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Addressing Malnutrition in Africa

Low-Cost Program Possibilities for Government Agencies and Donors

F. James Levinson
SDA Working Paper Series

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World Bank
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F. James Levinson

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F. James Levinson is the former director of the M.I.T. International Nutrition Planning Program and of the AID Office of Nutrition.

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Integration of social and poverty concerns in the structural adjustment process in Sub-Saharan Africa is a major driving force behind the design of the World Bank's adjustment lending program in the Region. To further the goal, the Social Dimensions of Adjustment (SDA) Project was launched in 1987, with the United Nations Development Programme and the African Development Bank as partners. Since then many other multilateral and bilateral agencies have supported the project financially as well as with advice. The task presents a formidable challenge because of the severity of economic and social constraints in Africa and the intrinsic difficulty of tracing the links between economic policies and social conditions and poverty. It is essential to have a continuous professional dialogue between all concerned parties, so that the best ideas get discussed by the best minds, and become, as quickly as possible, available for implementation by policymakers. This is the aim of the SDA working paper series.

To fulfill its mission, the SDA Project operates on different levels. Conceptually, contributions need to be made which advance our understanding of how the economic crisis in Africa on the one hand and the adjustment response on the other hand affect the living conditions of people. Empirically, major improvements are needed in our knowledge of the social dimensions of life in Africa, how they change, and whether all groups in society participate effectively in the process of economic development. Gaining this knowledge will demand new efforts in data collection and policy oriented analysis of these data. Most importantly, policy actions are needed in the short term to absorb undesirable side-shocks stemming from the adjustment process so that the poor and disadvantaged are not unduly hurt, and in the long term to ensure that these groups fully participate in the newly generated growth. The SDA Project's mandate is to operate, in a concerted way, in all three domains: concepts, data, actions. This working paper series will report progress and experience in all three areas. I encourage every reader's active participation in the series and the work it reports on. It is meant to be a forum not only for exchange of ideas but even more importantly to advance the cause of sustainable and equitable growth in Africa.

Edward V.K. Jaycox
Vice President, Africa Region
The SDA Project has been launched by the UNDP Regional Programme for Africa, the African Development Bank, and the World Bank in collaboration with other multilateral and bilateral agencies. The objective is to strengthen the capacity of governments in the Sub-Saharan African Region to integrate social dimensions in the design of their structural adjustment programs. The World Bank is the executing agency for the Project. Since the Project was launched in July 1987, 32 countries have formally requested to participate in the Project.

The Project aims to respond to the dual concern in countries for immediate action and for long-term institutional development. In particular, priority action programs are being implemented in parallel with efforts to strengthen the capacity of participating governments (a) to develop and maintain statistical data bases on the social dimensions of adjustment, (b) to carry out policy studies on the social dimensions of adjustment, and (c) to design and follow up social policies and poverty alleviation programs and projects in conjunction with future structural adjustment operations.

The working paper series “Social Dimensions of Adjustment in Sub-Saharan Africa” aims to disseminate in a quick and informal way the results and findings from the Project to policymakers in the countries and the international academic community of economists, statisticians, and planners, as well as the staff of the international agencies and donors associated with the Project. In the light of the three terrains of action of the Project, the working paper series consists of three subseries dealing with (a) surveys and statistics, (b) policy analysis, and (c) program design and implementation.

The Surveys and Statistics subseries focuses on the data collection efforts undertaken by the SDA Project. As such, it will report on experiences gained and methodological advances made in the undertaking of household and community surveys in the participating countries to ensure an effective cross-fertilization in the participating countries. The subseries would also include “model” working documents to aid in the implementation of surveys, such as manuals for interviewers, supervisors, data processors, and the like, as well as guidelines for the production of statistical abstracts and reports.

The Policy Analysis subseries will report on the analytical studies undertaken on the basis of both existing and newly collected data, on topics such as poverty, the labor market, health, education, nutrition and food security, the position of women, and other issues that are relevant for assessing the social dimensions of adjustment. The subseries will also contain papers that develop analytical methodologies suitable for use in African countries.

Another subseries, Program Design and Implementation, will report on the development of the conceptual framework and the policy agenda for the project. It will contain papers on issues pertaining to policy actions designed and undertaken in the context of the SDA Project in order to integrate the social dimensions into structural adjustment programs. This includes the priority action programs implemented in participating countries, as well as medium- and long-term poverty alleviation programs and efforts to integrate disadvantaged groups into the growth process. The focus will be on those design issues and experiences which have a wide relevance for other countries as well, such as issues of cost-effectiveness and ability to reach target groups.
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Executive Summary

During the past decade, nutrition has become an increasingly important component of poverty alleviation programs in Africa. This has resulted in part from an appreciation of the severity and the consequences of malnutrition in these countries and in part from recent programmatic success in dealing with the problem.

While major donors and some governments have allocated substantial resources to programs addressing malnutrition, others, with more limited resources, have moved more slowly perhaps because the problem appears so massive and unmanageable.

This paper suggests that, on the contrary, there is a broad array of opportunities available to government agencies and donors with more limited resources which offer the opportunity of positive, short-term impact. Some of these programmatic possibilities are now feasible because of program initiatives already underway which have exposed new targets of opportunity. Others have emerged from recent research findings (for example, on the effects of micronutrient supplementation) or from the development of potentially successful program models (for example, poverty lending).

For government agencies and donors not fully familiar with the range of existing nutrition activity, the paper seeks to provide a summary discussion of the potential effectiveness and the costs associated with several categories of interventions, plus what appear to be the requirements for viability and sustainability.

Because of the focus on low-cost programmatic possibilities capable of short-term impact, the paper does not include discussion of such nutrition-related interventions as agricultural price and land-use policies and consumer food subsidies. Nor does it deal with infectious disease or child-spacing, despite their significant interactive effects with nutrition.

The paper instead focuses on activities pertaining to (1) the delivery of nutrition services and (2) the economic constraint at the household level which often inhibits improved nutrition. The former category includes the so-called “core nutrition activities”: growth monitoring, nutritional counseling, food supplementation, and activities which address micronutrient deficiencies, the most important of which are iron deficiency anemia, iodine deficiency disorders, and Vitamin A deficiency. Household food security activities discussed in the paper include “poverty lending” (small-scale credit designed for particularly low income individuals or households), pre-harvest hunger alleviation, home or community gardens, and food for work programs. Finally, a brief discussion of deworming is included as Annex B.

While in the past, activities such as these have often been viewed as discrete programmatic alternatives, more recent experience, particularly in Africa, indicates that they might more productively be viewed as components of integrated programs with possibly synergistic benefits. An important example is the use of credit programs as a lever to generate community participation in the core nutrition activities, and, in turn, of these core activities to facilitate the translation of income-generation into improved nutritional status of the family. The evolution of these integrated programs is described in Annex D.

In the context of such integrated programs, two categories of projects, potentially low-cost and capable of short-term impact, are suggested for government agencies and donors: (a) localized community or NGO-initiated activities, and (b) components of larger projects. The choice essentially is between intensive impact, often provided independently, in a limited geographic area, and more extensive coverage in partnership with other sponsors. Each approach is described briefly, with suggested interventions summarized in Annex A.

Government agencies or donors choosing to concentrate their nutritional improvement resources in a relatively small geographic area could employ appropriate combinations of core nutrition activities with interventions designed to address household food insecurity and pre-harvest hunger. One potentially attractive format for such assistance might be a variation on approaches used successfully with emergency social funds in Latin America and by the Freedom from Hunger Foundation in Africa. The approach uses a
capital fund to assist communities in developing core nutrition activities, the establishment of which would be a prerequisite for capitalization of a poverty lending program aimed particularly at low-income women.

An alternative to these intensive and localized nutrition activities is the use of limited resources to provide financing for components of larger programs in ways which can increase the effectiveness of such programs. The paper presents a range of options which are illustrative of the possibilities which exist.

The financing of project components might well relate to and facilitate larger scale planned or ongoing programs in at least the following three ways: (1) necessary preparatory activities; (2) specific program components which for various reasons may be difficult to include in the primary funding arrangements; and (3) innovative, short-term targets of opportunity which emerge from project operations. Financing also may be needed for evaluative studies.

Note

1. The short-term, for purposes of this paper, is defined as two years or less.
In recent years, increased attention has been given by governments and international assistance agencies to poverty alleviation programs in Africa. In these efforts, nutrition has been recognized as an important program component, addressing both a basic human need and an essential input for human resource development.

The severity of malnutrition in Africa is well-documented. Sub-Saharan Africa has been characterized by long-term declining per capita food availability and continued high rates of malnutrition. Roughly a quarter of the population faces chronic food insecurity. The diets of an estimated 44 percent of the population are deficient in calories by more than 10 percent, and those of 25 percent of the population by more than 20 percent. The prevalence of underweight pre-school age children (weighing less than 80 percent of weight for age standards) has increased in Sub-Saharan Africa from roughly 25 percent in the 1960s to 30 percent in the 1980s. In Ethiopia and the Central African Republic the figure is just under 40 percent. In Ghana, the most recent nutrition survey found fully 50 percent of pre-school children underweight, double the level reported in 1960 (World Health Organization, 1987).

The very magnitude of the problem has sometimes inhibited assistance organizations and even governments from allocating resources for nutritional improvement, particularly when resources are in short supply. The terrifying disparity between needs and resources can result in near paralysis in such organizations, particularly those with a mandate to produce shorter-term results.

This paper suggests that there are opportunities to utilize smaller amounts of money for nutritional improvement in ways which have the potential for short-term impact. Some of these may be localized initiatives in which relatively small financial outlays may provide substantial benefit although for a limited population. Others may be components of larger programs in which these smaller outlays can be used to increase the effectiveness of programs covering a much larger population. It is suggested that if either type of assistance can be provided without lengthy lead time, and can be flexible in terms of scope, it could fill an important need in overall efforts to address malnutrition.

Social Action Programs in Africa offer a prime example of an opportunity to introduce nutrition activity on a substantial scale. These initiatives are being carried out by governments with donor assistance both to address the transitory social costs of structural adjustment and to help alleviate long-term poverty. Such programs in Sub-Saharan Africa have included a broad array of poverty alleviation activities, among them public works, small-scale enterprise, vocational training, and the provision of health and education services, and infrastructure. To date, however, little attention has been given to nutrition.

The argument for increases in support for nutritional activity in Africa is based on recent success in dealing with the problem. During the late 1970s and the 1980s a growing number of well targeted and administered programs have had significant impact on malnutrition. Initially the most impressive of these successes were located in Asia, specifically India and Indonesia, leading to speculation that such program success may depend on high levels of administrative capacity, local resource availability, and relatively high population density (present in the Indian state of Tamil Nadu) or on unusual community cohesiveness (which characterizes parts of Indonesia). While the transferability to Africa of these particular models remains a question, there have more recently emerged several highly successful African programs and several attractive models which are discussed in this paper. The most important of these may be the Iringa Nutrition Program in Tanzania, the Supplementary Food Production Program in Zimbabwe, and programs combining nutrition with the provision of small-scale credit on a loan basis in Mali and Ghana.

For agencies and donors not yet fully familiar with the range of nutrition and household food security activity taking place in low-income countries, Part I of the paper presents a summary discussion of the poten-
tial effectiveness and the costs associated with several categories of interventions, plus what appear to be the requirements for viability and sustainability.

Part I includes the core nutrition components: (a) growth monitoring; (b) nutrition-related behavior change (including its specific application to breastfeeding promotion and weaning food preparation); (c) food supplementation (both for young children and pregnant women, plus, for the latter, means of reducing caloric expenditure); and (d) micronutrient supplementation, fortification and dietary modification addressing the three major micronutrient deficiencies: iron deficiency anemia, iodine deficiency disorders (IDD), and Vitamin A deficiency.

The text describes three categories of household food security interventions which appear particularly relevant for inclusion in integrated nutrition programs: (a) "poverty lending" (small-scale credit designed for particularly low-income individuals or households); (b) pre-harvest hunger alleviation; and (c) home or community gardens. Finally, there is a brief discussion of food for work programs which, although not relevant for inclusion in nutrition programs per se, are generally self-targeting to particularly low-income populations and may themselves provide a locus for some nutritional improvement of women workers and their children.

Annex B presents the special case of deworming which appears to offer significant potential for the growth and cognitive development of children and to the absorption of nutrients. There may be a need, however, for additional pilot testing in most African countries before the establishment of national programs because the drugs are still new, and because of uncertainty regarding the safety of taking them simultaneously.

While all these activities have been discussed and pursued as separate initiatives—a menu from which to choose—more recent experience, particularly in Africa, indicates that they might more productively be viewed as components of integrated nutrition programs, and that these components may well have synergistic benefits. The concept of integrated programs is discussed at the beginning of Part I and their historical evolution is reviewed in Annex D. The orientation of these evolving integrated nutrition programs in Africa and elsewhere is being affected by an enhanced understanding of the critical role of maternal nutrition. The effects of maternal malnutrition on birth weights, and of these on subsequent child growth and development, as well as on the risk of mortality, indicate that considerably more attention needs to be directed to women during pregnancy and to means of delaying the first pregnancy.

Several important categories of nutrition-related interventions are not discussed in this paper. Agricultural price and land-use policies and consumer food subsidies are not included on the grounds that they lend themselves less well to smaller projects geared to shorter-term impact. Several infectious disease problems, most notably diarrheal disease and measles, having important synergistic relationships with nutrition, are referred to in the paper but not included as intervention categories, given the low likelihood that decisions on their implementation would be made primarily on nutritional grounds. The same is true of child-spacing. Finally, despite renewed interest in school feeding, this intervention is not included since its primary justification, in a context of tight budgetary constraints, would be the increased educability of children rather than nutritional impact.

