TECHNICAL ASSISTANCE

Increasing the Nutritional Impacts of Agricultural Interventions

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Supporting integrated food security and nutrition programs to improve health and well-being of women and children

FOOD AND
NUTRITION
TECHNICAL
ASSISTANCE

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I. INTRODUCTION

The primary objective of the study upon which this summary is based was to foster a clearer and more in-depth understanding of program and policy options for improving the impact of agriculture projects on nutrition levels. This knowledge should provide guidance to policymakers and program managers in the selection and design of effective agricultural interventions. Findings and recommendations are based on an extensive review of the literature, as well as interviews with researchers; USAID project managers; NGO, private sector, and university project implementers; and other development actors with knowledge of food security issues. A more detailed version of this paper will be available from the FANta project in early 2000.

The rationale for most USAID agriculture-sector interventions in Africa derives from the premise that household income generation is an effective means to reduce poverty and increase food security. The review focused largely on programs in agricultural research, productivity, and policy, and food marketing systems in four African countries (Ghana, Kenya, Mozambique, and Uganda) that are representative of USAID's program portfolio on the continent. However, many of the activities contained in the four agriculture portfolios did not fall neatly into these categories. Several of the projects included agroprocessing, credit, and microfinance and microenterprise components, and some of the most successful programs cut across several areas. Furthermore, literature on the linkages between agriculture and nutrition often extends beyond the boundaries of the focus areas. Country-specific information is included in the longer report; this summary includes an explanation of the conceptual framework used to link agriculture and nutrition and a listing of the recommendations for strengthening these links based on the country-level research and analysis.

The concept of "food security" varies over time and across institutions and disciplines. A researcher who defines food security as consisting only of *availability* (physical supply) and *access* (ability to purchase) to sufficient food may arrive at a very different conclusion about household food security than a researcher who factors in the notion of *utilization*. Similarly, USAID considers small-scale production of non-traditional agricultural exports to be part of microenterprise development. However, small-scale basic cereal production is excluded in the USAID view, because much of what is produced is for home consumption. Consequently, the conclusions of a USAID review of microenterprise programs are not directly comparable to a review that attempts to be more inclusive.

Another important point to be borne in mind is that not all agricultural projects with nutritional impacts have explicit nutrition objectives. Often, nutritional impacts are unplanned, indirect effects. In such cases, the projects do not monitor nutritional impacts, even when they exist. Just as performance monitoring requirements vary across different USAID assistance programs (e.g., PL480 Title II, Child Survival, and Development Assistance), so does the depth of program impact information. Title II programs, for example, place a heavy emphasis on food security and include strict reporting requirements based on performance indicators. Thus it is relatively easy to establish agriculture and nutrition linkages for Title II projects. Tracing nutritional impacts is much more difficult in the case of Development Assistance projects, which do not require the use of monitoring indicators and have less rigorous reporting procedures. In many instances, the specific linkages between USAID agricultural interventions and nutrition had to be inferred from anecdotal information.

II. FOOD INSECURITY AND MALNUTRITION IN SUB-SAHARAN AFRICA

For the purposes of this paper, food security is defined according to USAID's definition (USAID, 1995), as summarized in Table 1.

Table 1: USAID Definition of Food Security

Food Security: When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life.
Three fundamental elements of food security: **1. Food Availability** is achieved when sufficient quantities of food are consistently available to all individuals within a country. Such food can be supplied through household production, other domestic output, or commercial imports of food assistance. **2. Food Access** is ensured when households and all individuals within them have adequate resources to obtain appropriate foods for a nutritious diet. Access depends on income available to the household, on the distribution of income within the household, and on the price of food. **3. Food Utilization** is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water and adequate sanitation. Effective food utilization depends in large measure on knowledge within the household of food storage and processing techniques, basic principles of nutrition, and proper childcare and illness management.
Source: IMPACT (1997)

Availability refers an adequate supply of food within the country or region. *Access* refers to adequate means to obtain food, via home production, the market, or other sources. *Utilization* refers to the appropriate biophysical conditions (i.e., good health) required to adequately utilize food to meet specific dietary needs. With respect to these three components of food security, agriculture constitutes the most important factor in availability; a primary factor in access where livelihoods are agriculture-based; and a complementary factor in regard to food quality and processing for utilization.

Food security analysis at the national or regional level yields important information for program design and policy prescription. This study, however, addresses the nutritional impacts of agricultural interventions and thus focuses primarily on households and individuals. At the individual level, food security implies that a person is well nourished. Poorly nourished individuals are said to be food-*insecure*. This condition may be chronic, resulting from a persistently inadequate diet, or transitory due, for example, to a flood or drought. Food *security* at the household level means that the household has access to sufficient food and health services. One or more members of the household, however, may still be food *insecure* or malnourished.

The Situation in Africa

Malnutrition afflicts a large and increasing number of Africans and impedes the social and economic progress of the continent. About one-quarter of the African population is unable to secure adequate food to meet their nutritional requirements (Badiane and Delgado, 1995) or other basic human needs. Women, children between the ages of six months and 5 years, and migrants are particularly vulnerable to

malnutrition. Under-five mortality rates in several African countries are above 300 deaths per 1,000 live births: *56 percent of child mortality in Sub-Saharan Africa is attributable to malnutrition* (AED, 1995:4-5). The UN Administrative Committee on Coordination, Subcommittee on Nutrition (ACCSCN) reports that since 1980 the prevalence of stunting[1] has fallen everywhere accept in Sub-Saharan Africa, where it increased by 62 percent (ACCSCN, 1998).

