

Discussion Paper
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Conceptualizing the Contribution of Agricultural Extension Services to Nutrition

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Introduction

There is growing global interest in better leveraging Agricultural Extension Services (AES) as a foundation for food and nutrition security. Pluralistic AES (defined in Box 1) consist of rural, agriculturally focused extension and advisory services implemented by public, NGO, and private-sector entities. They reach millions of farmers and represent largely untapped potential for influencing production and consumption decisions which could, in turn, affect the health and nutrition status of populations, particularly in rural areas. Their specific contributions, however, are only beginning to be articulated and evaluated.

This discussion paper addresses the specific contribution that AES can make to food and nutrition security in a way that is consistent with AES's primary functions. It is particularly focused on the scope of the INGENAES project and the context of the Feed the Future countries within which the project operates.

The paper is organized into the following three parts:

- Part I: What AES can contribute to nutrition
- Part II: Planning and implementing to integrate nutrition into AES
- Part III: Coordinating and collaborating with other sectors and actors



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The Context of Agricultural Extension Services: Opportunities and Challenges to Integrating Nutrition

Building on the definition provided in Box 1, extension service providers, not just in the public sector, operate around the globe, and include massive numbers of field-level staff who regularly interact with rural (and in some cases, urban) households. For example, in Zambia the public sector employs 108 Senior Agricultural Officers who supervise 1700 Camp Extension Officers based throughout the country's 105 districts.

Box 1: Definition of Agricultural Extension Services

Pluralistic agricultural extension and advisory services comprise “all the different activities that provide the information, [goods,] and services needed and demanded by farmers and other actors in agricultural settings to assist them in developing their own technical, organizational, and management skills and practices so as to improve their livelihoods and well-being” (Christoplos 2010).

The Global Forum for Rural Advisory Services (GFRAS) has developed the concept of “The New Extensionist”, a professional who facilitates dynamic problem solving so that information can be acted upon by rural populations. This staff person is responsive and effective in the face of rapid changes impacting global markets, and enables the agricultural innovation system (AIS) actors, namely farmers,

producer organizations, and research services (GFRAS 2012), to overcome barriers and effectively leverage existing resources. The New Extensionist contrasts historical AES models, wherein staff acted primarily as conduits of agricultural information under the assumption that improved knowledge would lead farmers to adopt new agricultural practices. Many AES staff have begun to adopt aspects of the New Extensionist approach to facilitating inclusive, market-oriented services, yet the transition is incomplete and varied from one context to the next. This discussion paper will therefore build on the ideal traits of AES as consistent with the New Extensionist, as well as observations of extension staff in the countries where INGENAES currently operates.

Despite momentum to modernize AES, INGENAES and another project, Modernizing Extension and Advisory Services, have both observed continued focus on increasing agricultural production of staple and cash crops. Activities to maximize market linkages, diversify production according to agroecological opportunities, empower women and/or marginalized farmers, and improve postharvest practices, all have the potential to further improve the nutrition of people working in the agriculture sector. To date, however, these foci have been underexploited (Ferris 2014).

Nutrition-sensitive agriculture is an approach to maximizing the contribution that agricultural development can make to improving nutrition (Ruel and Alderman 2013, FAO 2014). The literature suggests specific channels by which agriculture can impact nutrition, which have been distilled to three overarching pathways: improved household consumption of the nutrient-dense foods they produce, improved use of income for nutritious foods, and the empowerment of women (Herforth and Harris 2014). Nutrient-dense foods are those that provide high levels of nutrients per unit of energy (typically measured as a kilocalorie), and are a focus of many nutrition-sensitive agriculture interventions. Given the inextricable influence of gender norms on responsibilities in both agricultural production and food consumption, AES cannot promote better nutrition without consideration of gender equity (BRIDGE: Development-Gender 2014). Given that even very low-income smallholders sell a substantial portion of their harvest and purchase food in the marketplace (Remans, Wood et al. 2014), nutrition-sensitive interventions also seek to improve market access and demand for nutrient-dense foods, as well as goods and services (e.g., health clinic visits, soap) that improve the body's ability to utilize these foods.

AES staff have many competing responsibilities, and nutrition may be an addition to an already lengthy list. In many countries, public sector AES budgets are severely constrained and high vacancy rates are the norm (Fanzo 2013). AES staff often possess little nutrition knowledge themselves, and have limited familiarity with local health and nutrition issues and attitudes. These challenges call into question whether it is reasonable to task AES staff with nutrition promotion in addition to the other agriculture services (Sigman 2015).

Yet AES is fundamentally committed to improving food security. Food security is understood to consist of four pillars: availability, access, utilization, and stability (FAO 2006). AES activities historically prioritize the pillars of availability and access, but can be expanded upon to encompass the other dimensions of food and nutrition security as defined in Box 2. This need not be overwhelming. The regular interaction between AES and farmers positions them to effectively influence household food actions that will ensure better nutrition, health and well-being.