Following the review of nutrition and related household food security interventions, Part II of the paper suggests specific program possibilities which appear to offer the opportunity for short-term impact at low cost. Part II then discusses organizational considerations pertaining to activities which are localized and relatively independent, and those which constitute components of larger programs.

Notes

2. This is not to suggest that government ministries and larger donors with more substantial resources have an opportunity to reduce their financial support. It is in part because of the inputs of larger government and donor programs that many of these possibilities for effective smaller contributions now exist.

3. The primary measures of effectiveness employed in the paper are growth-defined nutritional status, mortality and morbidity reduction, effect on birth weights, and reduced caloric deficiency.

4. The integrated nutrition programs referred to here may appear to others, not so "nutriocentric" in their perceptions, as broad-based rural development programs. What is important is that they be designed to improve the nutritional well-being of vulnerable population groups and the food security of now food-insecure households.
Part I. Nutrition and Household Food Security Interventions

Integrated Programs and African Successes

Before reviewing the specific components of nutrition and food security programs, it may be useful to examine briefly the efforts made in the 1980s, to pull together many of these activities into integrated programs. The evolution of these integrated nutrition programs from earlier applied nutrition programs and the unfulfilled promise of multisectoral nutrition planning and clinic-based nutrition is presented in Annex D. Here it will suffice to introduce the concept and look at two successful African examples.

The central tenet of integrated programs recognizes that the malnutrition affecting extremely poor families and most specifically young children and mothers within those families, is difficult to address effectively through nutrition or income generation efforts alone. Nutrition programs which do not include some resource transfer often fail to achieve their objectives because families are constrained by lack of financial or time resources, or both. At the same time, the effects on nutritional well-being of policies and programs addressed solely to income improvement but accompanied by basic nutritional services, often have not met original expectations. This outcome is due, at least in part, from insufficient awareness at the household level of nutrition problems relative to other wants and needs (among them, diet diversification for the family as a whole). The linkage of nutrition and food security efforts not only seeks to eliminate these problems, but may well have additional synergistic benefits. One important benefit, seen in several parts of Africa (and discussed under poverty lending), is that income generation sometimes has been the lever to elicit substantial community organization as well as participation in health and nutrition activities.

So far, the two most important African successes in such integrated programs have been the Iringa Nutrition Program in Tanzania and the Supplementary Food Production Program in Zimbabwe. In both, success was facilitated not by central government actions or national planning but rather by governmental decentralization and the organization of regional and local committees, women's groups and volunteer workers.

In the ongoing Iringa Nutrition Program initiated in 1983 and now covering roughly 300,000 children under the age of 5 years in 600 villages, the primary pre-determined input was not a set of technical interventions but a conceptual framework referred to as Triple A (assessment, analysis and action). Local communities were active in the design, operation and monitoring of programs. Community programs included growth monitoring, immunization, infection control, and nutrition education focused primarily on feeding practices during early childhood—specifically feeding frequency and the caloric density of foods provided. These programs frequently led to related supporting activities such as, supporting community gardens (using this food in child care-taking), developing technical means of conserving women's energy, and setting-up a revolving fund for women's credit. Major attention and funding was devoted to the training of field workers.

The program was successful in reducing severe malnutrition (weight for age of less than 60 percent of standards) from 6.3 percent in 1984 to 1.8 percent in 1988. (A 1987 survey of non-project villages in the same area found a severe malnutrition prevalence of 5.6 percent). Because the program also provided a focus for disease control activities, full coverage immunization of children rose, over the same period, from 50 to 92 percent, the highest in the country. There were declines in diarrheal and acute respiratory infection, and a decline in overall child mortality. Importantly, according to project observers, deaths of young children are no longer accepted as a given, and discussions of child death are no longer taboo (Yambi and Mtalo, 1990). The cost of the program per child per year has been estimated at US$8 (WHO/UNICEF, 1989) compared with an estimated $11 in Tamil Nadu (Chidambaram, 1989).5

The Zimbabwe "Supplementary Food Production Program" which is similarly oriented, emerged in 1981 not as a nutrition initiative, per se, but from a war-related emergency relief program and as a result of
subsequent efforts to substitute local foods from com- * Growth monitoring permits early and accurate
munal plots. Despite the absence of successfully coor- detection of problems, invisible to the naked eye,
dinated efforts at the central government level, there and permits early responses (for example, intro-
has been impressive coordination at the district level duction of solid foods, other dietary changes or
together through intersectoral committees established in diarrhea management) which are easier and far
most districts of the country under the leadership of the more cost-effective than the treatment of malnu-
Ministry of Agriculture. The program concentrates on trition. In well-functioning programs, growth
rain-fed crops, vegetable gardens and small animal monitoring can be used as a decisionmaking tool
production as well as growth monitoring, nutrition for mothers and health workers and a targeting
education and feeding for roughly 250,000 children mechanism for nutritional counseling.
under the age of five. The nutrition education compo-
nent places particular attention on energy-dense weaning foods, the frequent feeding of young chil-
dren, and continued feeding during bouts of illness. All extension personnel working in the program are trained to disseminate this information (Mason et al, 1987).

In both Iringa and Zimbabwe, programs have been focused on young children (although not adequately on pregnant mothers), but targeting to the neediest children has, to date, been more ad hoc than institutional. Targeted food supplementation based on the results of growth monitoring—the mechanism, sometimes labeled “food as medicine” (see discussion under “Food Supplementation”) which was successfully implemented in Tamil Nadu India—has not been undertaken thus far in Africa, despite attempts by international agencies to introduce the concept.

Nonetheless, the attractiveness of community-based integrated programs, involving active community participation, has recently led UNICEF to join a growing number of NGOs in adopting this approach as a focal point of its strategy for addressing malnutrition programs (UNICEF, 1990b).

Components of such integrated programs are now discussed.

Core Nutrition Components (PEM)\

Growth Monitoring

Although growth monitoring has been challenged from several vantage points—accuracy, efficacy as a screening device, and time requirements—(see, for example, Gerein, 1988), it continues to be central to integrated programs for several reasons:

- Periodic growth monitoring activities often constitute the focal point around which numerous activities can be undertaken and services provided. In the best projects, it is an occasion for a gathering of parents, health workers and volunteers, women’s groups and local leaders most concerned with the nutritional well-being of the community’s vulnerable population.

- Growth monitoring permits early and accurate detection of problems, invisible to the naked eye, and permits early responses (for example, introduction of solid foods, other dietary changes or diarrhea management) which are easier and far more cost-effective than the treatment of malnutrition. In well-functioning programs, growth monitoring can be used as a decisionmaking tool for mothers and health workers and a targeting mechanism for nutritional counseling.

- Growth monitoring can be used to target health and food interventions to at-risk children and mothers. In the Tamil Nadu food as medicine approach, provision of food supplements (and, perhaps more important, the special attention surrounding it) is triggered by two successive months of weight loss or inadequate weight gain. Similarly, exit from the food supplementation program is determined by resumption of a satisfactory growth curve.

For pregnant mothers, the absence of appropriate scales inhibits weight gain monitoring which may be an important means of reducing the number of low birth weights. In the interim, screening of women at the onset of pregnancy by arm circumference is a potentially effective means of identifying women at risk of having a low birth weight infant or one at high risk of infant mortality, while screening by height is useful in assessing the risk of low birth weight or of difficult or obstructed labor. In both cases these measurements identify women in particular need of dietary supplementation.

- Growth monitoring can be used locally and nationally to assess the effect of programs—and of development strategies as a whole—and to identify problem areas of a region or country through surveillance or early warning systems. The most promising of these systems use data or a subsample of data from community-based growth monitoring programs to feed into such systems, without disrupting these programs or requiring additional anthropometric data collection.

The effectiveness of growth monitoring is, most basically, a function of the effectiveness of interventions which it can trigger. Accordingly:

(a) Growth monitoring should be focussed on younger children not beyond the age of 36 months. Inclusion of older children, even in well-functioning programs, is unlikely to produce significant changes in growth.

(b) Growth monitoring should not be undertaken in the absence of education and/or other follow-up resources or activities.
More generally, growth monitoring should not be one more poorly-performed task to check off on a list. Its efficacy depends on accuracy and on follow-up which, in turn, require good planning and attention to training, supervision and management.

Finally, parents, as the primary agents in the maintenance of good health and in nutritional improvement, need to be actively involved, encouraged, reinforced in what is positive, and listened to.

**Changing Nutrition Behavior**

Despite the high prevalence of food-insecure, resource-constrained families in Africa, well developed and operated nutrition education, even in the absence of additional resources improve nutritional status at least of young children and persons suffering from micronutrient malnutrition. The greater anticipated effects on young children is, in part, a function of the small increments in food or shifts among foods which are necessary to achieve caloric or nutrient adequacy. By contrast, improving the nutritional status of undernourished pregnant women involving the need for several hundred additional calories per day, may be more difficult to accomplish through nutrition education alone.

In the case of young children, nutritional counseling, when coupled with growth monitoring, and directed to individual cases of growth faltering, can take the form of advice for concerned and attentive parents. More generally, nutrition education efforts coupling face-to-face efforts with mass media reinforcement have been effective in changing practices related to the feeding of young children particularly during the weaning period. Beyond specific behavior modification objectives, there appears to be a role for nutrition education in stressing the importance—and the consequences—of malnutrition problems as deserving scarce household time and limited resources. Finally, nutrition education can help empower and boost the morale, particularly of disadvantaged women, by recognizing and positively reinforcing what they are now doing which is nutritionally beneficial (Cerqueira and Olson, forthcoming).

Nutrition education messages directed at malnutrition in children have addressed such problems as delayed solid food supplementation, dietary management of diarrhea and other infectious diseases, and the need for increased frequency of feeding. Two additional areas frequently requiring information priority are breast feeding promotion and weaning food preparation. Because of their importance and because of particular issues relating to each, they will be discussed separately.

**Breast Feeding Promotion.** In at least the rural areas of most Sub-Saharan African countries, breast feeding continues to be the one major nutritional asset among many negative forces. The importance of breast feeding lies in its nutritional value, its immunological properties particularly in reducing the nutritional consequences of diarrhea, its non-contaminated state, and its inhibiting effect on fertility. Breast feeding promotion campaigns are needed to preserve this practice, to offset promotional efforts by producers of infant formula foods, and to underscore the importance of exclusive breast-feeding for the first four to six months of life to assure its protective health, nutritional and fertility-inhibiting effects. Successful breast feeding promotion campaigns can reduce child mortality and morbidity. Theoretical calculations made by Feachem and Koblinsky (1984) indicate that well-functioning campaigns have the potential of reducing diarrhoea morbidity by 8 to 20 percent and diarrhoea mortality by 24 to 27 percent in the first six months of life.

Successful campaigns in Papua New Guinea, the Philippines and Honduras have involved not only information to parents but also the motivation and training of health professionals, the changing of hospital routines, active discouragement of the use of infant formula samples and, in Papua New Guinea, legislation restricting the sale of feeding bottles to a "prescription only" basis.

**Weaning Food Preparation.** The importance of education on weaning food preparations stems in part from the now widely-acknowledged failure of commercial products to reach low-income, malnourished children, and from more recent understandings relating to the caloric density and potential enzymatic properties of certain foods.

During the 1960s, considerable attention was given to the potential of low-cost formulated and commercialized children's foods, often based on the processing of protein from oilseeds or unconventional sources. Among the more famous were Incaparina in Guatemala and Superamine in Algeria. U.S. Government-provided PL480 Title II foods such as Corn soy milk (CSM) or Wheat soy blend (WSB) were based on similar principles. It was found, however, that for low-income, food-insecure households unable to afford adequate quantities of basic staples, any product costing more than the cost of the raw materials was, almost by definition, beyond their reach on a sustainable basis. In fact, the commercial products usually sold for 8–40 times the cost of the raw materials on a nutrients per dollar basis (Popkin and Latham, 1973).^9^

Not surprisingly, one study concluded that of the over 100 such products relying on regular retail distri-
bution, not one was reaching the needy target groups (Cordaro, 1972). Indeed, given the pricing of such products, their purchase by any low-income family would represent a misallocation of resources. Most Ethiopian families purchasing Faffa, a commercial supplementary children's food, were, at the same time, reducing their cereal and legume consumption, (Popkin and Latham, 1973, quoting Wickstrom, 1969). According to the Academy for Educational Development and regarded as a social marketing

Accordingly, attention has shifted to weaning food preparations that can be made at home with local ingredients. In several countries, specific preparations have been identified, named and promoted, in other countries, education has focused simply on the concept of such foods. In a pilot study of 62 children aged 6 to 24 months in 3 villages of Yako District in Burkina Faso, a home-based weaning food, Bouillie, was the focal point of a nutrition education campaign within a broader health care package, which reduced the prevalence of moderate and severe malnutrition (weights of less than 75 percent of weight for age standards) from 35 percent in a comparable village to 12 percent (Zeitlin, 1981). Similar results were reported in the much larger Nutrition Communication and Behavioral Change Component of the World Bank assisted Indonesia Nutrition Development Project (described in Annex D) which recommended green leafy vegetables in home-produced weaning food preparations along with the continuation of breast feeding (Manoff, 1984).

In recent years, the two primary foci of child feeding education have been caloric density and frequency of feeding. Because in many areas, children's food is made extremely dilute for digestibility, it is possible for a child to eat, feel full, and still be malnourished. Accordingly, parents are being advised to feed young children smaller but more frequent portions of food which has more calories per unit of volume.