Much of the Sub-Saharan African population, particularly in rural areas, experiences some degree of hunger over the rainy, or "hungry," season, when food stocks dwindle and roads become muddy and impassable. This time of year also has the highest incidence of diarrhea, malaria, and other diseases that inhibit the body's utilization of ingested nutrients (Frankenberger, 1989:2). Huss-Ashmore (1997) claims that the increase in the number of underweight children during the rainy season has more to do with diarrheal diseases than food shortages. While food production and distribution is essential to food security in Africa, access to adequate health services and appropriate behaviors play a critical complementary role (Smith and Haddad, 1999).

Despite some common trends and seasonal patterns, the causes of malnutrition throughout Africa vary widely, including factors such as: poverty, drought, conflict, HIV/AIDS, and cultural particularities. Other key variations are related to the *form* (type of deficiency and severity), *duration* (chronic or transitory), *spatial coverage* (national or regional), and *distribution* (global or within a subpopulation) of malnutrition. Popkin and Bisgrave (1998) found that malnutrition exhibits spatial variation in low-income countries. Urban children were found to have lower calorie, but higher protein, consumption than rural children. Mozambican women from the north have a higher incidence of anemia than those from the south, in part because of the former's increased exposure to malaria. Drought in the Sahel, or flooding in central and southern Mozambique, can lead to acute, but temporary, malnutrition manifested in a high incidence of wasting[2] among children under five in affected areas. Protracted civil unrest can lead to prolonged food insecurity that affects the population in all geographical regions and extends well beyond a peace settlement.

Because poverty, food insecurity, and malnutrition in Africa have so many different causes and consequences, there is no simple or single panacea. Each distinct situation needs to be assessed, and a specific set of interventions prescribed. The situation may call for agricultural or health interventions, or a combination of the two. Table 2 illustrates several common malnutrition scenarios in Africa and agricultural interventions tailored to each scenario. The interventions are general and meant only to suggest the diversity of options available within the rubric of agriculture. Each of these scenarios, of course, could be improved through concurrent health interventions, but the aim of the table is to emphasize the importance of designing *agricultural interventions tailored to the nutrition problems* prevalent in the country or region.

[1]Stunting is an impairment of linear growth and a measure of chronic malnutrition in children's height for age are low (more than two z-scores below the average for the reference population)

[2]Wasting results from acute, current, short-duration malnutrition in children whereby weight for age and weight for height are low (more than two z-scores below the average for the reference population).

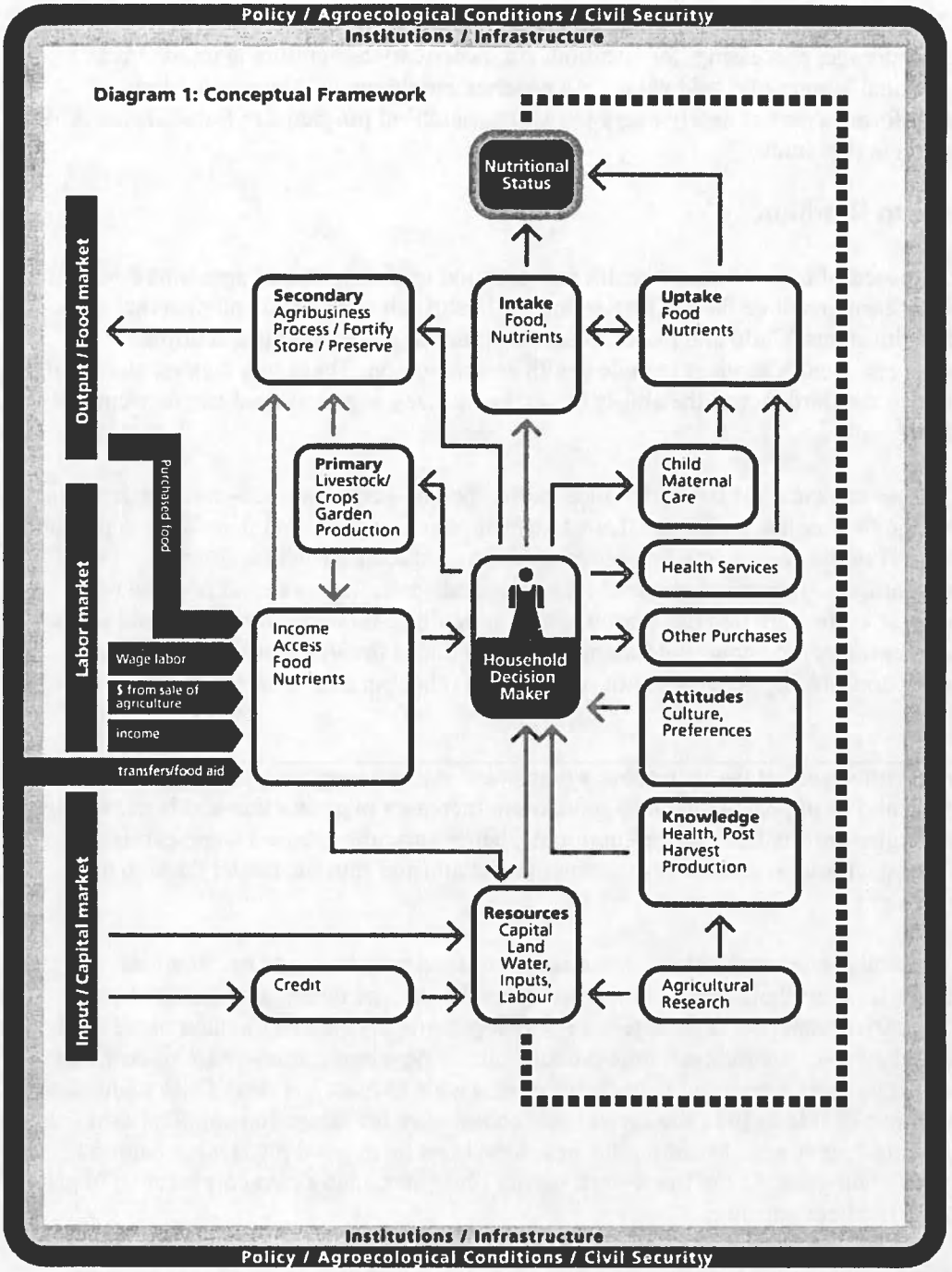
Table 2: Selected Characteristics of Malnutrition Problems and Potential Agricultural Interventions

