efforts to bias household consumption patterns through transfers in kind, such as supplementary feeding programs, may be less effective than originally expected because the household reacts to increased income in kind by making corresponding changes in purchasing patterns in order to maximize the perceived utility of total real incomes. Thus, the nutritional effects of changes in the ability to obtain the food that is available depends on the desire to obtain food rather than other commodities.

Increasing income among households in which there are malnourished members does not necessarily bring about improvements in nutrition. The additional income may be spent on foods of low nutritional value, it may be spent on nonfoods, or it may be invested or saved. Furthermore, increasing household incomes may cause the substitution of more expensive for less expensive nutrients. Two points are important in this regard. First, patterns of household spending and consumption, while rational to the head of the household, may not be optimal from a nutritional point of view. Nutrition is only one of a series of considerations entering into decisions on spending and consumption. Needs other than nutrition may carry considerable weight, and there is no reason to expect that the fulfillment of all other needs is subordinate to the fulfillment of nutritional needs. Lack of knowledge regarding food and nutritional needs of members of the household is another reason that the ability to obtain food is not fully exploited. Wrong information imposed from outside the household and promotion of nonfoods or nonnutritious foods add to the problem.

Second, the patterns of spending and consumption depend on who it is within the household that controls incomes and decides on spending and consumption. The importance of this point has been grossly underestimated in past analyses. In traditional economic analysis the point tends to be overlooked under the assumption that the household operates as a single decisionmaking unit and that no conflict exists between the utility function used for decisionmaking and the utility function of individual members of the household. As long as there is no change in the share of the individual members of the household in the decisionmaking process, the assumption may cause relatively little harm, except that it causes the potential nutritional effects associated with changes in these functions to be ignored. If projects and policies influence the intrahousehold decisionmaking process, however the assumption may cause considerable error in estimations of nutritional effects. Rural development projects, for example, can alter

the traditional distribution of income control and income-generating ability among individual members of a household and thus affect nutrition.

Although precise knowledge of the subject is lacking, there is reason to believe that, as a rule, the nutritional effect of expansions of real income, whether in money, in kind, or through price decreases, will depend on who in the household controls such expansions of income and who decides what should be the appropriate adjustments in household patterns of consumption.

THE USE OF THE FOOD ACQUIRED

In addition to the availability of food, access to food, and desire to obtain food to which the household has access, the nutritional status is affected by the use of the food obtained (see Figure 4.1). The use of the food obtained by a household can be discussed at two levels. First, how does the household distribute the food among its members in relation to their nutritional needs, and second, how is the food consumed by the individual members of the household being used to meet their nutritional needs?

Intrahousehold distribution of food depends on the intrahousehold decisionmaking process, goals, and knowledge regarding nutritional needs of individual members of the household. The aforementioned potential conflict between household rationality and optimality from a nutritional point of view may also be apparent in the case of intrahousehold distribution of food. Households with limited purchasing power may face the hard choice of maintaining a source of income -- however low -- through allocation of sufficient food to income-earning members of the household or placing high priority on the nutritional status of economically inactive members, such as small children. Many households are forced to make this difficult decision. If, as is usually the case, income-earning capacity and control over spending patterns and intrafamily distribution of food are closely linked, nutritional needs of small children may be given low priority. Attempts to improve the nutritional status of small children by means of direct feeding programs and other interventions that can be translated into expanded real incomes will cause adjustments in spending patterns and intrahousehold distribution of food that would partially or totally offset the desired effects on child nutrition. Lack of expressed demand by malnourished members of a household because of anorexia is an important factor in this regard.

HEALTH AND SANITARY CONDITIONS

Regarding the use of food by the individual, a number of factors should be considered. The most important of these are health and sanitary factors, the composition of the diet, nutritional balance, energy density, food processing and preparation, and extent of

breast-feeding and general child care. From the point of view of the design of nutrition interventions, the most important topics are the influence of such interventions on the allocation of women's time and the resultant nutritional effects through changes in breast-feeding, child care, food preparation, and eating habits in general, and the identification of the health and sanitary factors that significantly hamper the attainment of a satisfactory nutritional status so that changing these factors becomes an objective of each type of intervention.

The factors influencing an individual's health and nutritional status have already been presented. What is clear from both the discussion of the conceptual framework and the nature and causes of malnutrition is that a variety of individual, family, and community-level factors can influence nutritional status. In the design and implementation of nutrition policies and programs this complex interaction must be considered.

5. A SYNOPSIS OF PROGRAMS AND POLICIES: CURRENT STATE OF KNOWLEDGE AND RESEARCH NEEDS

As discussed earlier, a variety of policies and programs may affect the health and well-being of nutritionally vulnerable groups. These range from macrolevel economic growth policies to microlevel nutrition and health interventions aimed at specific groups. Research and evaluations conducted in the past have provided information about what does or does not work in various situations.

This chapter provides an overview of the present state of knowledge of the principal types of programs and policies that have either been designed to alleviate malnutrition or can be expected to have significant nutritional consequences. The interventions are discussed according to the five main classifications outlined in Figure 4.1, namely, the availability of food, the ability to obtain food, the desire of the members of a household to obtain food, the use of food by the individual or household, and the health or nutritional status of an individual. Some programs and policies may influence more than one of the five groups: food supply policies, for example, may influence both the general availability of food and the ability of malnourished rural households to obtain food. Thus, in order to avoid discussing a particular program twice, a slightly different grouping is used in the synopsis: agricultural and rural development projects and policies, including food-for-work projects; food price policies; food- and income-transfer programs, including food stamp programs; nutrition education; food fortification programs; programs and policies concerning formulated foods; and integrated health and nutrition programs. The review of each type of intervention provides a synopsis of what is known so far and is focused on an identification of research subjects that are germane to a better understanding of the intervention for the purpose of assisting in the design and implementation of more effective programs and policies.

AGRICULTURAL AND RURAL DEVELOPMENT PROJECTS AND POLICIES

In addition to the effects of programs designed and implemented for the explicit purpose of alleviating malnutrition, human nutrition is influenced -- whether positively or negatively -- by a large number of projects and policies that are not explicitly aimed at the achievement of nutritional goals. Of particular importance are projects and policies that influence food prices or generate incomes among low-income population groups. In this section, emphasis is on projects and policies within agricultural and rural development because they influence both incomes and food supplies -- which is not to imply, of course, that income-generating activities outside agriculture are unimportant for human nutrition.

In some instances the nutritional effects of agricultural and rural development projects and policies is assumed. In other instances, the effect is unexpected and unintended. In very few instances are the potential nutritional effects explicitly considered in the design of agricultural and rural development projects and policies, and in even fewer instances do estimates of the potential nutritional effects significantly influence their design.

Direct nutrition intervention programs may be effective in reducing nutritional deficiencies. Effective programs, however, are usually costly. Furthermore, their effectiveness depends on a continued outlay of funds; they do not become self-sustaining. Thus, while such programs may provide the best solution to a large part of the nutritional problem in the short run, a long-term, self-sustaining solution must be sought through broader development efforts that will eventually reduce and perhaps even eliminate the need for direct nutrition intervention programs. Agricultural and rural development projects and policies offer great opportunities for such long-term improvements in nutrition.

But if these opportunities are to be fully realized, nutritional issues must be considered in the design of projects and policies, and due consideration must be given to the potential nutritional effects of alternative projects and project modifications. This is not to argue that nutritional goals should take priority over all other goals of agricultural and rural development, merely that they should be explicitly considered along with other goals. If the nutritional effects of alternative projects and project designs are estimated, it is possible that positive nutrition effects may be enhanced and negative ones reduced without unacceptable losses in the achievement of other goals.

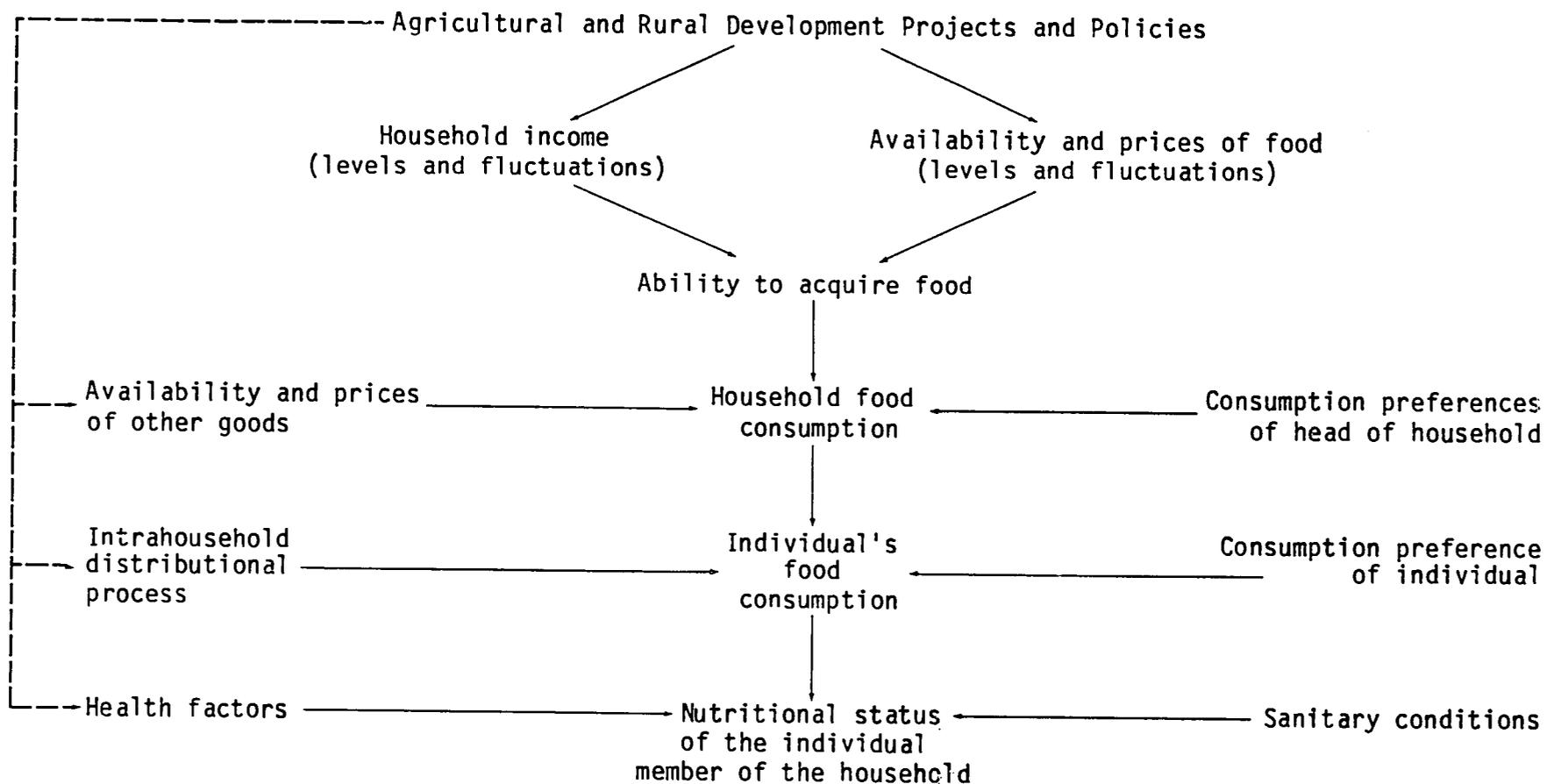
Positive effects of modifications of agricultural and rural development projects and policies may exceed the effects of direct intervention programs, while negative effects may cancel them. Thus, to ignore the potential and real effects on nutrition of modifying agricultural and rural development projects and policies while promoting direct nutrition intervention programs makes little sense, even in the short run.

Principal Factors and Relationships

How can changes in agricultural production strategies and rural development schemes affect nutritional status? The principal factors and relations to consider in assessing the nutritional effects of agricultural projects and policies are outlined in Figure 5.1.

Increases in the availability of food within a country are not sufficient to alleviate malnutrition in target-group households; rather, the ability of vulnerable households to acquire food must be increased. This can be achieved through increasing income, reducing food prices, or both.

Figure 5.1--Agricultural and rural development and food consumption and nutrition: the linkages



Agricultural strategies implemented in developing countries may attempt, explicitly or implicitly, to influence nutritional status indirectly through an income or price effect. Several projections can be made. First, adoption of new agricultural technologies might lead to greater food supplies, either through improved yields per acre or increased use of previously uncultivated land. The available data indicate that recent increases in worldwide food production have occurred mainly because of larger yields per acre.^{1/} This increased agricultural production generates greater family income, a portion of which presumably will be spent on additional food. The extent of the income effect on nutritional status will depend on how directly a household is linked to the new technology. While the farmers using the technology will benefit and agricultural laborers may benefit through increased employment, nonagricultural workers are less likely to experience any change in income as a result of new agricultural technology, although generation of income among the poor employed in the rural services sector may be important.

Increases in food supplies may bring about either a reduction of food prices or a slower price increase than that which would occur without the supply increase. In the case of unrestricted foreign trade in food, such price effects may be small or insignificant.

Agricultural and rural development projects and policies that cause food prices to decrease and to fluctuate less with the passage of time offer a high potential for improving the diets of the urban poor. High price levels and severe price fluctuations are much more harmful to the poor than to the better-off urban consumers.

As discussed earlier, however, the rural poor who depend on food production for their incomes either directly or indirectly benefit from higher food prices. The apparently conflicting objectives of low food prices for urban consumers and higher prices as production incentives and higher incomes for the rural poor need to be addressed through coordinated agricultural and price policies. This will be discussed further in the section on food price policies.

Finally, the type of crop production advocated by specific agricultural policies may influence nutritional status. A considerable proportion of existing malnutrition is found among households that produce most or all of the food they consume -- the semisubsistence farm households. For those households, changes in cropping systems that influence the amounts and kinds of food produced and the fluctuations in the availability of food during the year may be much more important than changes in food prices. Agricultural and rural development projects and policies may change the crop mix and the cropping patterns to better meet the nutritional requirement of the semisubsistence farm family, but they may also cause a deterioration in the nutritional situation of these families. In fact, certain projects and policies may create a nutritional problem where none existed before.

Projects and policies that promote a shift from mixed cropping systems to monocropping should be carefully watched for possible negative nutritional effects. This is particularly important for projects that promote substitution of a nonfood cash crop for a mixture of food crops traditionally produced for home consumption. This is not to argue that the nutritional effects of such projects are usually or always negative. The additional incomes generated within the farm household and the associated expansions of food purchases may fully compensate for the loss in the consumption of own produce and provide for additional real incomes that can be used for nutritional improvements or other desired gains in welfare. But without the appropriate policies it cannot be assumed that this will always be the outcome.

Many countries are now pursuing policies of increasing production of nonfood cash crops for export. Yet relatively little is known about the nutritional consequences of cash cropping; the nutritional effects cannot be assumed to be positive. Methodologically rigorous studies of the problem are needed.

The ability of the household to acquire food determines the extent to which nutritional requirements could be met. Whether in fact this ability will be fully realized will depend on a number of factors, as illustrated in Figure 5.1. Some of these factors, such as the availability and prices of other goods, the intrahousehold distribution process, and certain health factors, may be influenced by agricultural and rural development projects and policies. The influence of rural development projects on control of the intrahousehold budget, the allocation of the time of women, and the resultant nutritional effect through changes in spending patterns, breast-feeding, child care, food preparation, and eating habits in general may be an important consideration for the design of projects and policies.

Although patterns of food consumption may be influenced by agricultural and rural development projects and policies, the final decisions regarding actual consumption of food are made by the individual household or member of the household. Thus, to predict the effect of a given project on the consumption of food by the malnourished it is necessary to study the behavior of the household. Not only must the effects of the project on the incomes of households of which some members are malnourished, on their access to food, and on the prices they have to pay be estimated but also on the way they will adjust their food consumption in reaction to changes in incomes and the availability and prices of food.

