

The Integration of Nutrition into Extension and Advisory Services: A Synthesis of Experiences, Lessons, and Recommendations



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Acronyms

ACE	The Department of Agriculture, Conservation, and Environment	IFPRI	International Food Policy Research Institute
AGRA	The Alliance for a Green Revolution in Africa	ISFM	Integrated Soil Fertility Management
AIS	Agricultural Innovation System	IYCF	Infant and Young Child Feeding
AKS	Agricultural Knowledge System	M&E	Monitoring and Evaluation
ALVs	African leafy vegetables	MEAS	Modernizing Extension and Advisory Systems
ATAI	The Agricultural Technology Adoption Initiative	MICS	Multiple Indicator Cluster Survey
AVRDC	Asian Vegetable Research and Development Center	MoA	Ministry of Agriculture
BBS	Bangladesh Bureau of Statistics	MoE	Ministry of Education
CGIAR	Consultative Group on International Agricultural Research	MoH	Ministry of Health
CSO	Civil Society Organization	NGO	Non-Governmental Organization
DFID	Department for International Development of the United Kingdom	OFSP	Orange-Fleshed Sweet Potato
DHS	Demographic and Health Surveys	QPM	Quality Protein Maize
EAS	Extension and advisory services	RAIN	Realigning Agriculture to Improve Nutrition
FAO	Food and Agriculture Organization	SAFE	Sasakawa Africa Fund for Extension Education
FFS	Farmer Field School	SEPs	Supervised Enterprise Projects
FSNSP	Food Security Nutritional Surveillance Project	SESAN	Secretaria de Seguridad Alimentaria y Nutricional
GFRAS	Global Forum for Rural Advisory Services	SMS	Subject Matter Specialists
GINA	Gender Informed Nutrition Agriculture	SNEA	The National Agricultural Extension System
HKI	Helen Keller International	SPRING	Strengthening Partnerships, Results, and Innovations in Nutrition Globally
HSAs	Health Surveillance Assistants	SUN	Scaling Up Nutrition
ICTs	Information and Communication Technologies	T&V	Training and Visit
IFAD	International Fund for Agricultural Development	UN	United Nations
		WASH	Safe drinking water, sanitation, and hygiene
		WB	World Bank

Executive Summary

The Global Forum for Rural Advisory Services (GFRAS) and the World Bank's Secure Nutrition Knowledge Platform supported this study to examine the integration and linkages of nutrition within extension and advisory services (EAS) and workers in Africa, South Asia, and the Americas. EAS consist of all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organizational, and management skills and practices so as to improve their livelihoods and well-being (Sulaiman and Davis 2012).

The major purpose of this work was to analyze and document the past, current, and future role of EAS, with regard to human nutrition. This report summarizes the current state of knowledge on the role of nutrition in EAS resulting from an extensive literature review, analyzing survey responses, and conducting interviews with actors from worldwide development organizations, governmental agencies, educational and research institutions, and the private sector.

This report highlights good practices stemming from country or program cases, and notes comparative advantages of different types of models. Building on the GFRAS Worldwide Extension Study (GFRAS 2013a), five objectives were established to fulfill the project's purpose:

1. Understand the status or existence of nutrition as part of the portfolio of EAS activities in different regions of the world.
2. Document the nutrition technical content of extension workers' training and the messages/information delivered to farmers and other clientele.
3. Understand if and how extension workers coordinate and/or duplicate work related to nutrition with rural workers from other sectors, e.g. rural health.
4. Understand challenges faced by existing home economics EAS and identify opportunities for strengthening these services (e.g. training and supervision quality concerns, constraints to work performance such as lack of transportation, task overload, supply bottlenecks, high extension agent turnover, etc.).
5. Identify good practice country or program cases. Note comparative advantages of different types of providers, and of nutrition advice coming from EAS rather than from other sectors such as health.

There is a heightened awareness globally and within development institutions and governments of the need to better understand the linkages between agriculture and nutrition, and to deci-

pher the ways in which agriculture can contribute to improved nutrition. The *what* and the *how* of effectively delivering "nutrition-sensitive agriculture" services to rural households, remains even less understood. *Nutrition-sensitive agriculture* involves the design and implementation of nutrition-based approaches to sustainable farming and cropping systems. Ultimately, nutrition-sensitive agriculture is aimed at improving the nutritional status of a population by maximizing the impact of food and of agricultural systems, while minimizing the potential for negative externalities regarding the sector's economic and production-driven goals.

Extension agents or community workers are often mentioned as a promising platform for the delivery of nutrition knowledge and practices to rural communities. However, the context and mechanisms for delivery on the ground have been less clear or under-evaluated. Extension workers are often thought of as the vehicle to the improved nutritional health of rural communities because they reach and interact closely with farmers in different settings. Furthermore, they act as significant service providers of crop, livestock, and forestry aspects of food security, consumption, and production.

Nutrition inclusion into EAS

This study examines some of the overarching approaches taken to connect EAS and nutrition. EAS for the most part, focus thematically on crops and food, and to a certain extent on livestock and natural resources management. They also focus on the education pieces that fit within these themes. Extension agents do not tend to work in sectors such as public health, or on health-related activities, for instance malnutrition screening or treatment. Most of the approaches have focused on improving the nutritional quality of food production, as well as on nutrition education and on awareness messages regarding better utilization of foods. One reason is that because many extension agents have experience of working in the food availability sphere, including nutrient-rich crops in their portfolio is an easy transition. Responsibility for food availability falls into the remit of the Agriculture ministries.

Less work has been done regarding concerns of food access and utilization in rural households. This may be because interventions in these areas are less known, less demonstrated, are supported by less research, and have less evidence of impact. These areas also involve integrating other actors, including value chain actors, for increased access to nutritious foods and public health in the case of utilization, which can be more difficult to coordinate under time and resource constraints.

In some cases, the integration of nutrition within EAS is a direct objective of programs or projects, while in others, it takes place indirectly as new technology or models present unique entry points for integration to occur. Very few of the integrated approaches are at scale and very little has been documented on their effectiveness.

Nutrition training and messages of extension agents

Our study demonstrates that there is extensive pre- and in-service training on nutrition taking place within EAS at different levels: within projects, within vocational training, and within the formal education system. The capacities that extension agents need to effectively integrate into nutrition include: technical knowledge of nutrition; communication, facilitation, and management skills; and gender-sensitive nutrition awareness. Nutrition training is occurring within EAS but mainly on educating communities around what consists of a diverse diet. Many extension agents receive training on crop production for improving nutrition, in addition to training on diets, food preparation, preservation, and hygiene. Along with training the extension agents on the technical aspects of nutrition, it is also necessary to introduce them to softer skills, such as facilitation, negotiation and communication, and gender sensitivity.

Training also encompasses support systems for extension agents including mentorship, feedback, and career advancement. If a country does not have a support system for EAS in place, the probability of younger generations entering the education system, or doing vocational training with a focus on EAS, remains low.

Messages and demonstrations are often used by EAS to transfer nutrition knowledge to communities. Peer to peer engagement, positive deviance, and model farmers, are all avenues that have been tried. Use of technology and existing community platforms and structures help to facilitate effective message delivery and ownership at the community level.

Injecting and incorporating nutrition, dietary diversity, and quality concepts into the overarching education system, as well as into training modules for extension agents, would provide longer-term bridges to sustainability than most other approaches. Education programs can model profiles of nutrition champions and leaders that emphasize cross sectionalism and cross-disciplinarily (Haddad 2013). Some countries integrate nutrition content into the curriculum of extension agents. The training of extension agents has to be robust enough to enable them to feel comfortable talking to farmers about the linkages between agriculture and nutrition.

EAS and other rural workers

The current profile, basic skills, and gender make-up of extension agents and other actors who participate in nutrition activities, including the basic types of workers in the field and at sub-national levels, was assessed. A diverse array of actors work in nutrition, though none who are capable of entirely taking on nutrition alone. Overall, results from our study indicate that there is little duplication in duties at the community level with regard to nutrition. It is often that nutrition falls through the cracks for both agriculture extension agents as well as health workers. Nutrition often remains no one's responsibility.

Community health workers focus more on screening and on treatment of malnutrition. Extension agents focus on crop productivity and on the transfer of technology. An area of potential overlap between health and EAS is in the transfer of knowledge to households on basic dietary guidelines and nutrition counseling. However, very few extension agents provide this type of service to households.

There are a number of EAS models that also apply to nutrition. There are subject matter specialists, as well as extension agents who provide general advice on all subject matters. Community members can also play a role as extension agents for their community by serving as facilitators.

Challenges and opportunities of EAS integrating nutrition

Integrating nutrition into EAS presents a number of challenges, including a deficit of resources to dedicate to nutrition-focused activities. There is also scant training on how to implement nutrition activities within the work portfolio of extension agents. Mobility and communication pose significant challenges. Many extension agents lack the means to reach the communities they work in, or to communicate via mobile phones with the community leaders. Extension agents are also stretched beyond their capacity, as are most community workers. Adding more to their workload neither motivates nor provides incentives to deliver.

Where there are challenges, there are also opportunities. The elevated profile of nutrition within agriculture presents one such opportunity. Many who work in EAS feel that the agriculture sector is the rightful home for nutrition work. Technology, whether in crops such as biofortification or fortification or information, communication and technology (ICT), provides opportunities to create an easier path for nutrition to fold into the core work of extension agents. It also enables improved communication, and brings down common language barriers.

Good practices and comparative advantages of EAS working in nutrition

In addition to examining the factors that contribute to an enabling environment, multi-sectoral coordination, and skilled human resources, our study also attempts to learn practical lessons and gain insight into what effective community delivery looks like. Understanding the type of training that is needed and that works best within communities is critical to guiding any efforts to scale-up or to further integrate nutrition into EAS. Throughout the duration of our study, a consistent message has been that training needs to be participatory and community-based.

It is becoming accepted wisdom that EAS should be tailored to the demands and needs of farmers, instead of being dictated by top down models that rely on what EAS determines farmers' needs to be. A critical factor in the success of nutrition interven-

tions is the ability to create *demand* for better nutrition, and for increased nutrition education and options. Leveraging community leaders and champions, utilizing technology to effectively communicate, and the creative use of human resources, can all help to elevate nutrition within EAS.

The existing infrastructure, trust, awareness, and reach that extension agents have within the communities in which they work should be harnessed and used to include nutrition-related activities and disseminate messages. Once they have been trained in food-based approaches to nutrition, and equipped with an understanding of farmers' needs, extension agents can become a vital part of shaping multi-sectoral actions to improve the nutrition status of the most vulnerable, rural populations.

Applying EAS to the guiding principles for improving nutrition through agriculture

A FAO systematic review on agriculture programming for nutrition identified an emerging consensus around 20 key guidance principles for improving nutrition through agriculture (FAO 2013a,b; Herforth et al 2012). These principles summarize and reflect the views by international development institutions and inter-agency United Nations bodies to enhance the impacts of agricultural programs, policies and investments on nutrition. Examining these principles, through an EAS lens, provides overarching parameters on how nutrition can be better integrated into EAS in both policy and in practice. The principles are divided into three parts: planning for nutrition, taking action, and creating a supporting environment.

EAS have the ability to ensure the recommended planning principles are included in their workplans, with some effort, and to use these principles as guidelines when developing plans and objectives. These planning principles are: incorporate nutrition objectives; assess the context of malnutrition; do no harm; measure impact; increase access to resources; and target the most vulnerable. Training on how to assess the status of food insecurity and malnutrition from a food-based perspective at a local level, and associated causal factors, should be included in the curriculum of EAS. This would involve understanding who the beneficiaries are, and identifying the most vulnerable from the communities that extension agents work in. Finally, very little has been documented on measuring and monitoring the impact of EAS on livelihoods, and in particular, on food and nutrition security outcomes. If these principles are to be applied, proper design of nutrition into EAS will need to include realistic monitoring and evaluation frameworks.

The "taking action" principles explicitly integrate EAS, in particular with regards to empowering women, incorporating nutrition education into agriculture interventions, and managing natural resources. The "approach principles" include: empowering women; including education; managing natural resources; diversifying production and livelihoods; reducing posthar-

vest losses; increasing access to markets; and reducing seasonality of food insecurity. These actions represent practical approaches for extension agents to promote within the communities in which they work.

The "supportive environment" principles are where EAS have in general fallen short across many countries. These principles include: improving policy coherence; improving good governance; and improving capacity for nutrition. EAS, in the most recent agriculture policies, have neither supported nutrition nor have they integrated nutrition activities into their mandates. However, that may change as the result of an increase in awareness, and renewed commitments to improving nutrition. Capacity is a vital requirement for the smooth functioning of EAS and for the successful integration of nutrition into the over-crowded work portfolios of extension agents. Although this study highlights the diversity of training models in place, sustainable capacity development of nutrition skills within EAS is, for the most part, lacking.

Moving forward, as EAS continue to be restructured and reformed, the inclusion of these principles in policies, programs, and monitoring frameworks, is essential to their success in addressing food and nutrition security.

Recommendations and final thoughts

When does it make sense to integrate nutrition into EAS? When not?

- 1. Focus on the food:** It makes sense to integrate nutrition into EAS when there is an extension system, where there is a robust rural livelihoods sector, and where there is evidence of malnutrition, and dietary insufficiencies. Subsistence farmers need technology and tools, and part of this toolbox should include nutrition knowledge and technologies. Conservation and sustainable use of biodiversity and harnessing ecosystem services are also important and should be emphasized as supplementary nutrient-rich food sources to staple and cash crops.
- 2. Utilize what is already available:** EAS can be complemented by and consolidated with other delivery channels at the local level. "It is important for extension agents to acquaint themselves with the organizations and knowledge systems available at the local level to determine how they can be improved, rather than assuming that nothing of significance is currently available. For example, instead of forming entirely new groups for women, local informal work exchange or savings groups could be strengthened through short training exercises on nutrition and dietary diversity" (Jiggins et al 1997). Many agriculture-focused cooperatives exist at the community level. These can serve as platforms for nutrition messaging and education by extension agents.

3. Embrace the feminization of agriculture: Women are the predominant producers in many countries, especially in those that have experienced emigration. This provides an opportunity for EAS to reach and empower women through nutrition tools and knowledge. By focusing on women, the biggest impacts can be felt on child health.

4. Diversify landscapes, diversify diets: Kitchen gardens, livestock, and especially small animals, can play an important role in dietary diversity and in increasing the consumption of micronutrient-rich foods. Many households around the world engage in these activities. Extension agents should be aware of the nutritional benefits of agriculture-based livelihoods, and promote diverse diets at the household level.

5. Apply nutrition agronomy: EAS from the public, private, and civic sectors can and do play a role mainly in providing a nutritious diet. This includes extension staff promoting biofortified varieties, providing support to social safety net programs, offering education on nutrition-sensitive agriculture, and promoting dietary diversity enhancements (e.g. through home gardens, small-scale livestock, or the promotion of high-nutrient varieties). However, there is a need to better understand which crops are nutritious, and what can be grown and utilized, and where. Agriculture ministries often tell nutritionists: "Just tell us what to grow." Does the nutrition community have sufficient understanding of agronomy, of nutrient gaps, and of what to grow, to ensure that judicious advice is transmitted to EAS? There is need for deeper knowledge and understanding of what is practical and feasible among disciplines, to make more effective recommendations of how EAS should deliver nutrition through food production systems. In addition, there needs to be greater understanding, particularly amongst the nutrition community, regarding farmers' decision-making processes and drivers. It is important to understand a farmer's income goals and the economies of scale of her farm gate when asking her to diversify what she grows.

What type of EAS is appropriate in what local context?

1. Know your backyard: Both agriculture and nutrition require knowledge of epidemiology and the agro-ecosystem at the local, immediate level. What is the nutrition situation in this district or community? What are the nutrient gaps? How can the food system fill such gaps? EAS must be able to assess these conditions to ensure that nutrition services are tailored for the particular needs of the clients.

2. Do not marginalize the marginalized: The rural marginalized are often those who are also most vulnerable to nutrition and dietary deficiencies. EAS must prioritize innovations for marginalized farmers, and include farmers in the process of demand-driven services, to ensure that they feel like active

recipients of EAS. Furthermore, knowledge-generation and sharing, through EAS, should take into account indigenous (and sometimes neglected) knowledge from communities (Wiggins and Keats 2013). Use the knowledge or lose it.

If EAS is used as an entry point to deliver nutrition, what are the possible approaches given the nutritional needs of specific rural populations?

1. Harness technology: Mobile technology has allowed for increased connectivity and communication. There is much scope to engage ICTs with EAS and nutrition. Some examples have been discussed in this report; however, there is much more to learn and harness from this field. It should also be noted that there are limitations to the use of technology, and if technology is to be scaled and prove useful in changing behavior, then other back-end support is needed.

2. Fill two needs with one deed: EAS strategies have traditionally focused on increasing production of cash crops by providing men with training, information, and access to inputs and services. Many farmer training centers and farmer field schools are traditionally centered around men, from accommodation to technical topics. Women are unable to attend farmer-training centers due to their workload. In the event that they are able to go, the training is often focused on crafts, or home economic-based activities, and less on technical agriculture and diversification of the farm gate from a nutrition and income perspective (Jiggins et al 1997). The EAS system should be overhauled towards becoming more *nutrition-sensitive*, and *gender-sensitive*.

3. Change Behaviors: Behavior change is the lynchpin in the EAS/nutrition wheel. Without a more comprehensive understanding of how EAS can play a role in providing the knowledge and skills needed for dietary behavior change, all could be lost. Changing behavior is difficult but not impossible. It will prove valuable to develop and provide extension agents with behavior change communication tools that are geared towards dietary information and change. These tools should harness the available modern technology. Right now, little exists.

What is needed to practically integrate nutrition into EAS?

1. Garner political will and commitment: Many governments are beginning to embrace nutrition as a key tool to improving health and alleviating poverty amongst their populations. Working multi-sectorally for nutrition sometimes requires new ways of organizing and operating within governments. Political will and commitment could increase with the availability of evidence demonstrating that nutrition can be improved through agriculture investments, and that in turn, would improve human capital and transform economies. Commitments must also translate into action on

the ground and reach district and community levels, where often EAS do most of their work. Without this reach, the political agenda will be just that, political, without effective change in rural communities.

- 2. Obtain financial commitments and synergies:** Without funding and resources to add-on nutrition within already underfunded EAS systems, there is little that can be done to integrate, improve, or scale up. Donors and development partners also need to speak the same language and agree on general messages. Joint funding mechanisms across different sectors could be a viable solution amongst funders.
- 3. Get a little help from friends:** “Effective solutions may involve innovation that may be too risky for governments and may be better managed by NGOs, foundations, and private enterprise” (Wiggins and Keats 2013). As this report demonstrates, NGOs and other local organizations often fill a gap where public EAS have not worked. Lessons and future partnerships from these projects should be harnessed. Multi-sectoral work is complex and no one should necessarily work alone.
- 4. Emphasize women, women, women:** We need more women extension agents, and more women recipients of EAS. In many countries, EAS have mainly been staffed by men. Many ministries have used the “home economic” approach to engage women in EAS, however these female home economists have primarily worked with women, thus reinforcing a “less important” gender bias around nutrition and agriculture. There has been less emphasis on ensuring that women extension agents and recipients receive new technical information and training, which comes with both nutrition and income-generating benefits. EAS do not often recognize women farmers’ circumstances, nor do they employ women as extension agents; the technologies they seek to disseminate are rarely designed with women in mind; and their approach does not take into account the scarcity of women farmers’ time. Labor-saving technologies can help women who are already facing time constraints. Women also need support through literacy programs and training in improving organizational and technical skills (Tripathi et al 2012; Wiggins and Keats 2013).
- 5. Monitor, evaluate, and document:** Throughout this research, it is clear that very little has been measured and documented in nutrition and home economics within EAS. As a result of the dearth of documentation and publications, the impact of nutrition-sensitive EAS on dietary and nutrition outcomes has neither been assessed nor evaluated. Further, the process of how integration occurs, and its sustainability, is less clear. What is clear is that a lot has happened in the field and a lot is currently taking place, yet, without a mandate to carry out operations research or document good

practices, the lessons for scale up will be difficult to harness. As more integrated research programs are funded and undertaken, new ways of collecting, analyzing, and sharing data need to be considered, that will accommodate issues of real-time data collection and community-driven data needs (Haddad 2013).

What are the implications with regard to support, resources, and training?

- 1. Complement with education:** The bricks and mortar of integrated nutrition and EAS need to sit in the education sector. Agricultural institutions of higher learning should embed nutrition in the curriculum and vice versa, nutrition programs should include agronomy and value chains in their respective courses. Furthermore, vocational and secondary training programs for EAS should provide *practical* nutrition education in their core training modules prior to extension agents entering the workforce.
- 2. Feature specialists:** Extension nutrition specialists, community champions, and women leaders are all avenues to inject and highlight nutrition within agriculture. Not every extension agent needs to be savvy in the way of nutrition. Having access to a smaller cadre of specialists who can provide technical leadership can go a long way. Specialists do not always have to be nutrition experts either, but some should have skills in facilitation and negotiation.
- 3. Weigh the burden:** EAS agents are often overextended in their geographic reach and the number of farmers that they engage with. Additionally, they often lack the support in terms of transport, training, and connectivity that is required to effectively carry out their duties. Many experts are critical about adding more tasks such as nutrition activities to the extension agents’ list of responsibilities, especially when they are already over-capacity. Each country will have to weigh its administrative support factors and resources accordingly. It is inevitable that rebuilding or increasing the capacity of EAS to integrate nutrition will have consequences with regard to time management, additional training, and support and incentive structures.

Purpose

The Global Forum for Rural Advisory Services (GFRAS) and the World Bank's Secure Nutrition Knowledge Platform supported this research project to examine the integration and linkages of nutrition within extension and advisory services (EAS) and workers in Africa, South Asia, and the Americas. The major purpose of this work was to analyze and document the past, current, and future role of EAS with regard to human nutrition. This report highlights good practices stemming from country or program cases, and notes comparative advantages of different types of models. Building on the GFRAS Worldwide Extension Study (GFRAS 2013a), five objectives were established to fulfill the project's purpose:

1. Understand the status or existence of nutrition as part of the portfolio of EAS activities in different regions of the world.
2. Document the nutrition technical content of extension workers' training and the messages/information delivered to farmers and other clientele.
3. Understand if and how extension workers coordinate and/or duplicate work related to nutrition with rural workers from other sectors, e.g. rural health.
4. Understand challenges faced by existing home economics EAS and identify opportunities for strengthening these services (e.g. training and supervision quality concerns, constraints to work performance such as lack of transportation, task overload, supply bottlenecks, high extension agent turnover, etc.).
6. Identify good practice country or program cases. Note comparative advantages of different types of providers, and of nutrition advice coming from EAS rather than from other sectors such as health.

We hope that this report informs the ongoing dialogue on *how* to best deliver nutrition-sensitive agriculture for rural farming populations and *when* it is appropriate to engage and utilize EAS. The lessons learned and the good practices stemming from this report can inform the current call for multi-sectoral approaches to improving food and nutrition security in the Scaling Up Nutrition (SUN) movement, and other global, regional, and national initiatives.



Background

Nutrition has traditionally been seen as an important yet forgotten area for development and progress throughout the world. However, that is slowly changing, thanks to country-led commitments and the momentum behind the Scaling Up Nutrition (SUN) movement to reducing the consequences of malnutrition and its immediate and long-term causes. SUN is a unique Movement founded on the principle that all people have a right to food and good nutrition. It unites people from governments, civil society, the United Nations, donors, businesses, and researchers, in a collective effort to improve nutrition.

Food and nutrition security exists when all people, at all times, have physical, social, and economic access to food. It exists when they are able to consume it in both sufficient quantity and quality to meet their dietary needs and food preferences, and they are supported by an environment of adequate sanitation, health services, and care, allowing for a healthy and active life (FAO 1996). Agriculture is central to this widely-held definition of food and nutrition security.

There is a heightened awareness globally and within development institutions and governments of the need to better understand the linkages between agriculture and nutrition, and to decipher the ways in which agriculture can contribute to improved nutrition. The *what* and the *how* of effectively delivering “nutrition-sensitive agriculture” services to rural households remains even less understood. “A new emphasis on making agricultural systems and food and agriculture policies more nutrition-sensitive is called for...” (Ruel et al 2013). *Nutrition-sensitive agriculture* involves the design and implementation of nutrition-based approaches to sustainable farming and cropping systems. Ultimately, nutrition-sensitive agriculture is aimed at improving the nutritional status of a population by maximizing the impact of food and of agricultural systems, while minimizing the potential for negative externalities regarding the sector’s economic and production-driven goals. It is agriculture with a nutrition *lens*, and should not detract from the sector’s own goals (Herforth et al 2012).

Extension agents or community workers are often mentioned as a promising platform for the delivery of nutrition knowledge



and practices to rural communities. However, the context and mechanisms for delivery on the ground have been less clear or under-evaluated. Extension workers are often thought of as the vehicle to the improved nutritional health of rural communities because they reach and interact closely with farmers in different settings. Furthermore, they act as significant service providers of crop, livestock, and forestry aspects of food security, consumption, and production. It is often thought that service providers within *agriculture* should focus on aspects of nutrition, and service providers within *health* should focus on factors around malnutrition.

Farmers deserve to have better access to information and knowledge, as well as stronger links to other actors along the value chain to ensure improved livelihoods. Part of this information, knowledge, and access, would involve strengthening advisory institutions that are in place to provide support to rural populations (GFRAS 2012). EAS are the different activities and sets of organizations that provide the information and services needed and demanded by farmers and other actors in rural settings. This assists them in developing their own technical, organizational, and management skills and practices, so as to improve their livelihoods and well-being (GFRAS 2010). EAS are important to ensure that the smallholder farmers' needs are being met, while enabling them to achieve food security in the face of risk and uncertainty. "Today extension is no longer viewed as an agency but as a *system* that is integral and central to innovation systems and that focuses on facilitating interaction and learning rather than solely on training farmers" (Davis and Heemskerk 2012).

EAS are recognized as a vital component of agricultural development. There are estimated to be at least 800,000 official extension agents worldwide (Feder et al 2001). More than 90% of these agents are located in the developing world (Umali and Schwartz 1994), where the majority of the world's farmers reside.

Traditionally, agricultural EAS were the application of scientific research and new knowledge to agricultural practices through farmer education. EAS are also no longer limited to the transfer of technology and education. Agents now have broader objectives beyond providing technical solutions; they assist farmers in organizing and acting collectively, they address processing and marketing issues, and they partner with other service providers and rural institutions (Alex et al 2002). At present, EAS are increasingly recognized by many development actors as an essential vehicle to ensure that research, development of farmer organizations, improved inputs, and other elements of rural development support, actually meet the needs and demands of farmers and other rural actors.

EAS imply a partnership that should exist between agents and farmers, within the wider agricultural system, whereby farmers

actively participate in ensuring that the technology and information generated is relevant to their needs. Extension agents act as facilitators in the system, advising farmers in a holistic manner. For this *demand-driven* system to succeed, many have pointed to the need for farmers to not only engage in conversation with extension agents, but to also directly participate in identifying problems, establishing priorities, and carrying out on-farm research and EAS (Rivera et al 2000).

Advisory methods are also beginning to incorporate more information and communication technologies (ICTs) to increase access to EAS. Tremendous gains in coverage could be realized where EAS staff are overburdened, or road infrastructure is weak; however, content and education will still be key if these services are to remain demand-driven. Potential gains can also be realized through old, low-cost technology such the radio, which has proven to be an effective medium for transmitting simple messages (Birner et al 2006).

EAS continues to place a high value on low-cost solutions for resource constrained, smallholder farmers. The point has been raised that these farmers, predominantly rural poor, have many more needs than just agriculture. There is more interest now in finding innovative ways to leverage EAS to enhance agriculture for pro-poor development across these multiple needs. EAS are now seeking to address environmental deterioration, HIV/AIDS, non-farm rural employment, as well as malnutrition, in addition to agricultural production. However, these additional goals and responsibilities have created a need for a type of extensionist equipped with diverse set of capacities to respond effectively (Sulaiman and Davis 2012).

As nutrition becomes an important contributor to poverty reduction strategies and as countries start scaling up nutrition programs, new ways of delivering interventions, knowledge, and tools will be essential. One potential vehicle would be through EAS because of their ability to improve knowledge, provide information, and deliver improved practices to rural households, as consistent service providers. Can extension agents provide knowledge to farming communities regarding the importance of how to choose and grow crops for nutrition, and provide education to farmer families about dietary diversity and quality? Can agricultural institutions of higher learning embed nutrition topics in the curriculum by which extension agents receive training? Can organizations support Agriculture ministries and their cadres of extension agents in delivering nutrition services, tools, and knowledge to farmers? Are communities driving and demanding more nutrition education from rural EAS? When can EAS deliver nutrition, and when should it be left to health workers?

It has become increasingly clear that there is a great need for EAS; however less is known about how to best support effective EAS within the larger agriculture and food system today. The

objectives of what EAS need to achieve are much greater and extend far beyond simply providing farmers with technologies and inputs. EAS must be able to:

"Link more effectively and responsively to domestic and international markets where globalization is increasingly competitive; reduce the vulnerability and enhance the voice and empowerment of the rural poor, promote environmental conservation; couple technology transfer with other services relating to credit, input and output markets and enhance the capacity development role that includes training but also strengthening innovation processes, building linkages between farmers and other agencies, and institutional and organizational development to support the bargaining position of farmers."

[Sulaiman and Davis 2012]

Nutrition services could fit within a larger food security mandate of EAS and include new capacities that effectively deal with malnourished rural populations, along with improvements in agricultural development.

Methodology

1. Literature review

Before embarking on a wider search, the starting point for the literature review was the GFRAS “Worldwide Extension Study” to seek out relevant information on nutrition, diets, and home economics within EAS programs. Thereafter, the following literature databases were searched: PubMed, ISI Web of Science, Agris, Google Scholar, Econlit, and IBSS by using the following key words: Rural advisory service OR agricultural advisory service OR agricultural extension OR rural extension OR participatory extension AND nutrition OR diet OR home economics OR consumption; Farmer field school AND nutrition OR diet OR home economics OR consumption. The following sources for grey and unpublished literature were searched: Eldis, IDEAS, IFPRI, Jolis, and World Bank. The following limitation was applied to the search: “published between 1960 to present”. Language limitations were also imposed, due to resource constraints. Lastly, studies were only considered if an abstract and full article existed in English.

A snowball process, whereby the reference lists of all the included studies were scanned to discover further potentially relevant studies, was used to identify additional studies. No differentiation was made between studies obtained through the initial search and those identified through snowballing.

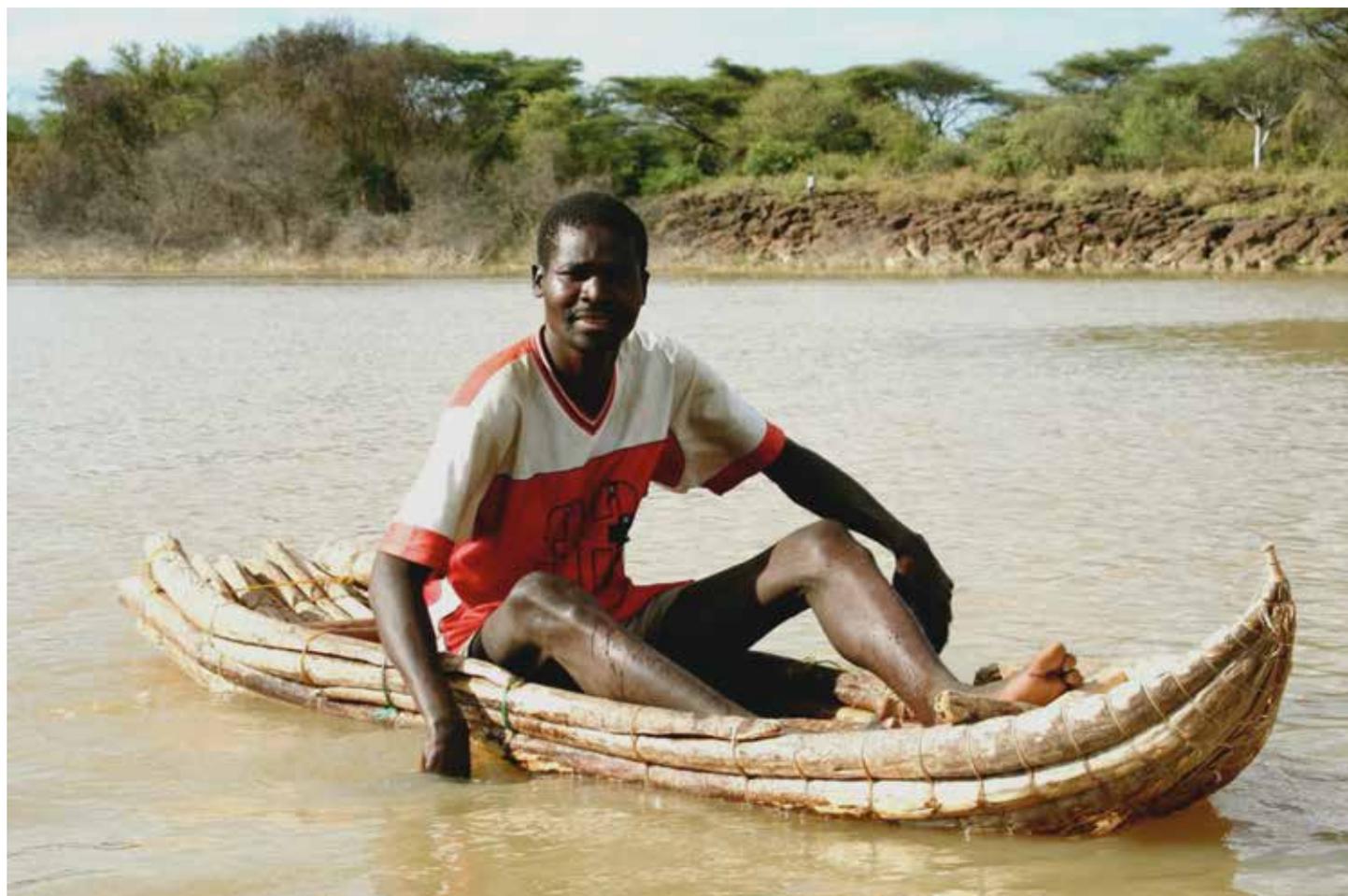
The snowball process was also used to identify grey literature and information papers that had not been published in peer reviewed journals. Some of the programs being implemented in countries with a limited history of documentation were also included by reference or recommendations.