Cause	Manifestation	Duration	Spatial Coverage	Distribution	Agricultural Interventions
Seasonal food shortage (hungry season)	Acute, chronic	2 – 4 months	Areas with limited market alternatives	Women and children	Diversification of production, home gardens, food storage and processing
Seasonal flooding	Acute	1 – several months	Flood plain of affected rivers	Entire population, Especially children	Flood control and irrigation
Cultural taboo for pregnant women	Acute, specific nutrients	Months	Region where taboo exists	Women and infants	Education, introduction of compensating practices
Malaria outbreak	Acute anemia	Days for any given case	Mosquito-infested areas	Children, women	
Conflict	Chronic and acute	Years	Region or whole country	Entire population	Infrastructure rehabilitation; low-input intensive agriculture (gardening);
Poverty	Chronic	Lifetime	Poorer households or regions	All household members	Agriculture-based income generation

III. CONCEPTUAL FRAMEWORK

Diagram 1 presents a broad conceptual framework of the linkages between agriculture and nutrition. The framework is a combination and expansion of the UNICEF (1990) and IMPACT (1997) models. While most components and relationships suggested by these models were retained, the conceptual framework presented here includes specific agricultural interventions and illustrates how they: (1) feed into the household decisionmaking, (2) combine with the presence of other health factors, and (3) influence the nutritional status of household members. To keep the framework relatively simple and focused, it excludes many nonagriculture-based factors that could enhance food security. The framework encompasses all of the agricultural interventions in USAID mission portfolios for Ghana, Kenya, Mozambique, and Uganda. Some of the more common interventions include introduction of nontraditional agricultural exports (NTAE), promotion of commercial agriculture through group marketing, microfinance for agriculture-based microenterprise development, improved storage and inventory loans, transfer of improved seeds, and institutional reform.

At the center of the framework is the household decisionmaker, who might be a smallholder, a landless laborer employed in the agricultural sector, or a consumer with no links to the agricultural sector other than food markets. The smallholder household is highlighted in this review because USAID agricultural interventions in Sub-Saharan Africa are geared predominantly toward smallholders.


Policy / Agroecological Conditions / Civil Security
Institutions / Infrastructure
Diagram 1: Conceptual Framework
Nutritional Status
Output / Food market
Secondary Agribusiness Process / Fortify Store / Preserve
Intake Food, Nutrients
Uptake Food Nutrients
Primary Livestock/ Crops Garden Production
Child Maternal Care
Purchased food
Labor market
Health Services
Income Access Food Nutrients
Household Decision Maker
Other Purchases
Wage labor
$ from sale of agriculture
income
transfers/food aid
Attitudes Culture, Preferences
Knowledge Health, Post Harvest Production
Input / Capital market
Resources Capital Land Water, Inputs, Labour
Credit
Agricultural Research
Institutions / Infrastructure
Policy / Agroecological Conditions / Civil Security

One key difference between this framework and the IMPACT model is the explicit inclusion of secondary agriculture production: storage, processing, fortification, etc. Secondary agriculture is important as a means to close the seasonal hunger gap, add value, and generate employment. Since secondary agricultural production forms a part of nearly every USAID agricultural programs in Sub-Saharan Africa, it requires consideration in this study.

Linking Agriculture to Nutrition

The framework is composed of two sub-units: health and nutrition on the right, and agriculture-related on the left. The upper right contains three factors that define the health sub-unit: child and maternal care, health services, and health status. Child and maternal care includes hygiene, food preparation, breastfeeding practices, etc. Health services include health and sanitation. These two factors, along with food intake, contribute to the third factor: the ability to uptake (utilize) ingested food and nutrients to support good nutritional status.

The left side of the framework contains the agriculture-based, income-generation sub-unit. Agricultural production might include field crops, garden produce, livestock, tree products, and fish. What is produced depends on the farming system. The income box refers to home production, whether stored or transformed, and cash earnings from crops and livestock sales and agriculture wages. Food-for-work transfer payments, insofar as they are derived from work on agriculture-related activities, would also be included here. Income represents the household's access to food that is derived from all agricultural sources. Income may be consumed, spent on health services and other purchases, or filtered back into productive resources.

Most agricultural interventions affect the household's nutritional status through support of production for household consumption and/or improving income-generation. Increases in production and better storage improve food access. Higher profits from agricultural trade, better agriculture-based wage-earning opportunities, higher product prices, and lower consumer prices all filter into the model through the income/food access element.

The path taken by a particular intervention to increase access to food may be direct or circuitous. The production of vegetables for household consumption, for example, is quite direct, as indicated by the arrow leading from primary production to income/access. Investments in research on plant breeding for higher nutrient-content, however, are indirect. Innovations must be developed; knowledge of new, high-protein maize seeds must be transferred; and households must decide to plant the seed. Once planted and harvested, households must decide to store the agricultural commodity for future consumption rather than sell it. Moreover, household members consuming the new food must be in good physical condition to most efficiently utilize its nutrients. As the framework rightly illustrates, many elements must be in place for agricultural research to affect nutrition.

Productive resources are shown in the bottom-center portion of the framework. Agricultural research flows into both the resources (improved seed) and knowledge (improved practices) boxes, improving the resource base. Knowledge spans health, production and post harvest practices. Credit also bolsters the resource base. Knowledge, resources, income, and attitudes (culture, values, and preferences) come together to build the capacity of, or empower, the decisionmaker. This supports the notion that resources, knowledge, and incentives are all necessary to make food-security aspirations a reality. The joined arrow implies that these factors collectively empower a decisionmaker in a sustainable manner. Households may have multiple decisionmakers with multiple, even divergent, objectives. However, for the purposes of simplification, the framework centers on the household as a simple decisionmaking unit. Issues related to multiple decisionmakers and intra-household resource allocation are dealt with in greater detail in the body of the report.