Nutritional Effects of Agricultural Projects. Research to evaluate the nutritional effects of agricultural and rural development projects has been limited. In addition, since improving nutrition has rarely been an explicit objective of agricultural schemes, many of the evaluations of these schemes that have been made have not included assessment of their nutritional consequences. Therefore, information on the nutritional effects of agricultural policies is limited to a few small-scale studies.

Goldman and Overholt assessed the nutritional effect of an agricultural project in Colombia.^{2/} The goal of the project was to increase the productivity of the small farmer through adoption of a new technology using high-yielding maize. Improvement in diet or nutritional status was not an explicit goal of the project. Adoption of the new technology brought an increase in the income of the farmers; there was only a weak income-calorie relation, however. The income elasticity of demand for calories was 0.1; a 10 percent increase in income would lead to an increase of only 1 percent in calorie intake. In addition, there was no apparent relation between increased income and improvement in the nutritional status of preschoolers. The authors suggest that preschool malnutrition may be more prevalent in the households of landless laborers than in small farm families.

There have been several recent reviews of the nutritional effects of agricultural policies that have emphasized the production of cash crops. Fleuret and Fleuret and Dewey identified a number of instances in which projects and policies aimed at the transition from subsistence or semisubsistence farming to cash cropping appear to have had negative effects on the nutritional status of farm families.^{3/} The reasons for such negative effects vary among the particular cases studied. In addition to the effects of changes in incomes and relative prices, it appears that a number of other factors, such as changes in intrahousehold income and budget control, amplified exposure to more expensive foods and nonfoods, changes in the position of women, particularly in the demand for their time, changes in the frequency of incomes, and alteration of the pattern of ownership of resources may be important. The evidence is too scarce and too fragmented, however, to be of much use for the design of policies and projects. To resolve the dilemma, there is a need for a set of integrated studies reflecting various socioeconomic environments but following a common methodology. Such an approach would permit comparisons across programs, policies, and environments and would, when focused on the principal factors and relationships, assist in identifying the policies and programs needed to assure a successful nutritional outcome for rural modernization.

The nutritional effects of agricultural policies and projects are not limited, however, to the transition from subsistence to commercial agriculture. Policies and projects focused on commercial agriculture are also likely to bring about changes in nutrition. The direction and magnitude of such changes are influenced by the nature and design of the projects and policies. While research on this topic in the past has been almost nonexistent, some such research is now being undertaken.^{4/} Among current research activities are a series of studies sponsored by the U.S. Agency for International Development (AID) of the nutritional effects of selected agricultural policies and analyses by IFPRI of the effects of technological change in agriculture on food consumption and nutrition. Furthermore, the Food and Agriculture Organization of the United Nations (FAO) is undertaking a major project to develop and test in the field, approaches for incorporating nutritional considerations into the preparation of agricultural and

rural development projects. Other institutions such as the World Bank and the International Fund for Agricultural Development (IFAD) are giving considerable attention to this issue.

Rural Development Projects: Food-for-Work Programs

Food-for-work programs were originally developed to provide income-generating employment opportunities and improve rural infrastructure in areas in which there were large groups of underemployed or unemployed labor. As the name implies, wages in food-for-work projects are paid in part or in full with food, some of which is often supplied by food aid. Of the food aid used annually 16 percent is for food-for-work programs.^{5/}

Increasing employment has always been the primary aim of food-for-work programs; a secondary aim is construction and maintenance of public works. It is only recently that in food-for-work interventions nutrition has been thought of as a specific goal.

Effectiveness of Food-for-Work Programs. Given the initial thrust of food-for-work programs in providing employment opportunities, it is not surprising that much of the information available has to do with the employment and income effects of food-for-work interventions, about which the World Food Program has published extensively.^{6/} It appears that food-for-work projects have been successful in increasing employment. In Bangladesh, for example, the food-for-work program increased the person-days of work by 45 million, provided employment for 1.5 million people, and used 160,000 metric tons of grain.^{7/} Similar results have been reported from other countries.^{8/} In some countries food-for-work projects have added significantly to the rural infrastructure.^{9/} Development of better roads, irrigation and drainage systems, and soil conservation have been the principal types of projects conducted under food-for-work programs.

Unfortunately, the effect that food-for-work programs have had on the nutritional status of households or individuals is less clear. Any assumption of a nutritional effect is based on the premise that a portion of the increased income generated by food-for-work projects will be used to increase food intake. With respect to food wages in kind, it is sometimes assumed that this food will be consumed in addition to what was already in the normal diet. With respect to cash wages, it is presumed that a part of the increment will be used to purchase more food.

From a study conducted in Mysore, India, a land-army project was reported to have had a significant nutritional effect on adult male laborers.^{10/} Results indicated that workers gained 8-15 kilograms while doing manual work. This example may not be typical of food-for-work programs. The laborers were living away from their families in a work camp where their basic needs were addressed.

A more representative picture of food-for-work programs is probably reflected in studies reported from Bangladesh.^{11/} In Bangladesh, sale or barter of the food wages was common. As a result, no more than 50 percent of the families' calorie requirements were met. Similar results have been reported from other studies.^{12/}

The evidence available is too scanty for any judgments to be made about the nutritional effectiveness of food-for-work programs. But some questions can be raised about the assumptions behind the food-for-work interventions.

As stated earlier, wages are paid either partially or totally in food rather than in cash. The availability of food aid is an important reason for using food as partial payment of wages. Another reason may be the belief that it will be a more effective way of improving the household diet. However, the opposite may be true. If people are selling the food at very low prices or in some instances even discarding the ration, the nutritional effect of food for work may actually be less than the effect of payment in cash. Additionally, it appears that it is more expensive administratively to operate a food-for-work program using food aid than to operate a cash wage program.^{13/} The cost of transporting, storing, and distributing large volumes of food aid to rural areas is a large one and is borne by the government. At the same time, such administrative costs may be offset by the availability to the government of cheap or free food.

Most of the work performed as part of a food-for-work program is hard manual labor. The wages paid, whether in kind or in cash, must be sufficient to compensate the workers for the additional energy that they spend. A growing number of food-for-work laborers, moreover, are women. The extra amount of time put into food-for-work projects may detract from the child-care activities of these women. In rural areas, mothers who work outside the home typically leave infants and preschoolers to be cared for by other siblings. The quality of child care and food provided by the mother substitute are often inadequate. Several studies have now shown that young children of working mothers are more likely to be malnourished than are those of nonworking women.^{14/} The potential positive effects of food-for-work may be negated by an alteration of child-care patterns. These factors must be considered in any assessment of the nutritional effects of food-for-work projects.

Research Needs

In view of the limited information available to guide the design of projects and policies, the expected large potential for improving nutrition through agricultural and rural development projects and policies, and the great interest among institutions and individuals who plan and implement projects and policies, well-focused research in this general area is likely to bring good returns. High-priority research falls into four areas:

1. Research is needed to develop, test, and refine approaches incorporating nutritional considerations into the design of agricultural and rural development projects. The FAO has completed considerable work in this area and it is important that such work be continued.

2. Research should be conducted to provide an improved understanding of the way food consumption and nutrition are affected by various food and agricultural projects and policies and the way positive effects can be enhanced and negative ones curtailed or eliminated. As an integral part of this research there is an urgent need to improve the understanding of the workings of the relevant linkages and relations in order to improve the basis for assessing the performance of past projects and policies. Other research may be linked to new projects and policies.

Within this general research area high priority should be placed on analyses of the effects on food consumption and nutrition of:

- a. policies and projects that attempt to replace semisubsistence food production by cash crops, with particular emphasis on the promotion of nonfood cash crops and related rural change;
- b. technological change in food production;
- c. selected producer price policies;
- d. integrated rural development projects and related policies; and
- e. policies and projects that promote home gardening and similar activities.

3. Research should develop effective food-for-work programs. Since it appears that food-for-work projects will continue to be used as important employment-generating activities in many countries, much more needs to be known about the nutritional effects of food-for-work interventions, particularly whether payment of wages in food implies a different marginal propensity to consume food than does payment in cash.

Part of the difficulty with food-for-work projects in the past was caused by the unacceptability of the commodities used as payment. Research on the income and nutritional effects of various types of rations should be pursued.

Finally, it is now clear that families having malnourished children who receive food transfers increase their food intake by relatively small proportions. If the ultimate aim of some food-for-work project is to help malnourished children, is this an effective method for reaching them? Does the success of food-for-work projects in

alleviating preschool-age malnutrition vary according to whether it is the man or the woman who receives the food?

4. Research is needed to improve the understanding of household behavior that may not be specific to any particular project or policy. Such research should include attempts to analyze the effects on nutrition of changes in the intrahousehold-budget control, the demand for women's labor, and other policy-relevant variables. Emphasis should be placed on explaining why many households having members with calorie deficits appear to spend a relatively small share of additional incomes to increase their consumption of calories.

FOOD PRICE POLICIES

Government intervention in food prices is widespread in developing countries. Frequently, pricing policies involve some form of subsidy to the consumer, to the producer, or to both.

Food subsidies can be either implicit or explicit. Implicit subsidies, such as export restrictions, subsidization of imports, and price ceilings, have been used as a means of depressing the prices of domestic food.^{15/} While these implicit subsidies have had the effect of keeping food prices low, primarily for the urban consumer, they also act as disincentives to local production.

Explicit subsidies are geared directly to holding down the price of food to the consumer or to subsidizing agricultural production.

Although nutritional concerns are sometimes used as arguments in support of government price policies, the principal goals are usually of a broader socioeconomic and political nature. Regardless of whether nutrition is a stated objective, nutritional status can be affected significantly by price policies. The principal types of price policy that have been followed in developing countries will be reviewed here, and high-priority research needs will be identified.

Consumer Price Policy

Many price policies favoring consumers have been attempts to increase the food purchasing power of the low-income consumer by decreasing the price of food below the free-market level.

In Egypt, wheat flour and bread are subsidized by the government.^{16/} The entire population qualifies for this subsidy. There are no restrictions on eligibility, and there are no limits on the amount of flour or bread that may be purchased. In addition to this general subsidy there is a rationed subsidy on a limited number of additional items. In 1980, Egypt spent approximately \$1.6 billion, or about 20 percent of current government expenditures, on consumer subsidies.

If better nutrition is the primary goal of a policy to help consumers, general food subsidies such as those mentioned earlier are a highly inefficient strategy. Many nonneedy households receive benefits under this type of system. As a result, many countries have adopted policies that limit the amount of subsidized food that may be purchased, restrict the subsidy to certain foods, or direct the subsidized items to particular households.

In Pakistan, for example, limited quantities of subsidized wheat and sugar are sold in government-licensed but privately owned ration shops. Similarly, in the Conasupo program in Mexico City, prescribed amounts of subsidized milk are sold to eligible households. Eligibility is based on an income standard and the presence of children under twelve or pregnant and lactating women in the household. The Conasupo program attempts to direct a specific food -- milk -- to particular individuals within the household -- children and pregnant and lactating women.

Many other countries, including India, Sri Lanka, and Bangladesh operate consumer food subsidy programs.^{17/} The amount spent by the government annually on consumer subsidies is substantial. As a result, many countries have begun to reevaluate the utility of consumer price policies in achieving nutritional goals.

Effectiveness of Consumer Price Policies. Studies in Kerala, India, Sri Lanka, Bangladesh, Pakistan, and Mexico indicate that consumer subsidies have had a significant effect on food consumption.^{18/} In Pakistan, in the second lowest income group, increments of 8.6 percent of the calories required and 24 percent of the protein required were attributed to participation in the ration system.^{19/} Similarly, in Sri Lanka, the ration program provided approximately 20 percent of the total calorie intake of the lowest income group.^{20/} In Mexico City, children participating in the Conasupo subsidy program received a significantly greater percentage of calories and protein from milk than nonparticipating children.^{21/} There was no difference over all in consumption of calories and protein between participating and nonparticipating children, however, indicating that the subsidized milk was substituted for other foods that normally would have been consumed.

In only a limited number of studies have attempts been made to look at other nutrition-related effects of food subsidy programs. In an evaluation of the Pakistan ration system the effect on the nutritional status of preschoolers was assessed.^{22/} Results indicate that the ration consumed by the household did not significantly decrease the prevalence of preschool malnutrition within participating households. These results are similar to findings from an evaluation of the Conasupo program, where there was no difference in the prevalence of preschool malnutrition between children participating and those not participating in the subsidy program.^{23/}

These studies indicate that the improvements in the ability of the households to acquire food brought about by the food subsidies is not fully passed on to the food-deficient children. As a result, governments have been interested in finding better ways to direct program benefits. If a consumer price policy is intended primarily to improve nutritional status, its effectiveness will be greater if it is aimed at the households most in need and to individuals within those households who are nutritionally vulnerable. One way is to identify the foods most likely to be consumed by low-income families. In Pakistan, it was found that when low-priced sorghum was available through the ration shops, the poorest households chose sorghum over the higher priced but generally preferred wheat.^{24/} For each dollar spent, a larger quantity of sorghum than of wheat could be purchased, and the effect on household food intake was thereby greater.

Several authors have concluded that a price subsidy will be more cost effective if the subsidy is applied to an "inferior" or low-status food.^{25/} The potential effect of any consumer price policy 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.

The use of a subsidy on an inferior food is one way to reach the poorest household. This approach still does not address the problem of distribution of food resources within the household. There are no simple solutions. Trying to reach nutritionally vulnerable individuals within a household further increases the cost of an already expensive intervention. Without a better understanding of the household decisionmaking process, including the intrafamilial distribution of food, the ability to enhance the nutritional effectiveness of food-subsidy programs will be limited.

Producer Price Policy

The consumer price subsidies just discussed will produce a nutritional effect only to the extent that the target households purchase a significant proportion of their food. While urban consumers and landless laborers purchase most of their food, small farmers usually do not. In some countries the most severe cases of malnutrition are found among the rural poor, who, because they may produce their own food, are less likely to benefit from food price subsidies. Price policies aimed at increasing agricultural production or subsidized farm inputs have often been pursued as one means of improving the economic situation and, thus, the nutritional status of the small farmer. Such policies tend to benefit farmers with large marketable surpluses.

Clearly, agricultural objectives, not nutrition goals, have usually been the prime incentive behind price policies meant to benefit the producer. Countries have pursued price policies that would ensure greater domestic production of food, leading ultimately to self-sufficiency in food. The effectiveness of such price policies has

varied. During the 1970s, the Korean government attempted to reduce the country's dependence on rice imports and, at the same time, to increase rural income by raising the price paid to farmers for rice.^{26/} This particular price policy has been a primary factor in the present rice self-sufficiency of Korea, but it has also increased the price of rice to the consumer.

While policies of price support and input support can help increase domestic production, some price policies actually have had the opposite effect. More often, however, agricultural price policies have been aimed at the taxation of the agricultural sector as exemplified by the Thai government export tax on rice. The net effect of this tax has been to depress the domestic price of rice and therefore to benefit urban consumers.^{27/} This tax has also been a disincentive to the local production of rice.

The apparent conflict between consumer and producer price policies is often resolved by dual-pricing policies. In Pakistan, the subsidized consumer food policy is carried out in conjunction with a guaranteed support price for farmers.^{28/} The Pakistani government purchases wheat from farmers and sells it to consumers at a lower price. The difference between the purchase price and the selling price is absorbed by the government.

Research Needs

Additional research is urgently needed on various aspects of government price policies. In particular, how the effectiveness of food subsidies to achieve nutritional goals can be enhanced by better understanding of household decisionmaking. Food subsidies and targeting may also be made more widely applicable and more cost-effective with modified or innovative management and administrative tools. Furthermore, the social desirability of such interventions depends upon the structure of food production and identification of characteristics of the target population. Research priorities, then, include the following:

1. Research is needed on the decisionmaking process for acquisition and intrahousehold distribution of food. How is the household welfare function determined? Who decides on food expenditures and to what degree does authority for the decision differ by source of income? How are allocations among siblings determined by age, sex, and state of health? Are food-related transfers treated differently from wage earnings? Furthermore, research is needed toward understanding the influence of household time and other nonmarket resource constraints that underlie low marginal propensities to consume food. What other resources are as scarce or scarcer than food in the households of the poor?