One problem here is the time involved for over-worked mothers. In Iringa, the average mother's food-related chores, beyond agricultural labor, include collecting firewood and carrying water, grinding grain and pounding of cassava, oil extraction by hand, and cooking (Rozanne, 1989). This recognition led to the introduction in Iringa and Zimbabwe of child caretaking, to permit the more intentional and more frequent feeding of children of working mothers.

Another concern is the digestibility and palatability problems children have with some high caloric density foods. One solution is encouragement of fermented cereals (made from grain—usually maize—which has been soaked in water for several days) and the feeding of “sour porridge” made from them. Such porridge, long discouraged by nutritionists in Africa because it could not be made with milk, assumed earlier to be the “sine qua non” of nutrition) is now known to have desirable viscosity and may also alter the bacterial flora in the intestine, rendering the child less vulnerable to diarrhea. This latter property made “sour porridge” a traditional recipe for sick children.

In several countries where fermented foods are not commonly consumed or as an alternative to them, the use of an amylase-rich catalyst has been encouraged to provide a more liquified consistency to regular (stiff) porridge which children often are unable to swallow or digest. Named “power flour” in Tanzania, a spoonful of germinated grain, often sorghum, is added to porridge immediately after cooking or warming, to produce this liquid viscosity and hence increased desirability and digestibility with no compromise in caloric density. The resulting food, called “kimea” in Tanzania, has considerable potential for home-based nutritional improvement. (Mosra and Svanberg, 1983.)

In its efforts to increase the effectiveness of nutrition education programs and components, the so-called “new nutrition education” has been characterized by:

- A fuller appreciation of the real resource constraints facing families in poor communities, and the frequent need for complementary resource transfers;
- An attempt to concentrate efforts on those nutritional problems where behavioral change can lead to nutritional benefits even in a poverty context;
- A greater respect for the choices, instincts and experience of the poor in local communities; experience which is based on generations of trial and error, and where the cost of error may be fatal;  
- An effort to base messages and campaigns on the priorities and the perceptions of local communities, determined through interviews, focus groups, formative evaluation, and community-based pre-testing;
- A sharper delineation of subject matter priorities;
- Carefully gauged reinforcement of community-based messages with mass media;
- Improved training, with greater focus on communication skills and counseling techniques; and
- Better-functioning management and evaluative mechanisms.

Sustainability and replicability are currently of paramount concern. A careful examination of the Gambia Mass Media and Health Practices Project (1981-84), part of a larger USAID-sponsored “Healthcom Project” carried out by the Academy for Educational Development and regarded as a social marketing
success found that the project, though successful in the short-run, was not sustainable. Once external funding was ended, the government was unable or unwilling to maintain project efforts at a satisfactory level. The evaluation found that problems lay in the original design, one more appropriate for research and design efforts than for long-term sustainability.

The Gambia evaluation underlines the conflict which too often arises between dramatic short-term results and long-term sustainability. When the efforts of project design teams, expatriate advisors, and capital city consultants are directed toward bringing about highly significant change in knowledge, behavior or nutritional status in the shortest possible time, issues of counterparts, institutionalization of skills, and in-country training capacity often become secondary. The result is impressive, oft-quoted results, while program effects all but disappear a few years later.

Replicability is just as important. The most replicable programs, it appears, are those with relatively little new investment and the creation of no new infrastructure, but rather a rearranging, strengthening and empowering of existing energies and skills and a willingness to build to the extent possible on previous initiatives.

The best-documented nutrition education experience in Africa is probably that of Morocco where a program was undertaken by Catholic Relief Services between 1972 and 1975. The program, a clinic-based initiative, provided 20 to 50 minutes of instruction to mothers on nutrition, health, sanitation, hygiene, and food preparation for young children when the mothers picked up their monthly “take home” food commodities at centralized health centers. Generally, health center-based education, when aimed at behavioral change, has been found to be less effective than more individualized efforts at the community level. This program, however, which was concerned primarily with knowledge transmission, did result in increasing the effectiveness of the food supplements.

In all, roughly 150,000 mothers and 300,000 children were reached. After three years of program operation, only 11 percent of program participants were moderately or severely malnourished (less than 80 percent of weight for age standards), as opposed to 33 percent among siblings who, in earlier years, had received food supplements only. The total cost of the program, including food, was estimated at US$105 per family per year (1979 prices), perhaps the costliest of inte-

**Food Supplementation**

In earlier years, food supplementation was not only the primary component of nutrition programs, it was, in public health vocabulary often synonymous with nutrition. The operation of food supplementation activities has been substantially affected over the years by the availability of donated food aid commodities for preschool child feeding programs which usually have been provided through maternal child health centers (see discussion in Annex D.)

These programs have raised questions, asked both by food aid donors and recipients, about the cost-effectiveness of such efforts. Beyond more general concerns with food aid, these questions have focused on nutritional effectiveness, problems of targeting, leakage, logistics (including reliability of supply), dependence, and the “swamping” of other program inputs. Several NGOs, most significantly Catholic Relief Services in Africa, have been cutting-back their involvement in such programs, and a growing number of health ministries are reluctant or unwilling to deal with food distribution—this notwithstanding the often favorable effects of food distribution on clinic attendance, and on clinic financing. Finally the more successful integrated nutrition programs have, by and large, opted against large-scale donated food components, relying instead on some combination of food from communal plots or gardens, and locally-purchased foods. Where processing is required, programs in Ghana (a UNICEF-assisted program providing women’s groups with milling facilities to process grain and weaning food) and India (the Tamil Nadu Integrated Nutrition Project) have worked through local women’s groups often organized and financed specifically for this purpose.

The critical supplementary feeding debate, as it relates to the use of food aid commodities, is exacerbated by the fact that these commodities, currently ear-marked for MCH/pre-school child feeding, are often non-fungible, that is not convertible to other forms of assistance for current beneficiaries. Program defenders note that despite the frequent absence of empirical evidence of the nutritional benefits of such programs, the food provided constitutes an often substantial increment to the real income of these households. This
will often justify the difficult and time-consuming process of dragging children to a usually distant health center even when they are not sick, spending several hours mostly waiting, and then carrying the food—and the children—back to their villages. Defenders further note that although food provision is an expensive and cumbersome means of increasing real income and household food availability (since a large part of an equivalent cash transfer to poor households would be spent on food without such major movement of commodities), it is sometimes, in reality, the only way.

Both critics and defenders of such programs generally endorse creative food aid monetization schemes which are used in some countries to permit more efficient deployment of food resources.\(^{15}\)

While the debate continues over the use of donated commodities, new understandings of the role of food supplementation in integrated programs have been emerging, along with a growing awareness of the previously undervalued importance of food supplementation for pregnant women. To facilitate the discussion of these issues and of benefits and costs, food supplementation for young children and for women will be discussed separately.

**FOOD SUPPLEMENTATION FOR YOUNG CHILDREN.** Clearly the benefits of food supplementation for children depend on the age of the child (greater for children aged 4 to 24 or 36 months than for older children), on his or her nutritional status (greater benefits for more malnourished children), and on the extent to which the household cannot provide sustained nutritional well-being.

It is more difficult to identify the best means of reaching the children who will benefit most. Problems associated with each of the major delivery systems are summarized as:

- **Take-home feeding.** Even if programs get food to the homes of the right children, there is little likelihood that the food will be reserved exclusively for that child, nor is this a reasonable expectation with other hungry children and adults in the household. Data from Project Poshak in India found that targeted children received roughly 50 percent of the food provided (Gopaldas et al., 1975). In some programs sizeable numbers of targeted children received little or none of the food. In some situations this problem may be mitigated by choice of a ration geared more specifically to young children and less useful in preparations for the family as a whole (for example, a more finely ground weaning food) and by accompanying nutrition education.

Problems also exist in establishing ration size in such programs. Where larger rations are provided to account for family sharing, some portion of the food is often sold. Where rations are pegged to individual needs, the child receives only a small portion of the food necessary to meet the caloric gap.

- **On-site feeding.** Where children are brought to a location for daily feeding, different problems arise. Often, particularly in the absence of integrated programs and active community participation, the children attending such feeding sessions are older pre-schoolers (over the age of 3 years) rather than younger ones. When younger children do come, the food provided often becomes a substitute for meals at home.

- **“Food as medicine.”** The most attractive use of supplementary food in integrated programs may be the short-term targeting of special food supplements to children identified in growth monitoring programs as malnourished or “at-risk”. This was carried out successfully in Tamil Nadu despite the small size of the ration (70 grams of a grain and legume preparation per child per day), probably because of the special attention surrounding these targeted children. So far, there has been reluctance in African countries to implement programs with such explicit targeting of needy children. Stigma and embarrassment issues are cited along with fears that children will be kept intentionally underweight to receive the food. Using food as medicine may be particularly difficult when resources for the feeding are communal in nature (for example, from community gardens) rather than externally provided, or when, during times of particular hardship, there is a general perception that all children are in need. Finally there is the political reality that programs which benefit only the poor, a group with, at best, marginal political power, may not be attractive to elite decisionmakers.

In addition to the question of delivery system, benefits from supplementary feeding often depend on the duration of the feeding. One review of such programs found that one to two years of regular participation in a feeding program was necessary to produce a significant effect on growth. An exception is the “food as medicine” approach where, according to data from Tamil Nadu, effects usually are seen within 90 days.

Such short duration food supplementation for malnourished or at risk children at the community level, and efforts, more generally to catch children early, are far preferable to nutrition rehabilitation centers (NRCs) which concentrate on intensive feeding of children and education of mothers at centralized locations.
and have been used in many countries to deal with severe malnutrition. Although conceived as a less costly alternative to hospitals, NRCs are expensive, ranging from US$46 to $120 (1982 prices) per period of recuperation, and with the cost per recovered child much higher (Kennedy and Alderman, 1987). Even with the educational component, the rate of malnutrition recurrence is high. In addition, NRCs make the heroic assumption that mothers can take weeks off from other responsibilities and other children and travel the usually considerable distance to participate in these programs. In Ghana where such centers are still an important claimant of scarce nutrition resources, only a small portion of mothers and children referred to such NRC programs actually attend them.\(^4\)

Several African countries are now considering the seasonal targeting of supplementary food for children and mothers to counter the debilitating effects of pre-harvest hunger. This might mean operating programs only during these months or increasing the ration size for this period.

There is evidence from carefully controlled and monitored studies such as that at Narangwal in India, that food supplements, if consumed by needy children, will have important benefits. While health care per se had a greater effect on infant mortality (although the potential role of Vitamin A supplementation was not taken into account), food supplementation (provided under pilot project conditions) was equally effective in reducing age 1-3 mortality, and more effective in promoting growth.

In operational programs, however, the nutritional effectiveness of food supplementation activities (mostly non-integrated) has been much less significant. A classic review of operational food supplementation programs by Beaton and Ghassemi (1982) found, for many of the reasons cited above, that most resulted in no significant nutritional benefits for children. Of five programs analyzed in depth by Kennedy and Alderman (1987), four reduced the caloric gap of participating children by less than 30 percent and two by less than 10 percent. In general, the effects on growth of on-site feeding were greater than in take-home feeding but at roughly 50 percent higher costs. The cost of most food supplementation programs ranged from US$24-42 per recipient per year (1982 prices), but the average cost per malnourished child reached varied from $40 to nearly $500—inevitably higher in countries with a lower percentage of malnourished children.

**Food Supplementation and Caloric Expenditure for Pregnant Women.** While nutrition strategies over the years have offered lip service to the importance of maternal nutrition, program content normally has neglected mothers. Among reasons offered have been the much larger quantities of food needed by women, and the absence of available instruments for the measurement of maternal malnutrition. A more basic problem has been that, until recently, the primary orientation of health care in pregnancy has been the medical model of disease prevention. Because low weight gain and even low iron levels are not traditionally viewed as diseases, they have not received major attention.

It has now become clear that the damaging effects of maternal malnutrition on these women and their offspring are so severe that serious nutritional efforts must recognize them. Low weight (less than 40 kilograms in early pregnancy) or anemic mothers have triple the risk of giving birth to infants who will be severely malnourished (below 60 percent of weight for age standards) within the first year, and between two and six times the risk of offspring who will be malnourished between the ages of 1-3 years. Malnutrition for the mother manifests itself most frequently in anemia, depletion of fat, protein and iron stores, and lower productivity.

Maternal malnutrition and inadequate pregnancy weight gain, most immediately, are reflected in low birth weight\(^1\) which, in turn is a primary determinant of mortality and morbidity in young children. Ashworth and Feachem (1985) conclude that a reduction in the prevalence of low birth weights from 30 percent to 15 percent in a low-income country would result in an estimated 26 percent decrease in infant mortality. While there are other determinants of low birth weight (among them certain infections; toxemia or poisoning associated with pregnancy; heavy work later in pregnancy; short birth intervals and early age of pregnancy), the effects of maternal malnutrition and pregnancy weight gain appear paramount. Anderson reports from Indian data that pregnancy weight gain of less than 4.5 kilograms, was invariably associated with low birth weight, and that the risk of low birth weight decreased steadily as pregnancy weight gain increased.\(^17\) Intervening with iron and folic acid increased birth weights by 270-360 grams. The gain was more than doubled when food supplements were added. This data further substantiates the conclusion drawn from Narangwal that found food supplementation of pregnant women to be the most cost-effective means of decreasing perinatal and neonatal mortality.