Surrounding the sub-units are two layers of environments. The first layer refers to policy, agroecological conditions, and the extent of public security (presence or absence of civil conflict). This layer influences the status of institutions and infrastructure that encompass the next layer. The market component includes capital, labor, food, input, and output markets. The first three markets flow into the income, or access, box. Access to short-term loans and wages increases access to food. Food prices influence the purchasing power of the household, and hence real income levels. Output, or production, flows to the market, but cash from sales flows back in. Higher sale volumes or output prices increase income and access. However, incremental income might not be spent on food. It depends on the decisionmakers' preferences, attitudes, culture and knowledge. The decisionmaker has a choice between investing in productive capacity for future consumption, allocating income to primary and secondary agriculture, or spending on immediate consumption.

Role of Complementarity

As in the UNICEF model, the intake and uptake of nutrients in this conceptual framework comprise the *immediate determinants* of nutritional status. The joined arrows leading to the nutritional status box signifies that they are complementary factors—an individual needs to ingest and metabolize a sufficient quantity of food or nutrients to maintain good nutritional status. The two-sided arrow between the two factors implies that they are mutually reinforcing. Good health status creates a healthy appetite, and an adequate intake of nutrients supports good health. Finally, the arrow leading from the nutritional status box back to the resource box signifies that good nutritional status translates into healthier, more productive agricultural laborers. According to Fogel (1999), improvements in nutrition and human physiology contributed significantly to the economic growth and technological progress experienced in Europe over the past two centuries. Thus agriculture and nutrition form a synergistic cycle, whereby each supports and advances the other.

The conceptual framework was designed to illustrate the important complementarity between agriculture and health in promoting desired nutritional outcomes. Agriculture is a source of food (including micronutrients) and income, and health is a source of the vital environment that supports the physical status of an individual. The framework, backed by findings in the literature, illustrates that while agricultural interventions have the *potential* to help achieve desired nutritional outcomes, such outcomes are not guaranteed. Many factors come into play (such as how household resources are allocated, subjective priorities of the decisionmaker, etc.). Similarly, the presence of health and sanitation services and knowledge of sound health practices can increase the potential for reaching desired nutritional outcomes, but adequate resources are necessary to implement and sustain them. To ensure desired nutritional outcomes, there is a need to establish and reinforce complementarity between agricultural and health programs and interventions. Links can be forged within a single program, across different activities within a program, or through collaboration with other agencies or local institutions.

IV. RECOMMENDATIONS FOR ACTION

Documentation of direct linkages between agriculture and nutrition is somewhat limited. For the most part, available literature and USAID project documents provide insights on: strengthening the participation of smallholders, women, and poorer households; building linkages between agriculture and nutrition; and enhancing the potential for nutritional impacts. While good examples of programs designed to build complementarity between agriculture and nutrition can be identified, most are new and experimental, and thus lack well-documented nutritional outcomes. Thus many of the options discussed below reflect means to enhance the *potential* for better nutritional impacts. Ongoing evaluation of such programs will help to substantiate expected outcomes. The longer report upon which this summary is

based contains detail on specific findings in the four countries under review. Here, the recommendations based on these findings are summarized to provide the reader with an overview of steps to be taken to increase the nutritional impact of interventions in the agriculture sector.

- **Develop nutrition strategies that can be explicitly addressed by agricultural interventions.** USAID health and child survival programs emphasize family planning, HIV/AIDS prevention and reporting, vitamin A supplementation, integrated management of childhood illness, education on breastfeeding and oral rehydration, vaccinations, and institutional development of health services. Health-sector performance is measured by changes in health practices and percentages of children vaccinated, but not by nutrition indicators. Although good nutritional status depends, in part, on each of these factors, few strategies explicitly address malnutrition—except to note that it is a problem and a primary cause of early childhood mortality, and to make assertions regarding how program activities are expected to alleviate poverty and malnutrition. With the exception of vitamin A supplementation, nutrition is simply not a stated priority. Attempting to build the capacity of agricultural programs to address nutritional issues, in the absence of clear nutrition goals and a framework, leaves agricultural activity managers without guidance on priorities and opportunities related to health and nutrition. Nutrition advocacy within and outside of the health sector is needed to identify priorities related to nutrition, set an agenda, and provide guidance to other sectors, such as agriculture.

  Strategies to improve the nutritional outcome of agricultural interventions should explicitly state how the mission intends to approach local malnutrition issues, and missions should tailor some agriculture projects focused to address specific malnutrition problems. Agricultural interventions generally fall under the rubric of economic growth. A review of strategic objectives and performance indicators for economic growth activity in nine USAID missions in Sub-Saharan Africa revealed that improved performance and goal achievement are generally gauged by standard macroeconomic growth indicators—without reference to poverty alleviation and food security. As a logical consequence, agricultural interventions track performance in terms of economic activity, including household incomes, but do not measure nutritional status. Food security is frequently discussed within strategy documents, but viewed primarily in terms of increased availability and access to food. *Utilization* is overlooked or presumed—incorrectly—to be an automatic result of increased availability and access. Economic growth programs and agricultural interventions are not conceived to tackle specific types of malnutrition or limited diet diversity.

- **Greater interaction between agricultural and health sector managers could promote better program integration, and should be encouraged.** Collaboration across sectors is always difficult. Multidisciplinary dialogue requires that individuals become sensitized to the terminology, concepts, and priorities of other disciplines. Because health and agriculture are administratively and financially separated within USAID, interventions will probably continue to be sector-specific, so that cooperation will most likely take the form of bringing together components of different activities. For example, agricultural income-generation activities that fall under the "economic growth" rubric could complement nutrition education as part of "health and child survival" activities.