Research of this sort will help determine the use of additional income, either in kind or as transfer of purchasing power, and the possibility of directing food to specific members of a household. The

latter project might be enhanced by identification of commodities that are usually allocated to nutritionally vulnerable groups.

2. Better methods of conducting means tests need to be identified. This involves research into administrative procedures and management incentives as well as identification of characteristics of target groups.

3. A further understanding of the tradeoffs of low food prices is needed. Are nutritionally vulnerable families net beneficiaries of low food prices, or would their increased earnings from farm sales or generated increases in wage earnings offset increased food prices? This involves identification of market channels, frequency of imports, and a better understanding of agricultural linkages.

4. Research should be conducted on the analysis of the effect of foreign-exchange constraints on the decision to import food for expanding supplies in local markets or facilitating food-subsidy schemes. Both the direct propensities and the indirect effects on other sectors should be studied.

5. Research on the analysis of the commodity choice, including the effects of and the obstacles to introducing composite flours or other cheap foods that allow consumers to substitute according to their household demand, incomes, and calorie needs should be conducted.

6. Additional research is needed on the effect of transaction costs of programs or policies on the distribution of benefits. These transaction costs include the time needed for acquiring subsidized food. Transaction costs and nonprice costs may vary according to the type of program or its design and implementation procedures. Certain groups of households may not find participation in a given program attractive because of these costs. Thus, the effect on household targeting and benefits distribution may be significant and research is likely to be useful for future program-design and implementation procedures.

7. Analysis of the effect of food price subsidies on wage levels should be conducted. The linkage between food prices and wage levels is poorly understood yet very important for both the growth and the equity effects of price subsidies.

FOOD-LINKED INCOME TRANSFER PROGRAMS

Food-linked income transfer programs take many forms, of which food stamp and food supplementation programs are the most common. Both types of programs are attempts to transfer incomes to families or individuals in target groups in the form of food or food-purchasing power, in order to assure that dietary intakes increase. The most common arguments for transferring food or food-linked incomes rather

than cash are that the marginal propensity to consume food may be higher when food and food-linked incomes are transferred than when the transfer is cash income, or that food is available to the government at a cost below market prices, that is, as foreign food aid or surplus production.

The effect of food and food-linked income transfers on the acquisition of food by a particular household is influenced by the size of the subsidy and the food acquisition behavior of the household. It is important whether the subsidized quantity is inframarginal. In many instances transfers are limited to specified rations smaller in quantity than those that would be acquired without subsidy -- that is, the quantity is inframarginal. This implies that the nutritional effect would be expected to be no different from that of a transfer of cash income equal to the real income embodied in the transfer. Except for such an income effect, there is no apparent reason that the household should allocate more of its real income to food, because the marginal cost does not change. If the marginal propensity to consume calories is around 0.5 -- a reasonable magnitude for many households which have some malnourished members -- then it would be expected that only half of any income transfer would be spent on increasing the number of calories consumed, irrespective of whether the income transfer was in the form of food or cash, as long as the transfer was inframarginal.

But food-linked income transfers need not be inframarginal. One way to design transfer programs that will have an effect on the acquisition of food beyond the income effect is to require the household to pay an amount close to that which it now spends on food in order to obtain food stamps that will cover a larger quantity. Such a purchase requirement was included in the U.S. food stamp program until 1979. Programs designed in this fashion are likely to have a greater effect on the acquisition of food by a household because in addition to the income effect, they make food cheaper at the margin, at least by the transaction costs or discount associated with resale of the food stamps.

Purchase requirements are difficult to implement in a socially just manner. If the amount to be paid for the food stamps is based on the average expenditures for food by the target group, the program will tend to be regressive among target households and may exclude the neediest from participating because the amount may exceed what they are able to pay. On the other hand, in most societies it is impossible to extract a different amount from each household on the basis of the ability to pay.

But even if food-linked income transfers do not influence nutrition any differently from cash transfers of the same magnitude, the former may be politically feasible when the latter are not. Better-off population groups generally derive more utility from income transfers aimed at the alleviation of overt human misery, such as extreme and highly visible malnutrition, than from general income transfers when the spending decisions related to the transfers are left in the

hands of the recipient households. For this reason, income transfers to the absolute poor may be politically desirable or feasible only if earmarked for alleviation of extreme human misery, even though the final result is not different from transfers that are not earmarked. Further discussion of this matter is presented by Scandizzo and Knudsen.^{29/}

There is some evidence that the marginal propensity to consume food is higher when food is transferred than when the transfer is another form of income.^{30/} One possible explanation is that intrahousehold budget control is a function of the source of income and that the marginal propensity to consume food varies among members of a household. Kumar, in Kerala, India, found evidence to support this findings; the marginal propensity to consume food varied among women's incomes, men's incomes, and incomes in kind from home gardens.^{31/} A similar situation may exist in parts of Africa where women tend to control food-related income but men dispense the cash income.

The two principal food-linked interventions -- food stamps and supplementation programs -- differ in the manner in which income is transferred and in the target groups served. Each of the programs will be reviewed and important research issues identified.

Food Stamps

The nutritional rationale of food stamp programs is the assumption that the program will increase the food purchasing power of a household, thereby increasing the consumption of food and, in turn, improving the intake of nutrients. The theoretical underpinnings of the food stamp programs are thus similar to those of the food-subsidy programs. Many of the issues are similar and will therefore not be repeated.

Given the similarity in objectives and potential effects of food stamp programs and food subsidy programs, it is interesting that some countries -- Sri Lanka, for example -- have recently changed from using subsidies to using food stamps. It is perceived by some that a food stamp program is more acceptable to the consumer, is easier to administer, and is less costly than a food subsidy program. The evidence of the effectiveness of food stamp programs will be reviewed and gaps in the research will be identified.

Effectiveness of Food Stamp Programs. The food stamp program in the United States is one of the oldest and best established of this type of intervention; it is therefore the source of much of the evidence regarding the effectiveness of a food stamp program.

A large number of studies indicate that there is a general relation between income and nutritional adequacy. Abdel-Ghany, using data from the 1965-66 Household Food Consumption Survey of the U.S. Department of Agriculture (USDA), found a positive and statistically

significant relationship between household income and the adequacy of certain nutrients -- niacin, vitamins A and C, iron, and protein.^{32/} These results and others support the notion that increasing a family's income would increase its intake of nutrients.^{33/} The U.S. food stamp program originally required that a family spend a certain amount of its own money to buy food stamps; this requirement was eliminated in 1979.

Price and others found that the food stamp program in the United States did increase the value of the food available within the household.^{34/} West and Price obtained similar results: food expenditures increased in households that had food stamps.^{35/}

Increased expenditures for food, however, do not necessarily mean improved intake of calories or nutrients. The increased expenditures for food could reflect a trade up to higher-priced sources of calories.

Lane explored the relationship between expenditures for food and quality of diet and found that participation in the food stamp program was associated with a significant improvement in the intake of six of nine nutrients in the recipients' diets.^{36/} These results are not corroborated by other studies. Madden and Yoder found a significant relationship between participation in food stamp programs and nutrient intake only under certain unfavorable conditions, such as a two-week lapse between paychecks.^{37/} This agrees with data from West and Price, who found that although the food stamp program increased the value of food in the home, there was no evidence that this increased expenditure for food led to an improvement in the nutrient intake of 8-12-year-old children in the family.^{38/}

Unfortunately, little empirical information is available concerning food-stamp programs outside the United States. Some qualitative information from Colombia suggests that although participants in food stamp programs increase their expenditures for food, the result is purchase of more prestigious foods rather than an improvement in nutrient intake.

The effects of food stamp programs can extend beyond nutrition. In the United States, studies have shown that the food stamp program has been of substantial benefit to the agricultural sector by providing additional demand for food products.^{39/} Clearly these agricultural linkages have economywide implications and need to be explored further.

Future Research. Relatively little is known about the nutritional implications of food stamp programs or other direct and indirect effects. A systematic assessment of the potential range of effects of food stamp programs needs to be made, with an emphasis on the process by which the nutritional effects of a food stamp program are influenced by the behavior of the household. Research is needed concerning

the effects of transaction costs, including time allocated to purchasing and searching. Also, research is needed to assess the ease or difficulty of reselling coupons and its effects on consumption and on nutritional status.

Finally, given that in the United States the food stamp program has had a substantial effect on the agricultural sector, the influence of a food stamp program on both the agricultural and nonagricultural sectors in other countries should be examined.

Supplementary Feeding

Supplementary feeding programs distribute foods through noncommercial channels to pregnant and lactating women, infants, and preschoolers. These programs are the most common form of nutrition intervention in developing countries.

Three types of delivery systems are generally used for supplementary feeding. These include on-site feeding, take-home feeding, and nutrition rehabilitation centers (NRC). NRCs include both residential facilities and programs in which children are cared for during the day but return home at night.

In two recent reports data from more than 200 supplementary feeding projects have been reviewed.^{40/} The results indicate that many supplementary feeding programs have had a significant and positive effect on prenatal and child participants. In studies conducted in Guatemala, India, Colombia, Mexico, Canada, and the United States it has been found that supplementation during pregnancy improves neonatal outcome.^{41/} Women in four villages in Guatemala who received a supplement of more than 20,000 calories during pregnancy, for example, had babies of higher mean birth weight than women in the lower supplementation group; the incidence of babies of low birth weight -- those weighing less than 2,500 grams -- was decreased by half in the highly supplemented group.^{42/} Similarly, in India birth weights of infants born to women who received a daily protein-energy supplement of 700 calories and 20 grams of protein were significantly higher than those of infants born to a nonsupplemented control group.^{43/}

Studies of infants and children have shown that supplementary feeding programs are often associated with improved growth, decreased morbidity, or improved cognitive development.^{44/}

It seems clear that many studies of supplementary feeding programs show some benefit. Despite the positive effect, however, the benefits are usually small. Increments in birth weights attributed to the supplementary feeding programs are typically in the range of 40-60 grams. Similarly, the increases in growth seen in preschoolers, although significant, are small.

A number of reasons are given for these small but significant effects. First, it appears that only a part of the food given is actually consumed by the target population. Leakages of the supplemented foods occur when the food is shared by nontarget family members or when the food is substituted for other food that normally would be consumed. Beaton and Ghassemi have estimated that leakages can account for 30-80 percent of the food distributed.^{45/} Partly because of these leakages, supplementary feeding programs usually fill only 10-25 percent of the apparent energy gap in the target population. Given this small net increment in energy, it is not surprising that the observed effect on growth is small.

Most studies have concentrated on growth as the sole measure of the outcome of supplementary feeding. Beaton and Ghassemi have suggested that physical growth may not be the only benefit nor even the most important benefit of supplemental feeding.^{46/} In one study an increase in voluntary activity was found as a result of the additional food; in children this increase in activity may affect cognitive development.^{47/}

Beaton and Ghassemi also make the point that any leakage in the food supplement is seen as inefficiency in the distribution program.^{48/} It cannot be assumed, however, that the energy unaccounted for provides no benefit to the family or community. Attention needs to be focused on a better assessment of the potentially wide range of benefits that can be produced by supplementary feeding. Given the magnitude of reported food leakage, the effect on household income may be substantial and the resultant effect on the nutritional status of members of the family may also be significant. Few studies have documented the potential income-maintenance effects of supplementary feeding.

In addition to the quantity of food distributed, factors such as the timing of supplementation, duration of participation, and nutritional status of recipients influence the effectiveness of supplemental feeding.

Timing of Supplement. Pregnancy and the period from six months to three years of age are the most nutritionally vulnerable times. Studies indicate that it is the last trimester of pregnancy that is the most critical for supplementation. In a study of mass undernutrition in Holland during World War II, those fetuses who were exposed to famine during the first 27 weeks but for whom the diet was improved during the last two months of gestation had mean birth weights higher than those of infants born shortly after the onset of famine. Median birth weights decreased in instances in which famine affected the last trimester of pregnancy. This would suggest that inadequate nutrition had its severest effect on fetal growth late in pregnancy.^{49/}

Other studies support this finding. Mora and others showed that women who received supplementary feeding during the first half of pregnancy did not produce babies of greater birth weight than those in the nonsupplemented group.^{50/}

Preschoolers below the age of three are also at special risk nutritionally. Inappropriate weaning practices, delayed introduction of solid foods, food taboos, and infection all contribute to a higher prevalence of second- and third-degree malnutrition in this group. In Tamil Nadu, it was the diet of the one- and two-year-olds that was the most deficient. This was true even when the total food intake of the family was sufficient to supply the household's nutrient needs.^{51/} This group, however, is also the hardest to reach. The majority of programs has been ineffective in reaching children below the age of three.

Duration. The duration of participation also affects the success of a supplementary feeding intervention. For prenatal participants, there appears to be a minimum participation of 13-15 weeks needed to produce significant changes in birth weight.^{52/} For infants and children, the minimum level of participation needed to affect growth varies significantly with the type of delivery system. NRCs are able to produce significant increments in growth in 3-4 months; to produce similar results, on-site and take-home feeding take much longer. In Colombia, both take-home and on-site feeding programs were able to alleviate malnutrition only after a year of participation by children.^{53/}

Nutritional Status of Participants. The effect of supplementary feeding on growth or neonatal outcome is influenced by the participant's nutritional status. Children with second- or third-degree malnutrition exhibit greater benefits from supplemental feeding than marginally malnourished children.^{54/} The same is true for pregnant women; Stein and others, in a review of prenatal supplementation, found that the greatest increment in birth weight was in the offspring of women who were undernourished before and during pregnancy.^{55/}

Other Services. Inadequate intake of food is only one of several factors that contribute to malnutrition. Malnutrition and infection often occur simultaneously. In Guatemala intrauterine infections during pregnancy were documented in low-income women.^{56/} In malnourished children, recurrent episodes of diarrhea and parasitic infections are common.^{57/}

It is not surprising, therefore, that the most successful supplementation programs have been those with strong ties to primary health care. In Project Poshak, for example, the most significant effect on the growth of children was produced by a combination of food, health care, and nutrition education.^{58/}

The findings for prenatal participants are similar. Lechtig and others, in reviewing four programs, found that prenatal supplementation was most effective when it was combined with health-care services.^{59/}

Research Needs. The results from the various studies that have been reviewed are inconclusive. While some evaluations have

demonstrated a positive effect as a result of supplementary feeding, others have not. In addition, it seems to be primarily the well-managed pilot projects that have succeeded; large-scale supplementary feeding programs have not. This has led some researchers to conclude that food distribution programs directed toward young children are expensive for the observed benefits; they conclude that it would be unwise to withdraw these programs, however, until their full effects have been assessed.^{60/} To that end, several research questions need to be answered in order to determine whether and under what circumstances supplementary feeding programs may be of value in either the prevention or treatment of malnutrition in pregnant women and preschoolers.

1. Research is needed on the amount, regularity, and duration of benefits provided in supplementary feeding programs. What is the minimum quantity of food that must be distributed in order to improve or maintain nutritional status? How is this level of needed supplementation affected by the baseline nutritional status of participants? If programs do not supply this quantity, what are the effects, if any, of a lower level of supplementation? How is the minimum level of food that is needed affected by the individual's nutritional status? What is the minimum length of participation in a supplementary feeding program that will produce significant changes in growth? In outcomes of pregnancy? Is there a maximum length of participation beyond which no further benefits are to be realized?

2. How are the effects of sharing and substitution of food factored into the calculation of the quantity of food that is needed in supplementary feeding programs? Are there any realistic methods for minimizing the amount of leakage that occurs? What foods or types of food would be most appropriate? In this regard, additional research is needed on the consumption and spending behavior of low-income households, including the effects of changing income and spending control among household members.

3. A large percentage of the supplementary food that is provided to recipients is either shared or substituted for other food in the diet. What are the effects, both nutritional and nonnutritional, of these leakages on the individual and on other members of the family?