Box 2: Definition of Food and Nutrition Security

“Food and nutrition security exists when all people at all times have physical, social and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life.” (United Nations Standing Committee on Nutrition 2013)

The Dimensions of Food Security

- Food **availability** addresses the “supply side” of food security and is determined by food production, stock levels and net trade.
- Economic and physical **access** to food are determined by incomes, expenditure, markets, mobility, and prices in achieving food security objectives.
- **Utilization** describes the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, diversity of the diet, and intra-household distribution of food.
- Food **stability** entails adequate access to food on a year-round basis. Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) may impede stability, and result in food insecurity. (adapted from EC, FAO 2008)

Gender and Nutrition:

Gender norms, the socially-prescribed roles assigned based on being a man or a woman, permeate food and nutrition decision making. The INGENAES project builds gender-transformative AES through approaches that include and extend beyond nutrition, with the complementary objectives of pursuing human rights for women, and increasing overall agricultural productivity through more efficient decision-making and labor (Manfre 2013). For the purposes of this paper, gender equity is also inherently a human rights matter, but is primarily discussed as it relates to improved food and nutrition security. The ways in which AES engage men and women farmers can perpetuate or transform gender norms that may not meet the needs of all members of the community. Examples of transformative approaches are provided in the following.

In most countries, AES officers are predominantly men. Evidence also suggests that men are more likely to be recipients of AES services and training, even when women constitute a large proportion of the agricultural workforce (FAO 1993, FAO 2011). This may be due to cultural perceptions that farmers are men, and/or restrictions to women’s time, resources or mobility (Manfre 2013). In contrast, the majority of nutrition-focused projects work primarily with women, due to traditional culturally prescribed roles of preparing meals for the family, feeding and providing care to infants and young children; yet men’s influence on food choice, production priorities, and use of income are well documented.

Feminist theory developed the concept of “productive” and “reproductive” labor; the former to represent types of labor that result in goods or services associated with a monetary value, and the latter to describe labor that is more typically associated with the private sphere (Beneria 1979). While child care and meal preparation (both examples of reproductive labor) are most frequently gendered tasks performed by women, the gendered distribution of labor can extend to all other productive and reproductive activities including farm responsibilities. In many farming communities, women contribute significantly to agricultural labor and are also responsible for processing and preparing food for the family (FAO 2011). Recent

research suggests that women's agricultural productivity may double when their diets are adequate (Isoto 2016).

Achieving good nutrition in agricultural households may require challenging traditional gender roles and building the capacity of household members to negotiate more equitable divisions of responsibilities. Encouraging men to value reproductive work, and to redistribute tasks while women are pregnant and/or lactating, can improve the nutritional status of both women and children. Men are often responsible for making decisions about income use, including the foods selected for purchase and expenditures for health inputs and services. They often eat first or get the highest quality foods available to the household. Engaging men in conversations about how food decisions are made is an important part of transforming household gender dynamics and improving nutrition outcomes. A discussion of specific ways that AES can facilitate these discussions is provided in Part II of this paper whereas Part I addresses how AES can contribute to nutrition in terms of the four dimensions of food security (Box 2).

Part I: What Agricultural Extension Services Can Contribute to Nutrition

Building on a thorough review of existing and potential ways that AES can contribute to nutrition (Fanzo J. 2013), this Discussion Paper examines areas in which AES are well situated to support improved nutritional outcomes and is structured along the four pillars of food security.

1) Improve the Availability of Diverse, Nutrient-dense Foods

AES aim to implement robust programs to improve the availability of and access to foods. Food security has historically been measured by the availability of calories to meet a population's estimated minimum energy requirements, (Jones, Ngure et al. 2013), which may explain the emphasis of agricultural policy and services on increasing the national production of starchy staples (e.g., maize, rice, etc.). A broader commitment to meeting a population's dietary needs (including energy as well as macro- and micronutrients) emphasizes the production and consumption of a greater variety of food groups.

Dietary diversity, typically measured as the number of food groups that a respondent consumed over the course of the previous day, is a measure of diet quality and is associated with improved micronutrient status (Arimond and Ruel 2004, Arimond, Wiesmann et al. 2010). Micronutrient malnutrition, including anemia and vitamin A deficiency, affects roughly two-thirds of the world's population, resulting in an estimated annual cost of \$17.3 billion due to productivity losses from related death and disability (Stein and Qaim 2007).