  Staff from agricultural and economic growth units should be encouraged to utilize existing social and economic data combined with the technical and practical knowledge of both USAID and local health personnel, to fine-tune the design of agricultural interventions. USAID currently uses available social and economic data to help formulate country strategies and activities. Statistics on poverty and needs assessments prepared by private voluntary organizations (PVOs) are often used to identify target areas. Other USAID-funded projects, local research institutes, UN agencies (especially UNICEF), nongovernmental organizations (NGOs), and other projects managed by other donors may be good

sources of information and advice. Standard PVO needs assessments can provide important insights, and should be fully utilized.

It is *not* recommended that USAID systematically mandate collaboration between the agriculture and health sectors. Instead, collaboration should result from a greater appreciation of cross-sectoral issues and opportunities. Missions should build upon existing talent and activities whenever possible. Greater awareness could be cultivated among development actors by encouraging the formation of working groups and supporting information-sharing mechanisms. In some instances, a lead PVO could help orchestrate these kinds activities within the broader PVO community.

- **Program design decisions should be based on knowledge of local macronutrient and micronutrient deficiencies or other nutrition issues.** Decisions should go beyond merely locating an activity in an area characterized by a high incidence of poverty or selecting crops to be promoted strictly on the basis of economic performance. Drawing up charts that match annual fluctuations in malnutrition with crop calendars can help identify the array of potentially appropriate agricultural interventions. Adding seasonal labor use to the chart reveals project participants' constraints and opportunities. In areas where women suffer a double burden (serving as the primary providers for their families and having low social and economic status), a design that emphasizes empowerment and confidence-building from the ground up would enhance the probability of women's participation in economic activities and adoption of improved health and nutrition practices. On the one hand, increased income helps women put new health knowledge to use. On the other hand, new knowledge and the awareness that it is possible to improve family health status gives women a greater sense of control over their environment and more self confidence, which is likely to spill over to their businesses.

Strengthening Programmatic Linkages

- **An activity, or set of interdependent activities, that successfully link agriculture and nutrition will most likely employ a three-pronged approach.** First, the activity will have a well-designed agricultural component—effective at generating output, income, or added value, as well as at drawing in smallholders, women, and/or poorer households. The incremental income will enhance households' capacity to implement new ideas and practices. Second, the intervention ought to have a well-designed nutrition component; it should provide appropriate services, including well-tailored education, to address specific, local malnutrition issues. Third, the agricultural and nutrition components should be mutually reinforcing. Agriculture and health project staff must actively collaborate, and the sets of beneficiary populations participating in the agricultural and health activities should overlap.

  Not all agriculture interventions should be judged according to their actual or potential effect on nutrition. Income-generation and poverty alleviation are laudable goals in and of themselves. However, if health or child survival is a primary objective for the funding source, the agricultural intervention ought to have clear and defensible links to nutrition or other positive health outcomes. Managers of health or child survival programs might launch a complementary agricultural intervention, such as home gardens, to economically empower poor communities and enable them to adopt new health and nutrition practices. Such agricultural interventions should have clear, intended, and measurable impacts on health and nutrition.

- **Requests for Proposals (RFP) that deal with agriculture-sector activities could include a health or nutrition dimension.** First, the RFP could stipulate that proposals explicitly address a specific nutrition problem in the programs location, insisting that bidders substantiate the nutrition link and

devise a plan to measure their impact on nutrition. Second, the RFP could request that bidders identify potential collaborators in the field (local or international entities) that can serve as a nutrition link. For example, an organization implementing an agriculture project sets up marketing cooperatives, while another organization works with the same communities helping cooperative members improve local sanitation, using a portion of their marketing proceeds. The two organizations need not be funded by the same source.

- **Interventions that aim to increase household income as a means of improving household food security should target women, since women are the providers of food, childcare, and health services.** The literature unanimously concludes that women spend a larger share of their income on food and health services for their families than men. Nontraditional agricultural export promotion, microenterprise development, and commercialization of agriculture activities should be designed to attract women and to address their specific objectives and constraints. Experience has shown that bringing women in at the design stage, or working directly with them on implementation issues, greatly increases their active participation—and ultimately the achievement of program objectives. The Ghana, Kenya, and Uganda mission strategies stress their aim to work with women. Project documents report on the number of women who are agribusiness owners, contract farmers, or members of cooperatives and associations. While significant efforts have been made to incorporate women, their representation is still low. Missions need to be more persistent and creative in bringing women into their mainstream activities.

- **Nutrition education is an important complement to agricultural interventions aimed at improving nutritional status.** While agricultural interventions increase the potential for improved nutritional outcomes by increasing food availability and access, only when they are combined with well-designed nutrition education have significant changes in the participants behaviors and nutritional status consistently been recorded. Agricultural interventions address the food *access* element, while nutrition training addresses the intake and *utilization* factor. Training introduces new behaviors, and helps break down stereotypes against low-status, but nutrient-dense foods. Such training can be geared to both men and women, sensitizing men to the importance of daily nutrition and childcare to the health and productivity of their children. Following from these observations, one general recommendation is to factor in training or social marketing in nutrition whenever possible, either as part of an agriculture project or through collaboration with other development activities. Health and nutrition messages should be limited to a manageable number and well-tailored to the beneficiary community's needs. It is best if the training is related to the agricultural intervention as well (for example, introducing improved crop varieties and cultural practices could be combined with nutrition education and techniques of preserving and preparing foods using the new crop). Training is easiest to carry out when the agriculture intervention works with groups that meet on a regular basis. Some have argued that attendance for nutrition training is highest when the training is attached to another mandatory (credit repayment) or financially rewarding (agricultural cooperative) meeting, but others have found that access to training is sometimes an incentive for participating in a group.