4. Most of the studies on supplementary feeding have concentrated on growth and birth weight as the principal measures of results. Research is needed to identify a wider range of potential benefits, including, but not limited to, morbidity, mortality, activity, cognitive performance, and income effects. Valid and reliable methods of measuring these broader effects need to be developed.

5. Most of the studies that have been reviewed indicated that the greatest effects of supplementary feeding were found in women and children who were the most severely malnourished. What are the most effective means of reaching these individuals? In addition, is there any benefit to enrolling the marginally malnourished? How can this potential effect be measured?

6. The type of food delivery system used influences the effectiveness of a supplementary feeding program. Given the variety of conditions under which these programs are implemented, how can planners determine which type of delivery network is the most effective? How can each of these delivery systems be improved?

7. It is unclear whether supplementary feeding programs should exist as a single entity. Are they effective in alleviating maternal and child malnutrition, if undertaken alone? How important are linkages with other services, such as health care and nutrition education? Are supplementary feeding projects more effective or less effective in reaching the target population when they are integrated into preexisting health or nutrition programs? How can supportive services, such as immunizations, deworming projects, and iron-folate therapy, be coordinated with supplementary feeding projects? Will the coordination of all types of service make each program more effective?

8. Community participation in design and implementation makes programs more successful. Little information is available on the best way to involve the community in improving nutrition projects. In what ways can the community be mobilized? What methods are most effective and under what conditions?

9. Although many studies have already been conducted to evaluate the effects of supplementary feeding programs, these have been conducted under such varying conditions and with such varying degrees of methodological rigor that it is difficult to interpret the results. The fact that some studies demonstrate a positive effect while others do not makes it difficult to determine whether investment in these programs is an effective approach to alleviating protein-energy malnutrition. The factors and relations that determine whether there is a positive effect and how large it is need to be examined. Attention must be paid to the use of valid and reliable instruments, both for the diagnosis of malnutrition and for the measurement of effects. In addition, research is needed to assist in translating successful pilot projects into successful large-scale programs.

FORTIFICATION

Diets of low-income people are characteristically limited in variety. Staple grains such as rice, wheat, and corn are only occasionally supplemented with vegetables and inexpensive bits of fowl, meat, or fish. Typically these cereal grains are the primary source of calories, protein, and other nutrients. Countries in which a single grain product supplies a disproportionate share of the total dietary intake consistently show a higher prevalence of protein-calorie malnutrition and micronutrient deficiencies.^{61/} Fortification intervention schemes have been put into effect in order to alleviate these malnutrition problems.

Fortification is a process whereby nutrients are added to a food to maintain or improve its quality; protein, amino acids, vitamins, minerals, and fat are all fortificants that can be added to a food. In order for fortification to be feasible and effective, a carrier for a particular fortificant must be consumed regularly and in sufficient quantity. As such, staples such as grains, sugar, monosodium glutamate (MSG), and other condiments have been used as carriers in fortification interventions.

To serve as carriers, however, these staples must pass through the market. Thus, fortification of staples produced for consumption on the farm is not usually feasible, and malnourished members of semisubsistence farm households cannot usually be reached by this approach.

Fortification interventions have been regarded as a relatively easy method of alleviating some forms of malnutrition among food-purchasing households, since nutrients can be added to food with a minimum of change in the diet and at a relatively low cost. Fortification has been used as one means of combating both macrolevel and microlevel nutrient deficiencies. However, the success of fortification interventions has varied.

Macrolevel Fortification

In the 1960s and early 1970s, amino acid fortification of grains was seen as one means of combating second- and third-degree malnutrition in preschoolers. Much of this interest in amino acid fortification stemmed from early work on experimental animals, which showed that growth could be enhanced by improving the quality of dietary protein.^{62/}

The efficiency with which a cereal protein will promote growth and maintain body tissue is a function of both its quantity and quality. The quality of cereal proteins is inferior to that of the protein in milk, meat, and eggs. Rice, wheat, corn, sorghum, and millet are all deficient in the essential amino acid L-lysine. In addition, with the exception of corn, grains are also lacking in the amino acid L-threonine. From a practical standpoint, the poor amino acid composition of grains implies that large amounts of the cereal protein must be consumed in order for a person to fill his or her protein needs. Amino acid fortification of grain was seen as a way to improve the quality of grain protein and thereby increase the usable protein in grain without necessitating an increase in the quantity of grain consumed.

The positive finding from experimental animals was reinforced by additional research conducted with children. Graham and others found that lysine-enriched white wheat flour could increase weight gain in children whose intake of calories was adequate.^{63/} Similarly, in India, researchers found a moderately significant increase in the height of children who consumed lysine-supplemented wheat over that of

children in an unsupplemented control group.^{64/} Other studies failed to show a similar positive effect. As a result, the United States Agency for International Development (USAID) funded three large-scale fortification trials in Tunisia, Thailand, and Guatemala to determine whether the amino acid fortification of cereals could increase the growth of children. The Guatemalan study produced slight but inconclusive evidence of a decrease in morbidity and mortality and the Tunisian and Thai studies showed no detectable beneficial effects.^{65/}

There are several plausible explanations for the failure of amino acid supplementation to produce a positive and significant improvement in growth. First, protein was probably not the limiting factor in the diet. Data suggest that caloric intake was more limiting than protein.^{66/} While amino acid fortification can improve the usable protein, it cannot increase the total protein content nor can it increase the total calories in the diet. The dietary protein was most likely used as an additional source of energy.

Scrimshaw and others have published data to indicate that lysine supplementation of the diet of an adult male can have a beneficial effect despite inadequate intake of calories.^{67/} There are few data so far, however, to suggest that young children can attain a positive nitrogen-balance on an inadequate caloric intake. Therefore, amino acid fortification should not be undertaken unless gaps in energy intake can also be filled.

Austin and others have suggested that even when an adequate quantity of food is available, amino acid fortification may be unsuccessful because the nutrient density or the degree of palatability of the grain may restrict intake in preschoolers.^{68/} This will be discussed in more detail in the section on formulated foods.

Some of the researchers involved in the Tunisia project have suggested that a zinc deficiency rather than a protein deficiency may have accounted for the retardation of growth observed in children.^{69/} If this is true, vitamin-mineral fortification might have been more appropriate than amino acid supplementation.

The composition of the total diet must also be considered in order to assess the appropriateness of an amino acid supplement. Although grains may supply the greatest portion of protein in the diet, they are rarely the only source of protein even for preschoolers. Pulses or milk often make up a small portion of the diet and contribute to the lysine content. This could increase the total nutritive value of the dietary protein to a level sufficient to promote growth.

Finally, the ability of a person to use protein is affected by the state of his or her health. Malnutrition is often associated with infection. The effectiveness of amino acid fortification can be totally negated by acute or chronic infection. If infections are prevalent in areas in which malnutrition is common, both problems should be addressed simultaneously.

Amino acid fortification of grains is no longer considered a viable means of dealing with protein-calorie malnutrition in preschoolers. In contrast to the poor results of amino acid fortification, some micronutrient fortification programs have produced positive findings.

Microlevel Fortification

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

The most dramatic results have been obtained by the addition of iodine to salt. Iodization of salt has almost completely eliminated goiter and cretinism in the United States and some parts of Latin America and Asia.^{70/} The iodization of salt or other appropriate food carriers is recognized as an effective means of alleviating goiter and cretinism. In areas where iodization of food is not possible because of an inaccessible population or the lack of an effective food carrier, however, the World Food Council recommends a mass-dosage approach as an alternative to fortification.^{71/} A large-scale program in which iodinated oil was administered intramuscularly to pregnant women, for example, has been successful in eliminating cretinism; virtually no additional cases of cretinism have been diagnosed in the ten years the program has been in effect.^{72/}

The results of vitamin A and iron-folate fortification programs are less clear-cut. Vitamin A deficiency is associated with night blindness, xerophthalmia, and, if left untreated, eventual blindness. Results from a sugar fortification project in Guatemala and an MSG fortification program in the Philippines indicated that serum vitamin A levels were increased as a result of these interventions.^{73/} The MSG fortification also showed a reduction in the clinical signs of vitamin A deficiency.

Here again, in a situation in which vitamin A fortification of a specific food is infeasible, a mass-dosage program is a suggested alternative. In the Philippines, 200,000 international units (IU) of vitamin A and 40 IU of vitamin E were administered every six months to children in areas in which xerophthalmia was endemic.^{74/} The mass-dosage approach was associated with an improvement of the clinical signs of vitamin A deficiency.

The mass-dosage approach with vitamin A has been less successful in other countries, however. Reports from India indicate that the effectiveness of the program has varied from area to area.^{75/} The coverage of the target population was poor in some areas; as a result, the effectiveness of the program was limited. Some of the principal reasons for the poor coverage include irregular or short supply of the drug, lack of supervision by program personnel, and lack of preparedness by the community.

A limited number of iron-folate supplementation programs have been successful in improving hematological status in pregnant women.^{76/} Results of iron-folate supplementation for preschoolers, however, have been less successful. In Tanzania, iron supplementation of the diets of children 5-14 years old failed to improve hematological status; the prevalence of malaria was then diagnosed as the primary cause of the anemia rather than simply dietary iron deficiency.^{77/}

In India, iron-folate supplements have had positive effects on the preschoolers served; unfortunately, the program has not covered the entire target population.^{78/} As a result, the government has been exploring countrywide fortification of salt with iron. Preliminary trials carried out by the National Institute of Nutrition in various parts of India have indicated that the introduction of fortified salt has produced a significant improvement in hemoglobin and a reduction in the incidence of anemia.^{79/} On the basis of the results of these trials, it has been recommended that the iron fortification of salt be implemented throughout the country.

Research Needs

Fortification programs have been successful in alleviating some micronutrient deficiencies. For more widespread use of this approach, however, certain issues need to be resolved.

1. More basic research is needed on the causes of various micronutrient deficiencies before more large-scale fortification efforts are undertaken. This will avoid situations like the one in Tanzania mentioned earlier, in which anemia was primarily related to malaria rather than to an inadequate intake of iron. USAID is now funding a program to identify the etiology of vitamin A deficiency. This type of research on other nutrients would be beneficial.

2. Mass-dosage approaches are often used instead of countrywide fortification because of the lack of an appropriate carrier. The mass-dosage method should be regarded only as a short-term approach, however. Additional long-term, permanent methods for dealing with micronutrient deficiencies should be identified and tested.

3. Research on the bioavailability of various fortificants is needed, and the influence of substances in the total diet on the absorption of the fortificant needs to be determined as well.

4. Some vitamins and minerals can be toxic if consumed in large amounts. Studies to determine the safest and most effective level of fortification should be conducted. Research on the long-term consequences of various quantities of micronutrient fortification for human beings is also needed.

FORMULATED FOODS

Weanling malnutrition is a serious problem in many developing countries and is related to the partial or total displacement of breast milk by nutritionally inferior foods. The delayed introduction of solid foods, food taboos, the improper preparation and storage of food, and family patterns of food distribution can also exacerbate malnutrition in the preschooler.

The concept of a "formulated" or "blended" food was developed in order to provide a product that could meet the special dietary needs of children 6-24 months old. A formulated food is a nutrient-dense supplement, based largely on a mixture of vegetable proteins, which is designed to meet the growth needs of the weanling child. Historically, the emphasis in formulated foods was placed on the protein content. Today, the emphasis is placed on the provision of calories, protein, and other nutrients in as small a volume as possible.

The bulkiness of some food is thought to be a serious constraint for infants and children, who may be unable to consume large enough amounts of food with low energy density to meet their calorie needs. The bulkiness of the food is contributed by the starch component, which when cooked absorbs large amounts of water, giving the product a thick consistency. The problem of bulkiness can be solved either by providing smaller, more frequent feedings or by increasing the density of nutrients in the food. Typically, weanling foods are not offered to the child frequently enough. Field workers in India have been successful in educating mothers to feed the child its total daily ration in smaller, more frequent meals.^{80/} As a result, preschoolers have been able to eat sufficient calories and protein to support growth.

A formulated food is usually based on the indigenous staple, with the addition of other foods to achieve the desired protein and calorie content. Jelliffe was one of the first to introduce this concept of a multimix food as a weanling product.^{81/} Locally available foods such as cereals and legumes could be combined with a dark green leafy vegetable to provide a nutrient-dense diet for the child. A number of countries have developed recipes for multimix dishes that make use of nutritionally adequate foods that are available locally. Rice and beans is a dish that is an example of a home-prepared blended food. Kichiri is another one-dish meal, which contains four to eight parts cereals, one part pulse, and oil, that is being promoted in parts of India as a weanling food.

Production of Formulated Foods

Formulated foods have been produced commercially as well as in homes and villages. From a technological point of view, home production is the simplest method of developing a weanling food; home production relies on ordinary techniques of food preparation and thus can be easily implemented. Home preparation of a multimix, however, does

involve some education of the homemaker in the proper mixture of ingredients and appropriate methods of preparation and storage.

Village production is similar to home production, with the exception that the local miller prepares the ingredients for the formulated food. The actual weanling food continues to be prepared at home.

Commercially prepared formulated foods involve more sophisticated technology than is used in home or village production. Industrial preparation of a formulated food allows production on a much larger scale. In addition, vitamin and mineral mixes can be added to the formulated food more easily than is possible in the home or village. A number of commercially prepared formulated foods have been developed, including beverages, flours, pasta, biscuits, and cookies. Icaparina, a beverage, in Guatemala and Superamine, a high-protein food mixture, in Algeria are two examples of commercially produced formulated foods.

Effectiveness of Formulated Foods

A number of studies have indicated that formulated foods can be effective in treating protein-calorie malnutrition and in promoting growth in preschoolers.^{82/} Commercially prepared formulated foods have had limited success as weanling foods, however, primarily because of distribution problems, acceptability, and cost. Although the price of commercial foods may be low in relation to the cost of production, the foods are still beyond the purchasing power of many of the target consumers.^{83/}

Formulated foods produced in the home or village circumvent some of the problems of commercially prepared products. They rely on locally produced, culturally appropriate ingredients and food preparation techniques that are already used by the household. Quality control and hygiene, however, are problems sometimes found in home and village production. Here again, in order to be successful in the home- or village-level production of weanling foods, an effective nutrition education program must be developed.

Research Needs

Formulated foods or multimix weanling foods can be of value in the treatment and prevention of malnutrition in infants and preschoolers, but problems of management and delivery must be solved before formulated foods can have widespread effects on preschool malnutrition. To that end, several specific research topics should be explored.

1. An important factor contributing to the inadequate intake of cereal-based diets by preschoolers is the low caloric density of the product. Procedures for reducing the bulk of the cooked food that can

be used in the home or village should be developed. Work is now being done in India on the use of a malting procedure to reduce the viscosity of cereal-based products. Studies using this malted weanling product with children six months to two years of age have been conducted. Results indicate that the product found acceptance and was effective in promoting growth. Research of this type on newer methods of production of weanling foods is needed.

2. For reasons that are not clearly understood, many of the weanling foods that have been developed have not been used extensively. Factors that affect the choice and use of a particular food should be identified. This information would be helpful in the design of an appropriate formulated foods intervention.

3. Development of multimix recipes for weanling foods has been limited. It has been assumed that a recipe found acceptable in one region of a country will be found equally acceptable in another -- not always a valid assumption. Recipes for weanling foods that will be accepted in various regions need to be developed and tested.

4. Recipes for weanling foods stress the use of low-cost, locally available foods. A recipe that is practical in one season, however, may not be in another season because the basic ingredients are unavailable. In order for interventions to be successful, a series of weanling recipes may need to be developed to reflect seasonal variations in the availability of certain foods.

5. Whether foods are produced commercially or in the home or village some education of women is required. Information on the proper preparation and use of the foods must be disseminated. Research is needed to identify the most effective methods of providing this information in each region. Ideally, this would be developed in conjunction with local nutrition education activities.