Programmatic experience in addressing maternal malnutrition is sparse compared with that on childhood malnutrition. But several issues can be raised:

- While it was earlier assumed that food supplementation could be concentrated in the third tri-
mester of pregnancy, more recent evidence indicates that beginning supplementation earlier essentially from the point that the pregnancy becomes known - can significantly increase the effect of the supplementation on birth weight.

- Findings from the Gambia indicate that when the pregnancy overlaps with the wet, pre-harvest hunger season, the period when most pregnant women have a negative energy balance, food supplementation has a particularly significant effect.
- The beneficial effects of supplementing the diets of mothers during lactation are less clear. The effect of such supplementation on breast milk quantity and quality may be minimal except in cases of severe malnutrition, and the supplementation may actually decrease prolactin and increase fertility.18
- Looking more broadly at the problem of maternal malnutrition and low birth weights, greater attention should be focused on adolescent girls in an effort to maximize growth and postpone first pregnancies (which are particularly high risk when the mother is young and physically underdeveloped.)

Given limited resources and the difficulty in most countries of providing adequate ante-natal attention and supplementation to all women, two approaches have been suggested:

- At-risk women could be identified using such criteria as low prepregnancy weight (less than 40 kilograms), inadequate maternal weight gain (less than 1 kilogram per month during the second or third trimesters), an earlier low birth weight child (less than 2.5 kilograms), closely spaced pregnancies, age (under 18) and high infant mortality in the household. The simple measurement of arm circumference can be used as a proxy for pre- or early pregnancy weight. An arm circumference of less than 22.5 centimeters has been found to have 77 percent sensitivity in predicting weight below 40 kilograms. As indicated in the discussion of growth monitoring, both arm circumference and height can be used as screening devices in dietary supplementation programs.
- Attention could be concentrated on first pregnancies with the idea that a successful experience and a healthy baby will be sufficient motivation for continuing these practices in subsequent pregnancies. This approach might be combined with a more general, health-based educational effort to urge newly-weds to delay their first pregnancy.

While providing iron and folate supplements, distributed as tablets or incorporated in fortified supple-

mentary foods, and well-focused nutritional counseling should be a requisite in such programs, the logistics of food supplementation for mothers are more difficult. The amounts of food involved are large, and the supply of food (if donated commodities are to be used) inevitably unreliable. In areas of overall food shortage, such food provision might "swamp" the project, becoming its sole focus for recipients. On-site feeding of pregnant women is usually difficult and non-replicable given the inherently fragile logistical infrastructure of most African countries, and take-home feeding would be unlikely to have the desired nutritional effect.

One approach being considered in some programs is the provision of snack rather than "meal" foods to bypass the traditional meal time family eating patterns which usually favor men. Another is the selection of particular non-taboo foods which are already associated with healthy pregnancies or can be endowed with such an attribute.

Notwithstanding the difficulties, efforts to augment the food intake of pregnant women are crucial and may, additionally, be helpful in drawing women to ante-natal care. In the short run, particularly in countries with a high prevalence of low birth weight infants, there may be no alternative to wrestling creatively with these thorny problems. In the longer run, it may be possible to reduce maternal malnutrition and increase pregnancy weight gain through more indirect means such as mutually supportive women's groups, additional employment generation, reduced caloric expenditure (see following paragraphs), secondary school incentives for female students, nutrition interventions addressed to adolescents, and formal and non-formal nutrition education. Such efforts, if successful, might raise the age of marriage and increase incentives for better maternal health and healthier pregnancies.

It has become clear in recent years that reducing the caloric expenditure of women is as legitimate as increasing their caloric intake, and sometimes easier. Particularly important are means of reducing labor involved in the most arduous tasks,19 and especially when these tasks have to be performed by women who are pregnant.

The Iringa project discussed earlier, has employed at least three such labor saving techniques for women: (a) small hand-operated maize grinding machines for those with no access to commercial hammer mills or unable to afford the commercial processing cost, and for whom the alternative may be 10 hours a week of strenuous hand pounding; (b) improved stoves to conserve fuel wood and reduce wood hauling, and (c) hand carts for the transport of agricultural produce and, in some cases, water (Yambi, 1990).
Micronutrient Components

While the interventions discussed thus far address primarily the problem of protein energy malnutrition (PEM), three major deficiencies of micronutrients: iron deficiency anemia, iodine deficiency disorders (IDD), and Vitamin A deficiency, exist among significant portions of the vulnerable populations of Africa, often coexist with PEM, and have serious consequences for health and nutritional well-being.20

Until recently, it was generally assumed that in the presence of serious PEM, the effects of micronutrient supplementation would be marginal. More recent data indicate that even with PEM, eliminating Vitamin A deficiency can have a significant effect on mortality reduction among young children. The same appears to be true of the effects of iron and folate supplementation of pregnant women on birth weights and neonatal mortality.

The benefits of micronutrient supplementation or fortification are so considerable, and their costs so low, that government agencies and donors might well consider participation in any supplementation or fortification intervention directed at one of these deficiencies with little risk that the intervention would not prove cost-effective. Among the means of addressing these deficiencies, fortification is normally the most cost effective if it meets the criteria discussed here. Since supplementation and dietary modification programs require the same type of supporting staff and family involvement as integrated community-based programs, they should be incorporated into such programs or, in the case of Vitamin A and mass dose iodine supplements for infants, into EPI (Expanded Program of Immunization) regimens.21 In pockets of particular micronutrient deficiencies where fortification is not possible and long term mass dose supplementation is inappropriate (for example, iodized oil) vertical programs may be justified. More generally, however, vertical programs for the delivery of micronutrients, are likely to be inefficient and less sustainable, and may detract from regular health services.

The effects of each of these nutrients on primary nutritional and health indicators (mortality, growth, birth weights and morbidity) are summarized in Annex B, while the nutrients are grouped together here in discussions of the primary intervention categories: supplementation, fortification and dietary modification.

Micronutrient Supplementation

For the prevention and cure of two of the three major micronutrient deficiencies, iodine and Vitamin A, high dose supplements can be provided orally and, in the case of iodine, also by injection. Injected iodinated oil can be given at 3 to 5 year intervals, oral iodinated oil (Lipiodol) at 2 year intervals, and oral Vitamin A capsules at 3 to 6 month intervals. Iron supplements which cannot be rapidly absorbed and stored in the body, must be taken daily. Estimates of costs per person year of protection are US$0.20-0.50 for iodine, 0.40-0.70 for Vitamin A and 2.50-5.00 for iron (plus ascorbic acid to increase iron absorption—see Annex B).

Micronutrient supplementation can be only as good as the MCH, community nutrition or other delivery system of which it is a part. In many African countries, operation of such systems still is weak, resulting in spotty and somewhat arbitrary coverage. An exception, sometimes, are EPI programs which provide immunization to children during the first year of life. Given the significance of the new research findings on the effects of Vitamin A supplementation on mortality (summarized in Annex B) and the concentration of these effects in the first year of life, some countries are considering incorporating Vitamin A supplements into the EPI program (50,000 I.U. at each EPI exposure for all infants).22 After the first year, Vitamin A capsules might best be concentrated in particularly high risk areas or, as is the case in Tanzania, reserved for sick children (a) after or during chronic diarrhea, (b) in all cases of measles, and (c) in cases of acute respiratory infection.

Even where coverage is high, additional problems often must be overcome. One common problem is the mild side-effects associated with iron supplements which often are distributed to pregnant women and other "at-risk" groups for daily home consumption. As with any long-term medication, counseling is needed to enhance compliance and reassure recipients. One successful program advised pregnant recipients to drink more water and consume more vegetables along with the iron supplements, and to be prepared for black stools.

Another issue in supplementation programs is toxicity. While longer-lasting massive dose supplements of iodine and Vitamin A are more cost-effective, they both raise the possibility of toxic overdose. This is of particular concern with adults over the age of 40 in the case of iodine, and pregnant women in the case of Vitamin A. Special care is also required to assure that individuals not receive more than one mass dose supplement during the coverage interval. This often is done for children by indicating doses on the growth chart and requiring that the chart be available at the supplementation location.

Micronutrient Fortification

Food fortification presents an opportunity to provide micronutrients to a larger population group, often at remarkably low cost ($0.04 for iodine, $0.15 for Vita-
min A, and $0.07 to $0.84 for iron per person per year of protection) without the often cumbersome and expensive delivery systems and compliance problems associated with supplementation or dietary modification programs. Possibilities for extensive coverage have increased with the use of unconventional carriers—salt, sugar, tea, MSG, and water (for iodine), and permit the possibility of totally eliminating at least iodine deficiency. Of these options, salt iodination is, by far, the most common. According to the estimates referred to above, the cost per person year of protection using salt iodination is less than 10 percent of the cost of iodized oil injections. Similarly, the cost of sugar fortification with Vitamin A in Guatemala was less than a third the cost of Vitamin A supplementation programs in similar countries (Levinson, 1982). Fortification, by definition, precludes targeting since the nutrients will be delivered to all persons consuming the food whether or not at risk. At the same time, fortification is so inexpensive that most attempts at countries in gaining the cooperation of private sector salt or sugar processors who perceive the fortification is so inexpensive that most attempts at fortification purposes or for grazing on land not suitable for crop production are major sources of iron.

Newer iron compounds, especially iron EDTA, do not appear to have these effects.

- That the added nutrients remain stable during storage. While the stability of Vitamin A in fortification programs has been a problem in the past, newer encapsulation technology makes it possible to store Vitamin A-fortified foods for longer periods. The stability of nutrients added to salt can be a problem depending on the moisture content of the salt (in the case of iron and iodine) and on the packaging (in the case of iodine).

- That the carrier is consumed in relatively constant quantities so that benefits will accrue without toxicity concerns. Setting fortification levels with salt, for example, is usually much easier than with sugar where the consumption range is much wider.

- That the fortification is mandatory or voluntarily agreed to by all parties, and that adequate enforcement capacity exists. There have been problems in many countries in gaining the cooperation of private sector salt or sugar processors who perceive the risks of fortification (reduced sales if characteristic or price is adversely affected or if there are fears of adulteration) but see little opportunity for additional profit. In some cases in Latin America, legislation has been used to require compliance.

Dietary Modification and Other Interventions

Addressing Micronutrient Deficiencies

Micronutrient deficiencies also can be addressed by dietary modification focusing on the need for these nutrients and their availability in locally available foods. Because these educational effects are similar in their organization to broader nutrition education activities discussed earlier (and usually should be included as part of them) there is no need for additional discussion here.

Although agricultural land-use choices are unlikely to be made on the basis of micronutrient deficiencies, horticultural production on home gardens can be a major source of Vitamins A and C (the latter is particularly important for iron absorption), while legumes, fish and livestock, where justifiable for income-generation purposes or for grazing on land not suitable for crop production are major sources of iron.

Similarly, although primary agricultural marketing decisions are unlikely to be made on the basis of micronutrient deficiencies, there may be cases where dietary diversification can be facilitated by governments even in the absence of expressed effective demand for it. A particular case in point is the movement of foods grown on iodine-rich soils to areas of iodine deficient soils.
In some cases, plant breeding has increased the micronutrient content of particular foods. One important example for Africa has been the development of Vitamin A-rich sweet potato varieties. Another is low toxicity (low anti-iodine) cassava. The success of such varieties in combatting nutrient deficiencies depends on the extent to which these commodities are consumed by at-risk population groups, and the absence of altered taste or appearance or of negative effects on crop yields.

**Household Food Security**

The second group of intervention possibilities addresses not the delivery of nutrition services per se, but rather what is often the primary determinant of child malnutrition, namely household food insecurity. When these food security initiatives are part of well-designed, integrated programs, certain household food security measures particularly those relating to income and employment-generation for women, appear capable of short-term impact on malnutrition problems.

The primary discussion in this section is of credit programs designed (a) to generate employment for low income women, part of a concept increasingly referred to as poverty lending, or (b) to offset the negative effects of pre-harvest hunger and nutrient shortages. Each of these approaches appears to offer significant potential for the translation of limited financial resources into short-term impact.

**Poverty Lending**

Research by Tripp (1981) in Ghana and food security studies elsewhere in Africa suggest that the primary determinant of nutritional status for young children may not be household income, but rather that portion earned and controlled by the mother. Accordingly, the nutrition programs in Iringa and Zimbabwe as well as projects in Ghana, Mali, Togo, and Lesotho have incorporated women's income-generation activities—either cooperative ventures by women's groups or credit to individual women—into integrated community-based projects. In some cases, for example, Ghana and Lesotho, these have included larger amounts of credit to permit the purchase and operation of hammer mills and oil-extraction equipment. More often, however, loans have been small and with short-term repayment periods.

The rationale for including women's credit components in such integrated nutrition programs rests not on empirical data on the effects of their inclusion (such initiatives are still too new, and evaluations still too general), but rather on (a) the unquestioned importance of household food security as a necessary but not sufficient condition for sustained nutritional wellbeing; (b) the disappointing short-term effects of policies and programs directed solely at increasing household income on the nutritional status at least of children in these households; and (c) the assumption that income increments earned and controlled by women in the presence of well-operating core nutrition activities will be much more likely to produce desirable nutritional benefits. There is, in addition, the practical consideration that income-generating activities, and not the core nutrition activities have been the primary motivating factor in most African programs.

Overall, and based on African experience, these income-generation components should not be viewed as alternatives to core nutrition or micronutrient activity, but rather as valuable complements to them.

The most promising mechanism for such "poverty lending" in Africa, although still small-scale, may be that initiated by the Freedom from Hunger Foundation in Mali and Ghana and termed "minimalist credit". The nature of such credit appears particularly well suited to financing by government agencies and donors looking for low-cost interventions.