- **Encourage complementary investments in community infrastructure.** Several studies suggest that the availability of health services and lower morbidity rates may be more important in determining good nutritional outcomes than increased food production and access. This review, however, did not uncover examples of agricultural interventions combined with investments in community health services that reported positive impacts on nutrition—largely because donors other than USAID funded most such programs. This result may also stem from the fact that investments in community infrastructure were not preprogrammed, hence not monitored, or because the examples are very recent and have not yet been assessed. Regardless, project beneficiaries have expressed interest in contributing to community health and education services. If complementary investment in health

infrastructure is made and its nutrition impacts monitored, the outcome will help to assess whether community health components enhance the nutritional benefits of agricultural interventions.

Agricultural Research and Productivity Enhancement

- **When possible, agricultural research should be linked to a direct application in the field.** The Bean/Cowpea Collaborative Research and Support Project and the Hunger Project's work on weaning foods, as well as the CIP (International Potato Center)/KARI (Kenyan Agricultural Research Institute) sweet potato research with PVOs and local extension units, are examples of how to jointly strengthen the nutritional outcomes of research, PVO projects, and extension services. Innovations are disseminated rapidly, and both PVO and Ministry of Agriculture extension staff provide immediate feedback from their beneficiaries to the researchers.

- **Research should focus more closely on indigenous food crops**. The adoption rate for research-based innovations is bound to be higher when the innovation addresses consumer tastes and preferences. Indigenous food crops also tend to predominate in the diet of poor households, and participants know how to cultivate them.

- **Intensive gardening should be promoted with the aim of diversifying food production and consumption as well as expanding the seasonal availability of food.** Depending on the location, gardening can yield produce year round. Horticultural crops are good sources of diverse micronutrients, and surplus production can be sold. Since gardening is predominantly a woman's activity in Africa, a portion of the incremental income is inclined to go toward household food consumption.

- **More attention should be given to crops that can be vegetatively propagated.** (e.g., cassava, potatoes, sweet potatoes, cashew) because they are easier and cheaper to multiply and distribute. Local seed multiplication brings seed closer to farmers and creates employment, but managerial and quality control can be problematic.

- **Extension agents should know more about, and provide information on, gardening and nutrition, especially in relation to the crops, technologies, and practices the agents are promoting**. Health messages spread by extension agents could be better focused by targeting specific health issues in the agent's jurisdiction. Nutrition education could be incorporated into projects that work with traditional or nontraditional crops.

- **Preserving, processing, and fortifying local foods should been given more priority**. These activities extend the seasonal availability of food and generate employment.

- **Nontraditional agricultural export (NTAE) promotion schemes should be accompanied by extension and input access for traditional food crops as well.** Whenever possible, NTAE schemes should act as source of capital and knowledge for domestic food production as well as export crops. International markets can be fickle and volatile, and currencies of Sub-Saharan African countries have been known to depreciate rapidly. Smallholders can hedge against market risk by diversifying production, even into more lucrative NTAE crops, but they should be cautious not to disrupt their local food supply.

- **Projects working through contract farming, cooperatives, or farmer associations should develop special mechanisms for drawing women, marginal farmers, and poorer households into**

the groups. These individuals are less likely to belong to economic or social networks, and often lack time, resources, technical skill, and confidence. Women's clubs can sometimes be transformed into cooperatives or marketing associations.

- **Credit and insurance schemes are critical to smallholders' ability to purchase improved inputs or diversify income sources**. Smallholders generally have excellent rates of loan repayment; particularly women. For very poor households, credit is often the only avenue for investment and expansion. Credit clubs can also be an excellent avenue for offering health and nutrition education.

Agricultural Policy and Marketing Systems

The focus of this review is on increasing agriculture and nutrition linkages. The recommendations listed above suggest how project design could be more successful at drawing in smallholders, poor households, and women and improving their incomes to increase food availability and access. To maintain this focus, the following recommendations are limited to suggestions for reinforcing the direct link to nutrition, rather than including potential indirect income linkages.

- **Enhance information-sharing and promote stronger links between analysis, policy formation, and program design by making greater use of existing relationships with local and foreign universities and research institutes**. Some examples are (e.g., Collaborative Research and Support Projects, national and international agricultural research centers, crop networks, the Food Security Initiative, the OMNI (Opportunities for Micronutrient Interventions) project, and others. These entities could be enlisted to conduct studies to identify factors underlying positive or negative nutritional outcomes and best practices. The results should feed into policy dialogue. Entities that receive external funding could be required to package at least part of their output in a user-friendly form to support wider dissemination.

- **Support efforts to broaden access to and use of data relevant to food security monitoring and planning**. This would include standard data on health and agricultural production and prices collected by ministries, nongovernmental organizations, and UN agencies. More in-depth and integrated analyses, accompanied by wider dissemination of results, should be encouraged. To be effective, nutrition and food monitoring needs to feed into policy formation and program design. This could be achieved through distribution of paper and electronic bulletins, regular working groups, mini-workshops, or more frequent interagency meetings, as well as through policy dialogue.

- **Become more involved in policy issues directly effecting the poor**. Much of USAID's policy work deals with general market liberalization. Small-scale rural microenterprises, traders, cooperatives, associations, and farmers would benefit from decentralization of licensing processes. Land reform remains a pressing issue for women in particular, and the poor in general. Legal codes and regulations for cooperatives and marketing associations have to be drafted. Governments and communities need to be sensitized to the dangers of chemical inputs. Those working in the informal sector need business training and a network or association to give them a voice. Local decisionmakers require support to move toward greater integration and coordination of development planning, disaster prevention, and food security and relief interventions. The latter is particularly important in countries where frequent natural occurrences, such as droughts or floods, put populations at risk and result in widespread food insecurity.