6. In order for the concept of a weanling food to be accepted, coordination with other programs and projects may be required. Some of the ingredients that are required for a local weanling dish, for example, may be available only sporadically. Development of local garden projects may be a method of providing some of the inputs, and foods distributed in a food-for-work program may be suitable for incorporation into a weanling dish. Methods of coordinating various types of intervention in order to realize their full effectiveness should be explored.

7. If the primary purpose of blended foods is to prevent or alleviate weanling malnutrition, would these methods ensure that these foods are directed to the intended beneficiaries? Can these foods be marketed with a special image?

8. The success of a formulated food intervention depends on an effective delivery system. This exists in some areas but not others. Alternative methods for formulated food interventions need to be developed and tested for their effectiveness.

NUTRITION EDUCATION*

"Nutrition education" applies to any communication system that teaches people to make better use of their resources to meet nutritional needs.^{84/} As such, nutrition education programs can be offered with a variety of approaches, including using various media and conducting discussion sessions with individuals and groups. Programs can be formal or informal and can involve a free-standing nutrition education project or, more typically, one that is part of a larger program. Nutrition education activities usually have been integrated into either primary health-care systems, supplementary feeding projects, or growth surveillance programs. The topics included have also varied. Most nutrition education programs in developing countries have been focused primarily on the feeding behavior of infants and preschoolers and secondarily on pregnant and lactating women.

Determinants of Program Success

How much can be achieved through nutrition education interventions? The answer to this question depends on the specific causes of malnutrition in a given area and, equally importantly, on the appropriateness of the system for delivery of nutrition education.

Clearly nutrition education interventions are not the appropriate solution to malnutrition within a family that is caused by lack of access to sufficient food. A strategy that could increase a family's food purchasing power through increased income, employment, or food benefits in kind is a more sensible approach. Malnutrition, however, is not caused solely by inadequate food resources; it is often related to a combination of low income and inappropriate patterns of food behavior. Increasing a family's income does not guarantee that malnutrition will be eliminated; this is particularly true of the nutrition problems of the weanling child 6-36 months old. Jelliffe had documented that a large share of preschool malnutrition is related to faulty weaning practices or poor preparation and storage techniques.^{85/} In Tamil Nadu, India, researchers uncovered weanling malnutrition even in households that received more than 100 percent of their calorie requirements; the problem was not the ability to purchase food but the distribution of proper amounts of food to young children.^{86/} This pattern of preschool malnutrition in families with adequate food has been found in many countries and is primarily related to two factors.

First, weanling malnutrition is often caused by a misperception of the nutritional needs of preschoolers. Many families do not realize that so small a child needs approximately half the food required by an adult male.

*Marian Zeitlin was a major contributor to this section.

Second, the nutritional status of preschoolers is significantly affected by the quality of child care. It is quite common for low-income mothers to leave the preschoolers with older siblings.^{87/} The amount and type of care provided by these mother substitutes is often of lower quality than that provided by the mother, and less attention is given to nurturing activities, such as feeding. To the extent that nutrition education can change these patterns of infant and child feeding this type of intervention can be effective in alleviating malnutrition.

Nutrition education programs can bring about significant changes in knowledge, attitudes, and behavior (KAB), but the ability to do so is specifically related to the nature of the nutrition education delivery system. The program factors found to be positively and significantly associated with changes in KAB are summarized in Table 5.1. Although many factors may be important, community-level participation particularly appears to be conducive to improvement in KAB. For example, in both Upper Volta and India volunteerism in the local community was sufficient to counteract external resource constraints.^{88/} Another example of the success of community volunteers is seen in the Sapuran subdistrict of Central Java, where there is one village volunteer for every five or six families. As a result of this volunteer effort, it has been reported that severe malnutrition has been eradicated from most of the subdistrict during the past two years.^{89/}

In addition, the appropriateness of the nutrition message is a prime determinant of the success of a nutrition education intervention. A weakness of nutrition education projects has been the inadequate testing of specific nutrition messages. In Senegal, for example, the message to "give the weanling child his own bowl of food" has led to abandonment of the baby and his bowl to a corner of the hut while the rest of the family eats together around the family pot.^{90/}

Pretesting of nutrition education messages in the homes of target families appears to be the only way to ensure the quality of the message. This was done successfully by the Nutrition Education and Behavioral Change Component of the World Bank Nutrition Loan to Indonesia.^{91/} The practicality and popularity of the nutritional message are features that need to be tested.

At the macrolevel, the success of a nutrition education intervention will be influenced by the framework in which projects are presented. Factors such as the political ideology of the country, its social and administrative structure, the level of socioeconomic development, the food distribution system, and the health and nutritional status of the population will, to a greater or lesser extent, influence the effectiveness of nutrition education efforts.

Effectiveness of Nutrition Education

Given the amount of activity that is conducted under the umbrella of nutrition education, it is surprising that there is so little

Table 5.1--Factors that promote changes in behavior

Institutional characteristics

- Adequate level of effort
- Credible public image
- Medical referral system

Characteristics of the individual worker

- Adequate level of effort
- Client-oriented rather than agency-oriented
- Authoritative professional image or social role
- Cultural similarity to learner group

Program characteristics

- Includes opinion leaders
- Uses other program outputs to motivate attendance at educational activities
- Generates social approval for participation and behavior change
- Educates at all vertical levels within face-to-face structure of program

Teaching methods

- Open-ended questions and active discussion
- Participant demonstrations
- Guided practice
- Positive reinforcement
- Role playing
- Public contractual agreements to try new behavior patterns
- Individual weight gain as a guide for counseling

Uses of mass media

- Synergistic support for face-to-face messages
- Awareness, simple KAB change, and reinforcement by logical phase

Subjects for motivational appeals

- Healthier children
- More intelligent children
- Modern or middle-class status

Environment for communications

- Does not saturate the target group with countermessages

empirical evidence to document what has actually happened. A number of studies have reported that nutrition education interventions have been successful in improving health or nutritional status.^{92/} The research has failed, however, to separate the effects of nutrition education from the effects of other components of the programs, such as health care and feeding. It has been difficult to ascertain the relative merits of efforts at nutrition education. More systematic work on this subject is needed for the guidance of policymakers.

Research Needs

1. Most nutrition education activities are, and should be, integrated into other components of a program. As indicated, however, in most of the evaluations reported in the literature the effectiveness of nutrition education has not been disentangled from other program services.

2. In addition, basic research in nutrition will continue to be vital to the design of nutrition education, since new research findings are needed in many areas to increase the precision with which educational messages can be designed to improve nutritional status. The principal area in which new research is required is in the development and streamlining of methods pioneered by Griffiths and her coworkers for deriving the content of the educational message in an interactive process with the target group.^{93/} Educational messages that have been pretested by the families and individuals for whom the advice is intended should eventually provide great savings for programs that now disseminate advice of uncertain effectiveness.

3. The relative effectiveness of commercial advertising in changing food habits in developing countries should be studied objectively in order to identify appropriate measures for facilitating positive effects and counteracting negative ones. Furthermore, current efforts to adapt the appropriate elements of commercial advertising to nutrition education should be strengthened.

4. Nutrition education often serves as an essential component in other interventions, such as food distribution programs. The entire motivational structure surrounding these programs and their educational components would be of research interest. If this structure were better understood, promotion of the program as a whole would be possible.

INTEGRATED HEALTH AND NUTRITION INTERVENTIONS

An integrated intervention is one that involves the delivery of a combination of services including, but not limited to, nutrition, health care, family planning, immunization services, water supply, and sanitation. AID defines integrated health projects as projects that at a minimum provide health, nutrition, and family planning.^{94/}

Similarly, the World Health Organization (WHO) defines an integrated health intervention as primary health care that makes use of some combination of direct nutrition intervention with health, family-planning, water-supply, and sanitation activities;^{95/} primary health care is the particular approach to make health care available to the population. The rationale behind the integrated approach is that to provide a package of services is more efficient and effective than to offer individual services in isolation from one another.

The integrated approach may provide an organizational benefit: the same personnel can coordinate the delivery of services to the same target group. It alleviates the need to train separate staff to provide each service. Initially the integrated approach was also regarded as a cost-efficient way to deal with malnutrition. Nutrition services could be integrated into existing primary health-care programs with only a marginal increase in operating costs.

Integrated interventions can be more effective in alleviating malnutrition; these projects provide a composite of services that may be needed to deal with the multiple causes of malnutrition. The evidence suggests, for example, that diarrhea may be twice as prevalent in malnourished populations;^{96/} simply supplying more food will not alleviate the dehydration, malabsorption of nutrients, and catabolism of body tissue that occur in untreated diarrhea. Ideally, both the malnutrition and the diarrhea should be treated simultaneously.

A similar argument can be made for the simultaneous provision of water, sanitation, and nutrition services. Both the quantity and quality of water that is available will influence the nutritional status of individuals within a community. Noted by Austin and others, in their review of the water-sanitation-nutrition linkages, is the suggestion of many authors that the provision of a sufficient amount of potable water is the most effective way to bring about an improvement in nutritional status.^{97/} An insufficient supply of water can precipitate infections of the intestines, the skin, or the eyes because people are unable to wash themselves, their food, and their utensils. In addition, infections can be spread through a water supply that is polluted with fecal material. If possible, therefore, water and sanitation schemes should be coordinated with an integrated intervention. Water and sanitation efforts are expensive, however, and for that reason often cannot be implemented. Furthermore, many evaluations have failed to demonstrate the linkages between potable water and health and nutritional status.

Some policymakers argue that it is ineffective to provide only a partial package of services; unless the total cadre of health, nutrition, water, sanitation, and family-planning services is provided, any one component will be of limited value. While no one type of service appears to be as effective as the combined package, single components may have merit. Well-nourished individuals are less susceptible to waterborne illnesses, for example. The evidence further suggests that the incidence of measles in developing countries is no greater than in

industrial countries, but a malnourished child may not be able to survive the disease. Thus there is a significantly higher mortality rate from measles in these countries. There has been a trend toward the use of integrated interventions in dealing with malnutrition. In India, the Integrated Child Development Service (ICDS) has expanded from 33 projects to 200. It is expected that the number will increase to 1,000 during the 1980s. The ICDS provides health care, immunization, and referral services. The supplementary feeding programs in India are now being dovetailed with the ICDS projects. The trend toward integrated delivery of services is being seen in other countries as well.

Effectiveness

Despite the popularity of the integrated approach, relatively little information exists to document its effectiveness. Gwatkin and others reviewed ten nutrition and health projects and concluded that "the role of the intervention in bringing about change in recorded nutritional status or mortality level was rarely established clearly and directly."^{98/} This leaves considerable uncertainty about the importance of this type of intervention in decreasing malnutrition in relation to other factors that also work.

In Narangwal, India, the most cost-effective measure for reducing infant mortality was supplementation of the diets of expectant and lactating mothers.^{99/} In Ghana, however, researchers found no positive association between food distribution and improvement in nutritional status.^{100/} The money spent on preventive health measures such as vaccines, however, proved to be cost-effective. The primary conclusion from the Ghana experience was that providing supplemental foods to all preschoolers was not very effective.

The Catholic Relief Service (CRS) has argued that even if supplementary foods are not a significant factor in alleviating malnutrition, the food may draw people into the health-care system. CRS data indicate that clinics supplying oil and milk are the ones most regularly attended.^{101/} Unfortunately, other studies have not produced the same results. Projects in several countries have documented frequent clinic participation when little or no food has been provided.^{102/}

It is not clear what conclusions to draw from these apparently conflicting results. The studies of integrated interventions have been conducted under such varying conditions that it is difficult to evaluate the effectiveness of integrated intervention as a general approach in dealing with malnutrition among mothers and young children.

Research Needs

Many of the integrated interventions that have had a positive and significant effect on nutritional status have been well-organized

pilot projects. It is less certain that the same results will be produced if these projects are replicated on a large scale. What kinds of problems arise when the same type of project serves a bigger population and how effective are integrated interventions?

1. The available research suggests that there is no single approach to an integrated intervention that will be effective in all situations. Yet knowledge of the factors that are critical to success is limited. Research is needed to develop and test models of program implementation that can be used in different country settings.

2. In the review of the work of Gwatkin and others it was noted that the most effective projects seemed to be those that provided a judicious mix of both nutrition and health services.^{103/} But here again, there is no magic formula to suggest what the individual service components should be. Research is needed to determine the optimal mix of nutrition and health services in an integrated intervention. It is clear that more of a particular service is not necessarily better in alleviating malnutrition. The Ghana experience suggests that food was of minimal significance in improving nutritional status. Yet in most of the integrated interventions that have been reviewed food is one of the largest costs. Before these programs are replicated on a large scale, information is needed on the type and amount of service that is most appropriate for the solution of specific problems.

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6. SUMMARY OF SUGGESTIONS RECEIVED REGARDING RESEARCH PRIORITIES

In addition to the research gaps identified in the review of the literature (Chapter 5), suggestions of high-priority research areas were generated from meetings, correspondence, and personal interviews with more than 200 individuals; of these, 18 percent were from various ministries in developing countries, 33 percent were nutritionists and other health professionals from universities in Third World countries, 21 percent were people from international institutions, and 28 percent were nutrition professionals from academic institutions in industrial countries. The individual respondents do not represent a random sample of policymakers and researchers, so the suggestions received may reflect a certain institutional or disciplinary bias. This should be kept in mind in any review of the suggestions.

In this chapter the research priorities stressed by individuals will be summarized. The majority of suggestions can be separated into three categories: suggestions related to policies and programs, comments related to research issues, and other suggested research.

Some of the suggestions on research that were received fall outside the mandate of this monograph; that is, the research was not related to factors that influence the "choice, design, modification and implementation of nutrition-related programs and policies in developing countries." In addition, some of the suggested research was so location-specific that it would be useful only in a limited setting and therefore has not been included in this summary.

POLICIES AND PROGRAMS -- GENERAL COMMENTS

A large number of responses indicated, both from empirical and anecdotal information, that free-standing interventions -- nutrition education, family planning, and so on -- do not work. Most respondents considered it important to promote linkages among programs and believed that it is the multisectoral approach to dealing with nutrition problems which will eventually bring the highest returns. Research should help to identify ways of promoting these intersectoral linkages.

Many felt that the family should be the primary target of projects, programs, and policies. Several reviewers criticized the focus of some interventions on the individual; they thought that this focus should be redirected toward the family rather than one member of the household. Following from this, almost everyone who commented on specific interventions felt that the subject of household acquisition

behavior was the key to understanding the effectiveness of nutrition projects, programs, and policies.

Finally, a number of persons indicated the need for research on the effect of seasonality on nutritional status. The type and prevalence of malnutrition problems may be different at different times of the year, making different intervention strategies appropriate.

Suggestions for Research on Specific Interventions

The largest number of comments was received on integrated health and nutrition programs. There was a consensus among those who commented on individual interventions that the integrated health and nutrition projects should have the highest priority within the category of interventions aimed at specific groups. The majority opinion was that the integrated approach needed to be evaluated systematically, since many countries seemed to be moving toward this type of program. One general question that respondents felt should be answered as part of this research is: How can nutrition and health care be integrated most effectively to improve nutritional status?

Several of those interviewed indicated the need for an expanded definition of integrated health and nutrition interventions, such as an integrated village development project. These respondents suggested that this term was probably more appropriate in relation to the overall goals of a country; an integrated village-development project tries to address many needs, not just the health and nutrition needs of the family or those of particular members within the family.

Some respondents emphasized that the integrated approach in the classical sense, as it has been taken in the past, often divorces the mother or the infant from the family unit, and this may be why these approaches have had limited success. Those interviewed thought that it would be useful as part of this research to compare the effects of an intervention directed toward the family and one directed toward the individual. The interviewees stressed that earlier interventions in health and nutrition have been too narrowly focused on mothers and children, and information on what has happened in the short run to the total population as a result of these interventions is not available. It will be important as part of any research on interventions to look at the effects of health and nutrition programs on the family and the village; there may be many unintended benefits. How, for example, can what has happened to the local merchant be measured? It may be that the entire range of benefits cannot be measured.