Based on the successful experience of the Grameen Bank in Bangladesh, minimalist credit schemes provide small loans for short-term income-generating activities that the loan recipients already know how to do. Accordingly, little technical assistance or training is necessary. These credit schemes have been combined with nutrition education activities to increase the likelihood that adequate household resources will be used for nutritional improvement.

In the Mali case, a joint venture of the Freedom from Hunger Foundation and a Malian NGO, the Association Malienne pour l'Insertion Professionnelle des Jeunes (AMIPJ), credit from the donor is extended through village credit associations (or village banks) of which there may be more than one per community. These village credit associations provide loans to individuals who have organized themselves into mutual guarantee groups ("solidarity groups") of five or six borrowers each. Each association, which is managed by a committee made up of representatives of the mutual guarantee groups, must repay the capital plus interest every four months to become eligible for a new loan from the donor. Each village credit association accumulates and invests its own funds derived from fees, savings, and interest paid by members. After three to five years, donor funding is discontinued, after which the credit associations are expected to manage their own funds, making loans from accumulated capital, or leveraging loans from local banks. As each association becomes progressively less dependent on the donor for capital, the donor is able to use that capital to initiate the program in new areas.
Credit from the village credit association is extended to individuals after approval by the individual's solidarity group peers and the entire membership of the association, and is based on their assessment of the applicant's ability to carry out the undertaking and pay back the loan. Loans which have averaged US$21 (roughly one quarter of the average annual per capita income in rural Mali) at an annual interest rate of 24 percent are used for the processing and sale of grain and other foods, and trading in kerosene, soap, cloth and bicycle spare parts. Borrowers repay their loans in regular instalments at the weekly meetings of the association. Loans must be repaid within four months; borrowers realize that the sooner repayment is made, the sooner more capital will be made available for loans.

In the first two years of operation in Mali, over 3,200 loans were extended to nearly 800 borrowers in 14 villages. Eighty-two percent of the borrowers were women and about 90 percent of them fell below a poverty line based on the amount of land owned, access to food throughout the year, and family assets. The combination of small loan size, short payback period, frequent payback and relatively high interest rates makes these credit programs less attractive to upper-income persons and thus helps insure self-targeting to those in greatest need. Most recipients have found these loan-facilitated activities to be more profitable than what they were doing before. Repayment has been close to 100 percent. Evaluations are currently underway to assess the nutritional and food security effects of the program (Freedom from Hunger Foundation, 1989, and Dunford, 1990).

Pre-Harvest Hunger Alleviation

Other credit possibilities are suggested by the nutritionally deleterious effects of pre-harvest hunger which is particularly severe in most Sub-Saharan African countries. Seasonal hunger for many rural households is the result of depleted household food supplies and substantially higher food prices during the pre-harvest period. Frequently, food-insecure farming households find it necessary to sell food inexpensively at harvest to meet non-food needs and to repay debts, and then purchase food later in the year at much higher prices.

In Ghana where low-income families are reduced to one or two meals a day during this season, the toll is particularly high on women and children. One survey found 36 percent of women classifiable as "severely underweight" in the lean season as opposed to 19 percent during the rest of the year. (The comparable figures for men are 23 percent falling to 3 percent.)

Since few of the women affected will achieve acceptable weights after the harvest, this has serious implications for fetal development and birth weights as well as for the mother's health. For children, growth curves clearly reflect the seasonal effect on growth and nutritional status.

There is today a growing appreciation of the suffering which results from pre-harvest hunger and a recognition that unless this problem is addressed, it is likely to reduce the effectiveness of other community level nutrition activity, given low energy levels and near total preoccupation with food.

While the major government approaches to pre-harvest hunger, for example, government purchase and resale of cereals, food storage, and other means of price stabilization would not qualify as low-cost interventions, local credit at the community level may be effective in helping low-income households avoid the worst consequences of these pre-harvest months.

Where these are possible, credit might be extended for food preservation and improved local storage, or cereal banks such as those established in Togo with the assistance of the Freedom from Hunger Foundation and operated by women could be established. An interesting variation is the community storage scheme in Madagascar where farmers producing surplus grains would receive credit for storing a portion rather than selling or consuming it all. During the pre-harvest period, these locked storage bins would be opened and stored grain sold to others in the community at a profit but below open market prices.

A third possibility being tried in Malawi, seeks to break the cycle of poverty imposed by pre-harvest hunger and to support more stable agricultural production for low-income and particularly female-headed households through one-time credit or grants. For many of these households, grain supplies run out as much as seven months prior to the next harvest. At this point, the woman has no choice but to seek employment on larger farms, thereby neglecting her own land during the critical planting and weeding periods. The result is another poor harvest and continuation of the cycle.

One-time low or no interest credit or grants to these families is provided as a package of agricultural inputs and three 90 kilogram bags of maize meal, enabling the woman to work her own land, substantially increase her yields, and become more familiar with credit and agricultural extension resources. The cost of the input package for 1,000 families in Malawi plus necessary support services has been estimated at US$150,000 using 1989 prices (UNICEF/Malawi, 1990). When costs associated with the technical assistance are deleted, however, the cost falls to $50,000 or $50 per household. Nutritional assessments have recently been initiated.
Home or Community Gardens

Well-functioning home or community gardens operated primarily by village women often have the capacity to generate income (for example, Marek et al, 1990) and to help meet micronutrient deficiencies (for example, ImMink et al, 1981). Depending on their orientation, garden projects could legitimately be placed here or among micronutrient interventions.

Where gardens are primarily a source of income, they can be operated with credit programs such as those already discussed. Where they are geared to home consumption, there is the possibility that even small amounts of land can go a long way towards meeting nutrient needs.

Where gardens are community-owned and operated, the basic questions are who does the work, who benefits from the sales, and who gets to consume the produce not sold. These need to be carefully resolved before funds are made available. One approach pursued by some communities in Zimbabwe involved the earmarking of produce from community gardens for child caretaking programs designed to permit the more frequent feeding of children of overworked mothers. Food from these gardens was either fed directly to the children or sold to permit the purchase of other needed food.

Two additional issues which must be examined to assure the sustainability of garden projects are (a) the availability of adequate water, seeds and fencing, and (b) the time available to village women to tend the gardens. Numerous garden projects have not proven sustainable because of inadequate attention to one or both these issues.

An additional issue pertinent both to community and home gardens is extension. In most countries, small, non-commercial plots farmed by women are the lowest priority of an agricultural extension system. One means of addressing this situation is through the training of special cadres of women extension workers. In Nigeria, a Women in Agriculture component of the country’s extension system has, since 1988, trained roughly 2,000 women extension agents who work with women in fields and garden plots and provide information on production, processing, storage and cooking techniques. Another approach pursued by one agriculture ministry which recognized the importance of garden plots and also its inability to deal adequately with them, was to contract with NGOs for such assistance. Initial financing of such NGO extension activity on small garden plots might also be an appropriate undertaking by donor organizations.

Finally, the planning of garden projects can profit from the seasonality concept in two ways: (a) gardens can be planned to provide nutrients when they are generally in short supply; and/or (b) they can be planned so that the primary labor input is concentrated in agricultural slack seasons.

Food for Work

Although food for work activities are not part of integrated nutrition programs, a discussion of these programs is included here because, by nature, they are self-targeting to neediest families where malnutrition is usually concentrated. In general, public works programs and guaranteed employment schemes are increasing in Africa as part of poverty alleviation programs and are often directed toward the creation of rural infrastructure. Food for work schemes, a subset of public works programs in which food is provided as part of the wage, employ men and women on a range of these infrastructure building activities including roads, irrigation and drainage projects, soil conservation and fish tanks. When well-conceived and targeted, such programs can provide employment and income for poor, food insecure households and have positive distributional benefits through the assets which are created.

While food for work accounts for roughly half of all project food aid in Africa, it has generally been smaller-scale and less structured than in Asia, given lower density populations and often inadequate transportation. Normally food for work provides only temporary employment, rarely more than one or two months per year per person, and the combined value of the food and cash wages normally is kept below minimum wages to assure that this is employment of last resort. Nevertheless some asset development has been impressive. For example, a large portion of the road network in Lesotho was built through food for work schemes. Female participation rates have reached 80-90 percent in Angola, Lesotho, and Niger (World Bank, 1990).

One generic problem facing food for work projects in Africa is insufficient funds to pay the cash component of wages and to cover the costs of other physical inputs needed in carrying out the projects. As in the case of supplementary feeding, food aid monetization has taken place in a number of countries to generate funds for these needs.

Another serious issue is often the process by which food for work projects are selected. Where decisionmaking is decentralized, project selection is likely to be more relevant to local needs unless that decisionmaking is controlled by local elites who select projects and project locations to serve their own interests.

A third issue is the caloric expenditure involved in such work, particularly for malnourished or pregnant
women. Because of the harmful effects of arduous work in the latter stages of pregnancy, such work by pregnant women should be discouraged. For other malnourished women, the situation is more complicated. One suggestion is to include arm circumference screening for all women employed in such projects and to provide special food and micronutrient supplements to women found to be malnourished. Since food movement is required in any case for these projects, the movement of additional food for nutritional purposes would not pose major difficulty. Similarly, women’s food for work projects could well include creches for the young children of these women with an additional woman worker paid in food to care for them, and pre-cooked food supplements available for the children.

Notes

5. The lower cost in Iringa is the result of a lower nutrition worker to child ratio, 1 to 150 (but regularly falling with the training of a larger number of workers) as opposed to 1 to 100 in Tamil Nadu (Cerqueira and Olson), and to the use of small food supplements in Tamil Nadu for children suffering from growth faltering. Costs in both the Iringa and Tamil Nadu projects are substantially lower than the $21–50 per person per year range for community-based integrated programs which include food as calculated by Kennedy and Alderman (1987) and referred to in Annex D. This is in part because many of the earlier programs used expensive though donated food commodities, the value of which was included in cost estimates.

6. For presentation purposes, those core components which primarily address protein energy malnutrition (PEM) (growth monitoring, changing nutrition behavior, and food supplementation) are distinguished from those which address micronutrient deficiencies.

7. UNICEF is engaged in developing a well-calibrated but portable weighing scale.

8. Where weighing scales are available and where the average height of low-income reproductive age females is around 150 centimeters, a pre-pregnancy weight of less than 40 kilos has been found to be an accurate predictor of low-birth weight and neonatal mortality risk. Weight gain monitoring is particularly valuable. A minimum weight gain of one kilo per month during the second and third trimesters is recommended. Even two weighings one month apart during the second or third trimesters will provide a reasonable estimate of weight gain velocity. Where scales for adult weighing are not available, maternal height as a proxy for pelvic proportion can be a useful screening device to assess risk of low birth weight and infant mortality. Cut-off points in assessing such risk range from 21 to 23.5 centimeters (Maternal Anthropometry, 1990).

9. The cost, for example, of packaging alone of a one kilo container of an Indian commercial children’s food cost from 30 to 50 percent of the monthly per capita food expenditure of the poorest 20 percent of the Indian population in the early 1970s (Mellor and Lele, 1973).

10. One creative recent use of such a food has been in the Maternal and Child Health Program in Kinshasa, Zaire, assisted by ORT and USAID. The formulated food, Cerevap, while too expensive for project participants, was sold commercially in urban areas to generate funds for program operations (Kennedy and McGuire, 1990).

11. One NGO, convinced of the accumulated wisdom of village women on such matters as nutrition, devotes almost all its nutrition education efforts to the asking of pertinent questions to groups of assembled mothers (Dunford, 1990).

12. The project as a whole related primarily to the promotion of home-based ORT for diarrheal management, while the specific nutrition goal was to promote the feeding of children during and after diarrheal episodes (Rasmussen et al., 1990).

13. Monetization is the sale of food aid commodities, generally at the port, for cash which then becomes the programmatic resource. The purpose is to transform food aid into a more flexible resource and eliminate the costs associated with direct food delivery. Although at present, over half of all food aid provided to Sub-Saharan Africa is monetized, most of this falls under the category of program food aid (designated to be sold in the recipient country for local currency which is then used for purposes agreed to by recipient and donor—in practice to date, rarely nutrition). Less than a third of project food aid, that provided for specific development projects such as pre-school child feeding, is monetized (World Bank, 1990).

14. Community-based rehabilitation could circumvent some of these problems. Children, living at home, could be brought to a central location in the community, weighed, and provided on site with a specially formulated food (high in fat as well as calories, protein and micronutrients), while mothers could discuss, together with health workers or volunteers, problems in the recuperation. Although a similar process occurs in the Tamil Nadu program, there is, to the author’s knowledge, no such activity operating on a significant scale in Africa.


16. UNICEF data indicate that in most African countries, the incidence of low birthweight is 17 to 20 percent (UNICEF, 1990a).

17. In several Asian countries low pregnancy weight gain is, in part, the result of intentionally “eating down” during pregnancy to assure a smaller baby and an easier delivery. It is not clear that this practice is significant in Africa.

18. Recent observations by Martorell and Merchant from Guatemala, however, indicate higher than expected lactation continuing well into the next pregnancy (double loading on the mother) without nearly adequate nutritional compensation. The prevalence of this practice in Africa is not clear.

19. Marek (1990) using information from Burkina Faso (Brun et al., 1990) notes that fully 23 percent of calories derived by adult women from food staples are expended on daily water drawing (equivalent to 40 grams of cereal per day) and maize and cassava flour preparation (equivalent to 70 grams of cereal per day).