The diets of rural people in many developing countries are particularly likely to be monotonous and heavily reliant on a staple food, and greater country-level availability of starchy staples is associated with increased rates of chronic malnutrition (FAO 2013). Global analysis suggests that current production of fruits and vegetables falls 22% below the threshold level established for good health by the World Health Organization (Siegel, Ali et al. 2014). A country-level analysis of supply compared to food group recommendations for Cameroon found significant supply deficits for the most nutrient-dense food groups: dairy, meat, poultry, fish, eggs, and vegetables (Dewey, Adams et al. 2014). Therefore, AES efforts to improve both the supply and demand for/consumption of more diverse, nutrient-dense foods would represent a major contribution to improved nutrition.

Smallholder farmers typically produce for both their own consumption and for market sale, and may obtain half or more of their food from the marketplace (Timmer 1997, Remans, Flynn et al. 2011). Being producers as well as consumers of what they produce, farmers are unlikely to cultivate crops or raise animals that are unfamiliar, not preferred, or for which there is no market demand. Where market linkages are strong, AES can support farmers to specialize in producing nutrient-dense foods (e.g., livestock, legumes, nuts, fruits, etc.). Conversely, where market linkages are limited, as in the mountains of Nepal, diversified homestead food production with an emphasis on nutrient-dense foods such as dark green leafy vegetables and animal-source foods may be a more effective means to improve family access to diverse diets (Bushamuka, de Pee et al. 2005, Olney, Talukder et al. 2009).

Helen Keller International has implemented homestead food production projects to improve the nutrition of young children and women of reproductive age in a variety of settings. Their projects have achieved positive results by providing social and behavior change communication (SBCC) with access to agricultural inputs (e.g., vegetable seeds, healthy chicks) in group learning sessions that build on formative research to identify what motivates families to make dietary changes (Safi 2014). The Suaahara project employed this model in Nepal, and participating households were significantly more likely to consume improved diets than those not participating, even when they were members of socially disadvantaged groups (FAO 2016). Efforts in Bangladesh led to the development of a curriculum, “Nurturing Connections”, which addresses household gender dynamics as foundational to achieving better nutritional outcomes.

Box 3: Nutrition Education and Behavior Change: Terminology

Nutrition education (NE) is defined as “any combination of educational strategies designed to facilitate voluntary adoption of food choices and other food- and nutrition-related behaviors conducive to health and well-being. Nutrition education is delivered through multiple venues and involves activities at the individual, community and policy levels.” (Contento 2008), p. 15)

“Social and Behavior Change Communication (SBCC) is a research-based, consultative process that uses communication to promote and facilitate behavior change and support the requisite social change for the purpose of improving health outcomes.” (Manoff Group 2012)

AES typically receive limited training and support in how to conduct appropriate nutrition education (NE) or Social and Behavior Change Communication (SBCC). To address this gap in Malawi, a package of NE materials geared toward AES was developed and piloted that included labelled pictures of hundreds of locally available foods intended to broaden thinking about production, marketing and consumption. Materials included photographs showing samples of balanced meals and snacks for all ages, and booklets guiding AES and farming households on the basic issues of food security and nutrition for all family members (FAO 2015).

SERVING PORTIONS FOR A CHILD 12 – 23 MONTHS OLD

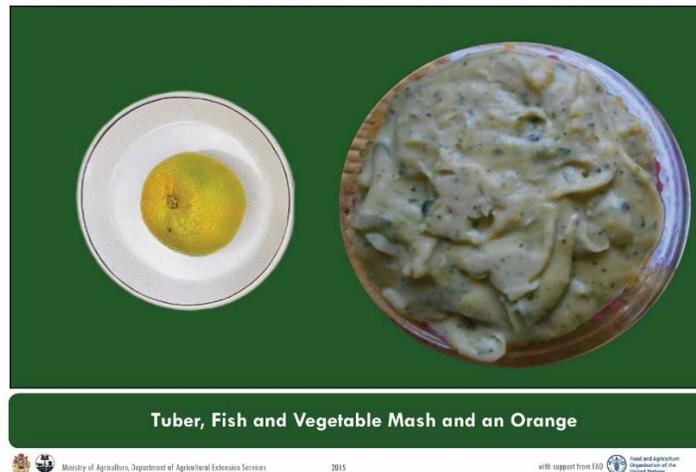


Figure 1: Example of Nutrition Education material created for AES in Malawi

2) Improve Access to a Diverse Diet

Food access is a function of social, economic, and physical aspects that may limit or facilitate the ability of households and their individual members to access the foods required to meet their dietary needs. AES has traditionally supported food access by improving the productivity of farming households, and by reducing food prices via increased food supply. But in order to achieve nutrition security, the understanding of what constitutes food access must move beyond access to staple crops, and consider whether the accessible foods meet dietary needs (Pingali 2015). AES staff can address food access in multiple ways, including: increased production of diverse foods for the household's consumption, improved access to markets, improved availability of nutrient-dense foods in the marketplace, reduced food prices, and gender-equitable decision making related to agricultural production and income.