Several of the researchers identified mistakes that have commonly been made in health and nutrition interventions in the past. Donated food has been too much relied upon as part of the project; projects and programs should rely on local food if supplemental feeding is to be included as part of integrated health and nutrition activities. Several of those interviewed questioned whether medical care should be given free. It was the general impression that if medical care is

given free, the recipients may not value it very highly. It is considered imperative that supplies for the health-care facility be provided on a regular and timely basis.

A few people indicated the need to examine the importance of supplemental feeding as part of an integrated project. It was felt that supplementary feeding programs as they have been administered can affect nutritional status negatively. Some of the specific problems that were mentioned include distribution of food to children who do not need it, distribution of food being taken over by the village elite who then use it for their own political control, and the difficulties of handling foods. Several people commented that in an integrated system the distribution of food may require an inordinate amount of staff time to the detriment of other components of health care.

It was felt that the children who most need supplementary foods are usually not the ones who go to a health center. Research is needed to develop methods for the identification of children who are at risk. One suggestion was that if supplemental feeding is to be included as a component of integrated health and nutrition services, the food should go only to those in need; the concept of using food as medicine should be explored.

Other factors mentioned that need additional research were the timing of supplementation and the type of foods used. When should a woman receive supplementation during pregnancy? When can supplementation complement breast-feeding and improve the weaning process? Which weanling foods should be provided?

Most of those interviewed noted that the acceptance of food by the family and the community is affected by beliefs, customs, and dietary patterns. These factors must be taken into consideration if culturally appropriate foods are to be provided. Respondents thought it would be helpful if the proposed research could include a comparison of the effects of locally produced and foreign supplementary food in alleviating malnutrition. The effect of the supplemental food on the food purchasing pattern of the family must also be considered.

Several persons stressed that nutrition has generally not been practiced as part of preventive health care and that it would therefore be helpful if ways of integrating preventive nutrition activities into networks for primary health care could be explored. In addition, a broad-based definition of preventive nutrition should be used, and activities other than nutrition education and supplemental feeding should be included in it.

Some consider home gardens a good way of filling the energy and micronutrient gaps in the diets of low-income families, and a systematic study of their effectiveness in improving nutritional status would be useful. The need to consider storage systems as well as production techniques for use in conjunction with home gardens has also

been suggested, as has the importance of the effects of home gardens on overall distribution of income within the household.

Fortification programs and formulated foods interventions were not considered fruitful subjects for research.

Although there seemed to be agreement on the importance of agricultural strategies and food price policies, only two specific issues were raised. First was the need to assess the effects of the transition from subsistence farming to production of cash crops and the intermediate effects on nutritional status. Additionally, if the reason that increased income generated from production of cash crops may affect nutritional status negatively is to be determined, the time element must be addressed. An increase in income from production of cash crops may have a negative effect only in the short run and only if the change from semisubsistence farming to cash cropping occurs very quickly.

RESEARCH ISSUES

There was virtually no disagreement that household acquisition behavior and the implementation process are important research issues. Concern was expressed, however, that some of the variables in these areas might be difficult to measure.

Regarding household behavior, several reviewers indicated that family cultural patterns might well prove to be more important than income or food prices in determining nutritional status. Micro studies are essential to an understanding of the mechanics at work within the household.

Reviewers also indicated that community behavior should be addressed in the research; and area-specific cultural and subcultural information may be important in the long run in identifying factors that improve human nutrition. It was observed that urbanization brings about changes in the family's values that are not always beneficial. A comparison of research on household acquisition behavior in urban and rural areas would be useful.

Concerning implementation, the issue of scaling up from pilot projects to large, long-term programs was the topic most often given high priority. Several reviewers mentioned that as part of this research it would be important to differentiate between those factors that can be generalized and those that are location-specific.

One commentator suggested that the emphasis on replicability of the implementation process was probably misplaced. Regional and local conditions vary so much that it may be unrealistic to assume that a given intervention could be replicated within a country; it may be even more unrealistic to assume that interventions should be transplanted from one country to another.

The importance of community participation as part of the implementation process was a recurring theme in the letters received. More research is needed on community participation in various types of interventions and in various countries.

Finally, a few persons thought it would be useful to explore the effect of better management and training on the effectiveness of a project.

OTHER RESEARCH ITEMS

Several reviewers thought that research on breast-feeding was needed. Ways of promoting breast-feeding, the effect of women in the work force on breast-feeding, and the reasons that women choose to feed their infants formula rather than breast-feed them should be incorporated into a research program.

It was also suggested that so much emphasis in research is placed on preschoolers that children of school age are often overlooked. Despite the fact that school feeding programs are politically popular relatively little is known about their nutritional effects.

Several of those interviewed indicated that research on the effects and the management of civil strife and natural catastrophies, such as famine and drought, that occur with almost predictable regularity in Third World countries is needed.

Another subject for research that is often underemphasized is nutrition surveillance. A national system of nutrition surveillance could provide information that would allow countries to pursue more appropriate policies and programs to improve the health and nutritional status of their people.

7. SUBJECTS FOR RESEARCH

As a result of the review of the available evidence of the effectiveness of various programs and policies (Chapter 5) and the comments and suggestions received from a number of experts (Chapter 6), a number of knowledge gaps and research topics that deserve high priority have been identified. There is considerable similarity between the concerns stressed by individuals and the research topics that emerged as important on the basis of a review of documents and earlier studies.

The research that is needed can be pursued either by research issue or by type of program and policy. The research issues cut across programs and policies but might best be studied in the context of programs and policies. A close integration of these two dimensions is essential to assure that the research findings will be valuable in the design, modification, and implementation of programs and policies that will be most appropriate in particular sets of circumstances.

Four research issues have been identified as critical to an understanding of the way various policies and programs might affect nutritional status: household food-acquisition and food-allocation behavior, market behavior, implementation, and macro or economywide implications of intervention strategies. In addition, four policy and program areas in which nutrition-related policy research should take high priority have been identified: agricultural and rural development programs and policies, food price policies, food- and income-transfer programs and policies, and integrated health and nutrition interventions. No ranking of the importance of these four areas was attempted.

THE FIRST DIMENSION: HIGH-PRIORITY RESEARCH ISSUES

While the examination of specific policies and programs is important, the primary purpose of any additional research effort should be to improve the understanding of the way key factors and relations influence the performance of various programs and program components under various circumstances and to suggest how such an understanding can be used in the choice and design of programs and policies.

In order to understand why some programs, projects, and policies are more or less effective than others in improving the nutritional status of individuals, it is necessary to understand not only by how much but also how they influence nutritional status. The primary elements that influence the nutritional status of an individual must be identified. If the sole purpose of a given study is to evaluate the

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effect of a particular program on the nutritional status of a particular group of people, it may not be necessary to analyze the mechanism which creates that effect. A simplified illustration of such a study is given in Figure 7.1, part A. No attempts are made to analyze what is happening within the black box. The study merely compares a situation in which the program is functioning to one in which it is not, either for the same population group throughout a period or across population groups at a given time. Such studies estimate the effect of the particular program on the particular population group but usually reveal little or nothing about the mechanism by which the effect came about. But if analyses of past and present programs are to be truly useful in the choice and design of new programs and in the modification of existing programs the linkages, such as those illustrated in Figure 7.1, part B, cannot be ignored. The intermediate steps and how they are influenced by a particular program must be understood.1/

The key elements in most or all of the programs, projects, and policies are relatively few, and many of them are common to various kinds of program. On the other hand, it is possible to design an almost unlimited number of programs and program combinations. If the way a given program affects the key elements is understood and the way these key elements affect nutritional status within clearly specified or identified environments is understood in turn, effective programs can be designed by selecting and combining the elements most appropriate to a given environment. Thus, it is more effective to study the elements than the programs. But to assure immediate relevance to policy, a study of the elements should take place within the framework of a program or policy.

Furthermore, the effects of factors other than those directly affecting a given program, including those falling into what is here called "the environment," must be understood and quantified. In the case of a supplementary feeding program, for example, it is important to know not only how nutrient intakes are affected, but also how the use of the additional food is affected by sanitary conditions, health factors, and the educational levels of women. While such factors can be used to evaluate a single program, they cannot be assumed to be constant when designing new projects under different sets of circumstances.

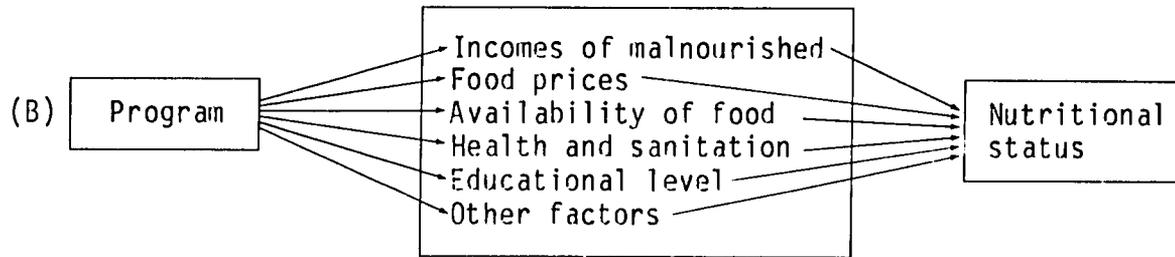
The four high-priority research issues mentioned earlier cut across program types and have much to do with the performance of these programs and policies. Knowledge of these issues appears to offer great opportunities for improving the design and implementation of future programs and policies.

Household Food-Acquisition and Food-Allocation Behavior

Food intakes are affected by changes in the ability of the household to acquire food, the desire to obtain the food that is available,

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Figure 7.1--Simplified illustration of two approaches to program evaluation



and the allocation of the acquired food among members of the household. The extent to which changes in the ability of the household to acquire food are reflected in actual intakes of food depends on the way the changes are brought about; household food-acquisition and food-allocation behavior. It has been found to vary considerably, not only among programs and policies but also for a particular program or policy among households some of whose members are malnourished. Furthermore, although the effects of food policies and programs on food intakes come about primarily through changes in the ability of the household to acquire food, some programs and policies may affect household food-acquisition behavior and the allocation of food among members of the household directly through changes in intrahousehold distribution of budget control, the demand for women's time, the level of relevant knowledge possessed by the household, and other factors. The nutritional effect of changes in food intakes depends, in turn, on household nurturing behavior, such as breast-feeding, food preparation, and other behavioral factors and the way these factors are affected by the programs and policies.

Thus, the nutritional effects of a particular policy or program depend not only on the magnitude of change it causes in the ability of the household to acquire food and the way the change was brought about, but also on the food-acquisition, food-allocation, and nurturing behavior of the household. Present understanding of this behavior as it relates to nutrition and interacts with nutrition-related programs and policies is insufficient, and food- and nutrition-related policies and programs are sometimes designed and implemented under incorrect assumptions or expectations of behavior. The results have been low cost-effectiveness, waste of public resources, and attempts that circumvented household preferences.

The problem has at least three parts. First, present knowledge of household acquisition and allocation of food appears to be ignored in the design and implementation of some policies and programs. Second, present knowledge is insufficient to explain the behavioral reactions to certain programs and policies. Finally, it appears that the food-acquisition behavior of households of which some members are malnourished in many instances does not reflect the goals of society that underlie food and nutrition policies and programs.2/

The extent to which poor households direct incremental income and food transfers away from food is such that most nutritional interventions and policies have fallen short of their goals. This behavior, commonly known as the leakage problem, is reflected in a number of ways. Consider these examples: Households that receive direct food transfers, such as food supplements, food for work, and school lunches, will reduce the level of their acquisition of food from other sources substantially; participation in feeding programs and food-based, income-transfer programs, such as food stamp programs, is surprisingly low in some settings; and econometric estimates of the allocation of additional purchasing power to more calories by calorie-deficient households are frequently low. This behavior is

paradoxical, because food is considered the most basic of needs, and malnutrition can have serious consequences for the malnourished, their families, and their communities.

It is not surprising that substitution away from food exists; what is surprising is the extent to which the substitution occurs and to which it differs among programs and policies as well as among groups of malnourished households. The extent of the substitution is such that even feeding programs carefully directed to certain groups are costly in relation to their effects.

In addition to reliable estimates of demand parameters of household incomes and food prices for calorie-deficient households, the ability to predict household food-acquisition and food-allocation behavior and the reaction of the household to food policies and programs with a high degree of precision depends on a better understanding of selected behavioral factors. Present income and price parameters, by themselves, are incapable of explaining household food-acquisition behavior. Other factors must be considered; these include: changes in the demand for women's time, intrahousehold budget control, composition of the income of the household, the range of goods and services competing for the household budget, the frequency and fluctuation of household incomes, the degree to which incomes are considered transitory or permanent, migration from rural to urban areas and the transformation from subsistence farming to an exchange economy.

Past research on the effects of these factors on the acquisition and allocation of food is limited. It appears plausible on the basis of the available evidence that a number of unexplained behavioral issues reflect the influence of factors such as those mentioned above. Additional research on this subject is needed, however, to provide useful information for the design of policies and programs.

Research Needs. Research is needed to identify the principal factors and processes that determine household food-acquisition and food-allocation behavior and its interaction with food policies and programs and structural changes in the household decisionmaking environment, to estimate the relative effectiveness of each of these factors and processes within specific socioeconomic settings, and to develop general principles that will assist in the design and implementation of future programs and policies.

In addition to the estimation of traditional demand parameters for population groups of interest, the attempt should be made to explain the large variation in the magnitudes of these parameters and in the degree of leakage found across programs and policies among households with similar nutrition problems and across households, some of whose members are malnourished, for similar programs and policies. The attempt should be made to clarify the functions of a series of factors and processes in household food-acquisition and food-allocation behavior, including the following:

1. What is the effect of intrahousehold budget control on household food-acquisition and food-allocation behavior? Under what circumstances would it be reasonable to expect that the proportion of additional incomes which is spent on food will differ according to whether the incomes are controlled by women or men? Why would such differences occur and what are the principal factors that influence their relative magnitudes?

2. How do nutrition and the demand for women's time interact? Under what circumstances would policies and programs be expected to influence nutrition significantly through their effect on the demand for women's time, on breast-feeding, and on other nurturing behavior? What is the process by which women's time and nutrition are linked?

3. What are the effects on nutrition of structural changes in the household decisionmaking environment such as migration from rural areas to urban, expansion of the availability of goods that compete for the household budget, and transformation from subsistence or semi-subsistence farming to a cash economy? What are the processes and how can the effects be estimated?

4. What are the circumstances in which household consumption and allocation of food are influenced by the source of incomes, such as food transfer, income transfer, or income in kind and the magnitude of the incomes that are generated by or transferred to households with some malnourished members? Are there instances in which a given amount of real income embodied in inframarginal food transfers or food-linked income transfers would be expected to cause a smaller or larger change in food consumption than the same amount of cash income? If so, why?

5. What characteristics of programs and policies lead the intended beneficiaries to consider income transfers as transitory rather than permanent? Under what conditions and to what extent will the proportion of additional income spent on food differ between the two?

6. What are the criteria and behavioral processes that determine household decisionmaking in a situation of extreme poverty in which households are faced with a choice between maintaining adequate nutrition for the economically inactive and maintaining the existing income-generating capacity? How do households arrive at the preferred tradeoffs? What are the criteria used for allocating scarce food among the various groups of economically inactive -- children and the elderly, for example -- and what are the implications for the formation of human capital?

7. How do changes in household cash flows and food price fluctuations influence nutrition and what are the most appropriate policy tools to deal with such problems?

8. Is household food-acquisition behavior observed during material improvements likely to be symmetrical to that which would occur

during material recessions or is the behavior likely to be exposed to irreversible changes when the material conditions move in a given direction? In other words, would the acquisition of food by a given household be affected -- in quantity and variety -- by the same magnitudes but with opposite signs if incomes increased in one period and decreased by the same amount in another?