20. This section and the associated Annex B draw considerably on Levin et al., 1990.

21. Nutrients (iron and, where necessary, Vitamin A and iodine) should be included in the Essential Drugs Program for specific countries and into drug packages for health centers and communities put together by UNICEF and other organizations.

22. At this writing, inclusion of infants under the age of 6 months is still under study.

23. Depending on the nature and prevalence of the deficiency and the distribution of appropriate carriers, however, geographic targeting of fortification programs may be appropriate and more cost-effective than national programs. To date, such local fortification has not been tried on a significant scale.

24. In Brazil, salt iodination was effective in large part because the government purchased the iodate, thus requiring only minor cost increases for the industry and for consumers. In Guatemala, the
Vitamin A fortification of sugar failed because the industry had to buy the nutrient. When nutrient prices tripled, the industry, which was regulated by price controls, found its profits being squeezed and extricated itself from the program.

25. This could change, however, with the development of appropriate technology. Already, for example, at least experimental technology exists for the home-based iodination of water and fortification of cereals.

26. In Chile, where blood from animal slaughter is traditionally retained as a by-product, nutritionists used this iron-rich blood in some programs as an ingredient in nutritionally-enriched cookies.

27. Although the discussion of women’s income-generating activities in this paper focuses largely on opportunities for additional, non-farming earnings, the major source of income for many of these women is in farming either on their own farms or as agricultural labor on other farms. A broader examination of women’s income in a particular location should begin with this agricultural work and the extent to which women are able to derive direct economic benefit from it.


29. Even when an individual is able to make up lost weight after the harvest, the amount of food energy needed for such “make-up” is always greater than that needed for normal growth. This adds an inefficiency of resources factor to the health and nutritional costs of seasonal food shortages.

30. The problem is both an absolute shortage of food and seasonal shortages of specific foods, often those rich in micronutrients, particularly Vitamin A.

31. As with any income-generation project, there is no assurance that earned income will be used for household nutritional improvement. Similarly, as indicated by a careful evaluation of a garden project in Senegal, increased micronutrient consumption cannot automatically be assumed (Marek et al., 1990). Educational efforts accompanying these projects could, at a minimum, indicate ways in which some portion of garden production can be geared to nutritional improvement in the home.

32. Although gardens have usually been thought of as a source of micronutrients, they also can provide calories. By one estimate, sweet potatoes planted on a garden which is one twentieth of an acre in size can provide roughly 250 grams or 300 calories for each member of a five-person household for six months (Karim and Levinson, 1979).

33. An additional problem is that indigenous gardens receive little attention in the horticulture, economic, social science or nutrition literature or in academic study associated with these disciplines. Where agriculture ministries do get involved, a frequent approach is the “model garden”, generally developed without adequate regard for community realities, and rarely useful.

34. With or without a cash component to wages, food commodities provided will often be sold or bartered by recipients to meet non-food basic needs or to permit the purchase of other foods. Such practices should not necessarily be discouraged. It may be more appropriate to view food not as a nutritional input but simply as a medium of exchange. Whatever sale or barter takes place, very poor families will end up spending a high proportion of any wages on food.
Part II. Selecting Interventions

Having reviewed in Part I those categories of nutrition-related interventions which are relatively low-cost and, for the most part, relevant for community-based integrated nutrition programs, the task now is to identify specific types of inputs which agencies and donors might consider and which offer the possibility of positive and cost-effective impact in the short-run, defined here as within two years.

Normally, the selection of nutrition intervention programs in a country would be based on an assessment of the nature and magnitude of malnutrition problems, some determination of the causality of that malnutrition and an appraisal of alternative approaches in terms of their cost-effectiveness in addressing the problem or its primary determinants. Selection also would be based on feasibility, the likelihood of sustainability, and, in some cases, the ease of integration with existing programs. These factors vary, of course, not only from country to country, but also within countries.

But for smaller government agencies or donors, these determinations may be less important than the relative attractiveness of certain targets of opportunity within categories of interventions which generally are considered to be cost-effective.

A more basic choice facing such organizations relates to focus and scale. Is the desire to use resources intensively by concentrating them in a small geographic area, for example to do more for fewer people, or is it to use resources more extensively, covering a larger geographic area, although perhaps with less impact per person?

Organizations opting for the former, by definition local governmental bodies but also most NGOs, often concentrate their efforts in a small region of a country, and seek to significantly improve the well-being of that population. They often conceive of their work as providing a model for the country as a whole. The needs addressed by such organizations in many local areas of Africa remain considerable, in part because of a continued shortage of trained staff and in part because social service resource allocation in most countries of Africa, as elsewhere, continues to be skewed toward urban areas. Donors choosing to operate in specific local areas often work relatively independently, although they may collaborate with a local government department or an indigenous voluntary agency. Such an effort often requires substantial staff resources.

Organizations interested in more extensive coverage, or those not able to deploy significant staff resources for a more independent local initiative, may choose an alternative not available in most countries until recently, namely the opportunity to provide inputs to larger programs often covering large regions of the country, or, the country as a whole. During recent years, major nutrition activities have been developed in many African countries at the national or regional level, often with the assistance of large international donor agencies. As is suggested here, opportunities often exist within these programs to provide particular inputs which will increase the effectiveness of the program as a whole.

Programmatic Possibilities

Many of the inputs suggested in this paper could be applicable either to localized nutrition efforts or as inputs to larger coverage programs. These are discussed under the broad headings of core nutrition and household food security.

Core Nutrition Activities

With respect to growth monitoring, relevant inputs might include scales, growth charts, and arm circumference tapes although adequate training should always be provided with these items. In-country UNICEF offices usually are equipped and willing to handle procurement of such items. Funds may be needed for training and evaluation.

Counseling follow-up to growth monitoring is a potentially high-impact activity which rarely receives adequate attention in program development. Should a government agency or donor wish to develop a few areas of specialized competence in nutrition, this might be a particularly attractive candidate. As indi-
cated earlier, most growth monitoring includes no systematic follow-up whatever. Where follow-up attention does exist, it usually is attempted by harried workers who are trying to expedite the weighing itself. The content of such counseling tends to take the form of brief, standardized directives.

If growth monitoring is to achieve its objectives in the context of integrated programs, post-weighing counseling must be far more intentional. One attractive model is that used by several NGOs in rural Kenya where one health worker is assigned, as her sole task, the counseling of parents whose children have lost weight or failed to gain weight during the past month.

The task is critical and requires specialized training and materials since the reasons for growth faltering may be complex. Counselors must be prepared to seek out information on breast feeding, solid food supplementation, bouts of diarrhea and other infection and loss of appetite, do considerable creative listening, and relate the child's updated growth curve to those problems encountered during the previous month. The counselor's effectiveness is likely to be much enhanced if these sessions are followed-up by home visits.

The development of short-term highly-focused training and perhaps periodic retraining for this particular cadre of health workers or community volunteers with appropriate supervision would be likely to have almost immediate impact on the effectiveness of ongoing growth monitoring activities and, at the same time, set a standard for growth monitoring which could be followed by others.

Other nutrition education expenditures might include the cost of formative evaluation, focus groups and interviewing to develop appropriate messages and campaigns, the printing of materials, the financing of reinforcing mass media, or evaluation. Decisions on the value of any of these would depend largely on the overall design envisaged.

While food supplementation would not be appropriate for organizations with limited financing, there might be a role for them in carrying out research tasks or providing start-up costs relating to it. In countries where the use of amylase-rich foods (power flour) may be appropriate, the financing of research, and, if successful, assistance with start-up costs for its production may be relevant for community-based cottage industry production, an additional opportunity for women's employment generation.

Another relevant example might be that used in Sri Lanka to encourage the production of an indigenous children's food for on-site feeding programs. In this case, a government department provided grants of US$76 (1985 prices) to communities for the production of Kola Kendra (herb porridge). This covered the purchase of cooking equipment and utensils and operating costs for three months. The program, which provides a daily supplement of 300 calories to participating children, has been sufficiently popular to be continued in most areas with local resources (Levinson, 1989). Such start-up costs might be particularly relevant in "food as medicine" type activities, where locally produced, easily prepared food mixtures will be necessary for daily on-site feeding.

Any of the labor-saving equipment or implements used in the Iringa project to reduce the caloric expenditure of women, would appear most appropriate for small-scale financing. The hand-operated maize grinding machines which cost roughly $200 each, have a grinding capacity of 15 pounds of maize per hour. If an average low-income family which cannot afford the commercial hammer mill charges, needs to grind 5 pounds of maize a day, 30 families or roughly one third of the households in an average Malawi village—and presumably the poorest—could use the mill in a 10-hour day.

More generally, such financing might assist governments or NGOs to develop packages of ante-natal care which are cost-effective for inclusion into integrated, community-based programs. This might include pilot projects, training and/or the development of materials.

One other potentially attractive area for small-scale financing where community-based programs are being planned or implemented is in the provision of prizes to those communities which achieve the most progress according to some empirically verifiable parameter, for example, reduction in moderate and severe malnutrition among young children, reduction in low weight pregnant mothers, or, eventually, a reduction in the prevalence of low birth weight infants. Prizes might also be given for the percentage of young children or families participating in the program.

The prize itself, presented at a public function by a governor or district secretary, might be anything from a trophy to some developmental input of benefit to the village as a whole, for example, an artesian well for drinking water. Where this has been tried, in Zimbabwe, Indonesia and elsewhere, it has generated community enthusiasm and provided an incentive to village leaders to use project resources efficiently.

Micronutrient supplementation and fortification programs are often particularly attractive to organizations looking for low cost program activity. Where one or more of the primary micronutrient deficiencies is widespread and where particular criteria are met, these projects are almost inevitably cost-effective.

While the nutrients required for micronutrient supplementation programs sometimes are provided by international agencies there is a need for many more micronutrient programs in Africa, and there are numerous program proposals seeking primary finan-
In a US$2 million micronutrient supplementation program in Malawi, the estimated three-year costs for nutrients are Vitamin A—$700,000; iodine—$600,000; iron (ferrous sulfate and folic acid)—$450,000. There also are smaller, less frequently recurring costs which may be vital for program success and appropriate for financing by government agencies or donors with more limited resources. These include (a) staff training; (b) printing of forms and of educational and training materials; and (c) evaluation expenses. In the same micronutrient supplementation program in Malawi, the estimated cost of each of these expenses was between $50,000 and $100,000 (Government of Malawi, 1989).

One attractive new input in Vitamin A supplementation programs is a plastic pump dispenser which squirts accurately calibrated liquid doses directly into the mouths of children and avoids the problem of young children needing to swallow capsules.

Financing of fortification programs where the necessary criteria are met offers a particularly attractive opportunity for short-term impact. The primary expenditures in fortification programs normally are equipment costs (and sometimes several years of micronutrient supply). Equally important, but often not included in fortification project budgets, is educational information for the population explaining the fortification program and its benefits. While this should be a component of all fortification programs, it is particularly important where consumers face a choice between the fortified and unfortified product.

Other needs often discussed but less frequently addressed are (a) the development of local institutional capacity to carry out periodic sample testing which will determine whether the added nutrient is present in the fortified food; (b) development of enforcement mechanisms where mandatory fortification is planned or underway; and (c) baseline surveys and periodic evaluation to assess impact and adjust programs as necessary. Any of these needs might be met with low-cost financing.

Newly-developed calibrated iodine feeders for the iodination of well or home water are now available for areas where this is a relevant intervention. More generally, this innovation suggests the potential value of donor support for research and development work pertaining to micronutrient programs.

Government agencies and donors interested in the provision of packages of agricultural inputs might consider the value of nutrient-rich varieties of sweet potatoes and other such foods.

**Household Food Security Activities**

Many of the programmatic input possibilities relating to core nutrition activities and discussed here can be provided in Africa through existing government systems at the central or district level or through national networks of private organizations. In most African countries there are entities responsible for growth monitoring, nutrition education, food supplementation, and some micronutrient distribution. Increasingly, as indicated earlier, these entities are focusing their inputs on integrated programs. By contrast, activity relating to poverty lending and pre-harvest hunger alleviation are relatively new in most countries and, accordingly, must be addressed more directly by interested donors or government agencies at the local level.

Poverty lending can be assisted through inputs of credit to help capitalize the program or through the financing or direct provision of technical assistance related to the creation of village credit associations and the necessary infrastructure for successful minimalist credit.

Similarly both capital and technical assistance are needed to support pre-harvest hunger prevention. As described earlier, such projects in need of assistance might include community food preservation or storage (including cereal banks or regulated storage and lean season sales by surplus producers), or one-time packages of agricultural inputs and food to female-headed households which are at present not agriculturally viable. The premium in this type of assistance would be on the empowerment of local communities to find at least partial solutions to these nutritionally-debilitating seasonal problems.

Financing of gardens might be made either on a credit basis if the purpose is primarily for income-generation, or on a grant basis if the garden is to be used primarily for the nutritional improvement of children in the community. In both cases, plans detailing the division of labor and benefits, and the required inputs would be necessary.

Involvement in food for work by government nutrition departments or donors with more limited resources might best be limited to the financing of added nutritional components, for example, screening of women, special food plus iron and folate supplementation for those who are malnourished, and creches with food provision for the young children of women workers. Such aid assumes cooperation from the concerned food aid donors and recipient governments.

**Operational Considerations**

As indicated, most of the programmatic possibilities would be relevant as local initiatives or as inputs in larger, more extensive programs. There are, however, considerations particular to each approach that deserve attention and are summarized below.
Local Initiatives

A government agency or donor choosing to work intensively in a limited geographic area might choose to offer some combination of inputs in a preselected number of communities and in ways which appear appropriate given the needs and capacities of these communities.