At the country level, rates of chronic malnutrition tend to decrease as wealth increases (de Onis, Blossner et al. 2012). These economic improvements are also typically accompanied by increasing rates of obesity, and stagnant rates of micronutrient malnutrition (Popkin, Adair et al. 2012). This transition from a situation in which undernutrition is dominant to one in which chronic disease and micronutrient deficiencies persist is called the “nutrition transition”, and is threatening the economic and health systems of many middle-income countries. Hardly a concern limited to wealthy urbanites, data also suggest alarming growth in rates of overweight in rural settings (Napoli, Mottini et al. 2010). This “triple burden” of malnutrition (featuring concomitant undernutrition, micronutrient malnutrition, and nutrition-related chronic disease) can be addressed by food system improvements, wherein healthy, diverse foods are accessible and desired by all segments of the population (Gomez 2013).

The New Extensionist approach and recent World Bank and FAO publications focus on market-oriented extension services, wherein AES staff support farmers in developing business skills that will allow them to remain competitive as markets become more integrated and sophisticated (Kahan 2013). Production diversification to meet market demand is an important aspect of specialization and commercialization;

nutrition education and SBCC activities are vital to influencing the market demand and farm-level production of nutritious foods. Multi-country research suggests that smallholder diets are more likely to diversify when they access foods in the marketplace than when increasing on-farm diversity (Sibhatu 2015).

3) Safeguard Stability

Stability represents the ability to access diverse foods at all times, and is determined by seasonal differences in food production, and market and income factors that affect whether a household can access food required for healthy, active living of all members. The concept of a “lean” or “hungry season” is familiar in many rural, agriculturally-based communities, and denotes the time when food may be inadequate just before harvest (Bardhan 1980, Moore, Cole et al. 1997). AES can advise households and communities on how to produce diverse foods that are agro-ecologically appropriate, extend production across different seasons (e.g., through water management practices), identify local and indigenous foods available throughout the year, and process and preserve foods to extend their availability. In Malawi, AES introduced seasonal food calendars as a means to assist families to plan ahead by analyzing foods available at various times throughout the year and plan accordingly.

Improved post-harvest processing, storage and transportation can enhance both food stability and utilization. Food that is lost to rodents reduces overall availability and may lead to seasonal food insecurity (an aspect of stability), while food exposed to pathogens will impede utilization. Rates of postharvest loss vary widely by location and crop, but losses as high as half of a harvest have been estimated in many low-income countries due to inadequate storage and transportation infrastructure, and poor processing practices (Parfitt, Barthel et al. 2010). AES can raise awareness of the related cost and food insecurity, and promote solutions that reduce post-harvest losses.

Appropriate post-harvest handling preserves nutrients and prevents the growth of food-borne pathogens, and thus contributes to food safety. For example, aflatoxins are produced by molds, and are associated with growth impairment in children and animals, as well as liver disease (Smith, Prendergast et al. 2015). Appropriate AES support to farmers for improved cultivation and storage practices can eliminate or greatly reduce the risk of aflatoxins. The African Union’s Partnership for Aflatoxin Control in Africa is providing support, guidance and research to inform AES interventions (PACA 2013).

4) Ensure Optimal Utilization

The utilization pillar of food security concerns the body’s ability to make the most of the nutrients in the food (FAO 2006). Food processing and preparation, diet quality, and health status all influence utilization. The health sector traditionally is seen as responsible for improving food utilization in rural households, through advice to pregnant and lactating mothers, well-baby programs, etc. However, a basic understanding of food utilization can enable AES staff to understand the context within which agriculture contributes to (or is a constraint to) nutrition, thus complementing the efforts of health colleagues. This understanding can, in turn, inform the nutrition education provided in partnership with health and other colleagues. Improved food processing reduces the malabsorption of certain minerals in cereals, legumes, and other edible seeds that also contain phytic acid; depending on the context, this guidance may be acted upon at the household level (possibly influenced by health staff) or by other value chain actors (more likely to be informed by AES).

Dietary needs are determined by sex, activity level, health status, and life stage (e.g., developmental phase, pregnancy, lactation), and thus vary across the life course. For example, adolescent girls require more iron than other populations as they grow rapidly and begin menstruating (Beard 2000). Men and women performing strenuous agriculture work need more energy: heavy labor can require as many as 4000 kcal/day in order to attain energy balance, twice the requirement for a sedentary adult (UN University 2004). And since their stomachs are small, young children can only hold a limited amount of food, and their meals must be nutrient dense, delivering more nutrients per calorie than an adult would require (Dewey 2003).