9. To what extent and under what conditions is it effective to direct aid to individual members of a household?

Market Behavior

Household food-acquisition behavior reflects itself in market behavior. Thus, microlevel insight can be converted into policy and program recommendations and used in the design of more effective interventions. Many of the research questions discussed in the preceding section apply at the market level. For example, the answers to the question of the possibly deleterious effect on nutrition of higher incomes from concentration on cash crops may rest more on the behavior of the market than on the behavior of individual household units. One possible explanation of this phenomenon is that as individual households turn from production of food crops to other types of production, the local availability of foods is reduced and lower supplies and higher incomes may -- in the short run at least -- lead to higher food prices. A related market-level phenomenon may include the spatial distribution of prices and the inability of local markets to respond quickly to new price levels.

The interactions between market forces and food policies and programs are of particular importance. There are many problems at this level of aggregation that need to be studied.

1. Both the market prices and the burdle of commodities demanded are affected by large shifts in food demand that are caused by:

- a. increased urbanization,
- b. food price subsidies and income-transfer programs such as food stamp programs,
- c. asset-redistribution programs such as land reform, and
- d. rapid growth of income such as has occurred in countries that belong to the Organization of Petroleum Exporting Countries (OPEC).

2. Rigidities exist in the food marketing systems, some through government fiat and some through technical or economic inefficiencies, which inhibit appropriate adjustments of food prices in the presence of a multiplicity of changes.

3. Demand parameters such as commodity-specific price and income elasticities go a long way in describing or predicting the relations between changes in the ability of a household to acquire food and the resultant change in household food consumption. Whether based on household data or not, these parameters must be applied in the market place. Since the concern is for households having members that are malnourished the parameters must be relevant for these households. In societies with skewed income distribution and considerable malnutrition, average estimates are not likely to represent the behavior of households having members who are malnourished. Thus, the relevant parameters must be estimated by income group or, even better, by population group according to nutritional status. Reliable estimates of such parameters specifically for groups of households having members who are malnourished are of recent origin and their use in the design of food policies has been limited indeed.

4. The interaction between food price policies and food-linked income transfers on the one hand and the labor market and wage levels on the other may be important in determining the magnitudes of costs and benefits to be derived from various food policies and programs and the distribution of such costs and benefits among population groups. To what extent and under what conditions are food price subsidies causing a reduction of wages or a slower increase than would occur in the absence of such subsidies? The linkages between food prices and wage levels are important in determining the nutritional effects in the short run. In addition, the effects of food prices on employment and economic growth can influence long-run nutritional status. This is a subject on which additional research is likely to bring large returns in more appropriately designed food and nutrition policies.

Implementation Issues

The process by which national government programs and policies are translated into action at the local level is a principal ingredient in the success or failure of any national intervention. Yet remarkably little is known about the determinants of a successful implementation process. To date relatively few efforts have been made to analyze how the black box (see Figure 7.1) at the local level influences the outcome of specific national programs. Until recently it was erroneously assumed that the black box was largely passive in nature, content to replicate policy decisions made at higher levels. In recent studies, however, it has been suggested that in many instances what the national government orders or commands is not necessarily what is actually done at the local level. It may indeed be true that local forces lack the power and resources to determine national policy. Yet since national decisions at the local level must be implemented by or through local forces, these forces possess an important cryptopower to constrain or deflect the character of national programs. Local forces act as a critical filter or prism capable of screening, altering, or even impeding the implementation of national health and nutrition programs. For this reason research is needed to identify the factors, issues, and processes at the local level that

impinge upon the implementation of national food, health, and nutrition programs and policies and the distribution of the associated benefits.

Local Forces and National Program and Policy Implementation. One of the central problems associated with implementation of programs and policies at the local level is that of leakage. One type of leakage occurs when food, nutrition, or health programs or policies designed for lower-income groups fail to reach their intended targets. Leakage is produced by a variety of factors, such as weaknesses or inadequacies in the local delivery mechanism. Yet the net effect of this type of leakage is always the same -- namely, a wide discrepancy between the promise of national government programs and the reality of local delivery.

In many rural areas the problem of leakage is directly related to the dynamics of local power structures. The skewed distribution of land and economic resources in these areas means that many poor peasants are economically and socially dependent upon the patronage services provided by rich peasants. These patronage services include the provision of agricultural employment, emergency loans, and intercession with officials. On the one hand, such patronage services are quite important because they ensure the daily survival of large numbers of poor peasants. Yet the importance of these patron-client ties serves to complicate the process of local implementation of projects. By virtue of their control over human and material resources at the local level, rich peasants expect to dominate all local delivery mechanisms established by the national government. Such expectations are seldom challenged by local government officials, whose power is typically not grounded in the economic structure of the local community. In most instances local government administrators simply lack the resources and the willpower to supply poor peasants with the means of ensuring their daily existence. At the same time, poor peasants, fearful of alienating the rich peasant who feeds them, are reluctant to press for access to national health and nutrition programs. From the standpoint of the typical poor peasant, national programs and policies, which come and go, are not to be trusted or pursued at the risk of antagonizing the local elite. As a consequence national programs are often "turned on their head" at the local level, in the sense that scarce food and health and nutrition resources are diverted to rich peasants and their favored clients. By directly or indirectly controlling the operation of all local delivery mechanisms, rich peasants are able to ensure the diversion of national resources away from target groups and into their own pockets or to use this control to reinforce local inequalities and resist any tendency toward redistribution of assets. Political party patronage frequently has the same effect.

There is at present a considerable need for more research on the effect of patron-client relations on the implementation of national programs at the local level. The following questions need to be studied:

1. How do these asymmetrical power relations affect the distribution of health and nutrition resources among the various strata of the local population?

2. How might national policymakers and local administrators be able to circumvent local patrons in order to increase the reach and effectiveness of national programs and policies?

3. How might the local poor be encouraged, assisted, and mobilized to resist the diversion of resources away from them?

Problems of circumventing local patrons are closely related to those of promoting broad-based community participation in national programs. Through the years it has been demonstrated that the seeds of national health and nutrition programs will never take root locally unless they are nurtured by self-sustaining community involvement and participation. Yet a much clearer understanding of how and why people at the local level become actively involved in such programs is needed. In many instances broad-based community participation would seem to demand the active or passive support of the local elite. Yet since the line between participation and support by the elite and domination by them is so fine, the extent to which the former can be encouraged and the latter discouraged must be ascertained through further research.

There is a concurrent need for a more detailed understanding of the character and operation of local institutions charged with implementing national intervention programs. Who staffs the local institutions, how are staff members trained, and what is the character of their commitment to policy implementation at the local level? Numerous microlevel studies have pointed to the need to upgrade the practical training and technical expertise of local administrators, particularly in health administration. Yet how can this be done cost-effectively and how would such training influence the effectiveness of health delivery systems?

Little attention has been paid so far to the ability of local institutions to circumvent elitist pressures for favoritism and deliver resources to the poorest segments of the population. Here the term elitist includes the local administrators themselves, since they typically number among the educated and intellectual elite of the community. According to some studies there is a tendency for the local intellectual and economic elite to combine and monopolize the provision of health and nutrition resources. This has had a deleterious effect upon the poorer segments of the local population, who stand in the greatest need of such services. Ways of rectifying this situation in the context of the particular socioeconomic and political environments need to be found, and the mechanisms and safeguards that are required to ensure that local administrators follow the letter of the law in distributing health and nutrition resources need to be identified.

Problems of implementing national policy at the local level are complicated by widely dissimilar levels of availability and use of resources. The geographic placement of a hospital or health clinic, for example, has much to do with the types of people it will reach and benefit. Similarly, while much has been made of the extent to which the local elite monopolize national programs, it is not entirely clear whether this is a function of political power or of local demand. At least some studies have pointed to the disturbing lack of demand for formal health and nutrition programs among lower-income groups. Considerably more research needs to be done on the relation between income, education, awareness, spatial proximity, and other factors and local demand for improved health and nutrition facilities.

The last, and perhaps most perplexing, problem associated with local implementation of national policy is that of reproducing a single successful pilot project regionally or nationally. Frequently the determinants of a successful pilot project in a single community are all too clear: a trained and committed local administrative staff, a cooperative local elite, and broad community participation. But are there other, heretofore unseen variables that impinge upon the success of a project? How is it possible, moreover, to translate and incorporate these variables into an effective national delivery system? It is vitally important that we learn how to move from successful pilot projects to the design and implementation of large-scale health and nutrition programs. In particular, it would be useful to distinguish between location-specific and more general factors.

Researching the Dynamics of Project Implementation at the Local Level. In general the anthropological technique of participant observation seems to represent the best way of achieving a fuller understanding of the dynamics of local project implementation. By living and working for varying periods in selected local settings, researchers would enjoy an unparalleled opportunity for studying the day-to-day dynamics of national interventions at the local level. Such participant observation techniques would necessarily involve a good deal of formal and informal interaction with various members of the local community. Relationships of trust and confidence would have to be forged with local administrators and well-informed members of various socioeconomic groups in order to ascertain the "true" dynamics of local programs. From time to time these techniques could be supplemented by more formal research endeavors, such as household budget and income surveys.

Macro or Economywide Implications

Along with knowledge of the behavior of households, market aggregates, and the implementation process, research is also needed on the economywide implications of the various programs and policies. While these implications may be of limited importance for some types of program such as integrated health and nutrition programs, they are of critical importance for food price policies, income-transfer and some

food-transfer schemes, and many agricultural and rural development programs and policies. Thus, the choice and design of mechanisms of government intervention may be greatly influenced by the economywide implications, and failure to consider these in the kind of research suggested here would be unfortunate.

The fiscal and economic costs are of particular importance. High fiscal costs of explicit food price subsidies frequently make such programs untenable in the long run. The associated economic costs may also be high. The results may be reduced economic growth and possibly a deterioration of the nutritional situation in the long run. The linkages mentioned earlier, between food prices and wage levels, may be important in this regard. The tradeoffs between short-run stopgap measures and long-run strategies need to be clarified, taking into account considerations of growth as well as of equity. Cost implications are also important in determining the feasibility of transforming pilot projects into large-scale projects, particularly if considerable transfers of income or food are involved.

Foreign-exchange implications are another issue to be considered seriously in the choice and design of public intervention and thus in the related research. What is important here is the origin of the food that is included in the programs and policies. Food-transfer programs and explicit food price subsidies are frequently based on external food aid. In fact, many of these programs would not be maintained in the absence of such aid, because the foreign-exchange implications of importing the necessary food commercially would be unacceptable to the government. Closely related is the effect of the various programs and policies on domestic agricultural production and rural incomes. Clearly, if food-transfer schemes or explicit food price subsidies are based on food procured from domestic producers at market prices, the effect would be quite different from a situation in which the food was procured from abroad. The much-discussed question of the effect of external food aid on domestic food production cannot be ignored. Other related research issues include the tradeoffs between explicit and implicit food price subsidies and the related distribution of costs among sectors and population groups.

THE SECOND DIMENSION: HIGH-PRIORITY RESEARCH AREAS

As mentioned earlier, it is suggested that high priority be given to research in four program and policy areas. Each of these will be discussed in turn.

Agricultural and Rural Development Programs and Policies

Direct nutrition intervention programs and food price subsidies are usually costly. Furthermore, their effectiveness depends on a continuous outlay of funds; usually they do not eventually become self-sustaining. Thus, while such programs may offer the best solution to a large part of the nutritional problem in the short run, a long-term, self-sustaining solution must be sought through broad

development efforts that will eventually reduce and perhaps eliminate the need for direct nutrition intervention programs. Agricultural and rural development projects and policies offer great opportunities for such long-term nutritional improvements.

The nutritional effects of agricultural and rural development programs and policies are indirect. Sometimes the effects may be intuitively obvious, while at other times the linkages between a given policy or project and the nutritional status of the individual may be highly complex. Some of these linkages are conceptualized elsewhere.^{3/} The primary objectives of the research undertaken in this area should be to gain a better understanding of these linkages and to explore and illustrate the way such an understanding can be used in the design, modification, and implementation of agricultural and rural development programs and policies to meet nutritional goals.

Three sets of research activities are needed:

1. Research is needed to estimate the implications for the nutrition of the rural and urban poor of selected agricultural policies and to strengthen the national analytical capacity for such work.

2. Research should be undertaken to improve the understanding of the way the nutritional status of the rural poor is affected by programs and policies that either promote shifts from subsistence or semisubsistence farming to cash cropping or introduce new income-generating activities in rural areas.

3. Research needs to be conducted to provide an improved understanding of the way the nutritional status of the rural poor is affected by rural development projects and selected components of such projects, with particular emphasis on food-for-work projects.

Implications for Nutrition of Selected Food and Agricultural Policies. Attempts are now being made in a few developing countries to strengthen national institutional capabilities to deal with the interaction between agriculture and public policy on the one hand and on issues of consumption and nutrition on the other. The success of these attempts is essential to sustained incorporation of nutritional goals into agricultural and other public policy. A number of factors tend to oppose success. The elements of an integrated approach to agricultural policy and nutrition are usually found among a number of existing institutions, and attempts to integrate the appropriate activities run counter to vested interests and traditions. Furthermore, shortage of funds and well-trained manpower is common. The international assistance community has promoted the establishment of analytical units in a few countries, but the support has usually been of a short-term nature and, while the institutional problems may have been at least partially overcome, support to develop appropriate analytical approaches and capabilities has been deficient. Yet without it those units will not succeed.

The principal objectives of the work proposed in this section would be:

1. to assist the appropriate national institution in developing and testing an analytical approach that is effective in ex ante assessment of the nutritional effects of food and agricultural policy measures, the monitoring of such effects during the life of such measures, and ex post evaluation;
2. to monitor or evaluate selected policy measures to assist in undertaking the above assessment; and
3. to assist in training for the above activities.

Nutrition Effects of the Introduction of Cash Crops among Semi-subsistence Farmers. The nutritional effects of expanded production of cash crops are widely disputed. On the one hand, it is argued that substitution of cash crops for subsistence food crops will lead to reduction in local availability of food which, in turn, will have negative nutritional effects on the rural poor. As mentioned in an earlier chapter, a number of studies seem to support this argument. On the other hand, it is argued that farmers will substitute cash crops for food crops only if they can thereby increase their net returns and that only part of the gains in net returns are needed to compensate for the loss in consumption of home-grown food through expanded purchase of food. Thus, if cash crops bring higher net returns, producers can maintain food consumption unchanged, with part of the higher net returns left over for consumption of additional food or other commodities. The nutritional effect is therefore unlikely to be negative.

The explanation for the divergence between the two viewpoints may be found in the assumptions underlying each. If the results of expanding production of cash crops in a given region is a significant increase in food prices, either because supplies of food are reduced or because additional incomes from production of cash crops among well-nourished households increase the demand for food, the net nutritional effect may be negative. Such a situation could arise if the marketing system for moving food to the region were deficient, or if public policy, including foreign trade policy, directly or indirectly prohibited the movement of food. In such cases local food prices might be highly sensitive to changes in local supply and demand. Furthermore, when cash crops are substituted for food crops grown partially or totally for home consumption, large differentials between the price paid to the producer -- the shadow price of home consumption -- and the price the farmer must pay for food in the marketplace may cause negative effects on food consumption if production of cash crops is introduced or expanded.

On the other hand, if it is assumed that expanding production of cash crops does not affect food prices significantly and that the

spread between producer prices and retail prices is small, then expanded production of cash crops would be expected to improve the farmer's capacity to meet the nutritional requirements of his family, provided, of course, that the net revenues from cash crops exceeded those from food crops; if this were not the case, farmers would be unlikely to expand production of cash crops. Under the latter assumption, urban consumers would not be affected, while the additional incomes realized by small farmers, rural labor, and rural services would be expected to have a positive nutritional effect.

In ex ante assessment of most cash-crop projects, the possible effect on food prices is either ignored or assumed to be insignificant. The effect of many projects on the food supply of a given country is likely to be so small that national food prices would not be affected. A price effect is even less likely if unrestricted foreign trade in food is assumed. Local food prices may in fact be greatly affected by a given project, however, because of market imperfections and public policy. This, together with the spread between the shadow price of home consumption and the retail prices of food mentioned earlier, may -- but need not -- cause cash-crop projects to have negative nutritional effects. The effect of such projects on intrafamily distribution of incomes, budget control, and time allocation as well as greater dependence on cash income may also cause significant changes -- positive or negative -- in the pattern of consumption and the nutrition of low-income farm households.