An alternative approach, reflective of experience with emergency social funds in Latin America, might be the creation of a capital fund with government allocated or externally provided financing, and the relaying of information about the fund (indicating criteria and priorities) to communities in a particular geographic area. Applications by individual communities then could be made to this capital fund for grants or loans to permit particular nutrition or household food security-related activities.

A particularly attractive scenario for use of such a capital fund might be a variation on the community-based credit schemes assisted by the Freedom from Hunger Foundation in Africa and discussed in Part I. The scenario might operate as follows:

- Communities, on their own or with NGO participation, would be encouraged to initiate integrated nutrition projects with an active women’s credit component.
- To be eligible for resources from the capital fund for the credit program, a community would be required to have in place a well-functioning set of basic nutrition services including, at a minimum, growth monitoring for children under the age of 36 months, associated nutrition education, screening of pregnant women using arm circumference tapes, and ante-natal care and counseling plus iron and folate supplementation for “at-risk” if not for all pregnant mothers. Financing of these nutrition services would be available from the capital fund unless the necessary inputs for them were otherwise available through the country’s primary health services, other donors or NGOs.
- Once a community offers evidence of a stable set of nutrition services, it would become eligible for a capitalized credit program. Assistance to communities in the establishment of such systems might be delegated to participating NGOs, which should also have a role in ongoing assistance and evaluation. Loans provided through the credit associations could be made available either to individuals or pre-formed groups with donor replenishment of loan capital to the community made contingent on full repayment.

Clearly the management of such a system will require a well-operating decisionmaking body and support staff, probably a semi-autonomous or quasi-public institution partially financed by the government agency or donor, to convey information about these possibilities to local communities and NGOs, review proposals, make disbursements, and review progress. There may be situations where different scenarios may be necessary. Yet in Zimbabwe an analogous system operates using regional and local committees (Mafon et al, 1989), and in Lesotho, an operation with some of these components was initially operated out of the local UNICEF office. In Ghana, Mali, and Togo, the credit and nutrition education components are carried out using combinations of voluntary agencies. Accordingly, in at least some settings, and with the cooperation of at least one government department at the central or district level and active NGO participation, it may be possible to initiate such a system. Clearly this would have multiplier benefits in terms of local cooperation, the development of local skills, and the organization of local women.

To be effective and to stay in close touch with the communities which will be carrying out such activities, such review and disbursement systems should be established at the most local administrative level and in needy areas of the country. A government agency or donor might begin such a program in a nutritionally depressed area of the country but one where such an organizational set-up appears feasible; and then, based on this experience, consider the creation of similar efforts in other areas.

Component of Larger Programs

An organization interested in participating in a larger, often multi-donor undertaking, will need to consider both the attractiveness and potential impact of the program as a whole. and the likelihood that its particular input(s) will increase the effectiveness of the larger program.

Financing of project components might well relate to and facilitate larger-scale planned or ongoing programs in at least the following three ways: (a) necessary preparatory activities; (b) specific program components which for various reasons may be difficult to include in the primary funding arrangements; and (c) innovative short-term targets of opportunity which emerge from program operations. Financing may be needed for evaluative studies. A government agency or donor interested in this type of a role would need to be particularly flexible and capable of decisionmaking without lengthy lead time. Examples
of each of these possibilities, described briefly here are taken from existing or planned nutrition projects in Africa.

PREPARATORY ACTIVITIES

(a) In Malawi, project preparation work on the nutrition component of a larger public health-related program identified, as one area of concentration, an attempt to reduce the high caloric expenditure of women. Specific attention was focused on the possibility of providing hand-operated maize grinding machines to communities to reduce the need for hand pounding of maize. Although such equipment had proven effective in Tanzania, the government expressed skepticism in the absence of in-country proof of effectiveness. In this situation, quickly-developed trials of the machine might have provided the needed information in time for necessary decisionmaking. Such trials, unfortunately, were not carried out, and commercial interests in the country were able to block its inclusion in the nutrition component.

(b) In Mozambique, an international food security mission identified yellow maize and sorghum as potentially self-targeting, low-status foods which might be disproportionately consumed by low income groups in food distribution or subsidy programs. Although the government had carried out a major food consumption survey, it had not covered areas where sorghum is well-known and available, and had failed to distinguish between white and yellow maize. As a result there was no empirical basis for decisionmaking. An interested donor agency, currently on site, however, has taken up the idea of field trials to assess preferences for these foods and their potential use in such programs.

PROJECT COMPONENTS

(a) In Lesotho, a World Bank-financed credit scheme for the purchase and operation of hammer mills by women’s groups required technical backstopping not available from existing government institutions but available from an international NGO working in the country. Although the principal donor at the outset of the project was not able to include the costs of including the NGO, this relatively small component might have been financed by another donor. Such financing was not forthcoming, however, depriving the project of a potential key input as well as a valuable advocate for the relatively powerless rural women who would be the primary beneficiaries of the project.

(b) Similarly, in Lesotho, a famine-related early warning system financed by Food and Agriculture Organization (FAO) did not include adequate funding for the inclusion of child growth monitoring data from health centers throughout the country. A small additional increment by an interested donor would have permitted the inclusion of this important information and the low-cost development of a nutrition monitoring system for the country.

TARGETS OF OPPORTUNITY

(a) A review of nutrition facilities in Ghana found that the first two years of nutrition training at the Rural Health Training School at Kintampo was limited to academic instruction because of the lack of transportation for field work. This is particularly unfortunate in that Kintampo not only has an active primary health center and outreach program, but is also the Ghana site of the Freedom from Hunger Foundation’s community nutrition and credit initiative described earlier. Very modest donor assistance would have provided almost immediate results in improving the quality of nutrition training in the country.

(b) The same review in Ghana found an almost total lack of up-to-date nutrition information materials. Given the considerable human resources available to further nutrition education among the largest cadre of such workers in Africa—and the high level of commitment already accorded to it, a revamping of the content of nutrition education might have produced significant short-term results. The financing of necessary message formulation and testing, the one-time printing of materials, and/or a brief retraining course for nutrition field workers focusing on the new materials might have been possible for a government agency or donor at relatively low cost.

In general, separately-financed components of larger projects are likely to be more effective if they:

• Avoid logistical and administrative complexity;
• Are labor rather than capital-intensive in terms of physical inputs;
• Are consistent with the norms necessitated by structural adjustment; and
• Are capable of making a difference in the overall effectiveness of the integrated programs with which they are associated.
Finally, interested government agencies or donors considering participation in larger programs should ensure that these:

- Are targeted to those in greatest need;
- Address priority nutritional needs in the area;
- Have the capacity for careful assessment of the problem and its determinants, and the ability to collect necessary baseline data and carry out regular assessments and periodic evaluations;
- Include the potential for active community participation in the identification of needs and in the operation of activities;
- Include, as necessary, participation of experienced NGOs; and
- Have adequate capacity for effective ongoing management of the program.

There is indeed a rich array of relatively low-cost opportunities for government agencies and donors committed to poverty alleviation, to become more actively involved in sustained efforts to combat malnutrition in Africa. The problems are substantial, but experience, particularly during the past decade, indicates that they are less intractable than had been earlier assumed. More generally, some major investments, a well-documented process of trial and error, new research findings, and careful, empirically-based assessments of nutritional benefits and costs permit today a much clearer roadmap for nutrition work in Africa than existed even ten years ago.

Notes

35. Data collected by the author in Malawi, 1989. Extensive research on these machines has been carried out at the Center for Appropriate Technology in Arusha, Tanzania. They are simple to install and only the millstone needs to be periodically replaced.

36. In some cases the effectiveness and commitment demonstrated by the community in setting-up the core nutrition activities will provide a good indicator of its ability to manage the credit.

37. In many African countries there are inherent constraints on government-related projects emanating from structural adjustment programs. Groups working in nutrition have sometimes experienced difficulties when projects have required additional government personnel, high levels of recurring expenditure or restrictions on private initiative. It is important to note, however, that the stated objective behind most of these constraints is public expenditure reform, which includes the redefinition of priorities and the redressing of imbalances. In countries where nutrition traditionally has received inadequate resources, there may be a case for significantly increased expenditures which would be consistent with the overriding purposes of structural adjustment.
Annex A: *Summary of Programmatic Possibilities*

Core Nutrition Components (Growth Monitoring, Nutrition Education, Food Supplementation, and Micronutrient Activities)

- Scales, growth charts, and/or arm circumference tapes;
- Training or retraining of local workers in nutritional counseling associated with growth monitoring;
- Message development, printed materials, mass media reinforcement or evaluation pertaining to nutrition education;
- Research and/or start-up costs for food supplementation components;
- Development of information packages of antenatal care for incorporation into such programs;
- Labor-saving equipment or implements to reduce the caloric expenditure of women;
- Prizes to communities operating effective programs;
- Micronutrient supplies;
- Staff training, printed materials and evaluation expenses pertaining to micronutrient supplementation;
- Vitamin A pump dispensers;
- Educational materials relating to food fortification;
- Periodic sample testing of fortified foods and evaluation of impact; and
- Calibrated iodine feeders for the iodination of well water.

Household Food Security Components

- "Minimalist" revolving credit geared to employment-generation for low-income women, and provided to communities through village credit associations;
- Financing of gardens and/or labor-saving equipment and implements for participating communities;
- Community food preservation;
- Community storage, including regulated storage and lean season sales by surplus producers; and
- One-time packages of agricultural inputs and food to break lean season-induced cycles of poverty among female-headed households.

Other Activities

- Nutritional components of women's food for work projects to include screening of women, provision of special food and micronutrient supplements, and supervised caretaking with food provision for their young children; and
- Pilot studies to determine the costs and effectiveness of periodic deworming.
Annex B: Effects of Micronutrient Deficiencies on Nutritional Outcome Variables

Iron Deficiency Anemia

Iron deficiency anemia, affecting over 50 percent of children and over 60 percent of pregnant women in Africa is the most common nutritional deficiency in many African countries and second only to PEM in others. It is usually caused by the interaction of iron-related dietary factors and chronic iron loss due to parasitic infection or malaria. Highest risk groups are young children and pregnant and nursing mothers among whom iron needs are also proportionately higher. A major problem is its bio-availability or absorption which is much higher in animal than in plant foods, but which can be increased by roughly 30 percent in the latter by the addition of ascorbic acid (Vitamin C) which often is provided along with an iron compound.

- **Effect on mortality (high).** Studies indicate a strong relationship between anemia and maternal and infant mortality. In Nigeria, 15 percent of severely anemic infants died in the first year of life, and 4 percent of severely anemic mothers died in childbirth. In West Africa, an estimated 20 percent of all maternal deaths were directly attributable to anemia.

- **Effect on growth (moderate).** Treatment of anemic children results in increased growth during the period of intervention. One explanation may be the effect on appetite which decreases with iron deficiency.

- **Effect on birthweights (high).** Evidence from several countries indicates a much higher risk of low birth weight or prematurity where mothers are anemic. In Papua New Guinea, the risk of having a low birth weight infant was found to be five times higher among severely anemic women.

- **Effect on morbidity (moderate).** Because of the association of iron deficiency with various types of immunity, pregnant anemic women suffer from higher morbidity. For the infant, the lactoferrin in breast milk protects the infant against infection through its effect on iron in the intestinal tract and by making the iron more absorbable.

- **Effects on cognitive abilities and productivity (moderate to high).** Iron deficiency anemia has been found to have negative effects on the attention and concentration of preschool and school-age children with implications for educational achievement, and to impair worker productivity in plantation agriculture.

Iodine Deficiency

Iodine deficiency disorders (IDD) affecting roughly 10 percent of the population of Africa is concentrated in mountainous and flood-prone areas. Most vulnerable are the fetus, reproductive age women and children. IDD results either from soil or water which is iodine-deficient or because of certain "goitrogens" in food which interfere with iodine utilization. In Africa, the faulty processing of cassava sometimes has resulted in such goitrogen interference.

- **Effect on mortality (mild).** Although conclusive evidence on the effect of iodine deficiency on human reproduction is weak, studies in Zaire have found a reduction in stillbirths and perinatal mortality resulting from IDD control programs and lower infant mortality when mothers were given iodine supplementation during pregnancy.

- **Effect on growth (mild).** Severe iodine deficiency in utero can result in postnatal dwarfism, and IDD-affected children can be retarded in their physical growth.

- **Effect on birthweights (mild).** Studies in Zaire also found somewhat higher birth weights after the implementation of IDD control programs.

- **Effect on morbidity (mild).** IDD can increase morbidity rates in children particularly from respiratory infection.

- **Effect on cognitive abilities and productivity (moderate to high).** The major effect of IDD relates to mental retardation. IDD in pregnant women results in reduced brain DNA and RNA in the fetus and extreme deficiency leads to severe mental retardation or cretinism. Probably more serious,
however, is recent evidence that less severely affected (and often unnoticed) children may be mentally and neurologically handicapped. Furthermore, there is some evidence that even the effects of mild iodine deficiency, particularly during fetal life, on brain function may be irreversible. These effects of IDD on intellectual capacity also have been found to have adverse effects on productivity.\textsuperscript{40}

**Vitamin A Deficiency**

Vitamin A deficiency affects roughly 15 percent of the children aged 1–4 years in the 16 African countries identified as having significant or probable problems.\textsuperscript{41} Those at highest risk are pre-school age children, adolescents, and pregnant women. Risk in some areas appears higher in boys than girls. Prevalence is highest among low-income groups, particularly in countries where the staple cereal is rice (which has no Vitamin A), and during seasons when Vitamin A-rich foods as a whole are scarce. Absorption of Vitamin A may be low because of inadequate fat or protein intake or because of bacterial infection or parasites. Children who are not breast fed, for example, are at higher risk of developing one or more signs of Vitamin A deficiency. Infections also can increase the requirement for Vitamin A and exacerbate adequate intake through appetite loss. The most serious illness in these respects is measles which is the precipitating factor in roughly 50 percent of the cases of Vitamin A blindness.