The inclusion criteria for review of primary and grey literature consist of the following:

- Must be focused on low and middle-income countries;
- Must have a stated objective of contributing to improved nutritional, dietary, and consumption, or home economic outcomes;
- Must target a potential interaction between agriculture and nutrition; and
- Should emphasize current or planned (next five years) initiatives, though the start date may be in the past. We include interesting case studies from the past as well.

The results from the literature review are summarized to complement the data collected in the surveys, interviews, and case studies.

Some terms need to be defined at the outset of the report. *Extension and advisory services* provide critical access to the knowledge and information that rural people need to increase



the productivity and sustainability of their production systems, and thus improve the quality of their lives and livelihoods (Swanson et al 1998). *Home economics* will not be used as frequently in this report, and instead, nutrition and diet will assume the role of home economics. Home economics, in modern development today, is not widely used, though it was more popular in the early 20th century. Traditionally, it was thought to bring science to the farm home and women to higher education and was a multidisciplinary field bringing together home, families, and communities, with aspects of human nutrition and child development, along with consumer economics (Cornell 2001). Agricultural EAS in the United States and in developing countries employed home economic agents. These agents were usually women. Instead of focusing on the producer and the production side of agriculture, they focused on the homemaker to enhance the consumption side of the food and agricultural system, and to take advantage of own-production. They provided information on food production, food preparation, hygiene, and diet for the rural family (Garrett and Natalicchio 2011). For the purposes of this study, home economics will be subsumed under nutrition, as nutrition takes on a multi-sectoral and multi-disciplinary approach in its overarching goals.

2. Surveys and interviews of stakeholders

Identification of countries and stakeholders

Purposeful sampling was used to select the survey and interview participants, who are information-rich sources. Sources included the GFRAS "Worldwide Extension Study" database and the directory of extension providers of the Worldwide Extension Study, as well as the specific contacts already known to the research team, in addition to information provided by GFRAS and World Bank.

An inclusion criterion for the countries, programs, and relevant stakeholders, was not developed for this report to ensure that most EAS programs were captured in the initial search for participants. Programs that have the stated objective of contributing to improved nutritional or dietary outcomes, or those that comprise of nutrition or home economic activities, were selected for deeper analysis, and some were highlighted as part of the specific country case studies.

For country case studies, research was performed on specific projects, programs, or initiatives of extension agents which have integrated or are currently integrating agriculture and nutrition, and that could be used for potential scale-up. These specific countries were chosen for case studies because of the wealth of information on them in the literature review and that emerged from the surveys and interviews. The World Bank report (2013a) highlighted a few projects that examined in greater detail how extension agents are used, trained, and at what cost, and this served as a starting point for further data collection and literature reviews. Other country case studies

were selected through the snowballing approach, using survey respondents and interviewees as reference starting points. The full-length country case studies can be found in **Appendix One**.

For surveys, a brief survey was published on eight agriculture and nutrition-focused websites. Follow-up emails were sent to various nutrition, food security, and agriculture listservs, as well as to the GFRAS extension contact list. The surveys were electronically available (also available in paper form) in English, French, and Spanish. The full survey can be found in **Appendix Two**.

For interviews, a brief survey was sent to the aforementioned list of stakeholders. After a review of the responses, semi-structured interviews were conducted by phone, Skype, or in person with key informants. Planning for such interviews included compiling a set of questions that drew from specific themes. Participants included those whose programs were relevant; and/or those who were involved in interesting programs where additional information was deemed valuable. Snowball sampling was also employed to reach actors involved with community workers and agricultural EAS. The team first identified individuals that fit the inclusion criteria, and in turn they recommended others who also met the same criteria. Interviews were conducted in the primary language of the stakeholder (we had a team of French, Spanish, Portuguese, and English interviewers). During the interviews, the questions asked were selected from the interview guide, but in varying order. The questions were selected depending on the flow of the interview as well as on level of expertise of the interviewee on the various themes. The interview questions can be found in **Appendix Three**.

3. Data analysis

Surveys and interview transcripts were reviewed, collating results from the electronic surveys, the interviews, the country case studies, and the literature review.

Literature review

Studies were screened in two stages. At the first stage, one investigator, by reading titles and abstracts, selected the studies that were written in English and that were relevant to the topic. At the second stage, two investigators independently reviewed the full text and excluded those that did not meet the standard set by the review. The initial screen provided 232 papers and after exclusion, the 25 remaining papers were included in the study.

Surveys

The electronic survey was circulated across networks of different development agencies in 3 different languages: English, Spanish, and French. A total of 68 responses were collected; 55 in English, 9 in Spanish, and 4 in French. As **Figure 1** illustrates, the majority of responses came from government organizations and educational/research institutions. Survey data was compiled, synthesized, and analyzed according to the following thematic areas:

- Good practices for linking nutrition and home economics into EAS
- Effective information dissemination for nutrition messages
- Available EAS training programs and their respective locations
- Capacities and gaps, challenges, and activities for integrating nutrition into EAS
- Mechanisms for functional collaboration between ministries
- A profile of women's role in EAS

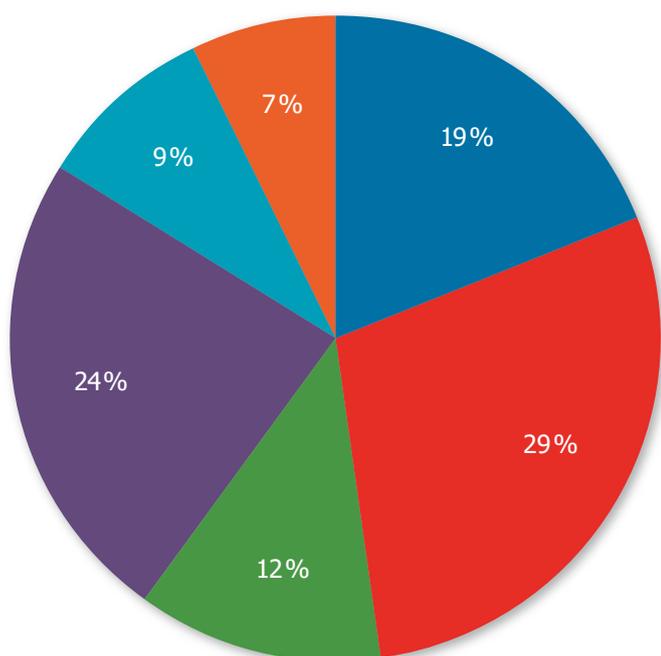
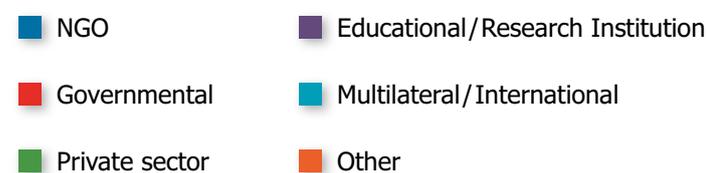


Figure 1: Survey respondents by organization type

Interviews

Two members of the research team audio-recorded the interviews and took notes. A Daily Interpretive Analysis was performed to assemble and interpret the information that was collected, to review the notes and the tapes, and to write a log that synthesized the bulk of the interview information. Qualitative data analysis consisted of identifying, coding, and categorizing

major themes. Interview responses were reviewed and analyzed to identify trends and case examples, and obtain expert opinions with respect to:

- Good practices and approaches to integrating nutrition into EAS
- Nutrition training topics, interventions, and messages
- Capacities required and challenges faced by extension agents
- Technical, institutional, and political support required to integrate nutrition into EAS
- Conditions for scaling the integration of nutrition and EAS

In total, 38 interviews were conducted with experts from government agencies, international and multilateral organizations, research and academic institutions, and non-governmental organizations (NGOs). **Figure 2** shows the breakdown of interviewees by organization type and geography. The list of the stakeholders interviewed can be found in **Appendix Four**.

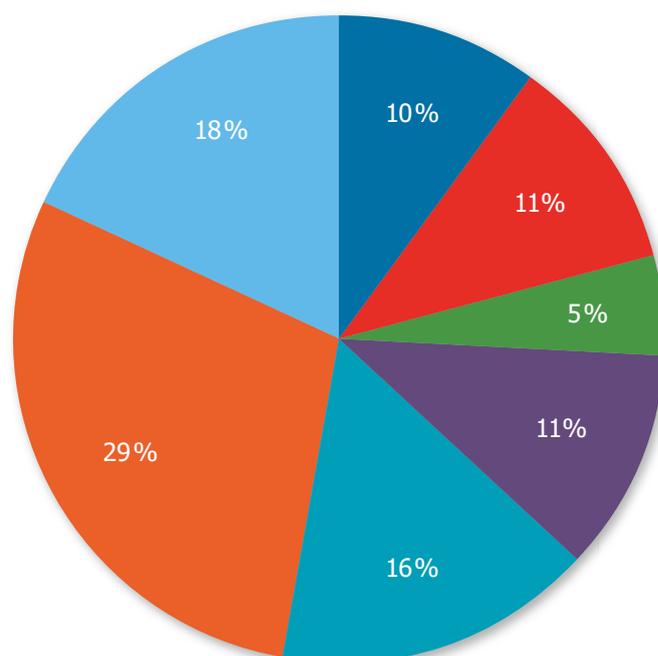


Figure 2: Interview respondents by organization type

Findings

1. Nutrition inclusion in EAS

The purpose of this section is to understand the status or existence of nutrition as part of the portfolio of EAS activities in different regions of the world.

1.1 Different approaches integrating nutrition into EAS

Recognizing the importance of agriculture in reducing malnutrition and the unique position that extension agents occupy, has provided a solid theoretical basis for integrating nutrition into EAS. The origins of this recognition dates back to academic literature in agriculture, nutrition, and rural development from decades ago. This leaves the critical question of how the development community has attempted to put these ideas into practice and make the integration a reality.

1.1.1 Home economics extension agents

Historically, many countries housed their home economics personnel within Agriculture ministries, and nutrition was one subject covered in their training (Rivera 2013). As country recipients of United States aid and assistance, it was typical for these personnel to be predominantly female. Men would train

male farmers in agricultural techniques and women would teach other women concepts of home economics and nutrition (Ashby 1981; Mead 1976). Home economics extension agents focused on how to manage family resources efficiently, improve cooking methods and food storage, and feed different family members according to their specific nutritional needs (FAO 1997). Women's reproductive health and childcare activities were also emphasized (Ashby 1981). While this division seemed to work in the beginning, concern grew over the extent to which females, who were also heavily involved in farming, had access to EAS that would improve their livelihoods from an agriculture perspective (Weidemann 1987).

In response, new policies for home economics EAS were put into place. Such was the case in Malawi, where agents were instructed to spend 75% of their time on agricultural activities and 25% of their time on home economics activities (Weidemann 1987). Our study found that while only a few home economics EAS programs remain in effect today, many of those that still exist have retained the agricultural component that these reforms led to. For example, in Kenya, home economics officers undergo a training curriculum that focuses 60% on agriculture and 40% on nutrition, and delivers traditional nutrition education in addition to promoting home gardens, raising small livestock, and diversifying crop production (Ndung'u 2013).



1.1.2 National to community programs: Highlights from the country case studies

At the national, provincial, district, and community levels, countries approach the integration of nutrition and EAS in different ways. Much of this depends on the capacities of national governments to coordinate multi-sectoral strategies and to provide services at the community level, as well as the resource constraints that countries are faced with at different times. Although many developing countries drastically reduced their public EAS during the 1990s, there is now renewed interest in bolstering and scaling up EAS programs. Furthermore, rather than relying on previous models, these improved models are integrating new mandates such as home economics and nutrition.

One example is Guatemala. In responding to the high incidence of chronic malnutrition and food insecurity, the country is rolling out the National Zero Hunger Pact, a strategy modeled after Brazil's Zero Hunger Program. The delivery of interventions relies on close to a thousand extension agents based throughout the country, a third of whom are home extension agents (SESAN 2013). These extension agents, who are predominantly female, work with vulnerable households on issues related to nutrition, sanitation, and hygiene, including dietary diversification using home gardens, under-utilized foods, and small livestock rearing (SESAN 2013).

Rather than rolling out a comprehensive national program to integrate EAS and nutrition, countries may focus initially on regions that have especially high levels of stunting, suffer from food insecurity, or that are relatively less well-off compared to other regions. This was the case in the North West Province of South Africa, where in 2003, the Mobilizing the Poor to Feed Themselves program was initiated. The program was led by the Premier's Office (the highest political office in the province) and received implementation support from multiple ministries: the Department of Agriculture, Conservation, and Environment (ACE), Health, Education, Social Services, and Water Affairs & Forestry (Stevens 2004). The program took a broad approach, including both income generation and food production strategies, and targeted the poorest segment of the population, as identified by a poverty index constructed by ACE with input from Social Services, Health, and local municipalities. Families were first provided with short-term relief in the form of food parcels, then "starter packs" for backyard gardens and production units, including seedlings, seeds, fertilizer, and small livestock. Multiple departments participated in the training, which covered nutrition and basic hygiene, as well as vegetable production and poultry rearing (Stevens 2004).

DAI's work in Ethiopia is an example of a project that did not engage the national EAS system comprehensively, but rather sought to demonstrate the success of a particular approach before taking it to scale. In a project implemented between 2008-2013, DAI established more than 500 community and

school vegetable gardens in 20 cities and towns across six provinces. The main objectives of the project were to improve nutrition and food security, as well as income opportunities among vulnerable households. Extension agents were included, but only selectively, as DAI trains agriculture extension agents in nutrition and HIV, and similarly, trains health extension agents in agriculture (Salerno 2013).

Some of the most innovative approaches to integrating nutrition and EAS are developed at the community-level, often as smaller projects. NGOs, multilateral and bilateral organizations, and research centers frequently collaborate with national partners on projects that seek joint agricultural and nutritional benefits. These projects often vary by the degree that they engage national EAS in the delivery of interventions, or rely on their own independent delivery mechanisms.

Semilla Nueva's work in Guatemala is an example of a project that retains the primary functions of EAS, yet centers on mobilizing the communities to take on these responsibilities themselves, so that they do not have to rely on public systems. Through the use of the farmer-to-farmer approach, Semilla Nueva helps communities create their own agricultural extension networks. Project facilitators begin working with interested farmers, who in turn serve as agriculture promoters for testing new crop production technologies on their own land. Once they achieve results, these promoters are provided with tools to teach the same techniques to their neighbors, as well as resources to create agricultural support groups which will continuously experiment and share findings. Semilla Nueva applies this same strategy to nutrition, where they mainly work with groups of women. Facilitators provide nutrition education on a broad range of topics, including food preparation and dietary diversification. They also engage men and women in joint conversations that integrate the agricultural and nutrition sides, focusing on a select few key crops such as pigeon pea, Quality Protein Maize, and tree spinach. Interestingly, the success of such methods has convinced the government to collaborate with Semilla Nueva to train public extension agents, scale up the organization's farmer-to-farmer approach, and expand its portfolio of nutrition interventions to the national level (Bowen 2013).

In a similar case, the India Institute of Hygiene and Public Health, with support from the FAO, conducted a pilot project in four villages in West Bengal to test the effectiveness of home gardens paired with nutrition education. The project's success led to adoption of the approach by the local government. The local government coordinated the expansion to 30 other villages, and also provided nurseries, water pumps, and wells. Rather than utilizing public EAS, extension agents were members of the community who had been nominated by the communities themselves. These agents were trained in home gardening, nutrition education, and effective message-delivery (Chakravarty 2000).

In Rwanda and Uganda, a partnership involving universities, research institutions, and NGOs, is working to improve common bean value chains. Food and nutrition security can be improved by raising the quality of production and yields of the beans, by providing linkages to markets, and by promoting consumption. The partnership is also focused on improving techniques of harvesting, drying, and storing the beans. EAS materials were developed to increase knowledge surrounding bean production and utilization. These materials cover the principles of and the opportunities in the improved feeding of children under the age of five. They also include methods of preparing beans that reduce cooking time and enhance nutrient bioavailability, as well as how to prepare bean-based composite flour and use it in making porridges, cakes, biscuits, and bread (FAO 2013b).

iDE UK and partners are undertaking the Agriculture and Nutrition Extension Project (ANEP) that targets poor and socially excluded rural and urban households in both Nepal and Bangladesh that have the potential to raise the quality of production and marketing of nutritious foods and improve nutrition values. They are developing and training service providers to ensure that the private sector will continue to provide the inputs, markets, and services along with embedded training and knowledge to their smallholder farmer customers, without creating dependency on external actors. These private sector extension agents are working with households to provide nutrition education and increase market access (iDE 2013).

1.1.3 Nutrition activities within EAS

Survey respondents were asked to reflect on how EAS could promote improved dietary habits and nutrition in populations. Responses included:

"Extension agents should introduce a diversity of crops, animal husbandry, and fisheries which are available locally, affordable and easily adopted by communities..."

[Multi-lateral agency, Indonesia]

"Extension can demonstrate to farmers the benefits of crop diversification, and the value of dietary diversity, weaning with foods rich in vitamins and minerals as well as breeding animals for protein sources."

[Government agent, Ministry of Agriculture, Liberia]

"Rural extension must ensure that people recognize the class of food they need, the role of each food, the quantity they need per age, and the seasonal accessible prices."

[Government agent, Cameroun]

"Provide hands-on training opportunities for consumers in rural and urban communities related to food access, food quality, food production in small gardens and farms, food choices, food budgeting, and healthy eating behaviors for individuals throughout the lifespan."

[Development practitioner, USAID]

"Conduct training indoor and on the field on planting nutritional crops as well as follow up with how to cook them in order to retain their nutritional value and to include them in their diet."

[Government agent, Ministry of Agriculture, Republic of Kiribati]

"Focus on food storage and food processing to increase shelf life and ensure people have access to nutritious food all the year round."

[Government agent, Ministry of Agriculture, Kenya]

Availability of nutrition

Some of the most common nutrition-sensitive activities conducted by extension agents, aim to increase the physical availability of nutritious food (**Box 1**). This does not come as a surprise, particularly in the case of agricultural EAS; considering agriculture's unique role in food production and its potential to supply nutritious food, as well as the presence of extension agents at the field-level working directly with farmers. The global SUN framework identifies food security and agriculture as two of the "closest actionable links" to nutrition and specifically refers to the need for a greater production of fruits, vegetables, and food products that are rich in nutrients (UNSCN 2009).

BOX 1: Linking agriculture & nutrition guidelines (FAO 2013a)

In a recent synthesis of resources published by bilateral organizations, multilateral organizations, and NGOs on linking agriculture and nutrition, FAO identified the following guidelines to determine what to produce, among others:

- Choice based on nutritional value of potential foods;
- Choice based on local nutrition issues and available solutions;
- Promotion of micronutrient-rich foods;
- Promotion of protein-rich foods;
- Promotion of locally-adapted varieties with higher nutrient content;
- Promotion of foods that children prefer; and
- Promotion of foods consumed by at-risk groups.

Our study identified numerous projects in which extension agents assist in increasing the availability of nutritious food. These emphasize the importance of ensuring the availability of nutrient-rich foods in the system, as a pre-requisite for other interventions.

Home gardens

Promotion of home gardens is a common technique to increase the production and availability of micronutrient-rich horticultural crops. The benefits may not be limited strictly to increased availability of food either, as there is a greater likelihood of improving access, utilization, and ultimately dietary diversity. This is likely given the close proximity of gardens to households and their predominant orientation towards home consumption, as opposed to commercial gain (Ruel et al 2013). However, NGOs, bilateral, and multilateral organizations working in agriculture and nutrition note that both producers and consumers of horticultural crops could enjoy increased income and reduced prices due to the greater availability of these crops in the market, assuming excess production is sold. Other advantages include the increase in control and decision-making power that women attain from managing home gardens. This is accompanied by a reduction in seasonality, and availability of opportunities to combine nutrition education and social marketing with home gardens to achieve behavioral change (FAO 2013a).

The Home Gardens for Diet Diversification and Better Health project, which is funded by the Sir Ratan Tata Trust, the World Vegetable Center, and Punjab Agricultural University, promotes the scaling-up of home garden models throughout the Indian states of Jarkhand and Punjab. Field demonstrations are conducted and seed kits are distributed to grow year round gardens. Over 25 different varieties and species of vegetables are being used. National extension agents in the area are trained in the importance of nutrition, and a “train-the-trainer” approach is used to allow community members to facilitate the adoption of the home garden model (Luoh 2013). The project requires a high level of supervision from extension agents. AVRDC conducted the initial training of these agents and partnered with women’s groups and the Punjab Agriculture University to facilitate training.

In Guatemala, home extension agents are helping women to set up and maintain home gardens as part of the National Zero Hunger Pact. They use showcase gardens in every community to demonstrate basic gardening techniques, such as spacing and watering, that can be used to cultivate a wider range of fruits, vegetables, and herbs. Home extension agents also promote medicinal plants that can be used to treat common sicknesses, such as lemongrass for children afflicted by a mild cough. The gardens are linked to other national programs, such as the government’s cash transfer program Bono Seguro. This asks participants to devote approximately 10% of a USD40 transfer received in exchange for bringing children to health

centers, towards the purchase of seeds and inputs for their gardens (Garcia 2013).

DAI is implementing a USAID-funded project in Ethiopia to promote urban gardens, in which extension agents demonstrate the utility of container gardening, small plot agriculture, and drip-irrigation. Urban growers are also encouraged to sell surplus vegetables for income (Salerno 2013).

In Vietnam, the Nutrition Improvement Project VACVINA, was in charge of establishing household gardens based on the VAC system. The acronym ‘VAC’ is derived from a combination of Vietnamese terms meaning ‘garden, pond, and animal husbandry.’ The model was designed in Vietnam to complement what has traditionally been a rice-based diet. Although the first VAC systems sprang out of the Red River Delta, the system was later modified to function in Vietnam’s three principal ecological regions: the coastal area, the deltas, and the foothills and mountains (ILEIA 1995). The extension agents focused their efforts on families with young children and on crops rich in carotene, vitamin C, iron or protein. To showcase farming practices and provide seeds and seedlings, extension agents were charged with setting up community demonstration gardens. Similarly, each community organized its women into small groups of 10 to 20 per group. Each group then elected a leader to organize technical assistance and seed distribution for the project, and to support and motivate mothers to participate in home gardening (English and Badcock 1998).

An interesting exception is the Relaunching Agriculture: Strengthening Agriculture Public Services II project spearheaded by the World Bank and the Government of Haiti. The project does not single out any particular crop, and specifically avoids working with home gardens. The rationale for this comes from an analysis of the pre-existing bundle of available foods; the typical Haitian farm, despite being only half a hectare in size, is usually diverse, producing anywhere from seven to 15 different types of crop. In light of this, the opportunity cost of shifting from production of coffee to focus on fruits or vegetables for consumption purposes, is considered to be high. Therefore, the nutrition interventions delivered by extension agents focus instead on promoting the basic benefits of a nutritious diet (Arias 2013). The project distinguishes itself by having made a conscious decision to not play an active role in increasing the availability of nutritious foods. The rationale is premised on an analysis of current production, as opposed to any institutional reluctance in the agriculture sector to take on a topic that might be viewed by some as falling into the health domain.

Crop diversification and increased nutrient dense foods

Diversifying crops through intercropping or mixed cropping strategies is another way of increasing the availability of nutritious foods (DeClerck et al 2011). While the role of extension

agents has traditionally been to promote staple crops, studies have shown a limited positive correlation between increased staple crop production and improved nutrition outcomes in different countries (World Bank 2013a). Particularly where market orientation is low, household consumption patterns may be determined by crop production patterns. In these cases, extension agents could improve nutrition by facilitating crop diversification. Increasing production of animal-source foods are also shown to be effective for reducing micronutrient deficiencies, especially with respect to vitamin A, iron, and zinc deficiencies (World Bank 2007).

As part of the Soil Health Program of the Alliance for a Green Revolution in Africa (AGRA), Integrated Soil Fertility Management (ISFM) techniques are promoted, including the intercropping of cereal crops with legumes such as pigeon peas, groundnuts, cowpeas, and soybeans. These legumes, in addition to having soil fertility benefits, can also address the nutrition gaps within communities (Bezner Kerr et al 2007; Bezner Kerr et al 2011). While they can be sold commercially, the majority of the vegetables are immediately consumed by households, or dried and stored for future consumption. The program also includes the training of extension agents as one of its good practices; they learn about the ISFM methods and nutrition, among other topics (Harawa 2013). In Ghana, where the level of knowledge and awareness among extension agents is low, AGRA is working to integrate these topics into the curricula of agricultural colleges in order that future agents are better informed (Ghana News Agency 2012).

In Malawi, FAO is training extension agents to engage communities in building calendars that will track the timing and availability of local foods. Once these gaps are identified, a joint planning process begins, whereby the agents and community members decide how best to increase the availability of missing sources of nutrition. Potential solutions include increasing production of appropriate foods using current farmland, starting home gardens and orchards, or through utilizing preservation methods such as drying (Heise 2013; Nordin 2013).

The NGO Semilla Nueva encourages farmers in Guatemala to intercrop pigeon pea with maize and sesame. A farmer-to-farmer approach is used to create an informal EAS network amongst the farmers themselves, but actual municipal extension agents are also trained in the intercropping of pigeon pea and other techniques to increase the availability of nutritious food.

The commercialization and utilization of African leafy vegetables (ALVs) in communities is declining. In certain countries including South Africa, crops such as cabbage and spinach have almost completely replaced the ALVs where EAS were active (Voster et al 2008). The AVRDC-World Vegetable Centre established working partnerships with the Agriculture ministries and National Research Institutions to enhance to incorporation of

ALVs as a food crop in Kenya and Tanzania. Extension agents were trained to improve the production technologies of leafy vegetables and to enhance marketing strategies for nutrient-rich vegetables. Both household consumption and access to markets increased through prioritizing ALVs as a commercial food crop and utilizing EAS to advise their adoption by farmers (Mwangi and Kimathi 2006).

Biofortification

Biofortification holds tremendous potential for addressing micronutrient deficiencies. It could be cost-effective, as plants themselves would do the work of fortification once the initial improved varieties have been developed and adopted by farmers. This is in contrast to supplementing or fortifying during the processing phase, both of which entail recurring costs. It would also be sustainable. Once the technology has been developed and disseminated, if productivity is enhanced, the profit incentive should be enough to motivate farmers in subsequent growing seasons. Further, the nutritional benefits realized through biofortification have the potential to reach remote areas that lack in processing facilities, which would otherwise be needed for conventional fortification or marketing systems (Bonierbale et al 2002). Biofortification is also thought to be highly pro-poor, as staples make up a large portion of the daily food consumption of poor households.

A study took place in Kenya in 1995-1997, which involved a visit by extension agents to women's groups at three different points in time; during planting, during midseason, and during harvesting, to support the adoption of Orange-Flesh Sweet Potatoes (OFSP). Hired fieldworkers also met with the groups to deliver nutrition education, and made 12 monthly visits to individual farmers. During this time, a 93% increase was recorded in the frequency of children under the age of five consuming vitamin A rich foods. However, this intervention has not been considered cost-effective due to the high number of visits required and associated expenses (de Brauw et al 2012; Hagenimana et al 2001).

In Mozambique, in 2003-2005, pairs of agriculture extension agents and nutrition agents working together sought to increase the production of OFSP. These integrated EAS teams taught agricultural concepts to farmer groups, mainly pertaining to production methods, storage, and commercialization, as well as nutrition. They also utilized interactive methods of group learning, such as community theater. A total of 90% of households reached through this intervention adopted OFSP, and children in those households consumed more vitamin A than children in the control group (Low et al 2007). However, farmer groups were small and EAS messaging was relatively intense, resulting in a high per beneficiary cost (de Brauw et al 2012).

More recently, parallel studies were conducted in Mozambique and Uganda to determine better ways for cost-effective usage of extension agents. In both countries during the first year,

OFSP vines were distributed to farmers who were trained in agriculture and nutrition-related subjects. The nutrition education aimed to create demand through community theater, billboards, and radio spots. Additionally, extension agents trained volunteer EAS promoters from the community to assist with either agriculture training or the dissemination of nutrition messaging. However, in the second year, EAS visits were scaled back substantially for the control groups in both countries, while they continued at the same intensity in the intervention groups. Both countries experienced an increase in vitamin A consumption in both the control and the intervention groups, indicating that more intense EAS involvement in nutrition education during the second year was neither necessary nor cost-effective (de Brauw et al 2012). This could either be the result of a contagion effect, where concepts pertaining to nutrition, agriculture, and/or health, travel by word of mouth from intervention to control groups, or the consequence of a high degree of information-retention in such communities, where the repetition of nutrition-related information is deemed unnecessary in the second year.

Reduced post-harvest losses

EAS has often focused on reducing post-harvest losses for farmers. In addition to this, activities around the processing and storage of nutritious crop harvests could help to promote availability of foods during the dry seasons and throughout the year.

One such example that has gained prominence in relation to nutrition is aflatoxin exposure. Aflatoxins are fungal metabolites that contaminate staple food crops in many developing countries and have been loosely associated with growth impairments in children. Foodborne aflatoxin exposure in maize and groundnuts is common in Africa and Asia (Khalngwiset et al 2011). EAS can play an important role in ensuring that post-harvest storage and handling involves aflatoxin control, which could indirectly have an impact on the nutritional status of households (Wild 2007).

The new Partnership for Aflatoxin Control in Africa, funded by the Bill & Melinda Gates Foundation and the United Kingdom's Department for International Development (DfID), underlines this growing interest in aflatoxin control. The partnership seeks to promote good agricultural practices related to post-harvest storage among smallholder farmers in Sub-Saharan Africa. In Nigeria for instance, extension agents have received training in adequate drying and storage techniques that reduce aflatoxin contamination (FAO 2011a). The role of extension agents however, remains limited. A recent assessment in Nigeria and Tanzania found that extension agents lack a clear agenda on aflatoxins, or mycotoxins, messaging, and food safety (ABT Associates 2013). The report recommends incorporating information about aflatoxin mitigation into the national agricultural EAS messages, emphasizing the importance of sorting and discarding crops with physical flaws and deformities.

Access to nutrition

The availability of nutritious food is not necessarily a precursor to access. Two conditions are required for households to have access to nutrition: physical proximity, and economic capacity. An increase in production of nutrition-rich crops, and the associated decrease in prices at market value, is one frequently cited mechanism to ensure greater consumption. When production is concentrated on a limited number of staple crops (due to biased research, EAS, and policy orientation that favors them), diversifying production may eliminate the price distortions that can result from induced scarcity in neglected nutritious crops (Herforth et al 2012). The Green Revolution in Asia and Latin America is an example of an initiative that has seen tremendous success in the production of key staple crops, namely rice and wheat. It has resulted in price reductions for those crops, but has also caused a rise in prices of those non-staple crops whose production failed to keep up with population growth. This in turn has decreased access among poor households, hampering progress towards dietary diversification for the most vulnerable (Graham et al 2007).

If it is to improve nutrition through an increase in access and quality of nutritious foods, the agricultural sector should pay more attention to activities at the intersection of production and consumption. One potential strategy is the value-chain approach to development whereby gaps, bottlenecks, and opportunities for value-addition, are identified along the value chain, and the roles of the different stakeholders are assessed and weighed for true relevance and redundancy (Hawkes and Ruel 2012). Extension agents may promote nutritious crops for both commercial and home consumption purposes. They can also utilize nutrition-sensitive value chains as a mechanism to reach the producer and the consumer, who are predominantly the same in many rural settings.

Stakeholders interviewed for our study referred to the additional incentive of selling surplus production, which can encourage farming households to be more receptive to extension agents' messages concerning cultivation of more nutrient-dense crops (Low 2013; Ndung'u 2013; Salerno 2013). However, increased incomes may not necessarily lead to more nutritious consumption patterns. This is also subject to household preferences and constraints.

"We used to think that they sell something, can earn money and buy foods that are rich in nutrients. But we find that rarely happens in poor households. Even if they sell their sweet potatoes, and we've told them about eggs, vitamin A-rich foods, they do not buy them. They have too many other cash needs—they'll buy their sugar, their salt, and they'll send their kids to school."

[Researcher, East Africa]

Households have multiple needs that compete for limited cash. While extension agents can deliver nutrition education to improve health-related decision-making, the impact they have will depend on an understanding of the realities that households (particularly the most vulnerable) face on a daily basis.

...[Extension agents] understand the farmer, the limitations and the opportunities the farmer has for creating a healthy lifestyle either through their food production techniques or sale to buy food that is not accessible at the farm level."
[Government Agent, Ministry of Agriculture, Kenya]

Many of the interventions lend themselves to increased proximity to improved nutrition. Home gardens, for example, are usually cultivated for the household's own production and a significant body of evidence supports their success in raising intake of fruits and vegetables among vulnerable population groups (World Bank 2007). Biofortified crops also lead to better access to nutritious food in remote areas, especially in the case of crops that can be propagated, such as beans, cassava, and OFSP, as these crops constitute planting materials that farmers can potentially use in following years too (Gilligan 2012).