Cultural practices also influence food intake and food choice. Intra-household food distribution, or the way food is allocated among household members, is sometimes categorized as a function of food access, but is also quite relevant to utilization given its interaction with eating, feeding, preparation, hygiene, and health status. Culturally-informed gender biases in some contexts result in poor feeding practices for girl children compared to boys (Choudhury, Hanifi et al. 2000), and women or children might be deprived of food as punishment in gender-based abusive relationships. Awareness of the unique nutritional needs of various household members and sensitivity to potential gender inequities can enable AES to support better household nutrition.

A Nutrition-Supporting Environment: Water, Sanitation and Hygiene (WASH)

Proper utilization of food is constrained by increased rates of infection, which can arise from inadequate access to clean water, inadequate sanitation, and lack of appropriate hygiene practices (WHO 2015). Infectious diseases reduce the body's ability to absorb nutrients, and contribute to poor child growth (Dewey and Mayers 2011). Infectious diarrheal disease is particularly widespread in many rural, low-income communities. Certain agricultural activities have significant implications for WASH; enhancing AES skills will enable them to support healthy environments and do no harm.

Environmental enteric dysfunction (EED) is a technical term used to describe poor gut absorption, and reduced barrier function (Crane, Jones et al. 2015). EED results from interactions among chronic infection, poor sanitation and hygiene, and micronutrient deficiency, and contributes significantly to undernutrition among young children in some contexts (Humphrey, Jones et al. 2015). Several large trials are currently underway in multiple countries to better understand how complementary WASH and nutrition interventions can best support health and child survival (Arnold, Null et al. 2013, Humphrey, Jones et al. 2015).

Water

Access to safe drinking water is most limited in rural areas of African and Asia, with 664 million people lacking access in 2010 (UNICEF 2016). In addition to poor access to clean water, contamination is a growing concern. Concurrently, climate change threatens to limit freshwater supplies in some regions. Farming households require multiple uses of water services; these uses can be understood in terms of reproductive uses including water for drinking, cooking and bathing; as well as productive uses such as irrigation and drinking water for livestock. A growing body of work supports planning for these diverse uses in a coherent way so as to reduce conflict and unintended consequences to either human health or livelihoods (SPRING 2014).

AES can work with farmers to eliminate or reduce the pollution of water sources by advising good practices for the application of pesticides and fertilizers (both organic and inorganic), including using moderate quantities and ensuring safe distances from drinking water sources. Improved irrigation practices, such as rainwater harvesting and drip where feasible, can reduce depletion and degradation of

water resources. Good animal husbandry practices (e.g., minimizing grazing near water sources used by humans) and proper manure management can help maintain water quality (Hubbard, Newton et al. 2004).

Sanitation

Sanitation entails interventions to create clean environments for people, where exposure to disease is limited (UNICEF 2016). Open defecation contaminates both drinking water and field crops intended for human consumption and its reduction is a major focus of sanitation investments. It remains a common practice among many agricultural laborers, however, as toilets are inaccessible in the field. Activities that sensitize households to the dangers posed by open defecation and to potential solutions, such as burying feces, will help safeguard community health and food safety.

Recent analyses suggest that the presence of animal feces in a home environment, particularly from poultry, are associated with slower linear growth among children (Headey 2016). AES staff can support environmental hygiene by demonstrating how animals need to be kept away from where children play, and from where food is prepared and consumed. AES can also promote the proper disposal of dead animals (e.g., burying or burning of carcasses) in order to reduce the potential for disease transmission.

Hygiene

Good hygiene encompasses practices that promote and preserve health (WHO 2016). Handwashing with soap is a notable thrust of hygiene promotion; it reduces the spread of infectious disease, and limits ingestion of pathogens and contaminants. Many of these actions are already promoted by the health sector, but a general awareness of them will allow AES staff to reinforce and model them. Handwashing should be promoted after using the toilet, handling animals and their manure, fertilizers and/or other chemicals, particularly before cooking and feeding children. Containers in which food and water are stored and eating utensils should also be washed thoroughly. Hygiene should be an important component of AES interactions with farm household members related to fertilizers, pesticides, and livestock management. Where water is scarce, the greywater resulting from appropriate handwashing practices can be used for irrigating plants or trees.

Part II: How to Integrate Nutrition within Agricultural Extension Services

Gender and Nutrition: Specific Actions AES Can Support

It is likely that AES will continue in the near term to reach more men than women farmers. While ultimately greater gender equity is necessary both within AES and amongst AES clientele, men currently working in AES are well positioned to positively engage other men. Engaging men in conversations about nutrition and gender equity may not only empower them with knowledge about better nourishing themselves, it can also encourage them to take specific steps to improve the nutrition of their family members. By linking nutrition to reduced health care expenditures and improved productivity,

Effective AES nutrition promotion activities ought to be context-specific, responsive to the nutritional opportunities and challenges confronted by AES staff and farmers, and build upon existing knowledge, perceptions and practices. Understanding the local food system, which encompasses the processes and infrastructure required to feed a population, and how they impact the nutrition of households, is the starting point to identify the entry points for AES staff (Aakesson 2014).