- **Effect on mortality (high).** Major new research in Madurai, India has found a 55 percent reduction in mortality in children receiving the recommended allowance for Vitamin A each week. Earlier data from Indonesia had found high rates of blindness resulting from xerophthalmia (caused by severe Vitamin A deficiency) among children, and that 50–80 percent of those children die within a year. Even children with mild Vitamin A deficiency appear to have higher mortality rates than matched controls. In total, an estimated 16 percent of all child deaths were attributable to Vitamin A deficiency. These highly significant effects appear to relate to the role of Vitamin A in maintaining healthy tissue in the body and through its effects on immune function.

- **Effect on growth (high).** Because of its effects on the immune system and cell differentiation, there is a well-documented association between Vitamin A deficiency and growth retardation.

- **Effect on birth weights (unclear).** Vitamin A deficiency in pregnant women appears to have effects on reproduction and possibly congenital malformation. In addition, to the extent that Vitamin A deficiency affects female birth weights, some effect on birth weights would be expected. Because Vitamin A overdose during pregnancy can also have negative effects on the renal and nervous systems of infants, high dose Vitamin A supplements during pregnancy usually are not recommended. However smaller doses, for example, 10,000 I.U. per day, can be safely given.

- **Effect on morbidity (high).** Aside from its strong reciprocal interaction with measles, Vitamin A deficiency is associated with respiratory and diarrheal disease. In Indonesia, Vitamin A deficient children were found to suffer two to three times the incidence of respiratory disease and diarrhea.

- **Effect on cognitive abilities and productivity (mild).** While Vitamin A deficiency has no known effect on learning and behavior, and hence productivity, the effects of vision impairment and blindness resulting from Vitamin A deficiency are obviously major.

**Nutrient Interactions**

In addition to those referred to, studies indicate that both PEM and Vitamin A deficiency may exacerbate iodine deficiency, that zinc deficiency may interfere with iron absorption, and that Vitamin A deficiency may affect anemia. Any micronutrient deficiency which decreases the absorptive capacity of the gastrointestinal tract will adversely affect the absorption of other nutrients.

**Notes**

38. African countries with recorded data (A = national prevalence, B = regional prevalence, C = for some age groups) and a significant prevalence of iron deficiency anemia (over 20 percent) are Benin (59 percent C), Chad (25 percent C), Kenya (20 percent B, C), Sierra Leone (50 percent A), Tanzania (25 percent B, C), Zambia (49 percent C), and Zimbabwe (45 percent C).

39. African countries with recorded data (A = national prevalence, B = regional prevalence, C = some age groups) and significant prevalence of IDD (over 10 percent) are Botswana (63 percent B), Burundi (56 percent B, C), Cameroon (49 percent B), CAR (25 percent A), Chad (11 percent B), Comoros (40 percent B), Côte d'Ivoire (18 percent B), Ethiopia (34 percent A), Ghana (13 percent B), Guinea (15.4 percent A), Kenya (30 percent A), Lesotho (14.3 percent A), Madagascar (18 percent B), Malawi (30 percent B), Mali (20 percent B), Niger (13 percent A), Nigeria (40 percent B), Rwanda (19 percent B), Senegal (33 percent A), Sudan (20 percent B), Swaziland (26 percent A), Tanzania (40 percent B), Zambia (20 percent A), and Zimbabwe (20 percent A).

40. It should be noted that iodine deficiency also appears to have a pronounced negative effect on animal productivity leading some farmers in areas of iodine deficient soils to set up iodated salt licks.

41. African countries with significant problems are Benin, Burkina Faso, Ethiopia, Malawi, Mali, Mauritania, Tanzania, and Zambia. Countries with probable but not fully assessed problems are Angola, Chad, Ghana, Kenya, Mozambique, Niger, Nigeria, and Uganda.
Annex C: Deworming

Parasitic (helminth) infections\(^4\) (the major ones being hookworm, ascaris, strongyloides, trichuris and schistosomes) are worm infestations which enter the body by direct penetration of the skin, by the injection of biting insects, or from oral ingestion of worm eggs resulting, in turn, from fecal contamination of food or hands. They are of public health and nutritional concern mainly because of their negative effects on growth and because of the possibility of long-term learning impairment. Nutritional problems result from impaired digestion and absorption which affects the utilization of calories, protein, iron and Vitamin B12. Parasitic infection also can precipitate anemia and, in the case of schistosomiasis, death, although only a small fraction of that caused by diarrheal disease or acute respiratory infections.

Interest in combatting parasitic infection, long discussed but rarely incorporated in nutrition programs, has been rekindled by the more effective, non-toxic drugs now available. It is, in fact, now probably possible to treat almost all parasitic infections simultaneously with three single dose drugs which are effective for one to five years.\(^3\) Sanitation and vector control programs are unlikely to be effective without unrealistically large investments.

Although deworming is possible among young children over the age of 6 months, most programs have focused on school age children among whom worm burdens are usually the highest. The theory is that repeated treatment of a heavily-infested group will also reduce parasitic transmission to others in the community. Accordingly, it appears that treating school children is more effective than treating an entire community. At the same time, mass treatment of school children is usually more cost-effective than screening children given the high cost of the screening itself.

The most expensive of these drugs is Praziquantel used for the treatment of schistosomiasis—roughly US$4 per person treated. Drugs for the treatment of other helminth infections are as inexpensive as $0.25 per treatment. The cost of treating an average school age child in Africa from the ages of 5 to 14 would be roughly $10 for the 10 year period.

Because these drugs are relatively new to most areas of Africa, the present priority appears to be pilot programs administering them at periodic intervals to measure costs and effectiveness in promoting growth and reducing morbidity.\(^4\) Further testing also may be necessary to assure that all three drugs can be given safely at the same time. Use in community-based programs to date has been relatively infrequent although results have been generally positive.

Notes

42. This annex draws considerably on Warren et al, 1989.

43. Sanitation and vector control programs are unlikely to be effective without unrealistically large investments.

44. Recent and as yet unpublished research results from Kenya by Stephenson and Latham, found that despite continual exposure to reinfection, schoolboys receiving a single dose of Albendazole registered significantly improved growth, physical fitness and appetite. The Kenyan research also found that treating helminth infections significantly improved cognitive competence.
This annex provides a brief discussion of the historical evolution of integrated nutrition projects and offers an international perspective on their potential effectiveness in addressing malnutrition problems.

During the late 1950s and early 1960s, the predominant form of nutrition activity in low-income countries were the Applied Nutrition Programs (ANP). Supported by UN agencies in 65 countries, these programs included combinations of small-scale food production activities, food supplementation, and nutrition education at the community level which sought to bring about nutritional improvement. The original ANP conceptualization, however, was not the creation of new activities but rather the coordination and strengthening of existing services relating to food production and utilization (McNaughton, 1975). Evolution of the ANP was itself a reaction to the scattered training and milk powder-based child feeding programs which had been operating earlier.

By the early 1970s these programs generally were acknowledged to have been unsuccessful in affecting malnutrition. This assessment was based only rarely on impact evaluation given the almost universal absence of reliable baseline data or control groups. More generally, negative impressions of these programs were based (a) on data indicating the absence of change in behavioral patterns (for example, McNaughton, 1969); (b) on the negative perceptions of beneficiaries (for example, Muthayya et al, 1978); and (c) on the problems identified in broader-based evaluations (for example, Hundley, 1966).

During the 1970s, ANP programs were generally replaced by support for multisectoral nutrition planning and clinic-based activity. Multisectoral nutrition planning was based on a recognition that malnutrition is not simply a health problem but one also inextricably related to food policy, agriculture, income-generation and other areas of development concern. Proponents argued that with rational planning and coordination, inputs from these diverse policy and program areas could be organized and ordered in ways which would address malnutrition problems more effectively than had been the case with traditional line ministry approaches. The emergence of this concept in the early 1970s was consistent with a high premium placed on systematic program planning in development programs as a whole at that time. Although conceptually sound, the idea proved exceedingly difficult to operationalize at the national level. Nutrition planning units established in many countries (a) seldom were given adequate authority to have any significant effect on major decisionmaking, (b) often antagonized the bureaucracy of line ministries (particularly ministries of health), and (c) proved particularly vulnerable to political change. As a result few of these units were still in existence by the mid-1980s (Levinson, forthcoming).

At the same time that attention was shifting to multisectoral nutrition planning, the primary locational focus of operating programs, particularly in Africa, was shifting away from the community and toward more geographically centralized rural health centers, parts of which often were designated as maternal child health (MCH) clinics on certain days of the week. This new focus resulted in part from a recognition of the synergistic benefits of combining nutrition with the control of infection (Scrimshaw et al, 1968 and Kielmann et al, 1978). The shift in focus to health centers also resulted from a shift in humanitarian food aid toward pre-school age children, and the relative attractiveness of MCH clinics as a delivery system for packages of "take home" food commodities. Once the health centers became distribution points for this food, growth monitoring of young children and nutrition education lectures for mothers usually were added as well.

By the mid 1980s, it had become clear that the clinic-based approach to nutrition, while perhaps useful in getting young children to health centers for immunizations and other health care, was not an effective means of improving the nutritional status of young children. In most cases, the food commodities provided to families were not reserved for the young children (although they were, unquestionably, an im-
the more recent initiatives have been far more sharply targeted to the vulnerable population (particularly younger children and food-insecure households) and to the malnourished within these groups.

- While the older ANP programs were largely supply-oriented (provision of pre-determined sets of inputs), more recent programs are increasingly demand-oriented and responsive to particular felt needs of communities. One result is considerably more community participation than in the 1960s.

- Newer programs also have paid much more explicit attention to the determinants of malnutrition, and, most specifically, to the issue of resource constraints. One result has been nutrition education activities which, by taking these constraints and women's perceptions into account, have become far more relevant. Another is a recognition that these resource constraints can be addressed directly in the context of community programs. A third result of attention to causality is a recognition that food itself may not always be the essential element in such programs. The best of the new programs, in fact, have used supplementary food sparingly, but have provided greater attention than before to infectious disease control, and have provided a locus for expanded immunization programs.

- Finally, the more recent programs have devoted substantially more attention to management and to evaluation than was the case before. On a worldwide basis, several of these newer integrated programs for which good data exist, have had significant effectiveness in reducing malnutrition on a substantial scale. The Tamil Nadu Integrated Nutrition Project (TINP) in India, initiated in 1980 and covering just under 2 million children aged 6 to 36 months in 11 districts (roughly 40 percent of the state of Tamil Nadu) reduced the prevalence of severe malnutrition (defined as weights of less than 70 percent of weight for age standards) by 55 percent (Vaidyanathan, 1989 and Berg, 1987). In Indonesia, the Nutrition Communication and Behavior Change Component of the Indonesia Nutrition Development Program covering over 52,000 children in 60 villages in 5 subdistricts, reduced moderate and severe malnutrition (weights for age of less than 75 percent of standards) by about 50 percent (McGuire and Austin, 1987 using data from Zeitlin, 1984). The Tamil Nadu project included the provision of small daily food supplements for children experiencing growth faltering while the Indonesia project was carried out without food supplements.

A more general, though early review of integrated community-based projects by Mason et al. (1984) found that they reduced the prevalence of malnutrition on average by 5 to 15 percent. A similar review by Gwatkin, Wilcox, and Wray (1980) indicated that, if effectively implemented, such projects had the potential of reducing infant and child mortality by one third to one half in 5 years. The cost of most such programs, when they include supplementary food, range from US$21 to 50 per person per year in 1982 dollars (Kennedy and Alderman, 1987).

Notes

45. An exception was an ANP evaluation in Tanzania (Burgess and Maletnlema, 1967).

46. A review by the author of early documents pertaining to Applied Nutrition Programs of the 1960s indicates that despite serious shortcomings in actual ANP implementation, there was at least lip service given to three of these four issues. Program documents refer frequently to the need for community participation at all stages of ANP program development and implementation (for example, FAO, 1966, and FAO, 1967), and one even refers disparagingly of “programs imposed autocratically from above” (Johnston and Greaves, 1969). There is some discussion of the need to address the causes of malnutrition (for example, FAO, 1967). Considerable attention is given to evaluation in most ANP manuals and reports, and several offer details on management techniques such as PERT (Program Evaluation and Review Technique) considered sophisticated at that time (for example, Latham, 1968).

At the same time, there is virtually no mention in any of these early documents of targeting resources to those in greatest need. In a listing of 29 recommendations emerging from an international seminar on ANP programs in Africa, for example, (FAO/Africa, 1966), and in dozens of recommendations emerging from similar
meetings elsewhere in the world, there is no word about targeting. The only references at all, in fact, to the economic status of beneficiaries were contained in early reports from the ANP in India which debated whether the ANP was "basically a welfare program aimed at the poorer and vulnerable sections of the village community, or whether its activities... (should) improve levels of living of all members of the rural community" (McNaughton, 1975). The implication is that as late as the early 1970s the international nutrition community as a whole had not yet become fully aware of the enormous disparities in both economic and nutritional status which exist even in the rural areas of low-income countries.


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