Gender dynamics often lie at the heart of nutrition access at the household level and represent a critical consideration for extension agents with regards to nutrition activities and messaging. There have been instances where shifting horticultural or indigenous crops from home gardens to the field for a more commercial orientation, has transferred control over the crops from women to men (FAO 2013a). Any increases in income through commercial production are not always shared with women. Considering the strong correlation between women's access to income and improved nutrition, extension agents may seek ways to address these gender inequities (UNICEF 2011a). A beneficial by-product of including a nutrition lens in EAS may in itself attract greater female participation in agricultural projects. However, this should account for women's time constraints with regards to child care in order to avoid any unintended consequences (Herforth et al 2012; World Bank 2013a).

Utilization of nutritious foods

In order to garner optimal nutritional status, the body must be able to extract and utilize nutrients present in food. This touches upon several categories of activity for EAS: care and feeding practices; food preparation; and intra-household distribution of food (FAO 2008). These are areas that home economics extension agents would traditionally have had most direct responsibility for. Given that they are not as prevalent today, other fieldworkers, mainly in the agriculture and health sectors, have been tasked with administering those activities that determine utilization of food within the home.

Efficient biological utilization of food requires good health. In many developing countries, diets consist largely of plant foods. These foods, such as staples (maize, wheat, rice), legumes, lentils, and vegetables, contain considerable amounts of anti-nutrient substances that can reduce micronutrient bioavailability and interfere with their digestion. Therefore, these foods require additional processing to reduce the amount of anti-nutrients and correspondingly increase their content of vitamins and minerals, and compensate for the lower bioavailability (de Pee and Bloem 2009).

Our study found that projects have sometimes been able to focus an intervention on increasing availability of one nutritious crop, as an entry point into discussions regarding utilization. For example, the OFSP allows extension agents to begin to engage households in dialogue on additional nutrition-related topics, including sanitation and hygiene, dietary diversity, complementary feeding, frequency of feeding for children, and other general health issues (Low 2013).

Another critical element of utilization is food preparation, which is an area that EAS are also engaged in. In Malawi, extension agents carry out training sessions in Improved Infant and Young Child Feeding (IYCF), which include cooking demonstrations. During these sessions, mothers are taught about the basic food groups, handwashing, breastfeeding practices, and complimentary feeding requirements for the different stages of the child's life. They are also shown the different recipes they can prepare using local nutritious foods. Although health extension agents lead the trainings, agriculture extension agents also participate and have taken the lead in some sessions. One of the major successes of the project is that "mothers are adopting the recipes and good practices [we] are teaching them...and the population is accepting the fact that they can help themselves" (Heise 2013).

In Guatemala, the extension agents of the Non-Government Organization (NGO) Semilla Nueva are also teaching women how to cook legumes and make new dishes. The organization works with women's groups and promotes new recipes involving pigeon pea, salads, and atoll (a corn-based beverage). They complement traditional dishes with pigeon pea and other highly nutritious foods like yerba mora, a leafy green, rich in vitamins and minerals.

In the Millennium Villages Project in Mali, agricultural coordinators work closely with extension agents on the post-processing of foods to remove anti-nutrients and enhance overall nutritional quality. Extension agents are trained in post-harvest food agro-processing at the village level, which they then transfer to the women (Bisseleua and Niang 2013).

1.2 Summary and lessons learned

Summary: This study examines some of the overarching approaches taken to connect EAS and nutrition. EAS for the most part, focus thematically on crops and food, and to a certain extent on livestock and natural resources management. They also focus on the education pieces that fit within these themes. Extension agents do not tend to work in other sectors such as public health, or on health-related activities, for example malnutrition screening or treatment. Most of the approaches have focused on improving the nutritional quality of food production, as well as on nutrition education and on awareness messaging regarding better utilization of foods. One reason is that because many extension agents have experience of working in the food availability sphere, including nutrient-rich crops in their portfolio is an easy transition. Responsibility for food availability falls into the remit of the Agriculture ministries.

Even when extension agents are not directly involved in the production of nutritious food, the interventions they deliver within the technical mandate of their ministry may have significant implications for the availability of nutritious food. There is a debate currently raging at the agricultural policy level over the extent to which agricultural interventions should factor in “do no harm” considerations for a range of environmental, gender, and health outcomes, including nutrition (World Bank 2013a). One specific risk is that an increase in production of calorie-dense foods could unfavorably alter dietary quality or diversity (World Bank 2013). What does this mean for extension agents? The impracticality of replacing outright the technical mandates with nutritional considerations has long been recognized for both EAS and agricultural investments in general (FAO et al 2010a; Sevenhuysen 1985). However, by understanding these implications, donors, policy makers, and extension agents, may be able to make the adjustments required to the design and implementation stages of interventions that will mitigate negative nutritional consequences and/or increase nutritional relevance.

Less work has been done regarding concerns of food access and utilization in rural households. This may be because interventions in these areas are less known, less demonstrated, are supported by less research, and have less evidence of impact. These areas also involve integrating other actors, including value chain actors, for increased access to nutritious foods and public health in the case of utilization, which can be more difficult to coordinate under time and resource constraints.

In some cases, the integration of nutrition within EAS is a direct objective of programs or projects, while in others, it takes place indirectly as new technology or models present unique entry points for integration to occur. Very few of the integrated approaches are at scale and very little has been documented on their effectiveness.

Lessons learned:

1. Food-based approaches are appropriate actions for extension agents working within nutrition. Those approaches that focus on nutrition-rich crops and their cultivation, linking farmers to markets to sell and buy nutritious foods, and better utilization of foods grown and purchased, would provide the best use of the skills sets of extension agents. Extension agents can provide on-site services on the farms, and do walkabouts to demonstrate which crops are rich in nutrition and which ones are not. Offering information at the crop or market level, as opposed to demonstrating dietary guidelines, allows for practical, hands-on, and locally adapted transfer of knowledge.
2. Extension agents need to be equipped with knowledge and appropriate tools that will help them better understand the needs of the clients they work with. They need to have detailed knowledge of the local food basket, of the diversity of the landscape, of the agroecosystem, and of which techniques are desirable from a production point of view. Extension agents need to understand the most appropriate agronomic practices required to improve nutrition at the household level. A pre-requisite is knowledge of surveillance, and of local epidemiology. Projects can focus on crop and agroecosystem basics within EAS, an area that agents are already familiar with.
3. Most nutrition programs within EAS acknowledge the importance of education and knowledge messaging within their work portfolio. Research has demonstrated the efficacy of pairing education with agricultural interventions (Berti et al 2004) and most projects highlighted in this study have adhered to this. One of the most effective ways of improving nutrition in the household is through the dissemination of women-focused messages to farmers, having adapted them to the local context.
4. Technologies such as ICTs or biofortification can provide a more accessible entry point for extension agents working in communities. There is need to expand the toolbox beyond projects like the OFSP campaign in East Africa, and Digital Green. Projects such as U Report in Uganda is changing social mobilization, as well as monitoring and response efforts by equipping community members with mobile phones to report what is happening in their community, and ensure transparency in demand-driven services through SMS technology. Perhaps technology specific to EAS in this vein may be beneficial.

2. Nutrition training of extension agents

The purpose of this section is to document the nutritional technical content of extension agents' training and the messages and information delivered to farmers and other clientele.

2.1 The history of nutrition training in EAS

FAO first introduced nutrition concepts into the training of extension personnel for rural development projects in the 1960s, and USAID joined this effort in the 1970s (Abeyrathne and Poleman 1983; Vaughn and Flinn 1983; Victora et al 1986). During those early stages, the general consensus was that to have an impact on nutrition, the agriculture sector would need to expand beyond its sole focus on food production, and incorporate food consumption as well. For this to succeed, a key step would be to improve the extension agents' understanding of nutrition-related concepts, as the prevailing low levels of training did not equip them with the tools necessary to recognize the causes and consequences of malnutrition (Bhuiya et al 1986; Haaga et al 1986).

In 1978, FAO developed a teaching set, "Field Programme Management: Food and Nutrition", that was aimed at addressing these challenges. The training materials contained technical information on nutrition, as well as lessons meant to enhance the managerial and communication skills that fieldworkers would also require in the context of nutrition (Sevenhuysen 1985).

This new approach served as a global resource and was later adapted to the national contexts of numerous countries throughout Latin America and Africa. FAO and USAID sponsored some of these implementation efforts. For example, in 1981, FAO and USAID joined forces with the University of Chile's Institute of Food and Nutrition and Food Technology to train a diverse group of agricultural extension agents, nutritionists, social workers, and health workers using the teaching set. Five years later, an evaluation confirmed that the teaching set was still being extensively used (Martorell et al 1984; Valiente et al 1988). FAO also facilitated national adaptation of the resource by printing a Spanish version of it (Valiente et al 1988).

This early initiative by FAO and USAID mobilized substantial support for integrating nutrition and EAS in the developing world. At least 10 Latin American countries were documented as having adopted the training materials, along with several African countries (Sevenhuysen 1985; Valiente et al 1988). It is noteworthy that national governments often supplied the materials to a broad range of fieldworkers, and not solely to agricultural extension agents. However, there is still a scarcity of information regarding the ultimate impacts and outcomes of these efforts. After the 1980s, 'globalization' altered agricultural policies significantly and resulted in market-oriented agricultural

sectors that favored food producers selling their output in the marketplace, thereby placing less emphasis on improving home consumption (World Bank 2007). Additionally, by the late 1990s, EAS across the developing world and in particular those using the Training and Visit (T&V) model, were deprived of funding as a result of the World Bank's shift in priorities to structural adjustment programs, as well as due to the expense of the model. Both of these factors may have influenced the limited success of these early efforts to integrate nutrition and EAS.

2.2 Examples of training and capacity development

Several projects examined in our study directly engaged national EAS. Where this is possible, it may lead to more sustainable outcomes, as projects have a finite lifetime and some gains will require ongoing training and education.

In the Improving Food Security, Nutrition Policies, and Program Outreach project in Malawi, one of FAO's core objectives is building institutional capacity in nutrition by training agricultural and health extension staff and community volunteers to become nutrition facilitators. The project reinforces government activities in agriculture and nutrition in two districts, Kasungu and Mzimba, and targets over 30,000 vulnerable households (FAO 2013c). FAO has found that in many cases, extension agents have been trained to focus on specific cash crops and therefore lack knowledge on the wider range of foods needed for a well-balanced diet. To that end, extension agents receive more robust nutrition training as part of the project, utilizing visual displays and covering a range of topics including food preparation. They also learn about participatory techniques pertaining to working in communities (Nordin 2013). In addition to these activities, FAO shares its lessons learned with Malawi's Department of Nutrition, HIV and AIDS (DNHA), which coordinates nutrition activities across the ministries so that they can be integrated at the national level (Nordin 2013).

In India, the NGO Digital Green trains extension agents as part of the government's National Rural Livelihoods Mission to improve agriculture practices. The Mission aims to create efficient and effective institutional platforms to enable rural communities to increase household income. Digital Green makes use of ICTs to generate knowledge that can be easily shared across communities; community members themselves produce and record videos that combine visual demonstrations with scientific evidence on a range of topics, including agriculture, health, and nutrition. Due to the high EAS-to-farmer ratio (1:500) in India, the government has been interested in low-cost, innovative delivery mechanisms. Together with Digital Green and local community members, extension agents are now helping to produce and customize videos on nutritional topics that can be shared almost immediately (Iyer 2013).

The USAID-funded SPRING program trains extension agents in Bangladesh, Burkina Faso, Haiti, India, Niger, Nigeria, and Uganda, with an emphasis on “small doable actions” that they can incorporate into their routine EAS with households in the community. These doable actions include messages centered around dietary diversity, including growing and consuming nutrient-rich vegetables and fruits and animal source foods, women’s nutrition, improved infant and young child feeding practices, and encouraging handwashing with soap and water before handling food and after defecation. SPRING adopts a “nutrition through life cycle” approach that focuses interventions on the critical 1,000 days between conception and two years of age. In Bangladesh, SPRING facilitators work not only with agriculture extension agents, but also with facilitators of farmer field schools, facilitators working on gender, governance, and micro-credits, and NGOs operating in communities. Extension agents are also trained with project partners including the CGIAR (SPRING 2013a,b).

The *Desarrollo de Proyectos Productivos Agropecuarios* program in Colombia was administered through the Ministry of Agriculture and the Ministry of Education. The objective was to improve food and nutrition security of the most vulnerable rural families by helping them to increase and diversify household agricultural production in environmentally sustainable ways. The Ministry of Education provided training materials for schools and the agricultural EAS. Once trained, the extension agents in turn provided guidance about diets; food preparation, preservation, and hygiene; farm management; agricultural production techniques; and community organization. Participating families received access to credit and an initial stock of pigs and seeds to help them transition to more sustainable and more productive techniques. The program is largely regarded as having been very successful (Garrett and Natalicchio 2011). Not only does this program demonstrate the attainment of a multi-sectoral partnership of different ministries, but also highlights the impact that providing extension agents with technical nutrition know-how has on furthering sustainable change.

2.3 Nutrition messages and information by EAS

2.3.1 Nutrition education and awareness

The major questions to be analyzed with regards to extension agents’ role in nutrition education, are the frequency that messaging should occur at, and the level of message penetration. **Box 2** outlines the key themes for messages, along with good practices regarding mechanisms for message delivery through EAS, stemming from the literature, surveys, and interviews.

The nutrition education activities of extension agents might also focus on local indigenous crops that have the potential to fill nutritional gaps, but that have escaped the attention of communities, or that are undervalued. In Guatemala, an impor-

tant component of the home extension agent’s role is to work with women to identify and prepare indigenous foods that are underutilized but that could play a role in improving nutrition and reducing hunger. A typical activity, for instance, is for the extension agents to lead a group of women in forest walks to harvest wild food. The home extension agent then shows the women how to prepare the food and incorporate such nutrient-dense crops into conventional dishes (Garcia 2013).

Some of the most innovative approaches to incorporating nutrition education into EAS have relied on participatory methods, in which communities themselves test different crops and in the process, build their knowledge base. In the *Soil, Food and Healthy Communities* project, which took place in Malawi in 2000, farmer research teams that consisted of volunteers selected by the community, initiated tests of different legumes and assessed their joint benefits for soil fertility and child nutrition. In this system, which was referred to as the “mother-baby” system, the research team would carry out “mother” trials with all the legume options available on village land, and individual farmers would carry out “baby” trials of one to two legumes by themselves. Interestingly, following project completion, the communities wanted to keep the village “mother” plots operational. This was possibly for the plots to serve as an informal resource for learning, or because the community members preferred to gain knowledge from a neutral village plot, rather than turn to another farmer’s private plot (Bezner Kerr et al 2007).

The success of extension agents’ work in nutrition hinges upon sufficient levels of education and awareness pertaining to nutrition-related issues in the communities in which they operate. This is often what fuels the demand that drives the production of nutritious crops. As part of the World Bank’s *Relaunching Agriculture: Strengthening Agriculture Public Services II* project in conjunction with the Government of Haiti, matching grants were awarded to farmer cooperatives which presented proposals, giving priority to those plans that included a nutritional component. One farmer cooperative was considering using a grant to market and produce fortified milk, but was hesitant, as they could not be sure there was enough demand to make it profitable (Arias 2013).

The potential for unintended consequences and negative externalities from increasing the production of nutritious crops in the field, must be carefully evaluated before the messages are designed and tailored for their audience. Unintended consequences, including vector-borne diseases from irrigation, zoonotic diseases from animals, and the opportunity cost of time that could be spent on childcare, can take its toll on nutrition (World Bank 2013b). It is important to ensure that messaging and education around nutrition include elements of “do no harm”, and innovation. The *Integrated Rural Nutrition Project* in Kawambwa, Zambia, which sought to increase the availability of legumes, succeeded in this respect, but did not ultimately

improve anthropometric results in children. Possible explanations are that extension agents stressed the technical side of production over nutritional benefits, and households used legumes as cash crops and income-generating sources, instead of as food for home consumption (Friedrich 1997).

BOX 2: EAS and messaging

What types of messages should EAS promote?

Where would they get this information?

- Consumption of iodized salt;
- Consumption of iron-fortified foods;
- Importance of antenatal care, growth monitoring visits, and post-natal care;
- Increase of feeding frequency of children on nutrient dense diets;
- Diet diversification including growing and consuming nutrient-rich and animal source foods;
- Encouragement of exclusive breastfeeding for 6-months;
- Encouragement of complementary foods for children ages 6-24 months;
- Promotion of home fortification of food;
- Hand-washing with soap and water;
- Promotion of birth spacing;
- Promotion of milk as an important source of calcium, iron, and protein;
- Improved storage of agricultural yields through appropriate technologies;
- Promotion of improved seeds and new crops with high nutritional value;
- Promotion of cooking only with the use of iodized salt;
- Food processing and preservation;
- Food hygiene and safety;
- Basic knowledge of food groups and their role in the body;
- Local biodiversity in the nutrition context.

How to incorporate messages into EAS?

- Educate extension agents on what locally available food varieties would serve specific nutritional needs;
- Involve extension agents in large campaigns promoting 'tippy-taps' for improving water and sanitation-related health;
- Conduct cooking demonstrations with local, nutrient dense food sources;
- Distribute flyers/brochures containing information on nutritional content of crops;
- Promote equitable intra-household food distribution to meet dietary diversity guidelines, particularly for mothers and children;
- Supply extension agents with nutritious recipes for distribution to the community;
- Provide extension agents with easy to use food composition guides;
- Use of ICT, Radio and TV programs;
- Use of community theater, music, and drama.

2.3.2 Adult learning approaches

Speaking with project managers and implementers, our study found common themes in how nutrition education and messages should be delivered, with a focus on understanding and building tools around adult learning principles. Overall, our study found that projects encouraged interactive sessions complete with demonstrations and discussions, as well as the use of diagrams and graphics, with an emphasis on *simple* and *actionable* messages (see **Box 3**). Diagrams were often cited as helpful tools for teaching about the food groups, and were more effective when customized for specific regions, and included locally-available crop varieties (Bagnall-Oakley 2013; Ofosu 2013). As demonstrations can be more time and resource intensive, it is beneficial to include tools that can be disseminated. In India, posters, pamphlets, and booklets, were effectively used to educate literate people (to promote vitamin A intake), and music and video cassettes proved particularly helpful for transmitting messages to illiterate women (Chakravarty 2000).

BOX 3: Messages: the simpler the better

Personnel in charge of developing nutritional messages, whom are often professional nutritionists, may overlook the complexity of technical words embedded in their messages due to their own familiarity with them. For example, terms such as "vitamin A" and "nutrient" may have little significance among rural populations with minimal nutritional awareness. Hence, the following messages, which essentially allude to the same concept, can yield a starkly different impact:

1. "Increase intake of vitamin A rich foods to reduce prevalence of blindness in children."
2. "Make sure your child eats carrots, papaya, mango, and/or green vegetables every day to improve their eye-sight."

Common end goal: Reduce vitamin A deficiency and associated blindness.

2.4 Skills, training, and qualifications needed to integrate nutrition into EAS

Integrating nutrition and the delivery of effective nutrition interventions often requires extension agents to acquire a toolkit of knowledge and skills that is very different from the one they traditionally have. Our study identifies some pre-requisites for successful integration. The method used to identify these competencies mainly relies on comparing the weaknesses revealed in certain programs and projects that have attempted this integration, in addition to opinions of key informants regarding primary causes behind programmatic successes and failures. Of the survey respondents, less than half thought that in their respective countries, extension workers had specialized skills in nutrition and/or home economics to pass onto their clientele (**Figure 3**).

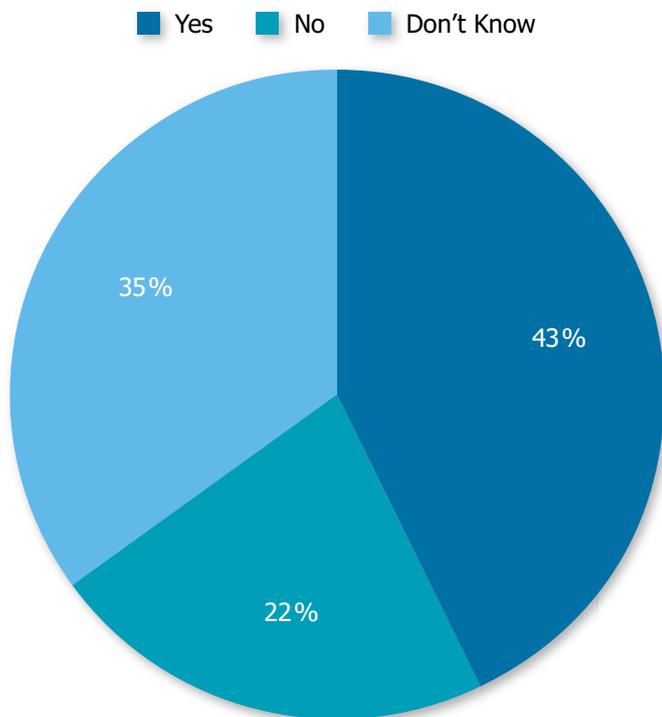


Figure 3: Survey respondents who think extension workers should have specialized nutrition skills

2.4.1 Technical nutrition skills

One of the first steps for an extension agent to effectively integrate nutrition is to gain an understanding of what constitutes good nutrition, or conversely, what causes malnutrition. Many EAS still do not provide adequate training in methods to recognize nutritional needs and adapt technical work accordingly, or address those needs proactively.

The following findings were made with regards to improving technical knowledge of nutrition:

- Extension agents must be able to make the connection between the crops being produced in the fields and the nutritional benefits that can be attained from them in the home, in particular where they are working with subsistence farmers. This requires them to understand the basic nutritional characteristics of the crops that they are working with and how families can use them in their diets (Harawa 2013).
- When the focus of EAS is heavily directed towards increasing the production of staple crops and export potential, extension agents may have little information about other crops that could be important for nutrition. They should be familiar with the different food groups, and at a very minimum, be aware that you need more than maize and rice for good nutrition (Nordin 2013).
- Extension agents need to believe in the importance of their nutrition interventions, the purpose of these interventions, and the ability of households to make behavioral changes. Many extension agents themselves grew up unaware of nutrition and are thus unable to recognize its importance.

Nutrition training must be sufficient to reverse this mindset (Heise 2013).

- Extension agents require ongoing training and refresher courses to give a professional focus to nutrition and to stay relevant with their delivery of messages (Fatch 2013).
- In Bangladesh, with the SPRING initiative, extension agents are trained to incorporate nutrition into their routine EAS with households in the community. The messages are centered on dietary diversity, including growing and consuming nutrient-rich and animal-source foods, women's nutrition, infant and young child feeding, and encouraging handwashing with soap and water (Williams 2013).

DAI's Urban Gardens in Ethiopia trained extension agents on how to deliver nutrition education, and structured the training in a way that was accessible to them, both of which are important aspects of educating extension agents.

"The whole education system in Ethiopia is based on listening and repeating, it's memorization and not a lot on experiential learning. So, it had to be part of our approach to not just train them on the content, but to train them on how to deliver it. The way that the 'Walk-and-Talk' methodology works is that it is meant to be very informal, so that in every interaction, you can pick up and start talking about any range of topics, like pest management, soil fertility, etc. – whenever there were these group garden meetings, and they would talk about how to garden, they would also talk about a new health topic. It became just a discussion, and that was a challenge. It required a lot of training to move into that model, but in the end, it was a lot more successful." [Development Practitioner, Ethiopia]

Other organizations have provided training to extension agents on the nutritional value of different crops. Because agricultural extension agents are already thinking in terms of crops, food groups could be presented in terms of crops, and crop diversity. Even using a simple diagram with the food groups, it is possible to maintain focus on crops and their nutritional value (Bagnall-Oakley 2013).

While these examples offer insight into how education and training programs could better prepare extension agents to incorporate nutrition into their portfolio, it is important to note that to date, these have been done on a relatively limited scale, in comparison with the training received by the broader EAS workforce.

2.4.2 Communication, facilitation, and management skills

Soft skills are also required for the integration of nutrition beyond just technical know-how. These skills include communication, facilitation, and management, and though they are fre-

quently the most important skills, they are often the most difficult for extension agents to acquire. Much of this is due to the traditional emphasis of EAS on delivering standardized information and technologies to capitalize on economies of scale. Further, strong critical thinking and problem solving skills are considered a pre-condition to ensuring that EAS are effective (Davis 2013). Interacting with communities to diagnose the causes of malnutrition and to develop solutions that are appropriate for local conditions may be a large leap for extension agents who do not possess these skills.

"For nutrition training, extension agents should be good at: communication skills, using visual aids, skills for demonstrations, how to do evaluations, how to apply participatory approaches, how to motivate farm families to identify projects on their own. They have to understand things from the bottom up rather than top down."

[Academic, Ghana]

Extension agents need to be more adept in such areas as community mobilization, and stakeholder engagement, as well as possess skills that would allow for a better demand articulation that clearly reflects the needs of the different user groups. Extension agents also need to know the physical terrain and agroecosystem in which they operate, and go beyond identifying the progressive farmers who may operate differently to other farmers. However, extension agents should not be required to go beyond their scope and venture into technical areas like nutrition or HIV/AIDS in too much depth (Spielman 2013). For example, SPRING in Bangladesh provides extension agents with a Counseling Guide, which covers the essential soft skills needed for effective community engagement. Local NGOs are fairly experienced at facilitation and can serve as a good resource for trainings and community mobilizations (Williams 2013).

Extension agents should seek context-specific strategies that utilize the wisdom of local communities, and communicate *with* communities rather than merely providing information to them. They should work with small groups, deliver culture-specific messages, and use creative methods such as theatrical performances where possible. Furthermore, they should train local leaders and interested parties in the techniques of demonstrating improved nutrition practices so that they can become self-sustaining in the management of nutrition programs (Pratt and Pratt 1987).

Another important skill that extension agents should possess in order to become more effective, is the ability to communicate with clients in their native tongue. This is highly valued by rural communities who perceive a horizontal relationship when their native tongue is used. In Guatemala, for instance, participants in a focus group highlighted how the ability of an extension agent to speak in the same Mayan dialect has made his work

more relevant to the community: "the other extension agent only spoke Spanish and not all the mothers speak Spanish" (FAO, 2012a). The National Extension System has recognized this as a desirable characteristic, and is actively recruiting EAS candidates whose cultural backgrounds correlate to where they will be placed.

Digital Green suggests that the language in which the information is disseminated is a significant factor in the adoption rate. Good command over local language, and familiarity with local context, are among their key criteria when selecting farmers to produce a video. The extension agents use the videos to showcase various agricultural practices and engage with the farmers who demonstrate an interest in them. Farmers are more likely to adopt the new techniques if they observe its usage from their peers.

2.4.3 Gender-sensitive nutrition awareness skills

Adequate delivery of nutrition interventions requires a clear understanding of community gender dynamics. Traditionally, extension agents have targeted the bulk of their resources and interventions towards male farmers. As we consider incorporating nutrition into the mandate of EAS, it is important to understand the cultural norms regarding gender, and the dynamics that may impact malnutrition. There is a need for an explicit gender focus to eliminate the inequalities that impede women from becoming active agents in improving their own livelihoods and that of their households (World Bank 2009).

Women play an essential role as stewards of the food security and health of their households, and therefore, programs that enable and empower women are seen as key to improving nutrition outcomes (World Bank 2007). Along these lines and backed by studies conducted by the World Bank, USAID, and IFPRI, consensus is emerging that women's empowerment and nutrition education are central to interventions that actually impact nutrition (FAO 2013a). For example, extension agents should be aware of women's unique nutrition needs, particularly during the critical 1,000-day window between pregnancy and the second birthday of the child. Interventions must accommodate and factor in this period of heightened need and be sensitive and responsive to unequal intra-household food distribution.

The literature emphasizes the importance of integrating and incorporating gender considerations into the design and delivery of nutrition interventions. However, nutrition-sensitive agricultural interventions must be balanced in order to ensure that the benefits are being distributed among communities.

"While female extension agents have a better chance to reach the women in the household, the literature tells us that it should not be nutrition education just for women – if women get the information but nobody else in the household does, they may not be able to act on it."
[Academic, USA]

There are also important "do no harm" considerations regarding gender that extension agents must take into account. For example, focusing on cash crops that provide income that is not shared with women, or a move to commercialize horticulture crops and transfer control away from women and to men, could potentially trigger negative impacts for women and household nutrition in general (Herforth et al 2012).

A recent report by the USAID-led initiative Modernizing Extension and Advisory Systems (MEAS), compiled a list of six principles needed to design and implement gender-equitable EAS (MEAS 2013a,b):

1. Increase the proportion of women extension officers. No single strategy is likely to produce the desired results; a combination may be needed. The use of ICTs in EAS may offer new opportunities.
2. Equip all extension officers with the knowledge and skills to address the needs of men and women farmers equitably. To reach more women producers and entrepreneurs, male and female extension agents should be equally responsible for and capable of reaching men and women farmers (although in some places local cultural norms permit only same-sex contacts).
3. Adapt gender-responsive techniques and methods to the local context. Appropriate methods for reaching men and women farmers equitably will differ between and within countries. EAS providers need to be prepared to choose methods based on local gender and social norms that influence women's time, mobility, and education.
4. Deliver cross-sectorial programming. It is equally important to support collaborative household strategies between men and women. Programs that link agricultural extension with nutrition and health education or microcredit opportunities, for example, can be very effective.
5. Collect sex-disaggregated data. The lack of sex-disaggregated data collected by national statistical units, ministries, and donor-funded projects, severely limits the ability to assess the effectiveness of EAS programs.
6. Evaluate the impact of EAS on reducing gender disparities in agricultural productivity. The shift from top-down and technology-driven approaches to demand- and market-driven

approaches is meant to create more responsive service delivery. This should translate into women farmers being able to shape service delivery to meet their needs. Greater investment needs to be made to systematically evaluate the results and to identify the strategies that have been most successful.

2.5 The role of the education system in training

Education and training, including on-the-job training, is essential to the ability of agricultural extension agents to effectively incorporate nutrition into their activities and interactions. The successful integration of nutrition education into the university-level, vocational, or certificate programs that extension agents undergo, could ensure that they have in place a basic knowledge of nutrition at the minimum, while others can continue to specialize in nutrition as a technical topic.

To plug this educational gap and include nutrition in future trainings, the Sasakawa Africa Fund for Extension Education (SAFE) initiative is working with universities to strengthen their programs for future extension agents. SAFE partners with universities and students to implement supervised enterprise projects (SEPs) that feature a hands-on learning experience and aim to narrow the gap between theory and practice. Some of these SEPs focus on nutrition, value addition, and processing. Key activities of SEPs include teaching women improved skills in food preservation, processing, value addition, and enhanced feeding patterns. The SAFE program can also be integrated into the professional training of extension staff. Most of the partner universities have food science and nutrition departments where faculty teach technical courses on nutrition (Akeredolu 2013).

In addition to SAFE's efforts to strengthen EAS education, there are other examples of how nutrition and home economics education has already been institutionalized in universities. At the University of Ghana, students can study Family and Consumer Extension through a four-year program that encourages students to first build a strong base in theory, and then spend one semester working within a community to conduct a needs assessment. Through this practicum, students develop and apply some of the softer skills required to build dialogue with families in rural communities, and to work at the community and household levels. Nutrition training focuses on communication skills, the use of visual aids, skills to conduct demonstrations, conducting evaluations, using different participatory methodologies, and how to motivate farming families to identify projects on their own. There are all skills that are required of an effective *facilitator*. The needs assessment allows students to identify the requirements of communities, and determine that nutrition is a critical area in which families need support (Ofosu 2013).

In Kenya, in addition to technical training (on agriculture), front-line extension agents receive training in communication skills and in the participatory methods that are key to community mobilization, and for the implementation of Kenya's demand-driven EAS model. The focus and key competency of the front-line extension agents is to mobilize households and communities to identify priorities, which then enables the frontline workers to arrange for further technical trainings (Ndung'u 2013).

2.6 Mentorship and feedback mechanisms

Complementary to the integration of nutrition content and participatory skills into formal educational and training channels, there is a potential role for mentors and supervisors in supporting extension agents' adaptation of new knowledge and skills.

If and as EAS move to integrate nutrition into their portfolio, mentorship and feedback mechanisms can provide ongoing guidance and support to ensure that those extension agents new to nutrition and/or participatory approaches can gain confidence and comfort. In Malawi, FAO's Improving Food Security, Nutrition Policies and Program Outreach project trained public agricultural extension agents in a more participatory approach that marked a departure from their usual *modus operandi*. Uptake and effectiveness of the new approach among the extension agents was varied, reflecting extension agents' need for adequate support when adopting a new methodology (Nordin 2013). Transitioning to a new training methodology, based on participation and discussion rather than information dissemination, requires extensive training and support. In DAI's Urban Home Gardens Program in Ethiopia, extension agents attended meetings on a weekly basis, which provided a venue for them to share experiences and challenges, to gain feedback, and to *reinforce* the initial training that they had received (Salerno 2013). Even if extension agents receive nutrition training, they still require mentorship to be able to effectively promote and enable behavior change (Bagnall-Oakley 2013).

Beyond the role of supervisors and mentors within EAS, feedback mechanisms allow frontline extension agents to solicit the higher-level technical or specialized support they do not possess. In demand-driven EAS, feedback mechanisms can be instituted in a way that leverages a limited number of nutrition specialists. For example, in Kenya, there are 565 home economics officers from a total of 5,440 agricultural extension agents, which includes nutrition specialists. Given this breakdown of staff and specialization, the frontline workers are not expected to be experts on all topics. The system is set up so that they can solicit support from home economics and nutrition specialists (and other subject area specialists) as needed (Ndung'u 2013).