Agricultural Marketing Cooperatives and Associations

- **Utilize meetings of cooperatives and marketing associations as opportunities to reach larger numbers of people with important health and nutrition messages.** Marketing projects often rely heavily on farmers' cooperatives, associations, or clubs. In Mozambique, for example, USAID Development Assistance and Title II programs work to establish and support farmers' marketing associations. In Uganda and Kenya USAID assists dairy cooperatives to assemble and market milk. Nutrition training comprised of a limited number of well-tailored messages could be added to the agenda of regular meetings. These projects already provide business training, and Mozambique's program also includes literacy training through participation in marketing associations. Group members, especially those belonging to microfinance clubs, report that training is an important reason for participating in their respective programs. Thus nutrition training could form part of future agriculture-based projects. Alternatively, a health project or organization working in the area could provide this service. Where feasible, missions could use funds to include nutrition education in ongoing projects.

- **Encourage community initiatives to invest in social infrastructure.** Most associations and cooperatives collect dues or retain a portion of their members' profits. The U.S.-based diary company Land O'Lakes notes that several communities within their project jurisdiction have expressed interest in applying cooperative proceeds to establish or expand health services and support schools; activities that lie outside the original scope of the project. Donors could assist existing agriculture-based projects expand their mandate to incorporate a health component. Program flexibility would allow project managers to respond to community initiatives that support overall project and program goals. In this case, improved health services would reinforce the impact of incremental income on nutritional status. Donors could help forge technical or financial links with an externally funded health activity, a local health organization, another donor, or a foundation. Funds could be used to expand the current capacity of the agriculture-based program by supporting additional staff, or covering other related expenses.

- **Future Requests For Proposals in the area of agricultural marketing that are based on establishment of marketing associations or cooperatives could request bidders to incorporate a small-scale social infrastructure component into the project.** This could take the form of identifying potential collaborators currently working in proposed project areas or who could expand their geographic scope into these areas. Developing sound and sustainable marketing associations and cooperatives can be a formidable task. Applying pressure on nascent community groups to identify and implement community based social investments before they have had ample training and experience working as a collective could easily overload the process. In addition, social investments are dependent on the economic success of the marketing activities. For these reasons, opportunities for social investment should be entertained as minor project outcomes.

- **Business training programs provided as part of income-generation interventions for agriculture could be expanded to include tackling community health problems.** A common element of most smallholder marketing interventions is training in problem solving and strategic planning. Project evaluations include accounts of farmers exalting new-found confidence in their abilities to identify market opportunities and negotiate deals. Expanding the program to include local health issues should come at a later stage in the project, to avoid overloading participants and to assure that they have ample training prior to addressing important health issues.

- **Implementers can work to sensitize agribusiness interests regarding how to work most effectively with smallholders and women.** Because poor households have unique constraints,

project managers will often need to broaden project design to absorb poor households into marketing associations and other project activities. New microenterprise and high-value crop schemes should consider the flow of income expected from the new activity. Steady regular flows of income support household food consumption. Petty trade, agroprocessing, and sales of prepared foods offer such returns.

- **Agribusiness firms working with small outgrowers should be encouraged to invest a small portion of their profits in the areas where they out-source**. Such investments could be in the form of productive capital or community health and education services.

- **NGOs working with group marketing, such as farmer cooperatives and associations, should employ a combined feasibility and participatory approach to identifying community priorities, constraints, and opportunities**. This approach seems particularly well suited for developing project designs that include all subpopulations within a community (e.g., women), build the self-confidence of participants, and promote more sustainable solutions.

Forging Links Through Food Fortification Programs

- **Where economically feasible, locally produced products should be used in food fortification. A link between nutrition, agricultural production, and microenterprise and agribusiness development can be forged through fortification**. Using local, micronutrient-rich foods as the source of fortification can limit the risk of inflation, when currencies devaluate and the cost of imported fortification inputs rises (Johnson, 1999, MOST, 1999; Wurdemann, 1999; Hammond, 1999 and Burger, 1993). Small-scale processing using local, micronutrient-rich foods would promote increased local incomes and employment, which in turn will improve households' access to food. Fortified foods could be sold to hospitals, schools, relief organizations, and local consumers. Microenterprise and agribusiness collaboration could result in the production of fortified final products without increasing the costs to the consumer. Adding higher-quality, cheaper foods (sweet potato flour) to more expensive products (wheat flour) can actually reduce the per-unit cost to the consumer, while improving per-unit nutritional value.

- **If consumers are expected to pay more for fortified foods, the project should include a social marketing component to educate consumers on the benefits of fortified foods**. Budgets of the poorest of the poor tend to be too constrained to allow for purchasing high-quality food, even when households recognize the potential benefits. In many cases, additional safety-net programs will still be required, because some households will not be able to afford the fortified foods.

V. NEXT STEPS

Cost-effectiveness studies. USAID's method for monitoring and evaluating outcomes using indicators does not provide information on the cost-effectiveness of program outcomes. Looking only at outcomes, a program that reduces stunting by 10 percent at a cost of US$2 million appears to be more effective than a program that reduces stunting by 8 percent for US$500,000 dollars. Thus it is impossible to evaluate which agricultural projects and programs are more cost-effective for reducing child malnutrition. Lacking such calculations, for example, it is impossible to compare fortification and home gardening projects as a means to reducing micronutrient (Vitamin A) deficiency. USAID could support a study or series of studies into the cost-effectiveness of several competing and promising options.

Further studies of nutritional impacts. Observations and conclusions made in this review often depend on the likelihood of positive nutritional impacts, since most projects (except for Title II) do not measure nutritional impacts. Few evaluations were available. Some programs have closer links or better integration of agriculture and nutrition program components; these are seen as having the potential to improve nutritional outcomes. Further studies should be carried out by those who have sufficient technical and managerial knowhow and human resources to undertake them.