AES can support food production, processing and marketing goals shared by local farmers. It may also challenge the commonly-held assumption that nutrition is a “women’s topic”, and a related assumption that nutrition is therefore less important than other production-related topics (Fanzo 2013).

As recognition of men’s roles in nutrition have expanded, examples of nutrition projects that involve men are also expanding (Kuyper 2012). In Bangladesh, Alive & Thrive specifically targeted fathers in materials and TV commercials that addressed their desire to buy sweets and non-nutritious foods for their young children, at the risk of displacing nutritious foods from the diet (Alive & Thrive 2011). An authoritative doctor shares child feeding information to both a mother and father, reinforcing good practices. Similarly, Alive & Thrive produced TV spots in Ethiopia that linked fathers’ existing knowledge of agriculture and livestock production to infant and young child feeding actions, including one that featured an AES presentation to a group of farmers (Alive & Thrive 2012).

Household Methodologies (HHM) shift the focus of gender equity efforts from historical approaches to empower women to a more nuanced approach that engages men and women. HHM build on the observation that by making decisions independently of each other, household members often pursue competing goals and ultimately remain poor when better cooperation could improve their livelihood opportunities. In Uganda, HHM was applied to a coffee value chain development program. Gender Action Learning System (GALS) used HHM to encourage reflection and dialogue on gender balances in the household and community and how they impact personal and professional growth. The approach helped participants to understand that gender inequities were constraining productivity, increasing labor burdens and limiting income. Participating women were able to increase their participation in the production, processing and sale of coffee. It also stimulated men’s engagement in child care and other tasks that were formerly considered to be “women’s work” (Farnworth 2013).

The Household Agriculture-Nutrition Doable Actions (HANDS) framework deployed in Ethiopia, identifies “Relate, Communicate, and Decide” as one of five clusters of pro-nutrition behaviors that can be used to design effective interventions. Activities that contribute to this cluster can strengthen family relationships, improve communication, and facilitate joint decision making. This “cross-cutting” cluster impacts all other areas of behavior and should be considered even when activities are primarily targeting one of the other four areas: Raise/Grow, Prepare/Preserve/Store, Rest/Share/Eat/Feed and Earn/Buy. Also in Ethiopia, ACIDI-VOCA used SBC methods to train members of farmer cooperatives on dietary diversity, growth stages and hygiene. This program purposely targeted men due to their role as decision makers for food selection and income allocation. The farmer participants then went on to train other cooperative members on what they had learned.

Institutional Capacity Development

Good nutrition depends in large part on the voluntary adoption of food choices and behaviors conducive to good health; thus, an enabling environment, personal motivation and agency are important facilitators of behavior change (Contento 2008). The New Extensionist asserts that AES staff and their supervisors need to be supported as learners who *themselves* can benefit from diverse, nutritious diets, and not just as conduits of information. When AES staff connect nutrition to their personal lives and are convinced of its importance in the lives of those with whom they interact, they will be motivated to include nutrition as a component of their extension portfolio.

INGENAES has developed an approach/framework to facilitate institutional commitment and action on nutrition and gender (for the purposes of this paper, we focus on the nutrition dimensions). The Institutional Review and Planning Framework (IRPF) guides institutional management through a process of reflecting upon the roles food and nutrition play within their own lives, reacting to case studies that depict nutrition challenges confronted by rural households in their local context, and contemplating how their organizational mission grounds a commitment to nutrition. The IRPF is intended to move nutrition from an implicit component of an organization's work, to make it an explicit priority.

The IRPF builds on previous experience of guiding microfinance service providers in a reflection on how to include social outcomes in the delivery of financial services. The outcome was that the health and social aspects became central to the work of field-level staff, and as a result, microfinance outcomes (e.g., loan repayment) improved.

Organizations that choose to make greater commitments to nutrition can facilitate action-based training and on-the-job support to ensure that staff at all levels gain the conviction, skills, and behaviors necessary to support improved nutrition. Other organizations may feel less able or ready to make a comprehensive commitment to nutrition. The INGENAES project is developing fact, tips, and activity sheets that are 1-2 pages in length, and guide AES staff through either information or specific practices and activities that support improved nutrition (available at: <http://ingenaes.illinois.edu/library>). Specific integration activities are informed by the INGENAES-developed competency framework, which describe skills, practices and behaviors (SPBs) needed by AES staff to positively contribute to better nutrition. As depicted in table 1, competencies are developed in relation to the impacts they are intended to achieve, and are accompanied by illustrative examples of how the competencies will be transferred from staff to farmers, and how training will support development of the desired SPBs.