Feedback mechanisms can be beneficial for purposes other than simply to ensure strong vertical relationships within EAS. Just as stakeholders noted the need to bring the agriculture and

health sectors together to collaborate on nutrition, they have also emphasized the importance of creating a space to continue to share their experiences and engage in joint problem-solving. This could be considered an extension of the joint planning processes mentioned earlier. In Western Kenya, the innovative Mama SASHA program involves community vine multipliers, community health workers, health clinic staff, and agricultural EAS, in a bid to increase the availability and consumption of OFSP. Integral to the success of the project are the regular feedback meetings that are hosted at the health facility. All of the health and agriculture personnel, and the decentralized vine multipliers (community members), meet to discuss their experiences and challenges they have faced (Low 2013). Meetings of this sort provide an opportunity to raise concerns and engage in collective problem solving beyond the initial planning phases and provide a valuable forum for extension agents, collaborators, and supervisors.

2.7 Career advancement and professional incentives

In conjunction with a lack of mentorship and guidance, a frequently cited training challenge is the lack of career advancement or performance-based incentives for extension agents. This may affect extension agents' decisions to study nutrition before entering the workforce, or sap their motivation to incorporate nutrition-related activities after they have been hired.

Although EAS may face a shortage of qualified nutritionists as they seek to integrate nutrition, it can also be argued that jobs must first exist in order for future extension agents to opt to study nutrition. That is to say, a decision by Agriculture ministries to increase the number of positions for extension agents specializing in both agriculture and nutrition could play a key role in motivating people. Conversely, a lack of clear career opportunities for specialists in agriculture and nutrition could act as a deterrent (Rivera 2013). Public investment and commitment is therefore required to create jobs and establish a curriculum, and once these exist, the workforce can then follow (Rivera 2013). An example comes from Ghana, where the University of Ghana's family and consumer EAS program receives between 60 and 100 students per year and equips them with the practical and interpersonal skills needed to work in nutrition. However, there is no guarantee that students will find employment at the Ministry of Agriculture (Ofosu 2013).

Another challenge is motivating the existing workforce to incorporate nutrition. Where agricultural extension agents are already working with limited resources and few or non-existent incentives, they may not welcome the suggestion that they take on additional tasks or responsibilities. In one extreme example, a home extension agent from Guatemala highlighted the existing lack of investment in public EAS when she noted that she had been working without a contract, and had not been paid in three months (Bowen and Barkett 2013). In FAO's Improving

Food Security, Nutrition Policies and Program Outreach project in Malawi, extension agents initially wanted to be paid more to monitor nutrition. Although nutrition activities were already within the scope of their work, adding any task perceived as new can be met with resistance, especially if workers are already stretched beyond capacity (Heise 2013).

2.8 Summary and lessons learned

Summary: Our study demonstrates that there is extensive training on nutrition taking place within EAS at different levels: within projects, within vocational training, and within the formal education system. The capacities that extension agents need to effectively integrate into nutrition include: technical knowledge of nutrition; communication, facilitation, and management skills; and gender-sensitive nutrition awareness. Nutrition training does occur within EAS but mainly on educating communities about improving dietary diversity. Many extension agents receive training on crop production for improving nutrition, in addition to training on diets, food preparation, preservation, and hygiene. Along with training the extension agents on the technical aspects of nutrition, it is also necessary to introduce them to softer skills, such as facilitation, negotiation and communication, and gender sensitivity.

Training also encompasses support systems for extension agents including mentorship, feedback, and career advancement. If a country does not have a support system for EAS in place, the probability of younger generations entering the education system, or doing vocational training with a focus on EAS, remains low.

Messages and demonstrations are often used by EAS to transfer nutrition knowledge to communities. Peer to peer engagement, positive deviance, and model farmers, are all avenues that have been successful. Use of technology and existing community platforms and structures help to facilitate effective message delivery and ownership at the community level.

Injecting and incorporating nutrition, dietary diversity, and quality concepts, into the overarching education system, as well as into training modules for extension agents, would provide longer-term bridges to sustainability than most other approaches. Education programs can model profiles of nutrition champions and leaders that emphasize cross sectionalism and cross-disciplinarily (Haddad 2013). Some countries integrate nutrition content into the curriculum of extension agents. The training of extension agents has to be robust enough to enable them to feel comfortable talking to farmers about the linkages between agriculture and nutrition.

Lessons learned:

1. Trainings should be on-going, reinforced, and mentored, in order for the addition of nutrition as a topic to be sustainable. This requires the public sector to take ownership and responsibility, and requires building the capacity of trainers and mentors in the field of nutrition.
2. The field itself can be used as a classroom for training on nutrition agronomy by using field plots, greenhouses, and local biodiversity and ecosystems.
3. Soft skills are key. Facilitation and negotiation skills are required for extension agents who move into nutrition. Farmers will need to be convinced to invest in nutrition for their own families and for the market. Creating demand amongst farmers will take time. One potential channel could be through women farmers.
4. Promote nutrition as a topic at the two-year post-secondary or vocational schools where agriculture extension agents are trained, so that it is recognized and accepted as a discipline. Introducing nutrition as a topic to the four-year higher education formal schools does not make as much sense because many of these students often emigrate (Rivera 2013). However, the education and training of extension agents must go beyond technical nutrition skills and encapsulate soft skills.
5. Training of extension agents should include emphasis on creating awareness of the potential causes of malnutrition that apply to them as fieldworkers (since extension agents perceive information about nutrition to be less important than other technical information).
6. Historically, the topic of nutrition was equated with food preparation, which falls to the female in many cultures. Yet, improved training materials present nutrition in a social context and strip out the domestic associations, which is an important distinction and fosters accessibility among both the males and females.
7. Coordination for nutritional purposes crosses between traditional disciplines and demonstrates the potential for cooperation for fieldworkers. The nutritional element is perceived as relevant because of its public health connotations and the materials provide practical examples and technical details for nutrition-oriented activities.

3. Extension and other rural workers

The purpose of this section is to understand if and how extension workers coordinate and/or duplicate work related to nutrition, with rural workers from other sectors, e.g. rural health.

3.1 Types of extension workers

The types of service providers working in nutrition extend beyond the traditional frontline agricultural extension agent. As EAS have become more pluralistic, the actors providing services have become more diversified. NGOs, CSOs, the private sector, and the public sector, all operate at different levels and in varying capacities of EAS. Our study adopts a broad perspective of those service providers who could be referred to as extension agents and presents several non-public sector examples of organizations or communities who provide nutrition information or activities.

It should be noted, however, that the public sector is often the largest provider of and player in EAS (Anderson and Feder 2007). Estimates place the portion of agricultural EAS that is provided by the public sector at 80%, compared to NGOs and other civic sector organizations, which provide about 12%, and the private sector, which provides 5% (Feder et al 2001). Not surprisingly, this study was unable to identify private EAS that focused specifically on nutrition. Today most private EAS address the needs of commercial farmers, as opposed to small-holder farmers, and focus on market goods, or on spreading knowledge of inputs or equipment, such as improved seeds or machinery (Anderson and Feder 2007). Nutrition is a public health issue that disproportionately affects the poor; thus, it may be difficult to align nutrition targets with business interests. Most information available on EAS and nutrition stems from the public sector or NGOs, whose roles are shaped more by donor, national, and those local interests likely to include nutrition.

3.1.1 Frontline public sector generalists

Some governments have made frontline extension agents responsible for addressing nutrition. They have gone about this in different ways however, and our study reveals a considerable variation in the types of frontline extension agents who incorporate nutrition.

One approach has been to train frontline extension agents to be generalists. These generalists have a broad range of agriculture-based knowledge relating to farming systems, fertilizers, or marketing. This is in addition to knowledge on rural poverty alleviation and development issues, including nutrition, which might impact specific clientele. The ability of generalists to respond and adapt to the varying needs that could affect specific groups within communities, is representative of partici-

patory, bottom up, EAS models (Davis et al 2010). Increasingly there is consensus around unified EAS structures where the front line is held by a single person charged with managing with a wide range of activities, messages, and other responsibilities. The extension agent could deal with crops, livestock, and fish, as well as nutrition (Bagnall-Oakley 2013).

In Haiti, as part of the Relaunching Agriculture: Strengthening Agriculture Public Services II program, nutrition and home economics modules are included in the training of new agriculture extension agents. However, activities are limited to general nutrition messaging to promote the benefits of a diversified diet, and to connecting those in need of more comprehensive nutrition information to other service providers, possibly from the health sector (Arias 2013).

In the Kasungu and Mzimba districts of Malawi, FAO is building on the nutrition training that public extension agents currently receive at the national level. In this case, frontline workers take a much more hands-on role, engaging in strategies to diversify production at the community-level as well as organizing cooking demonstrations (Nordin 2013; Heise 2013).

The examples above demonstrate that generalist extension agents vary across the board in terms of the reach and scope of their nutrition-related activities. Governments must make decisions regarding the optimal degree of involvement, based on the budgets allocated for frontline staff, and on the other, competing, national priorities. The ability of EAS to incorporate nutrition into frontline activities will, in many cases, be determined by their capacity to execute the standard agricultural activities that fall into their technical mandate. This is difficult to assess because little is known about the capacity, quality of service, and performance, of EAS in some countries (Davis 2008).

3.1.2 Subject matter specialists

Other extension agents within Agriculture ministries, known as subject matter specialists (SMS), may have a greater focus on nutrition. SMS commonly serve as technical backstoppers and provide ongoing training to frontline extension agents, who they supervise from the district or provincial level. SMS had a prominent supervisory role in the T&V model and planned regular bi-weekly meetings with frontline extension agents. The dual-function of these meetings was for the SMS to relay relevant information from the research community to the frontline staff, and to gather feedback from frontline staff concerning the local needs of communities (Evenson 1998). Though the T&V model is no longer functioning, SMS have continued to play a role within national EAS. The conditions of their work and their qualifications, however, can vary from country to country, and there are significant variations with respect to SMS-to-fieldworker ratios and the percentage of specialists who hold advanced degrees.

Though SMS traditionally focus on agricultural topics, such as fertilizers or crop management techniques, there are examples of SMS who focus on nutrition. For instance, in Malawi, the nutrition SMS focus on both interventions and nutrition surveillance. Surveillance SMS design data collection mechanisms with health sector partners. Intervention SMS then use these data to design interventions that fit the needs of the districts, and provide direction to frontline staff on how to execute these interventions (Fatch 2013). In Ghana, the Women Extension Volunteer model works with smallholder women farmers on issues ranging from basic agricultural practices and income generation, to health and sanitation. They serve as a liaison point between women's groups and traditional extension agents (MEAS 2013a,b).

3.1.3 Generalist extension agents with access to nutrition specialists

Several countries also utilize systems whereby frontline extension agents, or those interacting most closely with communities, are agriculture-focused, but have received basic training in a range of topics including nutrition. Their primary responsibility with respect to nutrition is to identify gaps within a community, and understand the potential causes of malnutrition. Their role is then transformed to that of a coordinator who helps the community to access other resources or services pertaining to nutrition, or to reach nutrition-focused extension agents within their own cadre. The role may require the frontline extension agent to foster further management and communication skills, without necessarily requiring them to become nutritionists.

Ghana offers one example that follows this trend. Within the agriculture extension workforce, all agents are expected to understand the basics of nutrition. However, during their training, nutrition is also on offer as a specialization. Those who elect this option are nutrition specialists and could be called on to deliver nutrition education to farming families in areas of that experience particularly high chronic malnutrition (Ofusu 2013).

Kenya's home economics officers, discussed previously, are also effectively specialists within the country's EAS. Kenyan frontline extension agents are trained primarily in agriculture, but some also have a basic knowledge of nutrition or home economics. These agents mobilize the communities to identify nutritional needs, and where necessary, coordinate with the home economics officers stationed at the district-level to deliver the relevant nutrition training (Ndung'u 2013).

Malawi's agriculture EAS provides a slightly different version of this approach. Extension agents include nutrition subject matter specialists. However, within this group of specialists, some focus on nutrition surveillance and others focus on interventions. Nutrition surveillance involves coordinating with frontline agriculture EAS and health surveillance assistants from the

Ministry of Health. Their role at the field-level is to design mechanisms for collecting health and nutrition data pertaining to agriculture. Once the data is collected, the subject matter specialists on the intervention side determine the specific actions to be taken to improve nutrition. As in the case of Kenya, these subject matter specialists are stationed at the district-level, and strategies are tailored to district-specific contexts (Fatch 2013).

Haiti is one more example of a country where agriculture extension agents are gaining a basic knowledge of nutrition. As part of its Relaunching Agriculture: Strengthening Agriculture Public Services II project, nutrition and home economics modules are being incorporated into EAS training. There are also plans for some agents to specialize in nutrition, though this initiative is at the early stages. Haiti's agriculture sector and EAS is in the process of being rebuilt following the 2010 earthquake, and with emphasis predominantly on improving production, initial nutrition interventions have been on the lighter side. At the community level, extension agents will mostly help to connect communities to other nutrition-related resources and services (Arias 2013).

SPRING/Bangladesh forged collaborations with the Ministry of Health and Family Welfare and the Ministry of Agriculture in Bangladesh. SPRING provides separate on nutrition and hygiene (essential nutrition and hygiene actions) trainings for staff at both ministries. The training for the Ministry of Agriculture extension staff is shorter, and gives practical examples of how extension agents can include nutrition and hygiene into their regular activities (SPRING 2013a,b).

3.1.4 Home economics extension agents

The home economics extension agents of Agriculture ministries also specialize in nutrition. As previously discussed, home economics programs were a fixture of EAS during the 1970s and 1980s. They were mostly comprised of female fieldworkers who addressed the nutritional needs of vulnerable family members, as part of a mandate that included other household matters relating to family resources and women's health (FAO 1997). The reduction in usage of home economics agents has been credited to the professionalization, or restructuring, of EAS in the last two decades, which introduced a set of minimum qualifications for all extension agents. The qualifications were primarily oriented towards agricultural production, which benefitted males as they were more likely to pursue agricultural courses of study in school. Male extension agents who were limited in their ability to deliver gender-sensitive services, were tasked with sharing knowledge on what remained of nutrition in EAS after home economics was phased out (Benson et al 2004). It is estimated today that only 15% of extension agents worldwide are women (Swanson et al 1998).

The research showed that home economics EAS does continue to function in certain countries, and furthermore, that countries are responding to the need for more female extension agents:

- In Kenya, home economics is a sub-division within the Ministry of Agriculture, but it includes frontline home economics extension agents as well as home economics at the district and sub-district levels. The frontline staff is mostly comprised of women, though some men also participate. The hiring criteria are based on qualifications, and because the home economics program also incorporates agriculture, a minimum of two years of general training in agriculture is required (Ndung'u 2013).
- Guatemala also has a cadre of female home extension agents who work mostly with mothers on food preparation, home gardens, hygiene, self-esteem, and gender equity (Garcia 2013).

3.2 Farmers, community volunteers, and facilitators

3.2.1 Lead farmers and community volunteers

There are numerous examples of community members themselves serving as extension agents. In these cases, extension agents from the public sector or NGOs train volunteers to be promoters within their community. This enables the community to leverage resources already available at the local level and increase the reach of EAS in a way that is both time-efficient and participatory. This concept is not new, and was a key element of the T&V model where extension agents worked with a select group of contact farmers who were then charged with disseminating the messages and training to their communities. This is evident today in the “train-the-trainer” approaches.

As part of DAI's Urban Gardens Program in Ethiopia, which ran until September 2012, extension agents were familiarized with the participatory Walk-and-Talk methodology that had been adapted from FAO's Farmer Field Schools. Extension agents trained volunteers to promote urban gardening practices within their communities and these volunteers then became the first movers who had already adopted good practices, such as growing more leafy vegetables.

In Guatemala, the NGO Semilla Nueva is training both men and women volunteers to promote nutrition-sensitive agriculture, dietary diversity, and food preparation techniques, in their communities. Though the role of “promoter” was previously perceived to be limited to the distribution of free packages of food, Curt Bowen explains that the farmer-to-farmer model shifts the focus away from this culture of dependency: “For us the whole experience has been how do we get a farmer to be what it really means to be a promoter” (Bowen 2013). Semilla Nueva staff limit their own participation in meetings to a minimum to allow the promoters to take on a bigger role. “It is all about turning that process away from a dependence model

and towards a model where people are learning the skills and also the methods *to go share them*” (Bowen and Barkett 2013). Some of the promoters are community leaders or members of the local government, and promote their nutrition knowledge at town meetings.

In India, to ensure support from the community and from local and state governments, multiple committees were formed: a state-level advisory committee chaired by the Minister of Agriculture, a district-level committee, and a block/village level committee, in each of the three blocks. Community volunteers were selected to conduct project activities at the household level (Chakravarty 2000).

3.2.2 Farmer field school facilitators

The Farmer Field School (FFS) model of EAS promoted by FAO provides another example of extension agents who integrate nutrition. FFS facilitators lead community farmers in experiential group learning activities, including experiments with different cultivation techniques, field observations, and group analysis. Though the focus is often on agricultural production, FFS also integrates priority issues such as HIV, gender, and nutrition. The involvement of public sector EAS in FFS varies across countries: in some cases government extension agents are themselves involved as facilitators, in others they supervise facilitators, or there is no cooperation between FFS and government EAS. Implementing partners of FFS are for the most part local, national, or international NGOs, who take responsibility for training the facilitators. It is typical for facilitators to be skilled in agriculture alone, and require additional training in HIV, gender, and nutrition, as well as in facilitation skills. Further, FFS are characterized by greater gender-representation among facilitators and participants (Davis et al 2011). More women participate as facilitators than as extension agents at the country level, according to an FFS study in Eastern and Central Africa, which found 37.5% of FFS facilitators in those countries to be women (FAO 2012b).

3.3 Health sector extension agents and community health workers

Though this study is largely devoted to agricultural EAS, it should be noted that health sector EAS and community health workers (CHWs), also play key roles in nutrition. Improving nutrition requires action across multiple sectors; no single EAS discipline fully encompasses all the areas where intervention is needed, so extension agents from different disciplines must work towards common objectives. Collaborating with the health sector allows for fresh entry points for nutrition messages. This is also a cost effective strategy (Low 2013).

Similar to agriculture extension agents, health sector fieldworkers often lack adequate knowledge of the causes of, and possible solutions to, malnutrition. In Malawi, for example, while

health sector extension agents are familiar with the food groups and dietary requirements of different family members, they only receive six months on-the-job training and often have not completed their secondary education (Nordin 2013).

Malawi has also begun to facilitate inter-ministerial collaboration at district levels, including the formation of working groups that manage joint-planning, supervision, and progress evaluations.

"Health at the community level works hand in hand with Ministry of Agriculture frontline staff when delivering extension messages. The Ministry of Agriculture has a concept called "Model Village Approach" which aims at totally transforming villages in all features, health inclusive. This forms the platform for collaboration."

[Government Agent, Malawi]

Rwanda also offers valuable lessons on the health sector's involvement in nutrition. CHWs and nurses provide nutrition counseling for malnourished families that touches upon components of a balanced diet, the importance of kitchen gardens, and appropriate feeding practices for children. The community selects its CHWs on the basis of their literacy abilities, completion of primary school, experience, and the strength of their relationships with neighbors. One study found that female beneficiaries considered CHWs as their main source of educational messages regarding nutrition, but that the training and supervision of CHWs was inadequate. Further, they demonstrated limited knowledge and skills in specific areas, such as on the basics of nutrition, nutritional assessment, and behavior-change communication (World Bank 2013a).

3.4 Educators

The education sector was not a major focus of this study, but teachers and professors can also play an important role in nutrition in certain countries. For example, in Nigeria, nutrition education is prioritized over agriculture. Primary and secondary schools include home economics as a core subject, with nutrition as one of three different study topics that students can choose to focus on. Nutrition is also included in Ghanaian primary and secondary school education, and both countries feature human nutrition as an important discipline at the university level. However, the emphasis tends to vary across countries. Kenya and Uganda have strong programs in human nutrition, but linkages to agriculture and ecology within the nutrition curriculum are less emphasized (Benson 2008).

3.5 Summary and lessons learned

Summary: The current profile, basic skills, and gender make-up of extension agents and other actors who participate in nutrition activities, including the basic types of workers in the

field and sub-national levels, was assessed. A diverse array of actors work in nutrition, though none who are entirely capable of taking on nutrition alone. Overall, results from our study indicate that there is little duplication in duties at the community level with regard to nutrition. It is often that nutrition falls through the cracks for both agriculture extension agents as well as health workers. Nutrition often remains no one's responsibility.

Community health workers focus more on screening and on household treatment of malnutrition. Extension agents focus on crop productivity and on the transfer of technology. An area of potential overlap between health and EAS is in transfer of knowledge to households on basic dietary guidelines and nutrition counseling. However, very few extension agents provide this type of service to households.

There are a number of EAS models that also apply to nutrition. There are subject matter specialists, as well as extension agents who provide general advice on all subject matters. Community members can also play a role as extension agents for their community by serving as facilitators.

Lessons learned:

1. There is currently no overlap of community workers' mandates. It might be beneficial for health and extension agents to undergo nutrition training together and to determine what fits within each portfolio. Joint trainings also enable the workers to learn across disciplines.
2. Community health worker activities should be distinct from extension agent activities. Community health workers can screen and treat cases of malnutrition, provide education on care and health-related conditions, and ensure that immunizations and supplementation are provided on a regular basis. Extension agents can focus on the food-related concerns of the household, including production, purchasing, and consumption. The distinct categories of food, health, and childcare, are more effectively covered with each rural worker focusing on their own specific area.
3. Subject matter specialists or nutrition specialists, who focus more on the nutrition related aspects of EAS, can serve as technical advisors and coordinators to a larger team of extension agents. Training a cadre within a larger group of workers leads to cost savings and efficiencies.
4. Empowerment of community members to serve as facilitators or change agents for nutrition has been an effective strategy in sectors such as HIV/AIDS and Community-Based Management of Acute Malnutrition. It might prove beneficial to train model farmers who then transfer their knowledge to other farmers, especially in the case of women.

4. Challenges and opportunities of EAS integrating nutrition

The purpose of this section is to understand the challenges faced by existing EAS in integrating nutrition and identifying the opportunities for strengthening such services.

4.1 Challenges

In reality, EAS face a range of challenges from the local to the national level and across both individual and institutional dimensions, creating capacity gaps between the skills and the knowledge of extension agents and those that they need to in order to integrate nutrition effectively. Some of these are common across EAS in the developing world, while others are specific to certain countries. In either case, these constraints affect the decision-making of policy makers and program designers when assessing the capacity of EAS to integrate nutrition.

Figure 4 provides an overview of the challenges that survey respondents deem the most daunting for the integration of nutrition into EAS. These are: transportation costs and inaccessibility, weak local demand for such information (people do not necessarily recognize nutrition as a priority area), funding, task-overload for extension agents, under-staffed agents, quality of training provided to extension agents, poor local supervision and monitoring of programs, and a high turnover rate of extension staff (primarily as the result of low pay, poor incentives, and task-overload).

4.1.1 Ineffective nutrition training and awareness

The nutrition training provided to extension agents at agricultural schools and universities is frequently ineffective and inadequate in length. This impedes the ability of extension agents to identify nutritional needs and provide possible solutions. It also makes it difficult to predict the nutritional impacts of different crops. There is a deficit of empirical and clinical evidence in this area, making it much harder to design interventions that can have a tangible impact on nutrition, such as home gardens. The experience of Helen Keller International with homestead food production in Bangladesh illustrates this difficulty. The initial focus was on reducing vitamin A deficiency by increasing the consumption of fruits and vegetables from home gardens that were rich in vitamin A. However, the extension agents found that the women were still not getting sufficient micronutrients. It was only when the program shifted focus to introduce animal-source foods such as poultry and small ruminants, that agents began to discern a difference in micronutrient and diet quality (IFPRI 2010).

The survey respondents found various capacity-related challenges in training extension workers to integrate nutrition into EAS. These included poor training on the technical aspects of nutrition, lack of materials such as tools and diagrams for extension agents to share with communities, and non-existent training at the decision-making level to raise awareness of nutrition as a priority. There was a scarcity of nutrition professionals to help guide and train extension agents on the topic of nutrition. Finally, there was insufficient training around fostering understanding of the local nutrition context (stunting vs. wasting, vitamin A deficiency, iron deficiency, etc.), and how to



Figure 4: Challenges in integrating nutrition into EAS

conduct a needs assessment of local extension staff to identify knowledge and skill gaps.

It should be noted that each of the various approaches and nutrition activities draw, to varying degrees, on different skills and knowledge. How critical each of these is, in any given situation, will depend on the overall objectives set by policy makers or project designers, and the “best fit” strategy that they identify.

4.1.2 Unclear organizational mandates and resource limitations

The capacities and roles that extension agents are expected to assume has expanded dramatically. Poverty alleviation, natural resource conservation, gender, political marginalization of smallholders, climate change vulnerability, and water scarcity have all been added to the agenda alongside nutrition. Many of the key informants interviewed for the study expressed the view that donors and policy makers are expanding the mandate of EAS at the expense of other service provisions.

“Extension agents are looked at as supermen or superwomen – they are supposed to solve all the problems, from legal issues for farmers to nutrition, marketing, and many other topics.”
[NGO development practitioner]

Viewed from within the broader EAS framework, it is apparent that expanding the capacities required by extension agents at the individual level, also requires broadening the organizational mandate of EAS to develop new capacities at the organizational and enabling environment levels (Sulaiman and Davis 2012).

4.1.3 Gender bias in EAS

Serious challenges exist in women’s access to EAS. Aside from the fact that women representing only 15% of extension agents worldwide, it is estimated that just 5% of women benefit from EAS (Swanson et al 1997). In certain cultures, it is not acceptable for men to address women in public, making it difficult for agricultural extension agents who are predominantly male to impart nutritional information to those women in need of it.

When survey respondents were asked to break out the percentage of female extension agents in their country or district, more than half of the respondents answered that women constituted 30% or less of the total agent count. Only 7% of countries or districts had 90% or more female extension agents (**Figure 5**). Survey respondents were also asked if female extension agents have different roles in comparison to male extension agents. Of those familiar with the roles, 33% said that female extension agents did have distinct roles (**Figure 6**). Lastly, survey respondents were asked if female extension

agents serve more women clientele or men. It emerged that most (81%) worked with men.

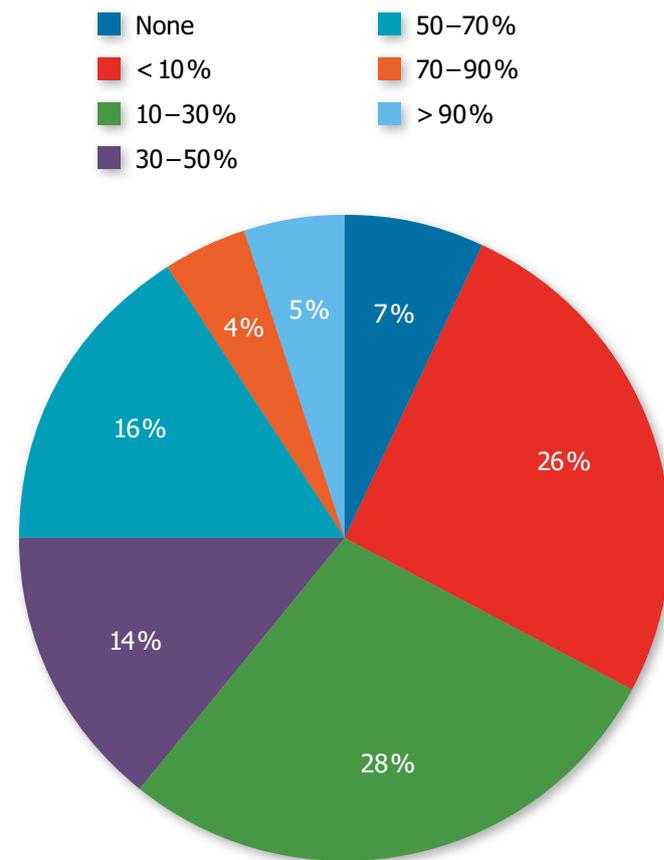


Figure 5: Percentage of female extension agents in the country or district

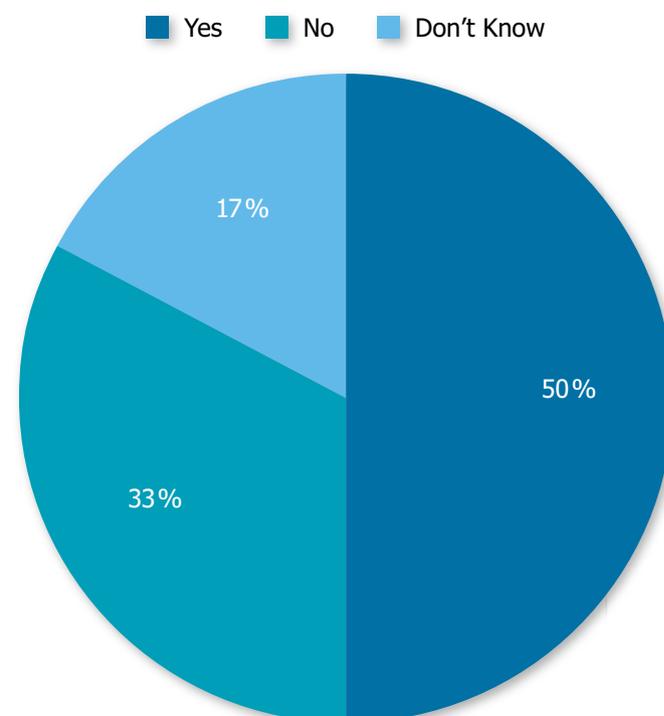


Figure 6: Survey respondents who think female extension agents have different roles in comparison to male agents

This study identified many cases of extension training curricula that have included new modules for gender along with nutrition and HIV (such as Haiti and Uganda). Some are also attempting to recruit more women, and add specializations in nutrition and home economics. This could lead to meaningful progress. However, reversing the inequality that results from embedded gender relations may require long-term behavioral change that is difficult for extension agents to bring about on their own, without corresponding changes in the broader policy environment. In the agriculture sector alone, gender inequality persists in food distribution within the home, in land and property rights, in access to agricultural inputs, in credit, and in agro-processing, among others (Christoplos 2010). All of these areas of inequality work against the ability of extension agents to deliver gender-sensitive nutrition.

4.1.4 Cross-cutting challenges

Previous sections have outlined the capacities that extension agents require in order to play a larger role in improving nutrition outcomes, and have identified some of the major challenges faced in acquiring those capacities. This section considers the broader system that extension agents operate in, and its enabling environment. It recognizes that the mandate of agricultural extension agents and the resources that they have to work with, are the product of national level policies and politics, institutional dynamics, and institutionalized management systems. By virtue of being an intermediary between rural communities and government district resources, agricultural extension agents can play a significant role in improving nutritional outcomes. Their efficacy is dependent on their ability to access information from communities, and understanding how delivery and engagement occurs within the community. Ultimately, the decision to adopt better nutritional practices and dietary habits is one taken at the household and individual levels.

In the section below, we outline the enabling factors and ongoing challenges that would need to be addressed within the overall EAS in order to secure the necessary momentum, support, resources, and skills, to effectively incorporate nutrition into EAS.

It emerged from interviews with experts that there are a host of challenges that appear to have implications throughout agricultural EAS and for the enabling environment:

- **The agriculture and nutrition sectors speak different “languages”.** Coming from different disciplines, agriculturalists and nutritionists adopt different languages, priorities, and terms, in a move that constrains integration (Luoh 2013). The notion of, and need for, a common language across disciplines has been reiterated given that the spoken dialect acts as a barrier that manifests itself from the national policy level, down to the field. Even where agriculture sector-wide approaches contain text on nutrition, this guidance might

not be implemented because agriculturalists cannot decipher the text (Bagnall-Oakley 2013). Nutritionists with a solid understanding of agriculture are scarce as many have a public health background, and very few nutritionists have a background in education (Dufour 2013).

- **There is limited understanding of nutrition.** Related to the above point, there is an underlying ignorance regarding the basics of nutrition. Despite a spike in overall nutrition awareness, practical understanding of nutrition, and the role that each sector plays, is still lagging. Those working in nutrition contend there needs to be a discussion across sectors to clarify the role of each in addressing nutrition, and decide how to mobilize resources and create a budget for nutrition interventions (Njoro 2013).
- **Lack of joint planning and dialogue at all levels.** The importance of coordinated planning and dialogue among the relevant agriculture, nutrition, and health actors, has been emphasized repeatedly. There are examples of this coordination at the national ministry level, but not at the level at which projects are being implemented. It is important to identify and leverage existing mechanisms and venues for collaboration (such as district meetings), or to build them in. One interviewee offered: “You need to physically be together to work together.”

4.1.5 Resources

Interest in integrating nutrition into EAS stems, at least partially, from the perception that it could be an efficient, effective use of existing resources as the extension agents are already embedded within the communities. However, it is important to keep in mind that incorporating nutrition into EAS activities *will* require additional resources, and that these systems are generally under-funded.

There is some variation in viewpoints regarding the bundle of additional resources required. There was general recognition that integrating nutrition into EAS would incur additional costs, and there was some convergence on what the main drivers of the cost increases would be. These include nutrition training for extension agents, additional skills training for extension agents, cost of demonstrations and logistics, and use of technology. Survey respondents detailed some of the key cost drivers:

“...Training and time. They need to be well prepared and time-allocated – extension agents are already over-burdened with tasks.”