Analysis of the nutritional impacts of new agricultural marketing interventions, such as reforming commerce regulations, supporting agribusiness, NTAE promotion, and small-scale processing . An evaluation of the specific design elements of such interventions is also critical. Certain project designs are more successful at engaging and empowering the poor, some are more sustainable, risk-sharing mechanisms between farmers and traders vary, etc. There is a need to better understand the incidence and relative magnitude of impact associated with these different program designs. Such studies should include both short-term and long-term impacts.

Review of the nutritional impacts of longer term agricultural interventions ,such as natural resource management, which were not part of the scope of work for this study. This would include, for example, soil conservation, forestry, community resources, and ecotourism.

Clarification of agriculture's role in relief and transition contexts. Agriculture can play an important role in supplementing diets, generating income, providing a sense of normalcy for displaced communities. Agriculture is also an important element in resettlement and transition for complex emergencies. Poverty and malnutrition associated with civil unrest is a growing phenomenon in Sub-Saharan Africa. A dynamic framework that captures the step-wise nature of transition situations is needed.

Develop program-specific guidelines. This report has provided a first pass at the literature. A useful follow-on activity would be to develop separate, program-specific (NTAE, oil processing, marketing associations, etc) guidelines for project managers. The review would combine these findings with insights derived from additional, program-specific literature reviews and interviews with relevant program staff. Additional briefs on program-specific literature for PVOs and other cooperating sponsors would summarize how to incorporate the ideas into project designs. These publications would be short with clear action points. In some cases, a decision-tree model could be adopted.

Build up a knowledge base regarding program design and agriculture and nutrition linkages. Few agricultural projects currently monitor nutritional impacts. It may be reasonable to conjecture, based on the literature and practical experience, that certain program designs probably promote desired nutritional outcomes, or could do so with only small modifications, such as additional nutrition training. In order to test this hypothesis, small narrowly defined studies should be conducted to explore the connection between specific project designs and nutritional impacts.

Develop a website dedicated to increasing the nutritional impact of development interventions. To make managers and development workers aware of options for enhancing the nutritional impacts of agricultural interventions, USAID could collect and circulate information on projects and other initiatives that are successful at making agriculture and nutrition linkages and obtaining results. The scope could extend beyond USAID-funded activities. Contact information should be provided. The information could be contained on the internal or external USAID websites. Furthermore, USAID could support site visits and small workshops for managers and technical staff to share ideas on effective methods of integrating agricultural and nutritional objectives into ongoing and new projects. In any case, a mechanism should be devised to circulate information and get the attention of managers and development workers.

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Appendix 1: Selected USAID Mission Programs: Agriculture and Health/Nutrition Activities

Country	Food Security Objective (Y/N)	Nutrition Objective (Y/N)	Activity/Strategic Objective	Description
Ghana	N	N	1) Increase private sector growth; 2) improve family health	1) Policy reform; technical assistance; support foreign invest and trade; improve private sector capacity. Focus on NTE, expand ME to manage biodiversity, tourism
Kenya	Y	Y	1) Increase commercialization of small-scale AG and NRM; 2) child survival	1) Policy reform; facilitate trade; increase competition in ag markets; increase ME and NRM businesses; support local NGO servicing ME; increase growth of NTAE; support NAR; simulate AG sector growth and employment; improve production; storage, marketing, and NRM practices and technologies; improve nutrition. 2) reduce fertility and risk HIV/AIDS; vaccination; Vitamin A supplementation; treat malaria; social marketing
Mozambique	Y	Y	1) Increase rural HH incomes in targeted areas; 2) improve maternal and child health; 3) improved NRM	1) Improve policy implementation, market info.; reduce public intervention in markets; simplify licensing and regulations; improve legal framework for land and financial markets; expand ME; support farmer marketing associations; increase use of improved AG production and processing practices and technologies; rehabilitate cashew orchards; feeder roads. 2) Increase use of health services. 3) Increase use of NRM
Uganda	Y	N	1) Increase rural HH incomes; 2) increase utilization of health services	1) Expand and diversify exports; increase NTAE and ME; develop rural financial services for ME; improve capacity of local associations; feeder roads and infrastructure rehab; policy reform; develop dairy sector and cooperatives; improved seed demonstrations. 2) Change maternal and child health related behaviors; increase use of health services; reduce cases of HIV

Appendix 2: Selected USAID Regional Programs: Agriculture and Health/Nutrition Activities

Initiative	Food Security Objective (Y/N)	Nutrition Objective (Y/N)	Activity/SO Objective	Description
Food Security Initiative *(Ethiopia, Ghana, Malawi, Mali, Mozambique, Uganda)*	Y	Y	Promote food security and child nutrition	Support smallholder production and finance; research and transfer of technology; expand smallholder associations; improve agribusiness skills; improve roads and info systems; policy reform; promote NTE; strengthen relationships between US universities and African organizations and IARC
Greater Horn of Africa Initiative *(Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Tanzania, Somalia, Sudan, Uganda)*		Y	1) Strengthen African capacity to enhance regional food security; 2) increase effective use of humanitarian assistance	1) Analyze and promote improved trade; support regional health networks and women's business associations; training in regional NRM 2) Improved crisis detection and management of response; increase capacity for rehabilitation and recovery
Southern Africa Initiative *(Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland Tanzania, Zambia, Zimbabwe)*	Y	N	1) Integrate markets; 2) accelerate adoption of NRM approaches	1) Promote equitable broad-based growth; harmonize policies and standards; improve capacity to regulate infrastructure 2) Policy reform; develop and transfer NRM technology for smallholders; build regional institutional capacity
Includes only information available from Congressional Presentation or R4 report. Not all documents were available for every country. AG=agriculture, HH=household, IARC=international agricultural research centers ME=microenterprise, NA=not available, NAR=national agricultural research, NRM=natural resource management, NTAE=non-traditional agricultural exports, NTE=non-traditional exports, SO=strategic objective, STD=sexually transmitted disease.				

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