Table 1: Illustrative Example from INGENAES Competency Framework

Competency Content Area and Description Include type of competency	Learning Changes in skills, practices, and behaviors that happen during a learning event and can be assessed during the event. (Achievement-Based Objectives)	Transfer Specific, expected actions that will be practiced/tried in work. Transfer points form the basis for supportive supervision.	Impact Longer-term or ultimate changes that will occur within the organization or community as a result of practicing this competency or this one along with others
Nutrition for all A knowledge and attitudinal competency: extensionists will be able to identify and address the needs of the most nutritionally vulnerable.	Describes how some groups of people, typically women, children, and disadvantaged groups, are more vulnerable to poor nutrition due to biological reasons and reduced access to nutritious food. Identifies groups of people in their “catchment area” who may be more vulnerable to poor nutrition. Demonstrates effective ways to dialogue with farmers about the nutritional needs of the vulnerable in their households. Role plays how to examine opportunities to improve nutrition with farmers in vulnerable households.	When interacting with households with potentially vulnerable members, initiates dialogue about their unique needs. Relates to the farmer gender-responsive ways to improve vulnerable HH members’ access to nutritious foods. Demonstrates effective engagement of vulnerable through farmer interactions. Supports the efforts of colleagues (health, education sector) working to improve nutrition and food security, as well as those working to dismantle systems leading to inequity.	Individual, household, and community-level knowledge of who is most vulnerable to poor nutrition will increase. Households, communities, beyond will identify and implement activities to prioritize the nutrition of the vulnerable. Inequity in nutrition outcomes will be reduced, such that the nutrition status of low-income households, women, children, etc. will be similar to that of those with greater privilege who live in a similar locale.

Competencies are organized by level of complexity; organizations can build upon foundational SPBs as commitment and opportunity allow. The competency example provided in Table 1 demonstrates how training extension staff to understand and impact food and nutrition security for vulnerable families will impact their ability to transfer skills and knowledge in the field, which is intended to ultimately lead to improvements in nutrition status among the most vulnerable members of society.

As mentioned at the onset, efforts to integrate nutrition should not add to the job responsibilities of an overstretched service, and ideally ought to complement existing tasks and responsibilities of improving food and nutrition security. When organizational leadership has committed to integrate nutrition within their services, staff and their supervisors can analyze the training, duties, and activities they are likely to perform at various points in the year, considering the manner in which they engage farmers. In Zambia, the nation-wide public extension service issues a planning and monitoring tool in the form of the Agricultural Diaries for Extension Officers, known as ADEOs, which are produced by the Ministry of Agriculture’s Extension Methodology Unit (Muyunda 2016). By including concise nutrition information in the ADEO and similar tools in Bangladesh and Nepal, the INGENAES project is leveraging this resource to support extension staff in their efforts to promote nutrition.

Implementation

Farmers are understandably risk-averse, and smallholder farmers are even more so since little separates them from serious hunger and deprivation (Carter 1997). Local AES can fine-tune the competency framework developed for a global audience with details about their specific context. AES can answer questions such as whether farmers are able to produce a more diverse range of foods, whether they face land holding or labor supply constraints that impede diversification, or whether it would be economically advantageous for them to specialize.

Operational supports are essential to successful implementation generally, and particularly when adding new components to existing programming. The INGENAES IRPF highlights three specific supports: education and training of both AES staff and the audiences with whom they interact, staff support, and partnership development (discussed further in Part III). Education and training should be based on proven adult education principles, building upon learners' past experience and providing opportunities for practice and reinforcement of new knowledge and skills (Knowles 1972, Vella 2002).

Activities should be linked to measurable outcomes and intermediary processes related to improved nutrition that AES can feasibly affect, and that staff have the capacity to track. A growing body of work related to metrics for nutrition-sensitive agriculture is enabling field-level staff to better evaluate the implementation and the impact of these efforts (<https://feedthefuture.gov/resource/summary-chart-feed-future-indicators>; <http://immana.lcirah.ac.uk>).

Part III: Coordinating and Collaborating with Other Sectors and Actors

Given that the core responsibilities and training of AES are focused on food production and value chains, it is likely that they can contribute to nutrition of farming households and communities without becoming experts. Multi-sectoral interaction can facilitate shared understanding about which roles are most appropriate for AES, and those better left to another sector. Relationships among organizations should be built on clear understanding of each partner's respective needs and desires.