[Development Practitioner]

“...Cost of additional human resources, training for communication skills as well as logistics and equipment for information collection and dissemination.”

[Government agent, Ministry of Agriculture, Liberia]

"Conventional extension agents require refresher courses for them to give professional focus to nutritional messages and that is quite costly. Lobbying with organizations to mainstream nutrition is also costly."
[Government Agent, Malawi]

"They will also need a means of transport (preferably a motorcycle) and monthly pay/allowance to fuel and service the motorcycle."
[Professor, Uganda]

The case for integrating nutrition into EAS is hampered by a deficit of conclusive information about the efficiency and cost-effectiveness of integrated agriculture-nutrition interventions. The HarvestPlus "Reaching End Users Orange Fleshed Sweet Potato" project tested the relative efficacy of interventions of different intensities. They found that there was no additional benefit to increasing the consumption of the vitamin A rich potatoes in households with increased promotional visits by community workers. If the goal was solely to increase intake of vitamin A, then the group sessions were sufficient. This was an important lesson, given the cost of these interventions. The challenge with integrated interventions is to figure out which elements are essential, and how to bring down the cost (Low 2013). The Agricultural Technology Adoption Initiative, various IFPRI projects, and similar programs, are beginning to offer rigorous evidence and insights on effective mechanisms to streamline the adoption of technologies and practices among farmers. However, there is need to investigate further the evidence behind incorporating nutrition into EAS.

4.1.6 Stable funding and operating conditions

Even where political support exists, many countries may struggle to maintain that support due to political disruptions; this has consequences at multiple levels. As with other government officials, extension agents are susceptible to uncertainty induced by changes in political leadership at the central, provincial, and district-levels. In Guatemala, for example, the arrival of a new agriculture minister often results in the replacement of extension agents. This could hamper the effort to focus agriculture extension agents towards nutrition (Juarez, 2013). A significant commitment of resources is required to equip extension agents with basic nutrition education, and high staff turnover – whether due to political disruption or lack of motivation – could create a substantial financial burden for the program, and/or constrain its potential effectiveness. Factors such as probability of political support and stability, and the turnover rate of the EAS workforce, should be considered when deciding whether to integrate nutrition into agricultural EAS.

In most countries, EAS fall under the remit of the Agriculture ministries, which means that they are particularly vulnerable to

political pressure and to trends. It might require enabling EAS to operate as independent institutions complete with appropriate, stable, and operational funding, in order to shield EAS from political pressure and ensure that they can operate without interference (Sanchez 2013). Some countries have developed and legislated for EAS policies in order to position them in a less vulnerable fashion. In the United States, the national EAS are attached to land grant universities rather than political institutions, which do not render them impervious to budget cuts, but offer perhaps a little more independence and stability (Reeves 2013).

Integrating nutrition activities will require governments to further invest in their already financially constrained EAS. Allowing for increased privatization of EAS could represent a possible alternative, but it remains unclear if nutrition is a priority in the privatized EAS.

4.1.7 Mobility and access to materials and inputs

A challenge that is common throughout EAS, and not unique to the integration of nutrition, is that of poor mobility and poor access to the materials that extension agents need to carry out their duties. Where nutrition is concerned, lack of access to (free or affordable) transportation may impede the ability or motivation of extension agents to reach communities or to make repeat journeys. (Ofosu 2013). In Guatemala, a common complaint voiced by extension agents and officials working for Secretaria de Seguridad Alimentaria y Nutricional (SESAN), which helps to coordinate organizations to ensure food and nutrition security for the country, was the lack of logistical support available for extension agents to physically reach communities. For example, a home extension agent mentioned in an interview that all expenses for transport, food, and materials for activities were deducted from his salary, which acted as a disincentive to travel long distances to reach communities, or to conduct demonstrations that required multiple materials (Bowen and Barkett 2013). On the other hand, limited resources can force extension agents to collaborate with other sectors. Officials at the SESAN office in the Retalhuleu Department said that they coordinated travel arrangements with other ministries to minimize the costs of visiting rural communities.

While not unique to nutrition extension agents, the challenge of access to transport and training materials is one that needs to be addressed before extension agents can be expected to incorporate nutrition into their portfolios.

4.2 Opportunities

4.2.1 Biofortification: an easy entry point

Biofortification serves as an accessible entry point and opportunity for the integration of nutrition into EAS. With biofortification, extension agents are dealing with staple crops that

provide nutritional value. Farmers are demanding more technology and improved cultivation training, both of which can be introduced by extension agents through biofortification. The CGIAR's HarvestPlus program specifically focuses on increasing the availability of iron, zinc, and vitamin A in staple crops for the poor, which are the three micronutrients most limited in diets (HarvestPlus 2013).

Orange-fleshed sweet potato (OFSP) is an example of a biofortified crop developed by international researchers, which extension agents in various countries have had experience of promoting. Compared to traditionally grown, white-fleshed sweet potatoes, the beta-carotene-enhanced OFSP provides a richer source of vitamin A, a vital nutrient needed by children under the age of five to develop healthy immune systems and to avoid premature blindness. Workers hired by NGOs, employees of national EAS, or volunteer promoters from their own communities, all number among the extension agents who have been tasked with increasing the availability of OFSP among the poor (de Brauw et al 2012; World Bank 2013a). Interventions have varied from simple messaging, to more in-depth group educational sessions on agriculture and nutrition-related topics. Though there appears to be agreement that EAS need to be active in promoting biofortified crops, there is debate regarding the extent to which their interventions should penetrate, as well as the most cost-effective way to increase uptake of such crops (de Brauw et al 2012; FAO 2013a; Herforth et al 2012).

The role that EAS can potentially play in disseminating biofortification technology is clear. A function of EAS is to connect research centers to smallholder farmers within the system. This applies equally to technologies aimed at improving crop production and to technologies aimed at reducing malnutrition. Both have the potential to improve the welfare of the rural poor and to reduce poverty. Likewise, awareness and proper utilization of both types of technologies may require the support and advice of extension agents.

4.2.2 Improved communication

The use of ICTs to backstop and support providers of EAS is gaining in popularity, particularly among NGOs experimenting with innovative ways to deliver messages. Mobile platforms using SMS, applications, and voice messages, have been in use for some years. For the most part, these services prove beneficial in relation to agronomic and marketing themes, for instance over questions of fertilizer application, pest identification, weather, and price information (Iver 2013).

The use of ICTs to support nutrition interventions is more prevalent within the health sector. Under the mHealth umbrella, several initiatives such as ChildCount, Rapid SMS, and CommCare, among others, are rapidly expanding the use of ICT applications to bolster the effectiveness of Community Health Workers (CHWs) and other frontline workers.

Digital Green is an example of an organization that is starting to explore the use of ICTs to deliver nutrition messages through extension agents. It uses instructional videos to begin a dialogue that is facilitated by an extension agent and which encourages the adoption of nutritional practices, health care practices, and effective agriculture practices. In comparison to more traditional systems, Digital Green's model has emerged as the more cost-effective, and has a wider reach. As a result it has attracted the support of donors, governments, and international organizations. In 2013, Digital Green decided to incorporate nutrition and health messages in its platform through two distinct models:

1) Odisha, India: As part of the SPRING initiative in India, Digital Green is leveraging its existing platform to disseminate nutrition and hygiene-related messages across 30 villages in Odisha. Extension agents conduct a detailed assessment of the nutrition situation, followed by a discussion with women and self-help groups regarding the specific themes and messages to be produced as a video. Topics covered include:

- Complementary feeding;
- Dietary diversification;
- Micronutrient supplementation;
- Household gardening;
- Safe water and hygiene.

2) Uttar Pradesh, India: Instead of using Digital Green extension agents for this second project, the organization is working with the Government of India's Ministry of Health and Family Welfare (MoHFW) to train Community Health Workers or ASHAs in the Digital Green model of video-facilitated trainings. The themes covered in this pilot are nutrition-specific, and integrate maternal and child health practices.

These projects began in 2013 and their impact has yet to be measured. They offer the promise of new pathways to wider audiences and an increase in adoption rates, both of which present a challenge to EAS.

Although cell phones are increasingly available in rural communities, radio remains the cheapest and the most widespread form of communication technology available to most farmers. Farm Radio International, a Canadian NGO, uses radio combined with other ICTs to serve smallholder African farmers. It currently has partnerships with over 400 radio stations across 38 African countries (Rao 2013; Farm Radio 2013).

Radio can play a vital role in strengthening and complementing EAS nutrition messages. The case of OFSP is a good example. Farm Radio International is working in Tanzania, Mali, Uganda, Ghana, and Burkina Faso, to raise awareness of the importance of vitamin A. The organization has forged partnerships with 15

radio stations, and facilitates the creation of interactive, rich, accessible, and entertaining content.

Similarly, with support from HarvestPlus, Farm Radio International is working in Uganda to create a 30-episode radio drama about farming and eating vitamin A-rich OFSP. The content of the series covers various aspects of OFSP, including its nutritional value and desirable methods of preparation. The drama will be aired in six languages and will be broadcast by nine partner radio stations in Uganda. The goal is to reach 350,000 households in 13 districts.

4.2.3 Nutrition surveillance

Conducting an initial needs assessment may present an opportunity to guide EAS as to which nutrition-related interventions will prove the most effective in reducing malnutrition. Nutrition availability, access, utilization, and education, are all inter-dependent but in different ways. Inaccurate information regarding weaknesses in nutrition security could trigger misguided interventions that are not cost-effective. For example, large-scale nutrition awareness campaigns to promote diversified diets will not be effective unless the nutrition sources are available and accessible to those who need them. Similarly, increasing the production of new sources of nutrient-rich foods will have limited impact unless accompanied by training on how to prepare or utilize such foods (Berti et al 2004; Ruel 2001; World Bank 2007).

Needs assessments may identify specific foods that are either absent or under-utilized in the diets of local communities. As part of FAO's work in the Kasungu and Mzimba districts of Malawi, public extension agents are trained to engage community members in establishing food calendars, which involves planning around the seasonality of locally available, nutrient-rich foods. The extension agent works with the community to select appropriate crops for cultivation and to plug nutrition gaps (Nordin 2013). Whether foods are available locally, adaptable, and appropriate, should be considered, and special emphasis should be placed on underutilized and wild foods (Fanzo et al 2011; Frison et al 2006). Improved and more relevant nutrition manuals, and guides for extension agents specifically, are required for this.

Identifying nutrition needs and gaps is an essential step and opportunity towards ensuring that EAS in nutrition meet local demands. However, if extension agents are accustomed to delivering standard messages bereft of analysis, or without consulting the communities, they may be uncomfortable with this task. This is even more so if they lack technical knowledge regarding nutrition.

Needs assessments can take place as part of a broader nutrition surveillance process at the district or national level. The Malawian national EAS, building on its interventions in the pilot

project with FAO, conducts nutrition surveillance in each district. Extension agents who have received further nutrition training, and serve as nutrition subject matter specialists, are divided into two groups, those focused on surveillance, and those focused on interventions. The surveillance team works with health surveillance assistants (HSAs) in their district, who are more active at the community level, to design collection mechanisms for nutrition data. The intervention-focused subject matter specialists then use the data to design appropriate interventions. The data helps to forge a few nationwide strategies for improving nutrition; however, there are some interventions that will only be implemented in districts with particularly high rates of hunger and malnutrition. For example, in the Southern districts, where vitamin A deficiency is more common, awareness campaigns promoting vitamin-A rich foods are rolled out and appropriate supplements are distributed (Fatch 2013).

Extension agents are not the only ones to conduct nutrition surveillance. When nutrition surveillance first came to prominence after the World Food Conference of 1974, government statistical offices were considered the best equipped to design surveillance systems and interpret and analyze results (Mason and Mitchell 1983). This may still be the case in many countries today. For example, in Bangladesh, the National Food Security Nutritional Surveillance Project (FSNSP), is jointly implemented by Helen Keller International (HKI), BRAC University, and the Bangladesh Bureau of Statistics (BBS). The primary goals of the project are to generate countrywide information related to food security and nutrition that can be used by policy makers, as well as to institutionalize a nutrition surveillance system to monitor ongoing progress (JPGSPH 2013). Extension agents should use other surveys, including the Demographic Health Survey (DHS), UNICEF's Multiple Indicator Cluster Survey (MICS), and Standardized Monitoring and Assessment of Relief and Transitions (SMART) surveys, to grasp the reality of the nutrition status in their respective countries and communities.

Nutrition surveillance data at the national level might serve to influence macroeconomic policy decisions related to food self-sufficiency and export earnings, which can ultimately impact households' ability to access nutritious food. This is in addition to informing the activities that extension agents need to engage in within communities. Data might also stoke the long-term advocacy necessary to keep nutrition on the policy-makers' agendas; an important goal given this data is only useful if accompanied by political will (Mason and Mitchell 1983).

4.2.4 Multi-sectoral coordination

One of the key outcomes of a high-level commitment to nutrition is the successful, multi-sectoral coordination, to implement the efficient and strategic delivery of nutrition interventions. This presents an opportunity for EAS to participate in delivery, and our study suggests some ways for this to occur at the national and sub-national levels.

National

At the national level, there are different approaches to facilitating collaboration among ministries and increasing awareness of nutrition. These approaches are also not mutually exclusive. In Haiti, where the National Agriculture Investment Plan for 2011-2016 (MARNDP 2010) contains a strategy to mainstream nutrition, it calls for the hiring of nutrition specialists to facilitate inter-ministerial collaboration and integration of nutrition into agricultural policies and programs (Arias 2013). Although some countries prioritized the nutrition agenda prior to the initiation of the SUN movement, the emergence of the SUN movement signifies the potential role for externally-driven platforms to instigate and foster this type of collaboration. In Bangladesh, SPRING has provided a platform to facilitate coordination between the Ministry of Agriculture and the Ministry of Health, and has played an instrumental role in helping them to coordinate complementary activities. SPRING has designed trainings for the Ministry of Agriculture extension staff, which offers practical examples of how they can include nutrition and hygiene into their regular activities (Williams 2013).

Malawi offers examples of mechanisms that can help to ensure that national policies translate into sub-national coordination. In Malawi, there are Technical Working Groups at different levels, and the officers from the Ministry of Agriculture and the Ministry of Health interact in their daily work at different levels. For example, the Ministry of Agriculture employs Nutrition Surveillance Officers at the sub-national level to collaborate with the Ministry of Health to collect data that informs the formulation of agriculture interventions, while Surveillance Officers from the Ministry of Health work in close proximity to Ministry of Agriculture frontline staff at the community level. To help further foster and provide a focal point for multi-sectoral collaboration, the Ministry of Agriculture has a concept called the "Model Village Approach". In these villages, frontline staff from both ministries work together to conduct Participatory Rural Appraisals, and then jointly address the priorities set out in the action plans and national roadmaps (Fatch 2013).

Sub-national

Efforts to facilitate multi-sectoral coordination do not always begin from the top; models of this kind of collaboration at the district or project level can also provide lessons for replication and scale. For example, the Realigning Agriculture to Improve Nutrition (RAIN) project in Zambia is facilitating a district-level process to promote inter-ministerial collaboration and form a working group. It is hoped that this will lead to joint planning and will inform SUN activities in the country. Similarly, in FAO's project in Malawi, Improving Food Security, Nutrition Policies, and Program Outreach, a key strategy has been to bring the public agricultural extension and health workers together to function as a team in the two pilot districts. A major challenge has been that their respective catchment areas are not aligned, which means that it is difficult to ensure coordination, which is desirable for consistent joint delivery (Nordin 2013).

A key question is *how* to motivate, initiate, and sustain such multi-sectoral opportunities. There is no one-size-fits-all response, but there are lessons to draw from. In Malawi, the importance of translating policies into accessible key messages was emphasized and workshops were held during which subject matter specialists met to translate policies into messages. Policy workshops were organized at the national and divisional levels, which helped to ensure that ministry staff truly understood the meaning of the policies in plain terms, and could more easily reiterate and implement them (Fatch 2013).

In Ghana, World Vision facilitates strategic planning between the Ministry of Agriculture and the Ministry of Health at the district and sub-district levels. Plans and activities on the roles of extension agents at the community level are jointly reviewed, discussed, and agreed upon. Starting from the grassroots level, World Vision brought the two ministries together for a week to jointly review activities and trainings (for health and agriculture) in detail. While time consuming, this allowed it to show that there are clear areas of overlap, and that in some cases, the ministries were virtually duplicating tasks and were working within the same households. This initial meeting fostered a greater understanding of what each ministry is doing, and by creating a shared vision of progress, paved the way for continued joint planning and follow-up (Macdonald 2013).

There remain valid arguments against the integration of nutrition into agricultural EAS. Not one size fits all and success can be achieved through different paths. In Ethiopia, ministries have decided that nutrition activities should be primarily carried out by the health sector rather than the agricultural sector, and they have achieved impressive progress in reducing stunting rates (Begashaw 2013; EDHS 2011). This does not mean that the agriculture sector in Ethiopia has not contributed to these stunting reductions; it may be doing so in an indirect way such as through major agriculture investments in social safety nets, food productivity, and agriculture-led income generation.

Agricultural EAS that are already weak may not have the financial or human resource capacity to invest in this endeavor; EAS that are weak but in the process of rebuilding may be prime candidates for incorporating nutrition into this process (such is the case in Guatemala), but this also depends on existing and projected financial and human resource capacity, and the stability of the macro-environment. Further, extension agents have competing demands on their time, and are asked to work on other areas including climate change, markets, and gender.

4.2.5 Other entry points: farmer field schools

The Farmer Field School (FFS) model can be considered an opportunity for EAS and nutrition and allow for effective delivery of nutrition messages without the hindrance of some of the transport and training challenges faced by extension agents.

Given FAO's pioneering emphasis on the FFS methodology, some of its efforts to integrate nutrition and agriculture EAS have focused on working through the FFS channel (Nordin 2013). The participatory nature of FFS, with its focus on team building in a group setting, can provide an ideal entry point to the discussion of additional livelihood issues, such as nutrition (Braun 2008). However, there are differing opinions about whether and how this can be a viable approach. It is important, therefore, to consider the conditions under which the FFS approach can be utilized, as well as how it may be adapted.

While the FFS model offers a tested participatory platform for farmers to learn, discuss, and experiment with new technologies, the interventions can be costly to implement, require skilled facilitators, and may not work as well for practices that do not have a short-term, tangible, and visible benefit, such as savings from reduced pesticide use (Davis 2013; Waage 2013). Despite its demonstrated effectiveness in some regions, and in teaching certain practices, scaling up an FFS approach is not feasible for most public EAS agencies, as they are not in a position to adopt or experiment with completely new approaches to EAS (FAO 2012c). The capacity and character of the facilitators should also be underscored, as this has been shown to affect the quality of information uptake among groups. As public EAS tend to overlook the personal attributes of extension agents and do not prioritize the development of interpersonal skills (relative to technical content), the lack of suitable extension agents within the existing workforce could be one important reason to not to pursue this approach (FAO 2012c).

At the same time, previous FFS efforts offer a channel for the delivery of nutrition interventions, and provide a model that can be adapted. In DAI's Urban Home Gardens Project in Ethiopia, the "Walk-and-Talk" methodology was adapted from the FFS approach (Salerno 2013). This enabled the project to extract and apply the essential principles of the FFS, rather than simply replicating the entire model.

While most interviewees spoke about projects that were implemented at the community-level (and sometimes mobilized community members to reach households), there was some variation among the stakeholders consulted on whether EAS can and should aim to reach individual households. In Ghana, extension agents begin with group sessions to share information, and to encourage participants to implement practices at the household-level. They then follow up with households to confirm that they are applying their newly-acquired knowledge correctly. Other stakeholders, however, felt that follow-up at the household level was neither viable (through public EAS) nor necessary. Given the average area and number of households that extension agents are expected to cover, it is simply not possible for them to visit households. They can only reasonably get to central community locations, and hope that it happens to be a day that farmers are able to take off (Rivera 2013). When



determining where and at what level extension agents ought to conduct nutrition education, it is important to consider what is reasonable, in the context of the constraints of the EAS and workforce. It is also important to decide which communication channels are preferred, in addition to the creative ways of leveraging different points of access, such as FFS.

4.3 Summary and lessons learned

Summary: Integrating nutrition into EAS presents a number of challenges, including a deficit of resources to dedicate to nutrition-focused activities. There is also scant training on how to implement nutrition activities within the work portfolio of extension agents. Mobility and communication pose significant challenges. Many extension agents lack the means to reach the communities they work in, or to communicate via mobile phones with the community leaders. Extension agents are also stretched beyond their capacity, as are most community workers. Adding more to their workload neither motivates nor provides incentives to deliver.

Where there are challenges, there are also opportunities. The elevated profile of nutrition within agriculture presents one such opportunity. Many who work in EAS feel that the agriculture sector is the rightful home for nutrition work. Technology, whether in crops such as biofortification or fortification or ICTs,

provides opportunities to create an easier path for nutrition to fold into the core work of extension agents. It also enables improved communication, and brings down common language barriers.

Lessons learned:

1. EAS needs the support of governments and if nutrition activities are to be added to their portfolio, there needs to be an investment of additional resources. Training alone will require further resources.
2. Countries need to understand their unique needs regarding EAS. What are the drivers of food insecurity and nutrition insecurity and which aspect needs the most support? Some countries may choose climate change adaptation over nutrition. There are competing demands for limited funds, necessitating informed decision-making. Nutrition may not always be the top priority in every country, and some countries are unable to address every challenge impacting its food system.
3. If investments are made, invest in female agents who can then become nutrition specialists.
4. Maximise opportunities such as ICT platforms and biofortification. If countries adopt these technologies, the subsequent impacts should be monitored.
5. Researchers and development practitioners are called upon to develop a greater range of tools. We need more than biofortification and mobile phones. What other innovative tools can be developed for EAS to enhance food security and nutrition security in the communities in which they work?

5. Good practices and comparative advantages of EAS working in nutrition

5.1 Good practices

This study has uncovered innovative and interesting examples of how national systems and smaller-scale projects have mobilized EAS to adopt nutrition into their portfolios and mandates. While the study is premised on the notion that there is great potential to increase alignment and collaboration of nutrition and agriculture through EAS, it is important to recognize that there are contrary opinions on whether this is viable or beneficial. The vast majority of survey respondents in this study – 64 out of 68 – believe that agricultural EAS is a valid mechanism by which to deliver nutrition information to households. Yet, there is disagreement among organizations working on agriculture and nutrition as to “how much to depend on agricultural extension agents to deliver nutrition-relevant information and how much to collaborate with or depend on health staff to deliver coordinated messages” (Herforth 2013).

5.1.1 Community channels

Stakeholders interviewed for the study emphasized the necessity of truly engaging community members by identifying and leveraging appropriate community channels. Working with individual households is costly and time-consuming, but forming community groups can also prove time-consuming and challenging. Group-based and participatory approaches to providing EAS are gaining ground. These methods have the potential to overcome barriers to participation, foster inclusiveness, and lead to more demand-driven services (Davis and Heermserk 2012). Such groups could include farmers groups (or FFS), women’s groups, and self-help groups. In Guatemala, the home extension agents that form part of the country’s new National Agricultural Extension System rely on grassroots community groups and NGOs to identify and mobilize the most vulnerable households, rather than trying to work with individual households (SESAN 2013). Similarly, the DAI Urban Home Garden Project in Ethiopia relies on numerous community-based organizations and the networks that they foster, in order to reach groups at the community level (Salerno 2013).

5.1.2 Community champions

Another strategy to mobilize communities and reinforce messages is to rely on community champions or promoters through a “train-the-trainer” approach. This creates a focal point and knowledge resource within the community, and can be an effective way to expand the reach of EAS. As with the larger extension workforce however, it is important to recognize the existing profile and relative capacities of community members. In particular, literacy and education levels should influence whether a program can effectively utilize community-level champions. In some countries, for instance Mozambique, many women have not had the opportunity to attend school and there is therefore a significant loss in the transfer of information from extension

agent to farmer. On the other hand, in countries like Rwanda where the average extension agent has been to college and promoters have a minimum of primary school education, there is a higher likelihood of message retention and transfer (Low 2013).

5.1.3 Demand creation and raising community awareness

It is becoming accepted wisdom that EAS should be tailored to the demands and needs of farmers, instead of being dictated by top down models that rely on what EAS determines farmers’ needs to be (CTA 2012). A critical factor in the success of nutrition interventions is the ability to create *demand* for better nutrition, and for increased nutrition education and options.

“You need to have a system and enough space for communities and individuals to set the agenda, to discuss things, and to pick from the menu what they want. You need to facilitate that. You do not miss what you do not know.”

[Former Minister of Agriculture, Ethiopia]

Other stakeholders consulted during the course of our study concurred: the first step to creating dialogue around nutrition and demand-driven approaches is to ensure that communities have access to basic nutrition knowledge. There are many ways to create this awareness, and all available channels should be utilized, such as radio, other media outlets, and marketing campaigns. In Kenya, the government has made a conscious shift towards more participatory and demand-driven EAS approaches that aim to foster farmer participation. Under these systems, field days, exhibitions and shows, and farm visits play a larger role in generating awareness around nutrition (Ndung’u 2013). Frontline extension agents mobilize communities to identify their own needs and areas of interests through a focal area approach (participatory community planning), FFS, and the formation of common interest groups (Kiara 2011).

Demand-driven systems that respond to the context and needs arising from the specific community in which the extension agents work, are critical. Demand-driven EAS can enable identification of the nutrition needs of women from crop production and livestock, across to nutrition (Rajalahti 2013). These needs can then be aggregated at the local level to improve coordination and collaboration among disciplines on the frontline. However, there must be some injection of supply-driven actions, particularly when with regards to nutrition. Communities are not necessarily aware that undernutrition is an area of concern. In these cases, initiating “demand” helps to tackle the problem (Rajalahti 2013).

Yet, how can we expect to find demand for better nutrition when many communities are not aware that they have a malnutrition problem? The visual signs of stunting, and micronutri-

ent deficiencies, often called hidden hunger, are not especially evident to the untrained eye. Furthermore, the long-term consequences of these deficiencies are less clear in terms of physical manifestation. Understanding of hidden hunger is limited in some communities and may be governed by gender dynamics. Women's needs may not factor as priorities in the demands sought by communities (Rajalahti 2013).

Once communities are empowered and informed, there exist feedback mechanisms to strengthen EAS. These feedback mechanisms are important for building cross-sectoral understanding and collaboration, real-time problem solving, and ensuring that extension agents have support and guidance on technical content and soft skills. This feedback also allows for better planning of services and transparent problem solving in a collaborative manner between EAS and communities. In India, for example, the panchayat (local leaders) were involved in the agriculture-nutrition project. The success of the project depended on the participatory involvement of their leadership and of the community members together. The local panchayat leaders and workers requested the continuation of the project, at least in respect to follow-up information for home gardening, creation of nurseries, and ongoing health and nutrition education (Charkrayarty 2000).

5.1.4 Leveraging technology

ICTs are becoming increasingly relevant to how community workers can better perform their own roles as well as how they communicate with their clientele. Global usage of mobile phones is at scale. The spread of the Internet and mobile phone technology has illustrated the potential for enhancing access to information regarding markets, weather, and technological options, as well as improving communication with and access to stakeholders. Why not introduce nutrition messaging into this platform? As the reach of ICTs increases, caution still needs to be exercised to ensure that illiterate farmers and women farmers are not excluded from these innovations. Neither should they be excluded from messages conveyed through such platforms (GFRAS 2012).

Use of technology platforms, including mobile phones, internet, radio, and TV, have helped in the training of extension agents, while assisting community training and communication. Digital Green uses technology to train and provide additional knowledge to communities. EAS could benefit greatly from technology by leveraging platforms to disseminate nutrition information that covers farmers' divergent needs. If scaled appropriately, this improves the efficacy of trainings, while managing costs. Some technologies, such as radio, can reach audiences with low literacy rates, and usually avoid exclusion.

5.2 Comparative advantages

5.2.1 Advantages of EAS over other types of community workers

Survey respondents listed several reasons in favor of linking EAS and nutrition. These include:

- **Established infrastructures:** In some countries, the EAS delivery system is already in place and it is just a matter of "topping-up" their portfolio with simple nutrition activities and messages.
- **Reach:** The existing networks of extension agents already reach many people, thus there is no need to tap into or seek new clientele. Extension agents have direct and sometimes extensive linkages to farming communities in rural, and remote areas. These linkages are founded upon well-established structures and systems that cover most farming households. Many of these households may also benefit from nutrition interventions and messages.
- **Community trust:** Extension agents maintain regular contact and have established relationships with the people and communities in which they work. It is much easier to introduce nutrition issues into communities with pre-existing relationships built on trust.
- **Cultural awareness:** Extension agents are often aware of the local social norms, cultures, and belief systems that accompany and contextualize food. They understand how to communicate with, and have an established rapport with the farmers with whom they work. Agents frequently hail from the region where they work, and therefore have intimate knowledge and understanding of the local context.
- **Empathy and understanding:** Due to their familiarity with the conditions and context under which the farmers work, and associated limitations and opportunities, extension agents are more able to demonstrate empathy with the farmers. This is particularly with regard to questions of food production and access. Equipped with knowledge of the local food production system, access to markets, and the nutrition status of households, extension agents have a clearer understanding of how to mitigate the constraints faced by farmers.

5.2.2 Commitment and high political support

Commitment to improving nutrition is finally front and center on the global agenda. High-level commitment to nutrition is a critical enabling factor for ensuring multi-sectoral coordination, continued support for nutrition, and funding for nutrition activities. As nutrition crosses the mandates of multiple ministry divisions, the creation of national nutrition policies, strategies, and plans, offers an important foundation for fostering inter-ministerial coordination and high political commitment. A unified and budgeted national nutrition plan sets the stage for further multi-sectoral collaboration on nutrition, and strategic, coordinated deployment of resources and expertise. The SUN Movement has been instrumental in this realm. Since its launch

in 2010, 41 countries have joined the SUN Movement, and 20 of those have updated and budgeted nutrition plans (SUN 2013). Beyond the development of a national nutrition strategy, one comparative advantage is to ensure that the agriculture policy and extension priorities align.

To make agriculture and nutrition work together, there needs to be institutional innovation to “facilitate and generate political pressure” (Haddad 2013). This was cited as and demonstrated to be a core factor for governments to drive the integration of nutrition into agricultural policies, and more specifically, into the mandate of EAS, which are frequently focused on increasing agricultural productivity (Benson 2008; Field 1985).

“Getting agriculture and nutrition together is a political problem.”
[Haddad 2013]

Securing and maintaining high-level political support for both nutrition and EAS is key to ensuring the inter-ministerial coordination and resource allocation necessary for EAS to play a meaningful role in contributing to nutritional outcomes. The growing interest in agriculture, as expressed in the Maputo Declaration and in various global initiatives, has translated into additional political and budgetary commitments to the agriculture sector. It is unclear however, if these additional resources are trickling down to EAS. On one hand, there is an increase in awareness of the role that EAS *could* play in improving the nutrition of rural communities and households (by virtue of their reach and advantages), and corresponding advantages. However, there remains a considerable gap between the perceived potential of the role of EAS, and the commitment to and investment in equipping the extension workforce with the requisite knowledge and skills (IFPRI 2010).

National multi-sectoral nutrition policies and strategies could provide a starting point for the integration of EAS delivery systems and nutrition activities. However, there needs to be an alignment with agricultural policies and priorities as well. Home economics and nutrition-specific EAS programs could be designed and budgeted into these strategies through a clearer conceptualization of the rural challenges faced by countries. However, without understanding cost effectiveness, and what could be scaled and where, the tasks of budgetary allocation are more challenging. This study has collected successful examples of combining nutrition education in particular with EAS, but a key challenge to greater uptake remains the question of cost and resource constraints – already a pre-existing challenge for EAS. For countries to scale, there is need for better understanding around which interventions are cost-effective, and what can be effective in different contexts in their own settings. We need more impact evaluations and evidence of what works effectively.

Multi-sectoral coordination, particularly between the agriculture and health sectors, lies at the heart of integrating nutrition into EAS. While there are successful examples of coordination at the grassroots and district levels (Malawi and Zambia), stakeholders noted the need for higher-level support and engagement to replicate and scale successes. There is something to be said about taking successful interventions at project and district levels, and giving them a platform, or channel, to be scaled and replicated in a supportive and conducive environment.

“Approaches and interventions undertaken by a single sector—such as the agricultural community or health community—have characterized the history of efforts to combat malnutrition. These approaches often reflect different understandings of the causes of and solutions for malnutrition. Nutrition interventions in the 1950s and 1960s, for example, could take the form of home economics extension when led by the agricultural sector, or food technology solutions when led by the health sector.”
[Garret and Natalicchio 2011]

However, most agree on a multi-sectoral approach to nutrition as a way to address not only immediate causes of malnutrition, but longer-term, basic causes as well. Multi-sectoral actions can strengthen nutritional outcomes in three main ways: (a) by accelerating action on determinants of malnutrition; (b) by integrating nutrition considerations into programs in other sectors which may be substantially larger in scale; and (c) by increasing “policy coherence” through government-wide attention to policies or strategies that may have positive or unintended negative consequences with regards to nutrition (World Bank 2013a). The integration of nutrition and EAS will also engage these three elements by ensuring that agriculture plays a role in the acceleration of action, incorporating nutrition into EAS programs, and placing it squarely into EAS agriculture policies and implementing plans.

5.2.3 Creative use of human resources

In response to the oft-mentioned challenge of insufficient extension agents, many projects encourage flexibility and resourcefulness in considering *who* can be part of the EAS. On one level, this concerns the profile of ideal extension agent versus the profile and skills of the available workforce. Although many interviewees commented on the need for more female extension agents to deliver nutrition education, given the prevailing gender dynamics it is wise to adjust the mandate and expectations and consider the available workforce. If women are engaged, particularly at the community level, it is important to remember that many have experienced social exclusion, and therefore their literacy skills and education levels may be low. If women volunteers are to be incorporated into EAS, there needs to be feasible and appropriate training to match the skill set of the local workforce.