In addition, it is important to differentiate the short-term effects of cash cropping from the long-term nutritional effect. Some researchers have talked about the concept of "transitional" malnutrition with regard to cash cropping.^{4/} That is, many cash crops require a long time between planting and harvest. Unless a family has some additional source of income during this period, shortfalls of food may occur. In Malawi, for example, farmers who planted coffee and did not have some interim crops or cash reserves suffered temporary food shortages.^{5/}

Empirical studies of the effect on consumption and nutrition of cash crops and other projects that generate cash income are scarce. The dispute over the nutritional effects of such projects is probably not a result of conceptual differences but is caused, rather, by insufficient empirical evidence to assist in making the right assumptions in a given situation. To resolve the dilemma, a set of integrated studies that would reflect different socioeconomic environments but would be carried out on the basis of a common methodology is needed. Such an approach would permit direct comparisons across programs, policies, and environments and would, when focused on the principal factors and relationships, assist in identifying the policies and programs needed to support a successful nutritional outcome of rural modernization.

The principal objectives of this series of studies would be as follows:

1. Research should identify the principal factors and relations that influence the nutritional outcome of shifts from the production of food, at least part of which is consumed by the producer and local nonproducers, to the production of crops that are exported out of the region. Some factors and relations may be integral parts of programs and policies that promote such shifts while others may be external to them.

2. Research is needed to estimate the relative importance of these factors and relations within various socioeconomic environments.

3. Research is needed to suggest how government policy and institutional change can be integrated with efforts to promote cash earnings from crop production in such a way as to strengthen positive nutritional effects and eliminate negative effects.

Nutrition-related Effects of Rural Development Projects. Some rural development projects address specific aspects of the rural problem while others attempt a broader approach. Examples of the former are projects aimed at increasing aggregate food production and improving marketing in the hope of restraining food price increases; others may be undertaken merely to ease the foreign-exchange problem, and they may use such measures as an expansion of cash cropping; still others may represent efforts to increase rural incomes and retard rural-urban drift by increasing the productivity of small farmers. Few of these projects except those of the last type will have better nutrition as an explicit goal, and hardly any will have it as the main objective. However, they all have serious implications for food consumption and the nutritional status of rural populations.

Examples of the broader approach are projects that combine two or more of the objectives identified above; these frequently have better nutrition as an explicit objective. The most complex of these is the integrated rural development project in which all facets of the rural development problem are addressed simultaneously with related implications for the urban population and the nation as a whole.

Food-for-work projects represent a particular type of rural-development effort that has been used with increasing frequency to generate employment and create physical infrastructure in rural areas. Many countries are now using food-for-work projects to generate employment opportunities for the landless poor and the subsistence farmer during slack periods. Wages in food-for-work projects are paid for in kind.

Knowledge of the nutritional outcomes of rural development projects is limited, and whether the projects are responsible for any observable nutritional effects is certainly not clear. More important,

how various components of these projects influence the nutritional outcome and its determinants is not well known.

Such an understanding would help in assessing the tradeoff between competing choices and in identifying possible problems well before they occurred. This knowledge of the nutritional effects of rural development projects could guide in the making of policy that might efficiently and effectively improve nutritional outcomes.

The main objectives of this type of research would be:

1. to identify the principal factors leading to the nutritional outcomes of rural-development projects;
2. to determine, as far as possible, which components of rural development projects are responsible for observed nutritional outcome;
3. to estimate the relative importance of these components and of the factors and relations that lead to nutritional effects under various socioeconomic circumstances; and
4. to suggest how rural development projects or public policies related to rural development could be put into effect or modified in such a way as to increase efficiency, enhance positive nutritional effects, and eliminate or offset negative effects.

Food Price Policies

Food price subsidies for the benefit of the consumer are widespread in developing countries. A number of countries spend large amounts of money on explicit consumer food price subsidies and others are now considering the introduction of such subsidies. Still others maintain food policies such as low procurement prices for the producer and foreign-trade policies that include large implicit food subsidies to consumers. The stated goals of subsidy programs and policies vary among countries and, over time, may include the reduction or elimination of calorie or protein deficiencies in specific population groups, and the maintenance of low food prices in the effort to maintain low urban wages or social and political stability, among other goals.

The design of subsidy policies and the procedures for putting them into effect also vary widely and include both policies aimed at selected population groups or food commodities and general food price subsidies and food-related income transfers.

Past and current research is focused on past performance of selected programs and policies. The results of this research provide useful guidelines for decisionmaking on new programs and policies such as those now being considered in a number of countries. A much more solid information base for such decisionmaking is needed, however.

Analyses of food price subsidy schemes to benefit the consumer are under way in various countries, but additional research is needed for the purpose of developing the general knowledge and analytical methodology that form part of the goal of this work.

The content of these studies would be similar to that found in studies carried out in Egypt, Sri Lanka, and Kerala, India. The focus would be on the effects of subsidies on real incomes, food consumption, and nutrition among the urban and rural poor; fiscal, economic, and foreign-exchange costs, including the effect on domestic food production; cost-effectiveness; the primary elements that influence program performance, including certain aspects of household food-acquisition behavior, market factors, and such issues as leakage and the effect of local power structures.

The main objectives of studies of food price policies would be:

1. to assess the cost-effectiveness of consumer food subsidy programs for urban and/or rural poor. Specifically, how do various types of consumer food subsidies affect household real income, food consumption, budget allocation, and nutrient intake of malnourished members of families and what are the fiscal and economic implications?
2. to extend present knowledge of the linkages between wages and various types of food price policies.
3. to further assess the macro or economywide effects of selected consumer food price subsidies.
4. to identify and assess second-order or linkage effects of food price subsidies on consumers and producers, with emphasis on the effect on the growth in demand for locally produced goods and services.
5. to evaluate alternative policy and program designs and implementation procedures.

Food-Transfer and Income-Transfer Programs

Food-Transfer Programs. Food-transfer programs may be aimed at households or at individual household members. A variety of food-supplementation programs fall into this category. Most such programs are directed toward individual members of the household, such as infants, preschoolers, and pregnant or lactating women. The leakage in those programs -- that is, the difference between the amount of food transferred and the net addition to the quantity consumed by the target group -- is usually large. Such leakage is a result of the sharing of transferred food among members of the household and a reduction in the quantity of food acquired through other channels.

While the magnitude of leakage in many programs may conform to expectations, the large variation among programs and population groups is a puzzle for which there is little empirical or conceptual explanation. One possible explanation is that in some programs more food is transferred than was previously consumed, and food prices are therefore reduced at the margin. Such programs are rare, however. Differences in program design that make substitution more difficult in some programs than in others, such as direct feeding rather than take-home rations, may explain some of these variations, particularly if the food directly offered exceeds the amount of food consumed by the individual in question without the program. Differences in the effects of the various types of program on intrahousehold budget control linked with different marginal propensities to consume food among individual members of a household, as well as different effects on the demand for women's time, may also be part of the explanation for the large variations. The effect of these and other elements of household food-acquisition behavior on food intake and nutrition, however, like the interaction of these elements with alternative programs and policy formulations, are poorly understood. This is an important subject for research, the aim of which is the improvement of food-transfer programs and policies.

Food-linked Income Transfers. Food-linked income-transfer programs may take many forms, of which food stamp programs are the most common. The aim of these programs is to transfer incomes to target households in such a way as to assure that the additional income is spent on food. Frequently, the quantities of food covered by these programs are inframarginal. Thus, as discussed earlier, the effects on household food acquisition would not be expected to differ from those of an equal cash transfer, though there is some evidence that the marginal propensity to consume food is higher in connection with food-linked income transfers than with other income transfers.^{6/}

As is true in the study of food-transfer programs, there is an urgent need for a better understanding of household food-acquisition behavior and its interaction with alternative program and policy formulations and implementation procedures. Income transfers and food price policies have much in common, and close interaction should be maintained in studies of the two subjects.

Research on income-transfer and food-transfer programs and policies should be focused on fundamental processes and interactions, and evaluation of a particular program or policy per se should be a secondary objective. Many food supplementation schemes have already been evaluated individually and additional ad hoc studies of the same nature would contribute little beyond their importance for the specific programs studied.

Research on the processes and interactions should be undertaken within the scope of income-transfer and food-transfer programs and should be focused on the household issues discussed here, with emphasis on the question of whether and to what extent the form and manner

in which real incomes are transferred affect food consumption by individual members of a household and on the interaction with intra-household distribution of income control; the related food-market relations, such as price effects; such issues as transfer mechanisms and the impact of local power structures on participation in programs and distribution of benefits; and the economywide implications, such as fiscal and economic costs, foreign-exchange costs, the effect on domestic food production and rural incomes and the importance of external food aid.

The principal objectives of studies of food-transfer programs would be:

1. to assess the elements in household behavior that explain the large variation in leakage among households having members who are malnourished and among types of programs and policies;

2. to examine the full range of benefits that accrue as a result of leakage of foods to nontarget households and individuals;

3. to identify barriers to participation in food-transfer and income-transfer programs;

4. to evaluate the effects of food-linked income-transfer programs on income, expenditures for food, consumption, and nutritional status;

5. to compare the effects of food-linked income-transfer programs and cash transfers in influencing nutritional status; and

6. to assess economywide effects of various transfer programs.

Integrated Health and Nutrition Programs and Policies

In recent years there has been a trend toward integration of nutrition services into primary health-care networks, because of the perception that the integrated approach is a cost-effective method of dealing with nutrition problems.

Preliminary evidence suggests that integrated projects can be effective in improving health and nutritional status.^{7/} While much has been learned from these early evaluations, the results of the studies are ambiguous. Some integrated health and nutrition interventions have demonstrated that they can alleviate malnutrition. An even larger number of interventions, however, have failed to produce significant, positive effects in the target population.

Integrated health and nutrition programs should be assessed more systematically with similar research methods in several geographic locations, rather than determining information that is useful only in the setting where the study was undertaken. The information that is

generated from this research can be generalized to other areas. As part of this effort, a better understanding of the process by which integrated health and nutrition programs influence health and nutritional status is needed. Two research issues -- the implementation process and household food-acquisition behavior -- need to be examined in the context of integrated health and nutrition interventions.

Implementation Process. The evidence from evaluations of integrated interventions suggests that how a project is implemented may be as important as what services are provided. Yet relatively little is known about the elements necessary to the success of a program.

The review of nutrition interventions in Chapter 5 indicated that many of the most effective projects are well-organized pilot projects. The results achieved in these pilot projects, however, are rarely duplicated when the interventions are scaled up to become countrywide programs.

One important subject of research in connection with integrated health and nutrition interventions will be the identification of elements that will make projects successful when they are undertaken throughout a region or country. This will require examination of a number of basic issues, including the definition of integrated services. It appears that the label "integrated interventions" has been used inappropriately. Integration implies more than simply making all the services available at the same facility. Timing of services, coordination of activities, training, supervision, use of auxiliary health personnel, and the availability of services and hospital backup to handle crises are some of the elements that contribute to effective integration of projects.

Community participation is another element that appears to differentiate successful projects from those that are unsuccessful. Here again, however, much more information is needed to identify processes that can be used to mobilize a community to work together to improve health.

Although nutrition services usually are mentioned as a component of integrated projects, nutrition has in reality received relatively little attention. When nutrition is included, it is generally in the traditional sense of nutrition education or supplementary feeding. Recent evidence suggests that this type of nutrition activity may not be the only way or, in some instances, the most effective way to provide nutrition services. Data from India and Indonesia indicate that surveillance of growth in children may bring a much greater return in benefits than other types of nutrition activity.^{8/} As a result, in some primary health-care systems nutrition activities are being defined more broadly. Home gardens, growth surveillance, and community health workers are, to varying degrees, being used as components of integrated health and nutrition projects. The function of specific nutrition activities in improving health needs to be assessed under a variety of social situations.

It is hoped that this type of research will generate a set of common factors that are associated with effective programs. This will allow some generalizations to be made regarding the appropriate design and implementation of similar projects in different areas. It is also possible, however, that the results may indicate that the conditions for successful intervention strategies are location-specific and that certain projects cannot be replicated from area to area. If so, the implication is that programs should be developed for specific communities rather than entire countries.

Household Acquisition Behavior. One of the primary goals of the research on this subject should be to determine whether, and how, integrated interventions affect the nutritional status of the family and the community. In order to do this it is necessary to look at more than the association between services offered in a program and data on their effects. The primary determinants of malnutrition within the family need to be identified.

Specifically, the research should assess the way certain household behavior -- including allocation of the time of women, family decisionmaking, use of family income, patterns of child care, the consumption of food and the use of health and nutrition services by the household -- influence the health and nutritional status of each member of the family. Once the dynamics within the household are better understood, the possible effects of various policies and programs can also be better understood. It has been well documented, for example, that an inadequate intake of food often exists in households that have received substantial transfers of food and other resources. In such cases the solution to the problem is probably not more food, for even in households in which all members of a family have received supplemental food, the proportion of the energy gap filled by the transfer in kind is still low.^{9/} Much of the research of the last five years suggests that the perception by governments and donor agencies of the benefits of better nutrition and greater intake of food exceeds the benefits as perceived by the intended recipients. Without a clearer understanding of the reasons why people eat as they do and of factors that determine participation in health and nutrition programs, attempts to alleviate malnutrition will be costly in relation to their effectiveness.

It will be important to differentiate between severe protein-calorie malnutrition, which occurs in only 1-2 percent of most target populations, and the more prevalent forms of mild and moderate malnutrition.

The primary objectives of this research would be:

1. to analyze the interaction between participation in an integrated health and nutrition intervention and household food-acquisition and allocation behavior;

2. to identify factors that are needed for the success of an integrated intervention; and

3. to assess the effect on the health and nutritional status of participants in the program of specific nutrition services as part of an integrated intervention.

FOOTNOTES

1/Per Pinstруп-Andersen, "An Analytical Framework for Assessing the Nutrition Effects of Policies and Programs," workshop on Strengthening National Food Policy Capabilities, Bellagio, Italy, November 1-4, 1982. (Mimeographed.)

2/Per Pinstруп-Andersen, Nutritional Consequences of Agricultural Projects: Conceptual Relationships and Assessment Approaches, World Bank Staff Working Paper No. 456 (Washington, D.C.: International Bank for Reconstruction and Development, 1981).

3/Ibid.

4/Patrick Fleuret and Anne Fleuret, "Nutrition, Consumption and Agricultural Change," Human Organization 39 (Fall 1980): 250-260.

5/J. Ogbu, "Seasonal Hunger in Tropical Africa as a Cultural Phenomenon," Africa 46 (October 1973): 317-332.

6/Shubh K. Kumar, Role of the Household Economy in Determining Child Nutrition at Low Income Levels: A Case Study in Kerala, Occasional Paper No. 95 (Ithaca, N.Y.: Cornell University Department of Agricultural Economics, 1977); and R. B. Reese, J. G. Feaster, and B. B. Perkins, Bonus Food Stamps and Cash Income Supplements, Marketing Research Report No. 1034 (Washington, D.C.: U.S. Department of Agriculture, Economic Research Service, 1974).

7/James E. Austin et al., Nutrition Intervention in Developing Countries, Study VII: Integrated Nutrition and Primary Health Care Programs (Cambridge, Mass.: Oelgeschlager, Gunn and Hain, 1981); and Davidson R. Gwatkin, Janet R. Wilcox, and Joe D. Wray, Can Health and Nutrition Interventions Make a Difference? Monograph No. 13 (Washington, D.C.: Overseas Development Council, 1980).

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Per Pinstруп-Andersen is an agricultural economist and director of the Food Consumption and Nutrition Program at IFPRI. Eileen T. Kennedy is a nutritionist and a consultant to IFPRI.