Some nutrition needs may already be familiar to AES staff, while others may appropriately be the "domain" of health sector staff. Many of the aforementioned points of intersection in this paper straddle the two sectors. Agricultural activities can impact the food environment in ways that either protect or challenge the health status of communities (Dury 2015, Herforth and Ahmed 2015), including the challenges described in the WASH section of this paper. Given their existing relationships with farming households, AES staff may have the opportunity to serve in the role of knowledge brokers, who can liaise between the health, agriculture and other relevant sectors (e.g., gender, education, social protection) and ensure that smallholders are able to access the support they need to improve their nutrition without causing harm.

In the aforementioned integrated projects in Ethiopia, a process review collected consistent descriptions of the respective roles of home economics workers (HEWs) and development agents (DAs): to paraphrase, DAs share services and information related to producing a more diverse diet, while HEWs create demand for these foods and share nutrition-specific information (Aakesson 2014). Challenges to coordination were similar to those encountered by other projects: although a National Nutrition Plan existed, the commitment of some signatory entities to nutrition was not evident. National level

coordination was better than that observed at the regional level, and greater commitment to nutrition was associated with increased levels of funding.

The Essential Nutrition Actions and Essential Hygiene Actions (ENA-EHA) are increasingly a widely-accepted framework for promoting integrated nutrition and hygiene services and behavior change communication (WHO 2013, Guyon A. 2015). The evidence-based actions promoted are listed in Box 4. Given the growing familiarity with these actions, it is important for AES to complement them whenever possible, and not to contradict or undermine them in any of their activities. The country-led Scaling Up Nutrition (SUN) movement is a driving force in leveraging the contribution that multiple sectors, including agriculture, can make to improved nutrition. SUN’s commitment to developing “functional capacities” (<http://scalingupnutrition.org/about/annual-global-gathering/global-gathering-2015/1d-the-development-of-functional-capacities-for-scaling-up-nutrition-in-actions-a-needs-driven-coordinated-effort>), or the ability of specific sectors to optimize their contribution to nutrition, is very much aligned with efforts to integrate nutrition in AES.

Broad Essential Nutrition Action (ENA) topics:	Broad Essential Health Action (EHA) topics:
<ul style="list-style-type: none"> • Women’s nutrition (for adolescents and women of reproductive age, and for pregnant and lactating women) • Breastfeeding • Complementary feeding (from 6-23 months) • Nutritional care of sick, malnourished children • Prevention and control of anemia • Prevention and control of vitamin A deficiency • Prevention and control of iodine deficiency 	<ul style="list-style-type: none"> • Household treatment and safe storage of drinking water • Hand washing at critical occasions • Safe storage and handling of food • Safe disposal of feces • Creating barriers between toddlers and soiled environments and animal feces

Certain nutrition and hygiene actions among those listed are more relevant to the context of agriculture and to the tasks of AES staff, while others are more appropriately addressed by health sector staff. Breastfeeding is an example of an ENA that includes aspects relevant to the roles of AES and others best addressed by health sector staff. AES staff can facilitate conversations about the importance of ensuring that lactating women who work in agriculture are encouraged to take breaks to either express their milk or breastfeed their children. AES staff are not typically trained to provide lactation support, however, which may be better provided by frontline health workers.

Previous documentation of integrated agriculture and nutrition projects has largely focused on health-focused projects that incorporate agricultural components, such as backyard gardens in HIV programming (Talukder, Kiess et al. 2000, Wills, Chinemana et al. 2010, Aakesson 2014, Olney, Pedehombga et al. 2015). The AES context expands on this, and agricultural production and income generation are major driving forces. Cross-sectoral partnerships will require each side to develop some understanding of the other’s approaches; for example, the model of “mothers’ groups” common to health interventions in which women meet to support each other and participate in educational experiences does not have a direct parallel to AES approaches. Farmer circles, cooperatives, and agriculture demonstration groups are historically less likely to include large numbers of women of reproductive age.

Conclusion and Implications

This discussion paper presents specific activity areas through which AES staff can support improved nutrition, an operational approach for engaging organizational leaders, staff and farmers in nutrition issues, and opportunities for multi-sectoral coordination. The local context and the specific demands of agriculture must guide these efforts. When agriculture optimizes its contribution to food and nutrition security, both farm and non-farm populations will benefit from a more nutritious and affordable food supply. AES must effectively engage with nutrition topics and discuss them with farmers in order to promote consumption of diverse, nutritious diets; support families in balancing the demands of agricultural labor and child care, prioritize nutrition when deciding on how to spend income, and promote agricultural practices consistent with good water, sanitation and hygiene practices.

Although this discussion paper primarily highlights strategies employed by the INGENAES project, we acknowledge that many other projects are currently engaged in integrating gender, nutrition and agricultural extension. It is our hope that our collective efforts will identify the best ways to optimize the platform of AES for improving nutrition. By building on the foundation provided by the New Extensionist, AES can create vibrant rural communities capable of providing food and nutrition security for their nations.

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