5.3 Summary and lessons learned

Summary: In addition to examining the factors that contribute to an enabling environment, multi-sectoral coordination, and skilled human resources, our study also attempts to learn practical lessons and gain insight into what effective community delivery looks like. Understanding the type of training that is needed and that works best within communities is critical to guiding any efforts to scale-up or to further integrate nutrition into EAS. Throughout the duration of our study, a consistent message has been that training needs to be participatory and community-based.

It is becoming accepted wisdom that EAS should be tailored to the demands and needs of farmers, instead of being dictated by top down models that rely on what EAS determines farmers' needs to be. A critical factor in the success of nutrition interventions is the ability to create *demand* for better nutrition, and for increased nutrition education and options. Leveraging community leaders and champions, utilizing technology to effectively communicate, and the creative use of human resources, can help to elevate nutrition within EAS.

The existing infrastructure, trust, awareness, and reach that extension agents have with the communities in which they work should be harnessed and used to disseminate nutrition-related activities and messages. Once they have been trained in food-based approaches to nutrition, and equipped with an understanding of farmers' needs, extension agents can become a vital part of improving multi-sectoral actions to improve the nutrition status of the most vulnerable, rural populations.

Lessons learned:

1. Integrating nutrition into EAS in countries where it is supported and prioritized. There are many examples of good practices on the integration of nutrition, but less work has been done on impact.
2. Many extension agents have substantial reach into the communities in which they operate, and rapport with community members. Harnessing this social capital, and particularly by prioritizing households headed by women, is considered to be effective in improving nutrition.
3. Train extension agents to communicate the importance of nutrition to the farmers with whom they work, and therefore drive demand for related services. The transfer of knowledge regarding the importance of nutrition to communities will create the conditions for nutrition considerations to be adopted within farming households.
4. Ensure extension agents focus on local food production systems. Through knowledge of the local cropping and food systems, and the local epidemiology surrounding nutrition, extension agents can better address the causal factors impacting the communities in which they work.

Applying EAS to the Guiding Principles for Improving Nutrition through Agriculture

We asked survey respondents what they thought was required for the integration and improvement of nutrition in EAS at the individual, organization, and system levels. Shown in **Figure 7** is a wordcloud of their responses. They ranked training and information dissemination high on the list. Governance was another highly prioritised demand, along with political willingness and ministerial collaboration.

An FAO systematic review on agriculture programming for nutrition (Herforth et al 2012) identified an emerging consensus around 20 key guidance principles for improving nutrition through agriculture (FAO 2013a,b) (shown in **Box 4**).

Examining these principles through an EAS lens provides overarching guidelines on how nutrition can be better integrated into EAS in both policy and in practice. EAS have the ability to include the eight recommended planning principles below into their core workplans, with some effort, and to use these principles as guidelines when developing plans and objectives. Training on how to assess the status of malnutrition at a local level, and associated causal factors, should be included in the curriculum of EAS. This would involve understanding who the beneficiaries are, and identifying the most vulnerable from within the communities that extension agents work. Finally, very little has been documented on measuring and monitoring the impact of EAS on livelihoods, and in particular on food and nutrition security outcomes. If these principles are to be applied, proper design of nutrition into EAS will need to include realistic monitoring and evaluation frameworks.

The “taking action” principles explicitly integrate EAS, in particular with regards to empowering women, incorporating nutrition education into agriculture interventions, and managing natural resources. The “approach principles” outlined in points 12 to 16 in the box below, represent practical approaches for extension agents to promote within the communities in which they work. The project activities and training examples provided in Section 1 and 2 of the Findings, touch on all four approaches in rural communities.

The “supportive environment” principles are where EAS have in general fallen short across many countries. EAS in the most recent agriculture policies have neither supported nutrition nor have they integrated nutrition activities into their mandates. However, that may change as the result of an increase in awareness, and renewed commitments to improving nutrition. Capacity is a vital requirement for the smooth functioning of EAS and for the successful integration of nutrition into the over-crowded work portfolios of extension agents. Although this study highlights the diversity of training models in place, sustainable capacity development of nutrition skills within EAS is, for the most part, lacking.

Moving forward, as EAS continue to be restructured and reformed, the inclusion of these principles in policies, programs, and monitoring frameworks, is essential to their success in addressing food and nutrition security.



Figure 7: Survey responses on what is needed to integrate nutrition into EAS

BOX 4: Guiding principles for improving nutrition through agriculture

Planning for nutrition

1. Incorporate explicit nutrition objectives in agriculture policy and program design.
2. Assess the context and causes of malnutrition at the local level, to maximize efficacy and reduce negative externalities.
3. Do no harm. Identify potential harms, develop a mitigation plan, and set in place a well-functioning monitoring system.
4. Measure nutritional impact through program monitoring and evaluation.
5. Maximize opportunities through multi-sectoral coordination.
6. Maximize impact of household income on nutrition, such as through increasing women's income.
7. Increase equitable access to productive resources.
8. Target the most vulnerable.

Taking action

All approaches should:

9. Empower women, the primary caretakers in households, through: income; access to EAS and information; avoiding harm to their ability to care for children; labor and time-saving technologies; and support for rights to land, education, and employment.
10. Incorporate nutrition education to improve consumption and nutrition effects of interventions. Employ agriculture extension agents to communicate on nutrition as feasible.
11. Manage natural resources for improved productivity, resilience to shocks, adaptation to climate change, and increased equitable access to resources through soil, water, and biodiversity conservation.

These can be combined with approaches to:

12. Diversify production and livelihoods for improved food access and diet diversification, natural resource management, risk reduction, and improved income.
13. Increase production of nutritious foods, particularly locally adapted varieties rich in micronutrients and protein, chosen based on nutrition gaps at the local level, and available solutions.
14. Reduce post-harvest losses and improve processing.
15. Increase market access and opportunities, especially for smallholders.
16. Reduce seasonality of food insecurity through improved storage and preservation and other approaches.

Creating a supportive environment

17. Improve policy coherence regarding support for nutrition, including food price policies, subsidies, trade policies, and pro-poor policies.
18. Improve good governance for nutrition, by drawing up a national nutrition strategy and action plan, allocating adequate budgetary resources, and implementing nutrition surveillance.
19. Build capacity in ministries at national, district, and local levels.
20. Communicate and continue to advocate for nutrition.

Conclusions and Recommendations

Conclusions

We are at an interesting time in global nutrition. Not only do we have the SUN momentum pushing forward with over 40 countries having committed to scaling up nutrition efforts, but we are also increasingly gaining more impact evidence as to what works and how to ensure food-based solutions for communities. The push to better understand *how* nutrition sensitive approaches, coming from other non-traditional sectors, can be included in more direct interventions is at the top of the agenda as we try to solve the malnutrition challenges in our world.

One of the obvious sectors to address nutrition is the agriculture sector and this does not only pertain to food production, but rather to the whole food system approach that goes along with agriculture: ecosystems, environment and biodiversity, as well as value chains, and markets. There is a realization that “the potential for agriculture to accelerate improvements in nutrition is large” (Haddad 2013). Yet, it is still unclear how best to achieve this potential with the current, insufficient, evidence base (FAO 2011).

There have been many recent reviews and reports outlining what agriculture approaches, interventions, and pathways could impact nutrition and dietary outcomes, and what empirical evidence is still needed to demonstrate such an impact (Gillespie et al 2012; Girard et al 2012; Haddad 2013; Masset et al 2012; Webb and Block 2011; Wiggins and Keats 2013; World Bank 2013a). FAO and others have also defined how this evidence could be realized through better programming (Herforth et al 2012; FAO 2013a).

With the momentum behind SUN and other initiatives, do we wait for further evidence before acting? Do we await outcomes stemming from better-designed integrated programs that include agriculture? Do we await better methodology and metrics, indicators and analysis, of mechanisms that link agriculture to nutrition and public health? Do we even have enough evidence as to how agriculture impacts nutrition and consumption patterns to start acting? If we have some evidence, do we know how to better deliver the science to communities, engaging them in a meaningful way to realize true behavior change? Do we have the tools to better assess the local food system environment so that communities can prioritise which issues matter the most (Webb 2013)?

These questions greatly impact how nutrition sensitive agriculture will be “delivered” or scaled. Without a clear understanding of *what* to scale, it is much more difficult to have a conversation about *how* to do so and by *whom*. Before engaging Agriculture ministries and scaling nutrition within EAS systems across the world, the global nutrition community needs clarity on what to grow, how and where, and what those decisions mean for nutri-

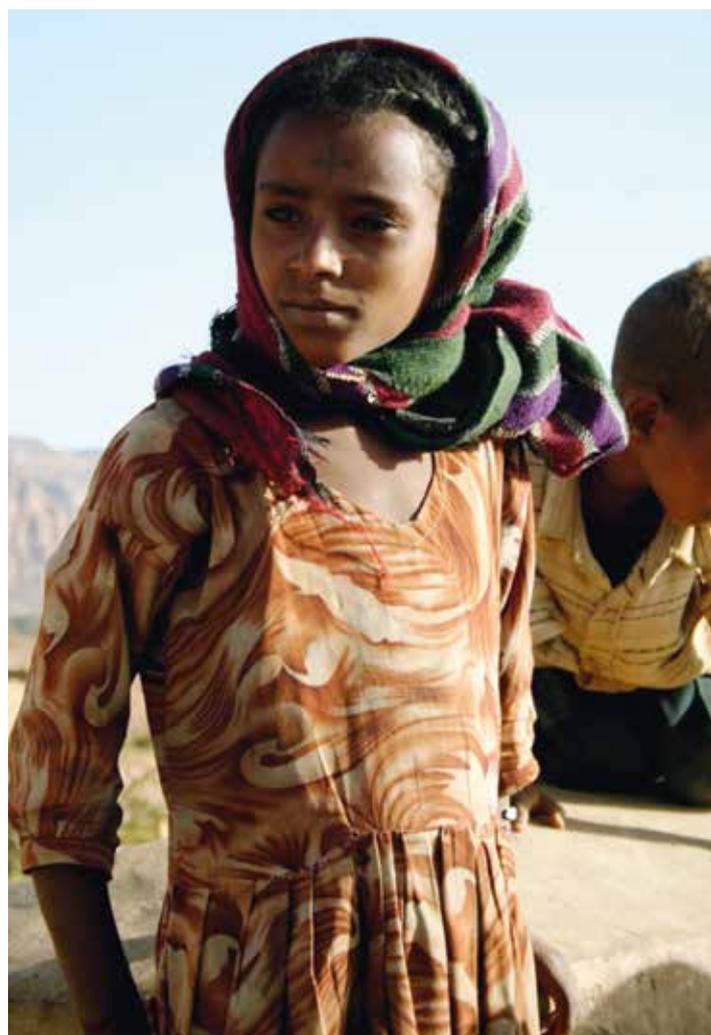
tion and dietary outcomes. Clarity is needed for governments to decide which crops to invest in, which areas to invest in, who has access to inputs and markets, and with that, who the clients of agriculture EAS are (Haddad 2013).

Countries still press on. There is an imperative to engage with communities, and doing so through community workers, such as extension or health workers, provides close interaction with households. Integrating nutrition into EAS has been an option in the global debate on how to integrate agriculture and health. How better to reach farmers than through EAS?

Is nutrition integration into EAS scalable?

Scalability is the ability of an intervention to show efficacy on a small-scale and/or under controlled conditions, and to be receptive to further expansion under real world conditions to reach a greater proportion of the population, while retaining effectiveness (Milat et al 2012).

This study did a comprehensive sweep of the literature, landscape, and opinions, with a call for input globally, and found that the integration of nutrition (and home economics) into EAS often remains archaic, scattered, or side-streamed. Most of the



programs lacked measures of “efficacy” because of the scant collection of data, peer reviewed publications, or evaluations examining the impact of integrated programs on dietary and nutritional outcomes. This makes *scalability* recommendations for nutrition-sensitive EAS more challenging.

This report does highlight some areas that can provide lessons for scale, including reach and adoption, resource capacity (human, institutional, and organizational), technical ability, delivery mechanisms, and contextual factors. “If these issues were addressed in the funding, design, and reporting of intervention research, it would advance the quality and usability of research for policy-makers and by doing so, improve uptake and expansion of promising programs into practice” (Milat et al 2012). The data in this study highlights lessons that can be extrapolated, if EAS were to take on elements of nutrition for scale. Scalability will depend on: achieving high-level government buy-in and multi-sectoral coordination; effective and equitable use of ICTs and other low-cost technology; and flexibility and resourcefulness in deciding who participates in EAS formally and informally.

Is nutrition integration into EAS sustainable?

Sustainability is the capacity to endure, and the potential to maintain long-term well-being. This maintenance has ecological, economic, political, and cultural dimensions. Sustainable development has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Commission 1987). Promoting nutrition as a development priority among a wide range of stakeholders creates openings for action and *sustained* attention to nutrition (Garret and Natalicchio 2011). Sustainability will depend on a separate set of factors, including: the ability of EAS to be demand-driven and empower communities; the quality of nutrition education and training for EAS; and the stability of funding for EAS, and the operational continuity and stability of EAS that results.

Recommendations and Final Thoughts

When does it make sense to integrate nutrition into EAS? When not?

- 1. Focus on the food:** It makes sense to integrate nutrition into EAS when there is an extension system, where there is a robust rural livelihoods sector, and where there is evidence of malnutrition, and dietary insufficiencies. Subsistence farmers need technology and tools, and part of this toolbox should include nutrition knowledge and technologies. Conservation and sustainable use of biodiversity and harnessing ecosystem services are also important and should be emphasized as supplementary nutrient-rich food sources to staple and cash crops.
- 2. Utilize what is already available:** EAS can be complemented by and consolidated with other delivery channels at the local level. “It is important for extension agents to acquaint themselves with the organizations and knowledge systems available at the local level to determine how they can be improved, rather than assuming that nothing of significance is currently available. For example, instead of forming entirely new groups for women, local informal work exchange or savings groups could be strengthened through short training exercises on nutrition and dietary diversity” (Jiggins et al 1997). Many agriculture-focused cooperatives exist at the community level. These can serve as platforms for nutrition messaging and education by extension agents.
- 3. Embrace the feminization of agriculture:** Women are the predominant producers in many countries, especially in those that have experienced emigration. This provides an opportunity for EAS to reach and empower women through nutrition tools and knowledge. By focusing on women, the biggest impacts can be felt on child health.
- 4. Diversify landscapes, diversify diets:** Kitchen gardens, livestock, and especially small animals, can play an important role in dietary diversity and in increasing the consumption of micronutrient-rich foods. Many households around the world engage in these activities. Extension agents should be aware of the nutritional benefits of agriculture-based livelihoods, and promote diverse diets at the household level.
- 5. Apply nutrition agronomy:** EAS from the public, private, and civic sectors can and do play a role mainly in providing a nutritious diet. This includes extension staff promoting biofortified varieties, providing support to social safety net programs, offering education on nutrition-sensitive agriculture, and promoting dietary diversity enhancements (e.g. through home gardens, small-scale livestock, or the promotion of high-nutrient varieties). However, there is a need to better understand which crops are nutritious, and what can be grown and utilized, and where. Agriculture ministries

often tell nutritionists: “Just tell us what to grow.” Does the nutrition community have sufficient understanding of agronomy, of nutrient gaps, and of what to grow, to ensure that judicious advice is transmitted to EAS? There is need for deeper knowledge and understanding of what is practical and feasible among disciplines, to make more effective recommendations of how EAS should deliver nutrition through food production systems. In addition, there needs to be greater understanding, particularly amongst the nutrition community, regarding farmers’ decision-making processes and drivers. It is important to understand a farmer’s income goals and the economies of scale of her farm gate when asking her to diversify what she grows.

What type of EAS is appropriate in what local context?

1. Know your backyard: Both agriculture and nutrition require knowledge of epidemiology and the agro-ecosystem at the local, immediate level. What is the nutrition situation in this district or community? What are the nutrient gaps? How can the food system fill such gaps? EAS must be able to assess these conditions to ensure that nutrition services are tailored for the particular needs of the clients.

2. Do not marginalize the marginalized: The rural marginalized are often those who are also most vulnerable to nutrition and dietary deficiencies. EAS must prioritize innovations for marginalized farmers, and include farmers in the process of demand-driven services, to ensure that they feel like active recipients of EAS. Furthermore, knowledge-generation and sharing, through EAS, should take into account indigenous (and sometimes neglected) knowledge from communities (Wiggins 2013). Use the knowledge or lose it.

If EAS is used as an entry point to deliver nutrition, what are the possible approaches given the nutritional needs of specific rural populations?

1. Harness technology: Mobile technology has allowed for increased connectivity and communication. There is much scope to engage ICTs with EAS and nutrition. Some examples have been discussed in this report; however, there is much more to learn and harness from this field. It should also be noted that there are limitations to the use of technology, and if technology is to be scaled and prove useful in changing behavior, then other back-end support is needed.

2. Fill two needs with one deed: EAS strategies have traditionally focused on increasing production of cash crops by providing men with training, information, and access to inputs and services. Many farmer training centers and farmer field schools are traditionally centered around men, from accommodation to technical topics. Women are unable to attend farmer-training centers due to their workload. In the event that they are able to go, the training is often focused on crafts, or home economic-based activities, and

less on technical agriculture and diversification of the farm gate from a nutrition and income perspective (Jiggins et al 1997). The EAS system should be overhauled towards becoming more *nutrition-sensitive*, and *gender-sensitive*.

3. Change Behaviors: Behavior change is the lynchpin in the EAS/nutrition wheel. Without a more comprehensive understanding of how EAS can play a role in providing the knowledge and skills needed for dietary behavior change, all could be lost. Changing behavior is difficult but not impossible. It will prove valuable to develop and provide extension agents with behavior change communication tools that are geared towards dietary information and change. These tools should harness the available modern technology. Right now, little exists.

What is needed to practically integrate nutrition into EAS?

1. Garner political will and commitment: Many governments are beginning to embrace nutrition as a key tool to improving health and alleviating poverty amongst their populations. Working multi-sectorally for nutrition sometimes requires new ways of organizing and operating within governments. Political will and commitment could increase with the availability of evidence demonstrating that nutrition can be improved through agriculture investments, and that in turn, would improve human capital and transform economies. Commitments must also translate into action on the ground and reach district and community levels, where often EAS do most of their work. Without this reach, the political agenda will be just that, political, without effective change in rural communities.

2. Obtain financial commitments and synergies: Without funding and resources to add-on nutrition within already underfunded EAS systems, there is little that can be done to integrate, improve, or scale up. Donors and development partners also need to speak the same language and agree on general messages. Joint funding mechanisms across different sectors could be a viable solution amongst funders.

3. Get a little help from friends: “Effective solutions may involve innovation that may be too risky for governments and may be better managed by NGOs, foundations, and private enterprise” (Wiggins and Keats 2013). As this report demonstrates, NGOs and other local organizations often fill a gap where public EAS have not worked. Lessons and future partnerships from these projects should be harnessed. Multi-sectoral work is complex and no one should necessarily work alone.

4. Emphasize women, women, women: We need more women extension agents, and more women recipients of EAS. In many countries, EAS have mainly been staffed

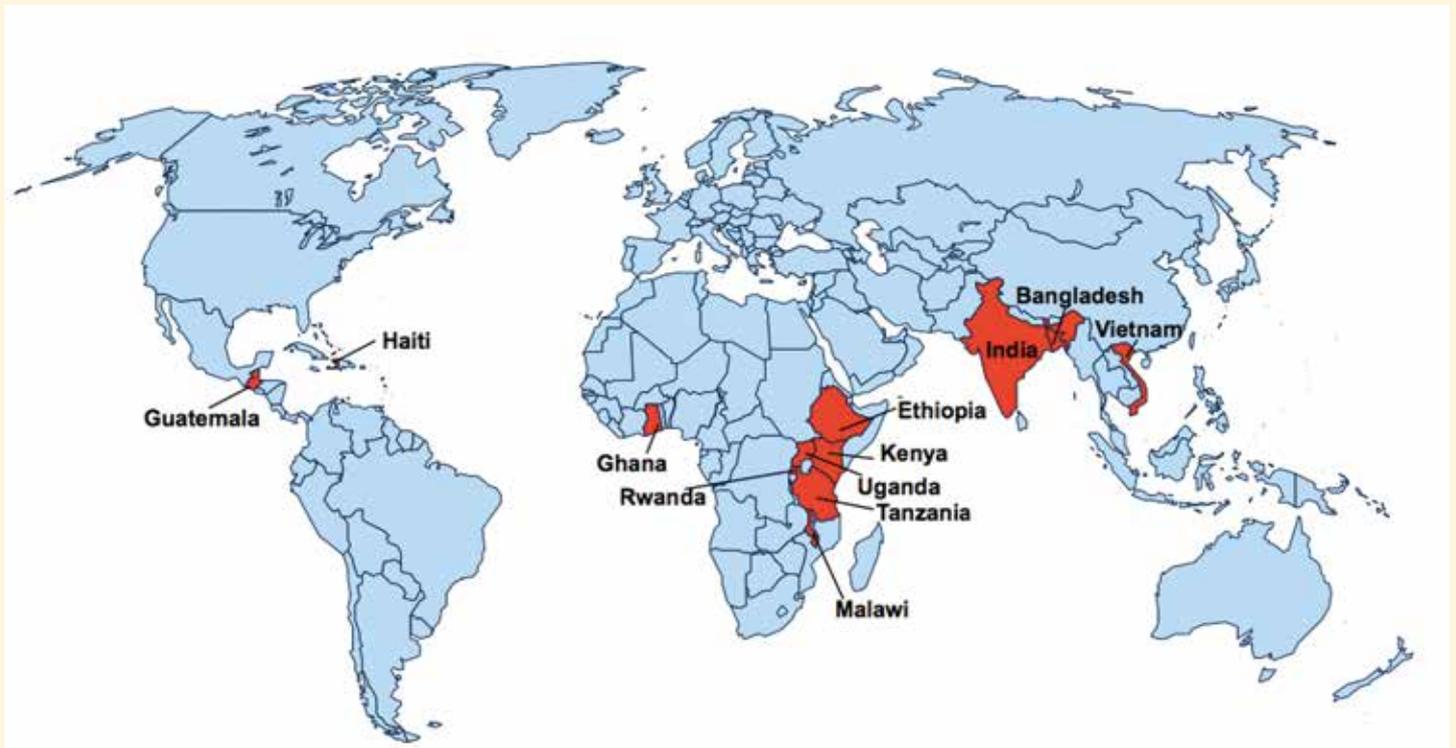
by men. Many ministries have used the “home economic” approach to engage women in EAS, however these female home economists have primarily worked with women, thus reinforcing a “less important” gender bias around nutrition and agriculture. There has been less emphasis on ensuring that women extension agents and recipients receive new technical information and training, which comes with both nutrition and income-generating benefits. EAS do not often recognize women farmers’ circumstances, nor do they employ women as extension agents; the technologies they seek to disseminate are rarely designed with women in mind; and their approach does not take into account the scarcity of women farmers’ time. Labor-saving technologies can help women who are already facing time constraints. Women also need support through literacy programs and training in improving organizational and technical skills (Tripathi et al 2012; Wiggins and Keats 2013).

5. Monitor, evaluate, and document: Throughout this research, it is clear that very little has been measured and documented in nutrition and home economics within EAS. As a result of the dearth of documentation and publications, the impact of nutrition-sensitive EAS on dietary and nutrition outcomes has neither been assessed nor evaluated. Further, the process of how integration occurs, and its sustainability, is less clear. What is clear is that a lot has happened in the field and a lot is currently taking place, yet, without a mandate to carry out operations research or document good practices, the lessons for scale up will be difficult to harness. As more integrated research programs are funded and undertaken, new ways of collecting, analyzing, and sharing data need to be considered, that will accommodate issues of real-time data collection and community-driven data needs (Haddad 2013).

What are the implications with regard to support, resources, and training?

- 1. Complement with education:** The bricks and mortar of integrated nutrition and EAS need to sit in the education sector. Agricultural institutions of higher learning should embed nutrition in the curriculum and vice versa, nutrition programs should include agronomy and value chains in their respective courses. Furthermore, vocational and secondary training programs for EAS should provide *practical* nutrition education in their core training modules prior to extension agents entering the workforce.
- 2. Feature specialists:** Extension nutrition specialists, community champions, and women leaders are all avenues to inject and highlight nutrition within agriculture. Not every extension agent needs to be savvy in the way of nutrition. Having access to a smaller cadre of specialists who can provide technical leadership can go a long way. Specialists do not always have to be nutrition experts either, but some should have skills in facilitation and negotiation.
- 3. Weigh the burden:** EAS agents are often overextended in their geographic reach and the number of farmers that they engage with. Additionally, they often lack the support in terms of transport, training, and connectivity that is required to effectively carry out their duties. Many experts are critical about adding more tasks such as nutrition activities to the extension agents’ list of responsibilities, especially when they are already over-capacity. Each country will have to weigh its administrative support factors and resources accordingly. It is inevitable that rebuilding or increasing the capacity of EAS to integrate nutrition will have consequences with regard to time management, additional training, and support and incentive structures.

Appendix One: Country Case Studies



For country case studies, research was performed on specific projects, programs, or initiatives of extension agents which have integrated or are currently integrating agriculture and nutrition, and that could be used for potential scale-up. These specific countries were chosen for case studies because of the wealth of information on them in the literature review and that emerged from the surveys and interviews. The World Bank report (2013a) highlighted a few projects that examined in greater detail how extension agents are used, trained, and at what cost, and this served as a starting point for further data

collection and literature reviews. Other country case studies were selected through the snowballing approach, using survey respondents and interviewees as reference starting points.

Each case study provides the nutrition and agriculture context, as well as the institutional context. The project strategy is described along with major lessons learned. These case studies were selected due to the wealth of data available. However, the selection is not comprehensive of all the projects on nutrition and EAS globally, as some may not be as well documented.

Bangladesh

This case focuses on USAID's Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING)/Bangladesh project (SPRING) in Bangladesh. The project is managed by the JSI Research & Training Institute Inc., with the following partners: Helen Keller International, the Manoff Group, Save the Children, and the International Food Policy Research Institute. Operating in Bangladesh, Burkina Faso, Haiti, India, Niger, Nigeria, and Uganda, SPRING provides state-of-the-art technical support and focuses on the prevention of stunting and maternal and child anemia in the first 1,000 days of life. With a focus on Bangladesh, important lessons are provided for creating and integrating nutritional messages and practices into the agricultural EAS alongside thorough training (SPRING Nutrition 2013c).

Nutrition and agriculture context

Poor nutritional status in Bangladesh is a key health challenge that disproportionately affects young children and women of reproductive age (FAO 2013d). As one of the most disaster-prone countries in the world, Bangladesh's malnutrition and poverty reduction efforts are continuously being undermined by the increasing frequency of natural disasters, food crises, and drought (WFP 2013). In Bangladesh, 41% of children under the age of five years are stunted, 16% are wasted, and 36% are underweight (NIPORT 2013). However, the prevalence of stunting and underweight has declined continuously since 2004 due to multiple and intensive investments as well as improved nutrition governance (UNICEF 2013a). Due partly to iron deficiency, anemia is present in 51% of children between the ages of six months to 59 months and in 42% of women of reproductive age; between the ages of 15 and 49 years (NIPORT 2013).

Certain socioeconomic and cultural factors contribute to the prevalence of malnutrition amongst women; 24% of women between the ages of 15 and 49 years are underweight (UNICEF, 2013a). Due to poor feeding practices, exclusive breastfeeding has a medium duration of 3.5 months with 64% of children under the age of six months being exclusively breastfed (NIPORT, 2013). Overall, only 21% of children between the ages of six months to 23 months receive appropriate feeding practices (NIPORT 2013).

Institutional context

Agricultural EAS in Bangladesh is formidable with numerous government agencies, NGOs, commercial traders, and input suppliers servicing both rural and urban areas of the country. Together, these partners comprise the National Agricultural Extension System (NAES). The largest agricultural extension agency is the Department of Agricultural Extension (DAE), housed within the Ministry of Agriculture and employing 14,000 personnel (GFRAS 2013b). Fourteen agricultural training institutes train the front-line extension staff, while the Bangladesh Agricultural University offers degree-level training for agricul-

tural officers mostly stationed at the district levels (GFRAS 2013). In addition, the Ministry of Agriculture makes technical and market information available online to farmers through its Agricultural Information Service (AIS) (Kashem 2010).

Strategy

Currently in its first year of implementation, SPRING's mission in Bangladesh is to support national efforts to improve nutrition-related health outcomes by scaling-up interventions that increase household food production, facilitate social and behavior change communication (SBCC), and disseminate essential nutrition and hygiene actions (SPRING 2013a). SPRING Bangladesh is the only country of the SPRING consortium that targets nutrition directly. The project is comprised of two main areas: Farmer Field Schools and training government extension agents, both centered on two frameworks: Essential Nutrition Actions (ENAs) and Essential Hygiene Actions (EFAs).

The FFS program targets pregnant and lactating women and their young children and is currently run by facilitators, who are comprised of local NGOs contracted by SPRING. Rooted in the ENA framework, the FFS program delivers a set of evidence-based interventions with a nutrition through-the-lifecycle approach, that specifically addresses pregnant and lactating women's nutritional needs, optimal breastfeeding and complementary feeding practices, nutritional care for sick and malnourished children, and control of micronutrient deficiencies namely anemia, vitamin A, and iodine. The main emphasis of FFS is on household consumption with messages and practices delivered during routine bi-monthly household visits or courtyard sessions, spanning a period of approximately nine months.

As a complementary FFS intervention, the Homestead Food Production model promotes the production and consumption of vegetables, fish, poultry, and eggs at the household level (SPRING 2013a). This model also incorporates gender, environmental, and socio-cultural considerations into each step of the implementation in order to enhance the nutritional impact on vulnerable groups.

Within the second area, SPRING/Bangladesh trains extension agents in the delivery of messages that they can incorporate into their routine EAS activities to households in the community (Williams 2013). These messages focus on dietary diversity, including growing and consuming nutrient-rich and animal source foods, women's nutrition, infant and young child feeding, and encouraging hand washing. With a larger catchment area of two to three thousand households and constrained staff resources, the national extension agents cannot deliver interventions to households to the same degree of intensity as their FFS counterparts.

SPRING/Bangladesh is not focused on integrating FFS into the DAE since the national agriculture EAS's main focus is to pro-

mote activities that lead to increased productivity and additional income. Occasionally, some trained extension agents or sub-assistant agricultural officers co-facilitate some of the FFS upon availability (Williams 2013). It is expected that the program's initial impact evaluation will reveal a significant increase in knowledge and awareness in nutrition, in both the FFS and the extension training areas. However, it is expected that the FFS will have a greater impact as compared to national EAS (Williams 2013).

Lessons learned

- **Facilitators, not specialists:** The greatest asset of a FFS agent is her ability to become a good facilitator who can communicate well and enable group dynamics (Williams 2013). Facilitators can be trained in nutrition and agronomy, and be given reference material for further learning. Furthermore, they can rely on additional technical support from senior officers who are specialists in nutrition, fish production, agriculture, and animal production.
- **Keep messages simple:** It is important to ensure that messages are simple and focus on key practices, without being overly technical. Messages should be broken into easy, doable actions for individuals to incorporate, implement, translate, and share at the community level (Williams 2013).
- **Redundant messages are encouraged:** Redundancy is not a bad thing when it comes to nutrition and hygiene (Williams 2013). Using a multitude of channels to disseminate the same message is encouraged. Similar messages across various platforms should be re-enforced to facilitate understanding, practice, and community buy-in.
- **Access to local markets:** FFS facilitators should eventually focus efforts on connecting farmers to markets where they can access various nutrient-rich local seeds that can be replanted, and that are affordable for resource-poor households (Williams 2013). This allows donors to eventually scale-down seed supply and strengthen local markets.
- **Initial challenges:** Many extension agents feel that nutrition messages fall outside of their remit and that their incorporation into routine activities detracts from core services. The non-priority status of nutrition has thrown up further obstacles to message delivery, as has the narrow window of time available to target pregnant and lactating women in a male-dominated client base (Williams 2013).
- **Potential to replicate and scale-up:** There is potential to replicate and scale-up certain nutrition-centered activities implemented by SPRING Bangladesh across other SPRING country missions, as well as in USAID country missions which share a similar need. An initial evaluation of SPRING Bangladesh's projects will clarify the methodology and suitability of the rollout.
- **Humble expectations for EAS:** Agricultural EAS can be a viable platform for integrating nutritional messages. However, it is important to remain modest about the possible impact of EAS (Williams 2013). The role of EAS are to create a sup-

port system that reach a larger number of stakeholders and enable them to adopt practices whereby positive results in nutrition are also a product of education, access to nutritious food, and sustainable behavioral change.

Ethiopia

This case study focuses on both the public agriculture and health EAS that could have a role in improving agricultural productivity, nutrition, and health care practices in Ethiopia. Both EAS place a strong emphasis on the importance of overcoming gender disparity gaps, empowering women as change agents, and identifying “model families” to encourage behavioral change in the communities they serve.

Nutrition and agriculture context

While Ethiopia’s history over the last four decades is replete with episodes of recurrent droughts, cyclic famines, and erratic regional conflicts, the country has made remarkable strides in the fields of health and nutrition. Between 2000 and 2011, the under-five mortality rate was cut by almost half, from 139 to 77 deaths per 1,000 live births, and so has the maternal mortality rate, which dropped from 700 to 350 deaths per 100,000 live births (World Bank 2013c). Improvements in malnutrition have also been of a large magnitude, with stunting and underweight dropping from 57.4% and 42% in 2000 to 44.2% and 29.2% in 2011 (WHO 2011), respectively. However, there remains much scope for improvement, as Ethiopia is still ranked as having the 8th highest prevalence of stunting (out of 136 countries), wasting prevalence still hovers between 10-12% since 2000, and the country’s progress towards MDG1 is lagging (World Bank 2013). Additionally, Ethiopia is performing worse than most of its neighbors and GNI/capita peers (including Eritrea, Somalia, Sierra Leone, Zimbabwe, and Djibouti) in terms of stunting prevalence. Moreover, undernutrition does not only pertain to poor households, as children are undernourished in one-quarter of the richest households too, making the issue about caring practices and diseases, and not solely about access (World Bank 2013c).

The agriculture sector contributes to 45% of the country’s GDP (Berhanu 2012), represents the main source of livelihood for 80% of the population (Berhanu 2012), employs 85% of the population (Spielman et al 2011), and makes up 85% of total export earnings (Berhanu 2012). Rural poverty is compounded by extreme land shortages in the highlands (per capita land area fell from 0.5ha in the 1960s to only 0.2ha in 2008), low productivity of food production (cereal yields averaging 1.5ton/ha), and recurrent drought and variable rainfall, contributing to high volatility in agricultural production (Spielman et al 2011). Pervasive structural food deficits have pushed Ethiopia into a state of chronic food aid dependence.

Institutional context

In recognizing the importance of the agricultural sector for poverty reduction, the Government of Ethiopia initiated an unprecedented public investment in the sector. A main component of the government’s investment in agriculture is the public agricultural EAS. In the mid-1990s, the government embarked on an

Agriculture-Led Development Industrialization (ADLI) strategy, focusing on modernizing traditional smallholder agricultural production. The Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) gave high priority to agriculture and rural development between 2005 and 2010 (Berhanu 2012). Further, the Five Year Growth and Transformational Plan (FYGTM), scoping over 2010 to 2013, builds upon the solid performance of the sector from the previous plan, and draws out a plan for accelerated growth based on a growing demand for food and industrial raw materials (EMoA 2010).

Though the agriculture EAS is decentralized, it primarily sits within the mandate of the Ministry of Agriculture and Rural Development (MOARD). MOARD outlines the national strategy for the efficient use of available resources, such as land and human labor; establishes linkages with other ministries and institutions relevant for EAS; and mobilizes donor support for scaling-up activities in the sector to meet the resource gaps identified. The EAS also comprises other national-level institutions such as the Ministry of Agriculture, as well as regional (Bureaus of Agriculture and Rural Development), *woreda* (district; Offices of Agriculture and Rural Development), and *kebele* (lowest administrative unit; Farmer Training Centers) level institutions.

Nutrition-specific activities fall mainly into the mandate of the Ministry of Health. In 2003, the Government of Ethiopia rolled out the Health Extension Program, which essentially created a “women-centered health system” by connecting leaders at the national, regional, and district levels with smaller groups of women from every village across the country. The program was designed to circumvent the challenges associated with the country’s severe shortage of doctors and health professionals – there is one physician for every 36,000 people – plus the fact that approximately 80% of Ethiopians still live in geographically inaccessible areas (Ramundo 2012).

Strategy

EAS is carried out in a decentralized manner and at the *woreda* (district) level. Agricultural EAS falls into the remit of the public sector; limited EAS is implemented by NGOs and the private sector. There are four main components to the EAS system in Ethiopia, as outlined in PASDEP (Davis et al 2012):

1. Participatory Demonstration and Training Extension System (PADETES); provision of a small amount of input packages to farm households;
2. Farmer Training Centers (FTCs); approximately 8,500 FTCs have been established at the *kebele* level, with 2,500 of them deemed fully functional in 2009. Those are staffed with Development Agents (DA), currently amounting to 45,000 agents on duty, of which 12-22% are women;

3. Agricultural Technical and Vocational Education and Training (ATVET) centers to train DAs; by 2009, 63,000 DAs had been trained;
4. Institutional Coordination; the government developed an administrative model to support a comprehensive set of EAS and manage a large network of DAs, while adapting to 32 agro-ecological zones.

The FYGTM Plan, while building on the milestones of its predecessor plan, undertakes a unique approach; one that places women's empowerment at the heart of all efforts to achieve accelerated economic growth and social development. The main focus of the program is increasing male and female small-holder productivity and production through:

- Scaling-up best practices implemented by model farmers, who exhibit productivity gains that are two to three times higher than the average farmer;
- Improving natural resource management by enhancing water utilization and expanding irrigation schemes; and
- Encouraging farmers to diversify crop production to include cash-crops.

Such initiatives are taking place alongside farmer-training as well as building the infrastructure to facilitate access to markets and agricultural inputs, and the establishment of farmers' cooperatives. While the FYGTM has only been rolled out recently, several of its main components mirror that of the Health Extension Program (HEP), namely those concerning the implementation of a women-centered approach, and the empowerment of the community to take charge of their own well-being by learning from other families in close proximity.

As part of HEP, the government has trained over 38,000 health extension agents (HEWs) or "frontline health workers" since 2003, all of which are women. Such women are trained for a year to provide basic, mostly preventative, primary health services to rural villages. Each HEW is charged with providing direct care for children and women at their community's health post. Two HEWs are placed in each health post throughout Ethiopia, and together, are responsible for the health and care of 1000 households, or 5000 individuals (James 2012). The MoH pays the HEWs for their services (Olson 2013). Each pair of HEWs are responsible for identifying model families that can be used as examples of families who are on the right path towards achieving a healthier living; obtaining antenatal maternal care, building and using latrines, and immunizing their children. The women members of these model families are referred to as the Health Development Army (HDA) and they share good practices regarding health, nutrition, and sanitation with other families in their community on a voluntary, unpaid basis.

The Government of Ethiopia only covers around 20% of the total cost of providing health care in the community, with international donors pooling in another 40%, and the rest coming from the pockets of patients. This innovative shared-financing program was first implemented in the Southern Nationalities, Nations and Peoples' Region (SNNPR) in 2004, but has since been scaled-up across the country. As part of this program the country's health facilities can collect nominal consultation fees equivalent to 50 cents at health centers and one dollar at hospitals, to pay for items such as aspirin, a blood test, and other basic services.

Lessons learned

- **Involve communities:** Directly involving the community in the dissemination of health, sanitation, and nutrition-related information by identifying community leaders in the form of "model families", to encourage behavior change, can have an immense impact on nationwide nutrition indicators.
- **Engage women:** Placing women at the core of EAS can have a large ripple effect in those countries where women are the primary caretakers, leading to significant uptake of proper care practices and behavioral change.
- **Central planning:** National and centrally-planned agricultural, health, and nutrition policies can be applied across a larger decentralized EAS to allow for adaptation to agro-ecological diversity and varying health and nutritional needs.
- **Scale and train:** Ethiopia's agricultural EAS program emphasized the importance of increasing the physical number and educational level of extension agents by enrolling them in agricultural, technical, and vocational training colleges.

Ghana

There is great expectation in the ability of Ghana to strengthen the linkages between agriculture and nutrition by piggybacking on the progress already made on MDG1. This case study demonstrates the multi-level engagement of EAS with nutrition at various levels: the government, international NGOs, and academia.

Nutrition and agriculture context

Ghana has enjoyed tremendous success in both nutrition and agriculture improvements. It has decreased the underweight prevalence in children under the age of five years from 25% to 14% in less than 15 years (UNICEF 2013b), thus achieving one of the MDG1 targets. However, less progress has been made on stunting, or chronic undernourishment, which indicates that although some interventions and sectors have provided benefits, other areas still need improvement. One standout sector is agriculture. Both food production and overall caloric consumption have consistently increased (Wiggins and Keats 2013). The country has been experiencing positive economic growth, while consumer prices have remained stable (Wiggins and Keats 2013).

Institutional context

Agricultural EAS approaches in Ghana vary: from the top-down commodity-based approaches to more participatory approaches, commodity participatory approaches, the farmer field schools (FFSs), the innovative ICT-based approaches which provide on-line advice to farmers, and the promotion of mobile phones and community radio stations. Various providers of EAS, including government, NGOs, producer organizations, and other farmer organizations, have promoted these approaches (GFRAS 2013c).

Under the Directorate of Agricultural Extension Services (DAES), the government works with communities through farm-based organizations (FBOs). Thus far, the government has registered 5,600 FBOs, which covers 82,000 farmers, one-quarter of whom are women. The DAES also promotes the uptake of technologies by farmers and the improvement of knowledge through communication tools. For example, an initiative involving the printing of 2,000 Information Education and Campaign materials on HIV/AIDS, coupled with a large-scale condoms distribution campaign, was carried out by extension agents at regional and district levels to improve information flows to farmers and raise general public awareness on the HIV/AIDS pandemic. This is an example of how governments can utilize EAS to promote health messages and to empower farmers with knowledge about how health can impact food security beyond just growing crops (DEAS 2013).

Strategies

Government model

In 2008, the Ghanaian Ministry of Food and Agriculture (MoFA) developed the Women Extension Volunteer (WEV) model to increase the reach of EAS to rural subsistence and smallholder female farmers in Northern Ghana. The WEV model is designed to plug this gap and improve rural livelihoods and agricultural development. Women volunteers were chosen by MoFA agricultural extension agents (AEAs), community members, and farmer groups to receive training on basic agricultural practices (including livestock production and soya kebab processing) as well as training in health and sanitation, income generating activities, and leadership and facilitation skills. Once trained, these volunteers are mandated to organize workshops to pass their training on to other women in the community, as well as to women in one adjacent community. The WEVs also collaborate with local MoFA extension agents, acting as an interface with local female farmers (MEAS 2013b).

The Women in the Agricultural Development Directorate (WIAD), is one of the seven Technical Directorates of the MOFA (MOFA 2013). It works in the areas of nutrition, food safety, value addition, and gender/livelihoods. Much of the work the WIAD does is through EAS. It is currently promoting:

- Improved nutrition interventions: bio-fortification, food fortification, food enrichment, nutrition education in relation to food production, post-production, and food consumption;
- Value addition to agricultural produce: food processing and preservation;
- Food safety along the agricultural value chain (safe production and handling of exotic vegetables, cottage level processing, etc.);
- Resource management (farm, home, processing site); and
- Gender mainstreaming of all agricultural policies, programs, and projects.

NGO model

World Vision has been working in Ghana since 1979 on integrated community development initiatives that have included nutrition and agriculture. One project that was piloted in several districts of Ghana was the Expanding Nutrition and Health Achievements through Necessary Commodities Education Project (ENHANCE). This was a partnership between World Vision, the Ministry of Health (MoH), and the MOFA, and engaged government extension agents. The agents carried out home and farm visits, and held group discussions at the community level, where they trained farmers on nutrition (food production, meal planning, and dietary diversity), did food demonstrations, promoted home gardens, and demonstrated food processing techniques. World Vision played a strong role in ensuring that the programs continued to run, particularly in times of funding gaps, and in providing transport for extension agents to get to the field. Although the project has since

phased out, collaboration with MoH and MOFA remains strong (MacDonald 2013).

Academic model

Over the last four decades the University of Ghana has supported a Family and Consumer Extension program. The program lasts four years and focuses on nutrition education and income generating activities. As it relates to EAS, the program first teaches students theory, followed by practical aspects of EAS, which includes a semester-long practical training exercise where students engage with families in rural communities. Most students focus their efforts on nutrition education. Graduates start working in the MOFA under the umbrella of agricultural EAS, where they focus on sharing information about fertilizers, crop growing, and other technologies, as well as nutrition education and income generation for farm families. These specialists act as resources for extension agents who conduct nutrition education at the grassroots level. Between 60 and 100 students enrol in the program every year, and many are female. These students are becoming the entry point to promoting better nutrition through EAS. Due to a lack of resources, mostly pertaining to budgets and transport, it is often difficult for specialists to travel out to the communities (Ofusu 2013). A recent study to examine the potential of linking agriculture and nutrition in Ghana, found the gaps listed in **Box 5** (Colecraft et al 2013).

Lessons learned:

- **Individual empowerment:** When women are empowered with knowledge and skills, they can make a large impact in their community, and in other communities too.
- **Community-based:** The WEV approach to knowledge-transfer is a more sustainable solution that relies on the active participation of communities.
- **Partnerships:** International NGOs, as in the case of World Vision, play an important role in the continuity of EAS and can be a valuable partner for governments.
- **Formal education:** Including nutrition education and its role in EAS into college curricula is important, but more work is needed to ensure that the content is rigorous and that capacity and support are promoted.
- **Resource support:** Extension agents and nutrition specialists need basic financial support to engage with communities. This includes transport, SIM cards, and the ability to produce communication materials.

BOX 5: Key gaps within pre-service training in agriculture and nutrition

- Narrow view of nutrition (food consumption, cookery)
- Limited or no requirement for nutrition courses in the programs
- Limited scope of nutrition topics covered
- Inadequate capacity (quantity and quality) of nutrition trainers at MOFA colleges
- Limited in-service opportunities
- Restrictive hiring policies for trainers at MOFA colleges
- Inadequate infrastructure for nutrition training
- Vague understanding of the role of agriculture in nutrition and vice-versa

Guatemala

This case study highlights Guatemala's new National Agricultural Extension System (SNEA) and its incorporation of nutrition interventions using "home extension agents" (Extension agentas del Hogar). Integrated within the broader "Zero Hunger Plan" (Pacto Hambre Cero), SNEA has now placed "home extension agents" in nearly all of the country's 332 municipalities. While they have a broad mandate, nutrition education is one of their core programmatic areas, with interventions such as food preparation and promotion of homestead gardens. SNEA's work is integrated with other front-line workers and coordinated with community groups, NGOs, and other stakeholders.

Nutrition and agriculture context

Guatemala has the highest incidence of chronic malnutrition in the Western hemisphere at an alarming 48% (UNICEF 2013b). Indigenous communities are particularly vulnerable, with stunting, underweight, and poverty rates almost twice the levels of those pertaining to non-indigenous children (PAHO 2008). Moreover, the country loses over US\$300 million in GDP from foregone wages because of vitamin and mineral deficiencies (World Bank 2010).

The country's diverse natural resources, micro-climates, and labor force offer significant potential for the development of many agricultural commodities, including horticulture and coffee (GFRAS 2011). Today, agriculture represents 13% of Guatemala's GDP, 38% of the labor market, and 50% of government revenues. Indigenous families, which account for 80% of the inhabitants in the region, grow grains (maize and sorghum) and beans for subsistence, and work as agricultural laborers at coffee and sugar plantations for additional income. Despite its potential, agricultural production has not lived up to the national demand and a large percentage of the population, especially in rural areas, is food insecure.

Institutional context

As in other Latin American countries, Guatemala's EAS system was essentially dismantled in the mid-1990s after the country's long civil war and international pressure for agricultural structural reform (GFRAS 2011; FAO 2011b). The expectation that the void would be filled by the private and civil society never materialized, and many marginal communities, especially those at subsistence and sub-subsistence levels, did not see any EAS for close to two decades.

However, in the past seven years the country has been making significant progress in addressing hunger and malnutrition, and in re-launching its EAS program. In 2006, it adopted a National Strategy for the Reduction of Chronic Malnutrition, which was incorporated into a National Zero Hunger Pact in 2012. Modeled after the Brazilian Fome Zero, the Zero Hunger Pact aims to reduce chronic malnutrition in children under the age of five

years by 10% in 2016 (Zero Hunger Pact 2013). The Scaling-up Nutrition (SUN) Movement has recognized Guatemala as a model for multi-sector, multi-stakeholder, food and nutrition security governance in the Latin American region (SUN 2011).

More recently, the 2013 Hunger and Nutrition Commitment Index gave Guatemala its highest ranking for the "substantial political commitment expressed through a range of efforts by the Government of Guatemala" (HANCI 2013). In addition to the Zero Hunger Pact, the government has significantly increased access to drinking water and sanitation, and has expanded its school feeding and conditional cash transfer programs (Bono Seguro). Similarly, Guatemala is investing substantially in health services and in the fight against infant-maternal mortality. The country has also set up two separate budget lines for nutrition and for intervention in the 1000-day window of opportunity (HANCI 2013).

Public EAS strategy

In 2008, with the support of FAO, the Ministry of Agriculture approved a new strategy to re-launch and scale up its national EAS system. Prioritizing the vulnerable communities, the National Agricultural Extension System (SNEA), targeted three types of smallholder farmers (Juarez 2013):

- **Below Subsistence:** Farmers who do not meet their household food requirements with production and rely on seasonal labor to supplement their income.
- **Subsistence:** Farmers who produce enough staples and occasionally sell surplus and labor through informal value chains.
- **Surplus Agriculture:** Farmers connected to formal value chains without the need for seasonal labor.

The overall goal of SNEA is to strengthen the productive, organizational, and implementation capacity of smallholder farmers to ensure self-sufficient production and food/nutritional security. With below-subsistence and subsistence farmers, the program focuses on "patio" level production of home gardens and small animal husbandry in order to raise families above the subsistence level. Farmers growing and selling surplus production are engaged in different programs tailored for strengthening value chains and revitalizing the rural economy (Smith 2011).

One of SNEA's five objectives addresses nutrition explicitly by aiming to improve the quality and diversification of food production. To reach this and the other objectives, the MOA began in 2010 to set up Municipal Extension Offices in each of the country's 332 municipalities. Each office is staffed with three types of extension agents; two who focus on agriculture-specific interventions, while the third, a female "home extension agent", is responsible for promoting the participation of women. Communities and participating households are chosen using the Food Security and Nutrition Secretariat's (SESAN) food insecurity ranking, prioritizing about 15-20 communities that are

considered most vulnerable to hunger and malnutrition (Juarez 2013).

According to SESAN, the home extension agents have a broad mandate. These women promote actions and activities to improve household conditions, encourage food security through consumption of more nutritious foods, and advocate for improved health, hygiene, and self-esteem. The home extensionists also work to strengthen the family unit as the foundation of society, and improve the living conditions of families. Most of these interventions are delivered using grassroots womens groups.

A key component of the SNEA framework is the community counterpart, which is comprised of three organizations. The first organization, the community facilitators, maintains demonstration plots and works with the agricultural extension agents to mobilize the community for demonstrations and workshops. The second organization is the "Women's Council", which works with the home extension agents to select vulnerable households and to organize events. Overseeing the functions of these two groups is the Community Development Councils (COCODE), designed to decentralize power and allow for greater community participation.

In addition to strong community linkages, SNEA has also established formal multi-sectoral coordination mechanisms with government agencies. SNEA has also worked diligently to build relationships with the civil society academia, and international organizations. In the department of Retalhuleu, for instance, the NGO Semilla Nueva provides vital technical training in the areas of nutrition (food preparation, nutrition education, hygiene, etc.) and sustainable agricultural techniques (Bowen 2013). Similarly, in the municipality of La Union, World Vision has supported the work of the extension agents by providing much needed training materials and transportation (Garcia 2013).

Lessons learned

SNEA and the Zero Hunger Pact are relatively new programs, which limits the ability to assess their impact on reducing stunting and hunger. There are however, some preliminary lessons that have emerged from interviews and the literature review:

- **Re-emergence of Home Economics:** Messaging about nutrition, care, and other related subjects, should be carried out by a cadre of home extension agents who tailor their work to women in vulnerable households.
- **Coordination:** Home extension agents must be part of a team of front-line service providers with established platforms and mechanisms for joint planning and coordination.
- **Community Engagement:** Strong and well-defined community organizations are a key counterpart for EAS as they articulate and contextualize local demands and mobilize farmers for interventions by extension agent.
- **Political Uncertainty:** While the program enjoys the strong support of the current administration, political uncertainty and high personnel turnover in the Ministry of Agriculture creates a sense of insecurity among extension agents, hence impacting program efficacy.
- **Funding** – The success of extension agents will be limited unless there are adequate resources allocated for transportation and training inputs. Relying on external support from NGOs may not be sustainable in the long-term.

Haiti

In this case study, the Government of Haiti and the World Bank provide an example of how to incorporate nutrition into agricultural programs at the design stage, when EAS are still relatively weak and the agriculture sector is in a post-disaster process of rebuilding. Nutrition has been prioritized from the highest levels of government, steps are being taken to improve inter-ministerial collaboration, and extension agents' are receiving training that will allow them to deliver simple nutrition messages and act as nutrition facilitators in the communities that they serve.

Nutrition and agriculture context

Haiti has the worst malnutrition rates in the Latin American and the Caribbean region. Stunting in children under the age of five years was at 30% prior to the 2010 earthquake and is likely to have increased since then (Bassett 2010). Conditions that were already dire before the earthquake have been exacerbated due to a variety of factors, including deteriorated accessibility to health services and nutritious food from infrastructure loss, and generally weakened government capacity. Furthermore, several hundred thousand Haitians relocated from Port-au-Prince to rural areas, thereby complicating the coping mechanisms of rural households, and leading to a decrease in average meals per day from 2.48 to 1.58 during this time (Feed the Future 2011).

Despite these challenges, the potential for a nutritious diet in Haiti is large. Farmers are known to grow a variety of crops on small plots, including roots and tubers, grains, fruits, vegetables, and legumes. The mountainous topography produces many different microclimates, which lend themselves to diverse crop production at the national level, since different regions have adopted different staple crops according to their local climates (Feed the Future 2011). However, the severity and frequency of environmental and economic shocks, environmental degradation, and weak or non-existent institutions, has complicated the translation of this potential into reality.

Institutional context

The agriculture sector in Haiti has historically been underfunded. Although it contributes 25% of Haiti's GDP and accounts for 75% of employment for low-income households, the budgetary allocation to the Ministry of Agriculture, Natural Resources, and Rural Development (MARNDR) in 2008 represented just 3% of total government revenues. In its role as a provider of agriculture EAS, the MARNDR has encountered a number of constraints including:

- The lack of a centralized planning function and poor coordination with district offices (MARNDR 2010);
- Weak linkages between the MARNDR and research centers as well as agriculture vocational schools (Cardwell 2011);

- Almost no new human resource development for applied research or EAS since the 1980s, and no revisions to the curricula for agriculture higher education in 25 years (Cardwell 2011).

As a result, EAS support for farmers has been weak or non-existent throughout the country. Although numerous NGOs have stepped into this void left by the public sector, the free services they offer are still insufficient and patchwork due to the MARNDR's inability to coordinate.

The institutional limitations described above have largely precluded the MARNDR from making efforts to deliver nutritional information to farmers on top of their traditional agriculture services. Not surprisingly, prior to the 2010 earthquake, the Government of Haiti had no structure in place to comprehensively address nutrition security (Bassett 2010). In 2012, in recognition of the risk of malnutrition worsening, particularly after the earthquake, Haiti took the step of setting concrete goals to halve hunger by 2016 and to eradicate hunger and malnutrition by 2025. It also established a national-level Commission, chaired by the First Lady Madam Sophia Martelly, to coordinate strategy across nine ministries.

Strategy

After the earthquake, the Government of Haiti made the decision to place agriculture at the center of both its short-term recovery and long-term growth strategies. Agricultural services and institutional support have specifically been identified as primary areas of focus in its National Agriculture Investment Plan for 2011-2016 (MARNDR 2010). Towards this end, the World Bank, with additional funding from the Global Agriculture and Food Security Program (GAFSP), initiated the Relaunching Agriculture: Strengthening Agriculture Public Services II Project (RESEPA II) in 2011, which aims to enhance the capacity of the MARNDR to provide EAS.

A strengthened EAS system has also been seen as an opportunity to incorporate Haiti's nutrition objectives. RESEPA II includes nutrition as a crosscutting component that will influence many of the project's efforts at all levels, from the national ministry down to local communities. The overall strategy of mainstreaming nutrition centers on the following three actions:

1. *Building high-level nutrition expertise and institutional collaboration:* Nutrition specialists will be hired within the MARNDR to facilitate inter-ministerial collaboration with the Ministry of Health and integration of nutrition into agricultural policies and programs (Arias 2013).
2. *Developing education/training of extension agents:* Nutrition and home economics modules will be incorporated into the curriculum for the training of agriculture extension agents (Arias 2013).

3. *Providing support for grassroots initiatives:* Matching grants will be awarded to farmer groups and NGOs, with priority given to proposed activities that are nutrition-sensitive (Arias 2013).

At the institutional level, inter-ministerial collaboration on nutrition policies and programs is mandated by the Commission for the Fight Against Hunger and Malnutrition within the office of the president, which effectively serves as a joint memorandum of understanding (MOU) between ministries. Though some skepticism in the MARNDR may exist as to whether or not nutrition should instead belong entirely in the Ministry of Health, institutional support is expected to build gradually with the hiring of nutrition specialists. Furthermore, the majority of RESEPAG II's interventions still aim to strengthen EAS for increased agricultural production, with the nutrition activities that extension agents are to engage having been carefully chosen.

Within communities, the project envisions that extension agents will play a facilitator role, providing simple nutrition messages, and linking community members with other resources available for health and nutrition, as opposed to delivering technical nutrition knowledge and interventions themselves. As such, the nutrition and home economics module focuses primarily on post-harvest and trade, as opposed to re-orienting primary agricultural production towards nutrition objectives. These are new areas for extension agents who have traditionally focused solely on production, and they are also areas that require interaction with female members of households, who are normally responsible for post-harvest activities and trade decisions. For this reason, the project has bundled a gender component within these new training modules and aims to increase the number of female agriculture extension agents (Arias 2013).

While the project will not attempt to shift agricultural production away from cash crops, and explicitly avoids incorporating home gardens, the World Bank and MARNDR are aware that on the demand side, households must be encouraged to consume more nutritious foods (Arias 2013). Another outcome of the inter-ministerial collaboration with the Ministry of Health will involve health agents at the local level, conducting awareness campaigns about the benefits of a balanced diet and the nutritional value of different foods. The World Bank and MANRDR hope this awareness, paired with higher incomes from improved production, will translate into increased consumption of healthy foods at the household level (Arias 2013).

It should be noted that the project is only now in the process of implementing some of these interventions, including the hiring of nutrition specialists and the nutrition module for extension training. Thus, we include it as an example of a strategy used to design an agriculture-focused program that integrates EAS and nutrition, while recognizing that its ultimate outcomes are currently unknown, and that it cannot qualify as a model yet.

Lessons learned

- High-level engagement: Establishing a high-level commission on hunger and nutrition that mandates coordination across ministries on nutrition strategies may be an alternative to joint MOUs at the ministerial level. This same approach was demonstrated by Brazil's Fome Zero initiative.
- Best fit: Training extension agents to deliver simple nutrition messages and steer households towards other health and nutrition resources may be a "best fit" when working with agriculture EAS programs that are weak or in the process of rebuilding.
- Demand-driven nutrition: The project seeks to achieve "demand-driven" improvements in nutrition through broad awareness campaigns and increased household incomes. A reorientation of agricultural production towards nutritious foods is not viewed as necessary due to the level of access to nutritious foods that already exists (Arias, 2013). Though this access may be threatened during shocks, if the project has its intended effect, resiliency during these times of shock should be improved through strengthened agricultural services.
- Social sector delivery: Demand for higher-priced nutritious products, such as bio-fortified milk, may take time to build, but this delay could be mitigated by delivering such products through school-feeding programs or voucher-based incentives.

India

This case study highlights a horticulture project undertaken in West Bengal specifically to tackle Vitamin A Deficiency (VAD). The project utilized the local government and local extension agents to improve micronutrient status and nutrition education of rural households.

Nutrition and agriculture context

India now stands as one of the fastest growing economic powers in the world, yet it still faces persistent challenges associated with a rapidly growing population, abject poverty, rural illiteracy, and malnutrition. Malnutrition is widespread, with 43% of children under the age of five years being underweight, and 48% (i.e. 61 million children) being stunted (Food and Nutrition Board 2013). More than 20% of children under the age of five years are wasted. Furthermore, micronutrient deficiencies are pervasive, where an alarming 70% of children aged between the ages of six months and 59 months are anemic (UNICEF 2013c) and vitamin A deficiency and iodine deficiency disorders affect the majority of rural households (Planning Commission 2002). Since 1980, the under-five child mortality rate has dropped by 58% from 147 deaths per 1,000 live births to 61 deaths in 2011 (UNICEF 2013c). Changes in lifestyles and dietary intake, especially in western-influenced urban settings, have led to the increasing prevalence of obesity and associated non-communicable diseases. The country is now faced with the dual burden of undernutrition and overnutrition (Planning Commission 2002).

The agriculture sector contributes 18% to national GDP and employs 50% of the workforce (GFRAS 2013d). Beginning with the Green Revolution in the late 1960s, India made considerable headway in becoming self-sufficient in feeding its growing population and in ensuring that the increase in food production stayed ahead of population by putting in place initiatives to improve food quality, access, affordability, and utilization (Planning Commission 2002).

Institutional context

In 1947, after India gained independence, the country faced two major nutritional challenges. The first was the threat of famine coupled with acute starvation due to low agricultural production, and the second was chronic energy deficiency due to low dietary intake (the result of poverty and low purchasing power), the high prevalence of infection (the result of poor water and sanitation practices), and poor utilization of available resources (the result of low literacy and awareness). The government identified the key national health challenges to be chronic energy deficiency, kwashiorkor, marasmus, and micronutrient deficiencies such as vitamin A deficiency, beriberi, and goiter, before adopting a multi-sectoral strategy to tackle such problems. Ever since, it has been committed to successive Five

Year Plans to track nutrition milestones (Planning Commission 2002).

The government identifies the lack of adequate information on nutritional needs as a major deterrent to improving the nutritional situation in the country. Child malnutrition is considered an outcome of both poor economic conditions and poor nutritional awareness. The Government of India established the Food & Nutrition Board (FNB), first as a subset division under the Ministry of Food in 1963, and since 1993, it has been a department within the Ministry of Women and Children Development. Embodied through the FNB's mandate, the Government of India sees nutrition education and EAS as one of the long-term sustainable interventions required to address malnutrition, generate awareness, and improve the country's nutritional standing (Food and Nutrition Board 2013).

India comprises of 28 states and seven union territories; each state is subdivided into districts for administrative purposes, and each district is further divided into blocks (*tehsils/taluks*) and villages. A country as large and diverse as India is unwieldy to study as one case example. Since the promotion of education is a national strategy to tackle malnutrition, we highlight an example of using nutrition education to reduce VAD in the state of West Bengal.

PROJECT: "Food-Based Strategies to Control Vitamin A Deficiency" (Chakravarty, 2000)

In order to tackle VAD, there are several strategies: dietary diversification, food fortification, supplementation, and public health and disease-control measures. Dietary diversity can be partially addressed in rural households through horticulture. A horticultural intervention, combined with extensive nutrition education, is recommended as a food-based strategy to reducing micronutrient deficiencies (Herforth et al 2012). VAD can specifically be addressed through the consumption of carotene-rich foods such as green leafy vegetables and orange-fleshed fruits.

Project Strategy

A project in West Bengal to prevent VAD was initiated through combined horticulture and education in nutrition and health, in collaboration with the local government. The project covered three areas within a province of West Bengal, which is the country's most drought-prone district, and boasts the highest tribal population. The project included 1,500 households in 30 villages under three local panchayats, where VAD was found to be endemic. Local governments and functionaries provided land for six nurseries; two in each of the three blocks that were used to grow plants and supply seeds to the community. Water sources (including wells and pumps) were also provided. The local communities offered up labor, and local extension agents, public health center staff, and local government workers assisted with the coordination of the program.

The local extension agents were trained in home gardening methods and in effective communication of nutrition and health messages to the public, especially to mothers. The producers were trained in improved horticultural methods suitable to local agro-climatic conditions, as well as in locally appropriate methods of food preservation, seed preservation, nursery development, and seasonal production.

The following nutrition education and training materials were prepared and disseminated:

- A handbook on home gardening methods for growing vitamin A-rich vegetables and fruits;
- An education booklet on the importance of vitamin A in the diet;
- A leaflet on the types and importance of vitamin A-rich vegetables;
- Audio cassettes containing songs for promoting consumption of vitamin A-rich vegetables and their role in the prevention of VAD;
- Video cassettes on methods of growing different fruits and vegetables, specifying land requirements, seeds and plants, timing, inputs, cost, etc.;
- Video cassettes on VAD and how to control it; and
- A crop calendar for vitamin A-rich vegetables.

The project provided the recipients with seeds, fertilizer, gardening equipment, and training on better cultivation practices for production in the home garden. Six central nurseries were established to produce seedlings for distribution by the local government to the project recipients, at a nominal cost. The government provided the land for the nurseries. Food technologists offered training on the preservation of fruits and vegetables as well as in suitable technology for local food fortification.

Findings

- The percentage of households cultivating green leafy vegetables increased in all three blocks compared with baseline: from 82% to 94% in Balarampur, from 78% to 94% in Barabazar, and from 84% to 97% in Hura;
- The weekly consumption of green leafy and other vegetables at the household level increased substantially to more than three times a week;
- In addition to growing enough for their own consumption, 40% of families sold about 10% to 25% of the produce;
- The prevalence of signs and symptoms of VAD was reduced: conjunctival xerosis from 6.4% to 3.5%, Bitot's spots from 2.8% to 0.8%, and night blindness from 15.3% to 4.7%;
- Women requested more cooking demonstrations, and when visited by volunteers and experts, they asked relevant questions regarding cooking practices for better extraction of nutrients;
- There was continuous demand to impart and to support methods of preserving seasonal produce; and

- There was significant cooperation between the workers and the villagers during the project.

Lessons learned

- **Community-led:** This case study demonstrates the importance of using a community participatory approach in program design and implementation, as it generates higher community uptake of EAS.
- **Media avenues:** The use of multimedia (audio, visuals, etc.) for nutrition education increases community reach, as it caters to those of the population who are illiterate.
- **Complementarity:** The provision of agricultural inputs (seeds, fertilizers, etc.), coupled with nutrition education and training on improved farming practices, can have a sizable impact on various nutrition indicators, food security, and agricultural yields.

Kenya

This case study illustrates how Kenya's demand-driven EAS program leverages a limited number of nutrition specialists, who are employed within the Ministry of Agriculture's Home Economics sub-division. Although the formal mandate for nutrition falls within the health sector, there are enormous capacity constraints. At the same time, there is increased interest in the potential for agricultural EAS to play a larger role in improving household nutrition.

Nutrition and agriculture context

Undernutrition is a significant factor contributing to the mortality rates of children under the age of five years in Kenya, which is high at 73 deaths per 1000 live births (UNICEF 2013b). Over the last 30 years, prevalence rates for wasting and underweight have declined, although they have remained relatively steady for the past decade at 7% and 16%, respectively (KNBS and ICF Macro 2010). Stunting prevalence, however, has increased to 35%, and is highest among infants between the ages of 18 months and 23 months at 46% (KNBS and ICF Macro 2010). Only 32% of Kenyan children are exclusively breastfed for the first six months of their lives, which is an important factor in preventing childhood malnutrition (Government of Kenya 2008). Within Kenya, there are regional differences in undernutrition rates; rural areas are disproportionately affected, with arid and semi-arid lands (such as the North Eastern province) most severely affected (KNBS and ICF Macro 2010). Nationwide, nearly one-third of Kenyans are chronically food insecure and per capita food availability has declined by over 10% over the past three decades (Government of Kenya 2008). Most Kenyans subsist on diets based on staple crops (mainly maize), which lack nutritional diversity and result in insufficient intake of iodine, iron, vitamin A, and zinc, particularly among young children and pregnant and lactating women (IFPRI 2011a).

Food insecurity and undernutrition are closely linked to stagnating agricultural production trends and a high dependence on rain-fed agriculture. Agriculture is the mainstay of Kenya's economy, providing livelihoods for 80% of the population (most of whom are subsistence farmers) and contributing 24% to national GDP (and another 27% indirectly) (Government of Kenya 2012a). Approximately 80% of the land area is arid and semi-arid, which means that the 18% of land with good agricultural potential, supports 80% of the population (FAO 2005). After experiencing more robust growth in the 1980s, the agricultural sector has been unable to keep up with the population's needs; national dietary energy supply barely meets population energy requirements and micronutrient-rich foods have been inadequately promoted (Government of Kenya 2012a). Kenya is vulnerable to natural disasters and shocks, which leave parts of the country reliant on food aid.

Institutional context

At the national level, the mandate for nutrition lies with the Ministry of Medical Services (MoMS) and the Ministry of Public Health and Sanitation (MoPHS), with the former focusing on curative measures and the latter addressing preventative practices. Within the MoPHS, the Nutrition Division is the primary unit coordinating nutrition initiatives, working groups, and activities, such as collaborating with UN agencies and NGOs to scale up High-Impact Nutrition Interventions (IFPRI 2011a). Public investments in nutrition have targeted the recruitment and deployment of nutritionists and procurement of supplies, but significant gaps remain. An assessment completed by the MoPHS in 2012 revealed that there was not only a shortage of nutrition personnel, but also that existing staff demonstrated inadequate knowledge of clinical nutrition. Although government-employed nutritionists are present in each district, they are typically based in provincial and district hospitals. From these posts, they may provide guidance to health workers on effective nutrition service provision, but their community outreach is extremely limited (Wagah 2011).

Nutrition has received renewed commitment at the policy level, as reflected in the Food and Nutrition Security Policy, Kenya's Health Strategic Plan, and the National Nutrition Action Plan 2012-2017 (NNAP), which outlines strategic objects and activities to improve nutrition. With this roadmap in hand, the key question now is *who* can play a role in delivering and reinforcing these nutrition interventions. In light of human resource capacity constraints and cross-sectoral linkages, there is increasing awareness of the role that the agricultural sector currently does and *could* play. The NNAP specifically mentions a need to build capacity of extension agents (and all frontline field staff) to incorporate nutritional considerations and messages into their work (Government of Kenya 2012b). During a Transform Nutrition stakeholder-mapping workshop, participants highlighted the Ministry of Agriculture's ability to reach households directly through extension officers, especially Home Economics officers. This reach contributed to a perception of agricultural EAS as a "sleeping giant" that could tremendously impact nutrition if put into action (IFPRI 2011a). Although the ratio of public agricultural extension agent to farmers is less than the desired ratio of 1:400 at 1:1000, it is more encouraging than the ratio of nutritionists to farmers of 1:93,000 (Wagah 2011).

Kenya's agricultural EAS system has a long history, and has undergone transformational changes over the last several decades. In its early days, agricultural EAS primarily served commercial farmers, and later evolved to engage indigenous African farmers through training and pastoralist centers, and an integrated agricultural development approach. The 1980s brought the introduction of the Training and Visit (T&V) system and a dramatic reduction in agricultural EAS budget and staff (GFRAS 2013e). While efforts to overhaul the EAS system succeeded in putting in place an integrated national system and in improving

staff technical capacity, fundamental questions remained about the top-down system's ability to serve and respond to farmers' needs (World Bank Operations Evaluation Department 1999). In 2001, in response to criticisms and challenges, the Ministry of Agriculture and Rural Development created the National Agricultural Extension Policy (NAEP), which marked the beginning of a deliberate, strategic shift towards the demand-driven EAS system that Kenya has today.

The current National Agricultural Sector Extension Policy (passed in 2012) aims to build on lessons from the previous decades to improve the provision of EAS, integrate modern technology, and to mainstream crosscutting issues into EAS (such as gender, environmental conservation, HIV/AIDS, and other communicable diseases). In collaboration with other stakeholders, the government has embraced more participatory and demand-driven EAS approaches that aim to foster farmer participation and private sector contribution in providing EAS. Under this system, rather than simply disseminating information on agricultural practices, frontline extension agents aim to mobilize communities to identify their needs and areas of interests. Extension agents do this through the focal area approach (participatory community planning), farmer field schools (FFS), and the formation of common interest groups (Government of Kenya 2012a; Kiara 2011). Today, Kenya's public EAS is comprised of 5,470 total staff, which includes 1,464 field staff (32.2% of whom are female), and 3,086 subject matter specialists to provide support to field staff (GFRAS 2013).

Strategy

The supportive policy environment and the demand-driven EAS approach create an enabling environment for nutrition to be integrated into Kenya's public agricultural EAS system.

At the policy level, the National Agricultural Sector Extension Policy (Government of Kenya 2012a) includes health and nutrition among the crosscutting issues to be mainstreamed. The policy emphasizes the role that EAS can play in raising community awareness of disease prevention measures and improved nutrition, and in connecting with the research community to identify and promote nutritional and immune-boosting biofortified products (Government of Kenya 2012a).

While fully mainstreaming nutrition (and other issues) into EAS may be a gradual process, the Ministry of Agriculture's Home Economics sub-division already delivers nutrition education. The Home Economics sub-division focuses on livelihood improvement technologies that can improve household food security and nutrition. Within this unit, there are two branches: nutrition, and appropriate technologies. The nutrition branch focuses on promoting nutrition interventions at the household and community level, such as home gardens, raising small livestock, preparation and preservation of food, and crop and dietary diversification (Ndung'u 2013). They also provide informa-

tion on the nutritional benefits of eating certain foods. Home economics officers are present in each district, and have typically completed a curriculum consisting of 60% agriculture-specific and 40% nutrition-specific requirements. While those officers are not pure nutritionists, their background allows them to take an integrated approach to promoting value addition and nutrition effectively.

Through the demand-driven approach, the frontline extension agents are able to draw on the expertise of home economics officers as needed. The extension agents are responsible for mobilizing communities to identify areas of interest, and they then link more specialized officers, such as nutrition specialists, to the farmers to provide trainings.

Lessons learned

- **Leveraging a limited number of nutrition specialists:** A demand-driven agricultural EAS system can leverage the expertise of limited staff with nutritional training by deploying them as needed. As the system relies on frontline extension officers knowing enough about basic nutrition and being able to solicit nutrition specialists when requested, the ministry's goals to mainstream nutrition into the EAS system will be key to ensuring that demand for nutrition training can be generated and met.
- **Serving a receptive audience:** The participatory, demand-driven nature of the EAS system can help to direct nutrition education and training towards communities that are interested in receiving it, rather than imposing it on an unwilling audience, with little effect.
- **Simultaneous focus on value-addition and nutrition:** A nationwide concern is food security, which the Home Economics sub-division operationalizes at the household level through activities promoting value-addition (to increase incomes) and nutrition.
- **A greater role requires an increased voice and resources:** Although the recognition of the potential of agricultural EAS to improve nutrition is increasing, rising expectations must also be accompanied by a boost in resources and capacity, and a more explicit role within the nutrition dialogue. Currently, the Ministry of Agriculture is largely focused on improving performance of the agricultural sector, and has a very limited role in the National Nutrition Action Plan.
- **Understanding of how to apply appropriate technologies:** The agro-ecological diversity of Kenya (and other countries) requires a differentiated agricultural and nutrition strategy that can adapt to local conditions, available resources, agricultural feasibility, and nutritional needs. Implementation then relies on the ability of frontline extension agents to truly understand and effectively facilitate access to appropriate technologies.

Malawi

This case study focuses on FAO's "Improving Food Security, Nutrition Policies, and Program Outreach" project in Malawi, in which national agriculture and health extension agents are assisting communities that lack knowledge of basic food groups and feeding practices to improve nutrition at the household level. Important lessons are provided for community participation in identifying nutrition gaps and possible solutions, and the types of skills and conditions needed for extension agents to integrate nutrition.

Nutrition and agriculture context

Malawi has made concerted efforts to combat malnutrition, and while there have been incremental improvements in the last decade, stunting in children under the age of five years is still high at 47% (UNICEF 2013d). Though maize production increased dramatically from 2002 to 2009 with the help of a national input subsidy program, this has not translated into more nutritious, balanced diets. Households generally demonstrate inadequate knowledge of the food combinations recommended by the Malawi Six Food Groups (dietary guidelines developed for the country), the nutritional value of foods available to them, and proper methods of food preparation to maximize the quality of foods consumed (DNHA and FAO 2010). Furthermore, cultural taboos are thought to limit both consumption and cultivation of some nutritious foods; for example, the bambara groundnut, traditionally grown only by women who have lost a child and not to be touched by men (Forsythe et al 2013).

Institutional context

In 2004, the Government of Malawi established a Department of Nutrition, HIV and AIDS (DNHA) in the Office of the President and Cabinet, differing from other Sub Saharan Africa nations that have formed their nutrition departments within the Ministry of Health. Malawi's DNHA defines its own nutrition objectives and has a separate budget, with the intention of facilitating better collaboration across sectors and improved stature of nutrition within the broader development strategy (Meerman 2008). However, enacting national nutrition policies has still been met with difficulties, primarily the lack of qualified nutrition personnel at all levels, especially at the community level (DNHA and FAO 2010).

In the 1970s, women extension agents were recruited by the Ministry of Agriculture to work as Farm Home Assistants, mainly in charge of improving the utilization of food at the household level, in addition to meeting the other needs of the women. This was brought to an end around 1998, although it remains highly regarded as an effective means of improving nutrition, and some national stakeholders and development partners have expressed a desire for its return (IFPRI 2011b). While it is unclear exactly why the program ended, one possibility is that

funding dried up (Fatch 2013). Today, nutrition subject matter specialists exist to support and supervise frontline agriculture extension agents, but there is only one per district and funding is still a major constraint.

Malawi's agricultural EAS program has gone through substantial re-thinking in the last decade as it has sought to adapt to a number of national and international changes, including Malawi's democratization and decentralization, market liberalization, and shrinking public resources (Masango and Mthinda 2012). Throughout this process Malawi's overarching goals have been to make EAS more pluralistic and demand-driven, often seeking participation from farmers themselves.

Strategy

FAO is currently supporting the Government of Malawi to improve food security and nutrition in the Kusungu and Mzimba districts through its "Improving Food Security, Nutrition Policies, and Program Outreach" project, which was initiated in 2011 and ends in 2015. The project aims to link agriculture and nutrition, with an emphasis given to enhancing the capacity of rural EAS in order to achieve this. In recognition of the multi-sectoral dimensions of nutrition, both agriculture and health extension agents are involved. The two major components of the project are the following:

- **Food Security:** Extension agents are using food calendars to engage communities in identifying local availability of nutritious foods and gaps that might exist in any of the six major food groups. Together, they then select diverse crops to grow in order to fill these gaps based on their local conditions.
- **Nutrition education:** Extension agents, working with community volunteers, deliver nutrition messages based on locally-appropriate dietary recommendations, through community-based cooking demonstrations and group discussions to improve young child feeding practices (FAO, Linking Agriculture and Nutrition Education in Malawi).

Through the project's ongoing monitoring efforts, FAO is already noting that households are realizing it is possible to improve their diets with locally-available foods and are adopting many of the new recipes and preparation techniques taught to them during the cooking demonstrations (Heise 2013; Nordin 2013). These developments are especially meaningful in a context of maize-based diets, where households have been unaware of the food groups necessary for nutrition and sometimes have even been unaware of the nutrition value of the plants that they have grown for generations.

The project is also representative of the participatory extension methodology that Malawi has been moving towards since its policy change in 2000. Communities have a joint role in identifying nutritious crops to produce, carrying out cooking demonstrations, and deciding what feeding practices are most

appropriate. For extension agents accustomed to top-down information dissemination, this type of interaction, in which they are counseling, mentoring, advising, and working in teams to develop plans, may come as a challenge. To improve communication and facilitation skills, the project's training has included topics such as problem solving and working in teams (Nordin 2013). However, extension agents also receive vital assistance from community volunteers serving as Community Nutrition Facilitators, who are trained by the extension agents, and are themselves responsible for engaging households to improve enabling conditions for nutrition and utilization of nutritious foods in the home. In this respect, the project is reaping many of the benefits from duties performed by the Farm Home Assistants program.

It is important to emphasize that FAO has been working with the national agriculture and health EAS and at each phase, plans to transfer more responsibility over to the government. This will increase the likelihood of benefits being sustained past the life of the project and scaled-up to other districts. However, FAO has noted several challenges that may need to be addressed:

- **Funding for volunteers:** It may be difficult to maintain motivation of volunteers without payment. No stipend has been provided by FAO out of fear that volunteers would leave once this funding ended with the project. National level discussions have taken place concerning compensation for volunteer work, but without any clear outcome yet.
- **Agriculture and health EAS coordination:** The ministry's designated coverage areas for agriculture and health extension agents do not align. This has made team-building very difficult, as agriculture extension agents do not always work with the same health extension agents in the same communities; teams have to be put together in a patchwork manner.
- **Training for EAS:** Agriculture EAS training is mostly focused on cash crops and agents [or staff] do not have the capacity to assist households in diversifying diets beyond the basic staples. FAO is in the process of working with the government to incorporate some of the project's training into national curricula.

Lessons learned

- **Seasonality matters:** Food calendars can be an effective tool to help communities understand the timing and availability of local foods and what nutritional gaps may need to be filled.
- **Sustaining volunteer support:** Community volunteers can play an important role in expanding the reach of EAS and providing household-level consultation. However, compensation may affect long-term sustainability.
- **Bottom up facilitation:** Nutrition requires a departure from top-down information dissemination in EAS and more facilitation and communication skills.
- **Community enabling:** By engaging communities in joint planning through food calendars, cooking demonstrations, and group discussions, communities may begin to realize that they have the ability to help themselves improve their own nutrition.

Rwanda

This case study demonstrates national efforts to decentralize the EAS, adopt a multi-sectoral approach, and use an innovative community-performance based financing model to entice CHWs to reach national targets for nutrition and health indicators in Rwanda. While the government's envisioned impact on most nutrition-related indicators has yet to be realized, this model may hold potentially promising results in the long term.

Nutrition and agriculture context

Despite the government's efforts to make nutrition a national priority, Rwanda continues to suffer from a high burden of child malnutrition. At current levels, 44% of children under the age of five years are stunted, 11% are underweight, and 3% are wasted. The prevalence of stunting is significantly higher in rural areas at 46.5%, compared to urban areas at 27.3%, and is more stark when only children aged between 18 months and 23 months are considered, at 55.1%. Further, over 38% of children between the ages of 6 months and 59 months are anemic (UNICEF 2013b). Those malnutrition indicators have been stagnant over time. On the other hand, Rwanda has made considerable progress in the reduction of mortality rates among children under the age of five: an annual reduction average of 2.4% between 1990 and 2008 and 6.3% between 2000 and 2008. Despite the reductions in child mortality, such progress is considered insufficient to reach MDG4 by 2015, with the current rate at 76 deaths per 1,000 live births (IFAD 2012).

The agricultural sector employs upwards of 80% of the Rwandan population (IFAD 2012). In 2009, this sector contributed to 34% of GDP, and on average accounted for 36% of total GDP between 2001 and 2008 (EIU 2012). Moreover, growth in the agriculture sector has been a driving force behind nationwide growth. This is illustrated by the 6.2% real GDP growth from 2010 to 2011, mainly attributed to 5.9% growth in agriculture (IMF 2011). However, the country is characterized by very hilly terrain, and most agricultural production occurs on small family farms of less than one hectare (Ministry of Agriculture and Animal Resources, Rwanda 2010). The majority of the total cultivated land, 92%, is used for food crops, of which two-thirds are used for family consumption.

Institutional context

The 1994 genocide led to a change in the country's demographic structure; women account for 54% of the Rwandan population, and 29% of the total rural population live in households that are headed by women, while many others are headed by orphans (IFAD 2012). Additionally, 21% of households with poor Food Consumption Scores are female-headed households. Women workers conduct 77% of field operations carried out by farm families (Ministry of Agriculture and Animal Resources, Rwanda 2010).

Against the backdrop of widespread malnutrition, the Government of Rwanda and the Ministry of Health set forth combatting undernutrition as a national priority. The government formulated the Strategic Plan for Agricultural Transformation (SPAT) in 2004 to ultimately improve food safety and nutrition, increase rural households' revenues, and contribute to national economic growth (MINALOC 2006). In 2007, the government adopted the National Nutrition Policy and the National Community Health Policy, and in 2009, adopted the Integrated Management of Childhood Illnesses (IMCI) guidelines in 29 of the 30 country districts. In the same year, the MoH collaborated with UNICEF, World Food Programme (WFP), World Vision (WV) and National Institute of Statistics (NIS), to conduct a Comprehensive Food Security Vulnerability Analysis and Nutrition Survey. In 2010, the MoH established a National Community-Based Nutrition Protocol to coordinate the delivery of community nutrition interventions and provide national guidelines for the implementation of community-based nutrition (CBN) programs. Also in 2010, the government adopted the National Multi-Sectoral Strategy to Eliminate Malnutrition, which integrates nutrition aspects into the health, agriculture, and agribusiness sectors, and sets ambitious targets for 2010-2013 (World Bank 2013).

Strategy

Historically, the Ministry of Agriculture (MINAGRI) dominated the EAS system in Rwanda, employing a top-down approach to implement the Training & Visit (T&V) extension model. Following the countrywide restructuring of 1994, both national and international NGOs facilitated the establishment of farmers' groups and associations and assumed increasing roles in EAS. Recognizing the missing links between research, EAS, and farmer groups, the government created the Rwanda Agricultural Board (RAB) and the National Agricultural Export Board (NAEB) (GFRAS 2013f). In an effort to meet the specific nutritional and agricultural needs of the population at the disparate national districts, the government decentralized agricultural EAS activities, handing down district-level extension-oversight to the Ministry of Local Government (MINALOC). Since the adoption of the SPAT, which served as the first step towards decentralizing EAS, the government's strategy has been to facilitate the participation of international and multilateral organizations, local NGOs (MINALOC 2006), and the private sector in the previously public-sector-dominated EAS.

It is noteworthy to point out that women account for 36% of senior management positions at the national-level EAS body (Ministry of Agriculture and Animal Resources, Rwanda 2010), and make up approximately 30% of extension agents at the local district-level (GFRAS 2013f). Those positions were traditionally held primarily by men, but the government recognizes the demographic changes that the country went through as a result of the genocide, hence aims to improve its reach to

female-headed households by increasing the role of female extension staff.

As part of the Multi-Sectoral Strategy to Eliminate Malnutrition, the government added nutrition-related indicators to the community performance-based financing (cPBF) program for community health workers (CHWs). The Ministry of Health began using the cPBF program, which is a remuneration mechanism based on outputs, in 2005. Based on performance indicators, the CHWs are evaluated and the resulting financial incentive is rewarded to the cooperative that the CHW belongs to. Rwanda's Community Health Worker system is volunteer-based; hence, the only financial remuneration that CHWs receive is based on their performance against improving the nutrition and health-related indicators of the community that they serve (World Bank 2013). However, the impact on health and nutrition that the Government of Rwanda has envisioned for this CHW system has not been effectively realized to date.

Lessons learned

- **Coordinating decentralization:** While a decentralized EAS strategy may seem favorable for the efficient delivery of EAS activities to meet the specific household-level needs, a robust national coordination mechanism needs to be in place to ensure progress towards national targets for nutrition and health.
- **Financial incentives:** The cPBF model is innovative, but the long-term sustainability of this model is questionable due to the meager financial incentives available for CHWs, who are faced with trying to ensure the subsistence of their own families. Additionally, a higher degree of transparency and accountability must be in place to help the CHWs clearly understand the exact link between outputs and remuneration.
- **Women helping women:** Giving women a large role in EAS is essential in a population where a large portion of households is female-headed.

Tanzania

This case study provides an overview of the capacity challenges at the national, district, and community levels to integrate nutrition into EAS in Tanzania. However, with renewed interest in nutrition for scale-up with the SUN movement, and in the wake of exploration by NGOs into novel models, improvements to and investments into nutrition-sensitive EAS can be made.

Nutrition and agriculture context

Tanzania is one of the 14 countries with the highest burden of undernutrition, with 42% of children under the age of five years being stunted (UNICEF 2013b). Micronutrient deficiencies are also high, with vitamin A deficiency prevalence among children under the age of five years, being at 33% (TDHS 2010) and significant anemia rates among both women, and children under the age of five years.

Agriculture remains vitally important for Tanzania. More than half of the total harvested land area is allocated to cereals, mainly maize. Yet, maize yields are typically low due to the reliance of smallholder farmers on traditional technologies and therefore, subsistence production (MINAG 2004; Pauw and Thurlow 2010). Cassava and potatoes account for 15% of harvested land, and cotton, tobacco, and sugarcane grow at 10% per year. Livestock and fisheries account for almost a third of agricultural GDP, with fisheries growing at a rate of 5% per year (Pauw and Thurlow 2010).

Institutional context

At the national policy level, the Government of Tanzania has recently shown renewed interest in nutrition with the development of a five-year National Nutrition Strategy (NNS) (2011-2015). Tanzania has also joined the SUN movement. Nutrition is becoming a priority within the national planning and budgeting guidelines of the Ministry of Finance, with a new budget line for nutrition as of 2012 (UNICEF 2013b).

The Tanzanian Agricultural Sector Development Strategy (ASDS), developed in 2001, contributes to Tanzania Development Vision 2025. The goal of the ASDS is to achieve a sustained agricultural growth rate of 5% per year, primarily through the transformation of subsistence to commercial agriculture. In June 2010, Tanzania signed onto the Comprehensive Africa Agriculture Development Program (CAADP) that gives funding priority to the agriculture sector to bring the country closer to poverty alleviation and universal food security. Tanzania has also been selected to receive additional funds to bolster its agriculture sector through the Global Agriculture and Food Security Program funding pool.

However, the realities on the ground beyond the policy agenda are challenging and complex. The responsibility to deliver nutrition is spread across different ministries. The TFNC is the

institute responsible for nutrition research, policy formulation, advocacy, monitoring, evaluation, and facilitation of nutrition activities at the national level (HKI et al 2011a). Yet at the district and community levels, the local government authorities (LGAs) are responsible for implementing and monitoring nutrition activities. In addition, the Ministry of Agriculture, Food Security, and Cooperatives (MAFC) has included nutrition within its portfolio with a focus on the production of iron and vitamin A-rich crops, and post-harvesting technologies. The MAFC is responsible for training agriculture extension agents, although managing agriculture extension agents falls under the mandate of the PMO-RALG (Prime Minister's Office – Rural and Local Governments) and specifically the LGAs (HKI et al 2011a).

Capacity context

In Tanzania, the majority of nutrition activities are managed and implemented by workers in the health and agriculture sectors, and in other social sectors. However, the country has an inadequate number of workers in these sectors, which makes the delivery of nutrition interventions at the facility and community levels very difficult (HKI et al 2011a). Across the country, there is a shortage of health and agriculture extension agents.

The decentralized structure of EAS takes on the following form (HKI et al 2011a):

- **Regional:** Regional Extension Officers work under the Regional Agriculture and Livestock Officer (RALDO); an administrative mandate. The Regional Extension Officer supervises EAS at the regional level.
- **District:** District Extension Officers work closely with SMS in the office of the District Agriculture and Livestock. Within each district there are Divisional Extension Officers who support the rest of the field staff in each of the divisions.
- **Village:** Village Extension Officers train and facilitate the formation of farmer groups, farmer networking, and assist farmers with developing service contract proposals and plans.

The current ratio of extension agent to farmer is 1:1800 to 1:3000. "The current head count of agriculture personnel is too low and there is widespread acknowledgment that this impedes efforts in disseminating biological and mechanical technologies, facilitating the capacity development process, and communicating research needs back to the research community" (HKI et al 2011a). Given this ratio, agriculture extension agents receive minimal nutrition education in their training and do not have access to means of transport or to the funds to pay for travel expenses. There is also limited funding to carry out nutrition activities within communities, such as food cooking demonstrations. There is an overall lack of staff incentives and delayed promotion, which has had devastating effects on worker-morale (HKI et al 2011).

Strategies

Models for scale

I. Women's participation in farmer-to-farmer EAS:

Engaging women in addressing nutrition through EAS is critical. Historically, assumptions held by male extension workers regarding women's roles in farming have meant women have been largely excluded from trainings or education in better agronomic practices and nutrition. A farmer group network called MVIWATA was formed through a partnership with Sokoine Agriculture University, which has a home economics program. This network aims to empower farmers through better training and networking. In different regions, women's groups or mixed-gender groups are formed to improve vegetable growing and horticulture, forestry preservation, and rice production. Each member has their own plot, but is trained as part of the group in crop-production and farm management. The group also acts as the guarantor that enables new members to gain access to credit. Some groups branch out into independent activities that build social solidarity, for example, composing songs about their activities and the network, or by holding farmer workshops (Mattee and Lassalle 1994).

II. BRAC's Agriculture and Livestock Program

BRAC's agriculture and livestock program addresses the problem of poor crop and livestock productivity in Tanzania by increasing agricultural output, decreasing livestock mortality, raising farm income, and increasing rural employment, which can have significant downstream impacts on nutrition (BRAC 2013).

BRAC uses an interesting model by which it provides program organizers with extensive training by BRAC specialists, as well as by the government in topics such as livestock and poultry rearing, improved farming practices, high-yield seed varieties, and program operation strategies. These organizers then train and supervise model farmers, agricultural extension agents and livestock volunteers (Aarnink and Kingma 1991). These extension agents specialize in crop production and promote good farming practices among others in their communities by turning their own small farms into demonstration model farms. They are required to have a minimum of two years of agricultural experience and have farmed at least two acres of land. They work with other low-income farmers including:

- **General Farmers** – These are farmers who operate on a small-scale, or less than one acre of land, and do not have to be BRAC members. The general farmers are provided with technical knowledge by agricultural extension agents and program organizers at farmers' meetings, and also receive supplies from the extension agents.
- **Horticulture Nursery Managers** These are farmers trained in how to set up a nursery and sell seedlings, such as ornamental plants, fruit trees, and flowers.

- **Vegetable and Kitchen Farmers:** Kitchen farmers use very small pieces of land, or no land at all, and farm from a bucket or sack. Vegetable farmers operate on a one acre-large piece of land.

The program also reaches out to self-employed volunteers, usually women farmers with experience of rearing livestock and poultry, who are selected from BRAC microfinance groups. After selection, they receive extensive training in livestock husbandry, health topics, and vaccinations. Training also includes the production and conservation of fodder crops. Once trained, they generate income by charging fees for their services. With help from BRAC, they offer vaccination services, sell veterinary medicines, and provide technical assistance to other microfinance group members and the wider farming community.

III. Helen Keller International's Homestead Food Production

Helen Keller International (HKI) has been working in Mwanza, Tanzania, near Lake Victoria, on a project to improve nutrition for both women of child-bearing age and children under the age of two years by working with Tanzanian agricultural extension agents and community volunteers (HKI 2013). While agricultural extension officers teach women how to create and maintain gardens and raise chickens, HKI provides nutrition education to the women and families. The project will also help women to improve their incomes through poultry farming, which would enable mothers to purchase food in higher nutritional content, for their children. The final evaluation of the project will occur in 2014.

Lessons Learned

- **Complement agriculture EAS:** Pairing nutrition education with agriculture interventions can improve dietary outcomes.
- **Engage women:** Engaging women in the process of agriculture EAS is one of the most powerful routes to improving nutrition at the household-level.
- **Income generation:** Generating income from smallholder productivity can have downstream impacts on nutrition.
- **Using local and international knowledge and innovation:** Local and international NGOs can play an important role in engaging public EAS.

Uganda

This case study provides an overview of the political will to integrate nutrition and EAS in Uganda. The case also provides a valuable lesson on how the HIV/AIDS community used EAS for the delivery of health messages, while addressing food security.

Nutrition and agriculture context

The prevalence of stunting among children under the age of five years in Uganda is 40% and many Ugandans are food insecure and unable to meet their daily caloric intake (UNICEF 2013b; FAO 2010). Agriculture is the main income generator for the country, with more than 80% of Uganda's workforce engaged in the sector, and approximately 30% of Uganda's total land area being dedicated to agriculture (Shively 2012). Uganda's primary agricultural produce includes plantain, cassava, sweet potatoes, and maize (FAO 2010).

Institutional context

In the 1970s, the agriculture sector incorporated home economics and nutrition in most districts throughout Uganda with support from the FAO. The focus was to enhance women's participation in the agricultural development processes that incorporate aspects of food production, post-harvest handling, value-addition, and nutrition education (HKI et al 2011). Namutamba University and Bukalasa Agricultural College provided additional capacity by developing mid-level cadres of workers to implement home economic activities at the community and household level. Interestingly, the university trained female students in home economics, and male students in agricultural engineering (HKI et al 2011b).

Uganda's National Agricultural Advisory Services (NAADS) program, started in 2001, is part of the country's larger agriculture strategy. The goal of NAADS is to increase the proportion of market-oriented production by empowering farmers to demand and control agricultural advisory and information services. There is a special focus on poorer farmers and women farmers. An evaluation of the program summarized that the "NAADS program has helped to strengthen farmers' capacity to potentially demand and manage the delivery of agricultural advisory services that are likely to meet their local production and market conditions. However, the results were mixed, and it was difficult to determine if participants in the program had increased agricultural productivity that led to improved food and nutrition security outcomes, as compared to non-participants" (Benin et al 2011).

Capacity context

Through the NAADS program, farmers groups are assembled, supplied with inputs, and trained in new varieties of crops and livestock, as well as in post-harvest handling techniques. NAADS coordinators reported that nutrition is not a priority in the program and often, food security is perceived to equal

good nutritional status amongst extension agents (HKI et al 2011). However, at the national level, there is political recognition that EAS could play a role in improving nutrition. In 2009, Uganda's first lady Janet Museveni, urged the government to deploy nutrition extension agents in villages to fight malnutrition (All Africa 2013).

Although agricultural extension agents can impart nutrition information, the potential of their impact is limited by the nature of their interactions. Health and nutrition centers are therefore seen as playing an important role in educating mothers about nutrition. However, Uganda has only 1,600 extension agents to serve 4,000,000 million farmer households in Uganda,. One FSN contributor noted that:

"A solution may perhaps lie in a stronger role of the private sector such as engaging in public-private partnerships and embracing technology. There is a pool of Extension Link farmers that were in late 1990's trained by Uganda National Farmers Federation all over Uganda. Mobile phones technology can be used to complement extension efforts. Could such a model bring down the current expansive farmer-extension agent ratio and abridge the current information gap at the farm level?"
[Development Practitioner, Uganda]

The Uganda National Academy of Sciences (UNAS 2011) considers linking nutrition and agriculture, through Extension and Community health systems, as a key action toward addressing malnutrition in Uganda. The Academy has documented key areas of integration for nutrition into EAS for Uganda. Macro-level recommendations focus on education. Agricultural institutions of higher learning can embed nutrition into the curriculum, aided by subject specialists who can support the design and delivery of health and nutrition messages to farmers. Similarly in education, linkages are needed to develop an agriculture curriculum that includes nutrition education.

Lessons learned

Recommendations for the community-level integration of nutrition and EAS, include:

- **Linking health and agriculture EAS systems:** Employing nutrition extension agents and/or Village Health Teams (VHTs) who link their messages with agricultural extension agents in order to get important health and nutrition messages delivered directly to the farmer.
- **Fostering community demand:** Creating community demand for the information may help with the message reception.
- **Strengthening civil society to drive decentralization:** Delivering community-based services where civil society has helped decentralize EAS to local governments, which are then

empowered to choose different ways of implementing development programs according to client needs.

Learning from other fields

The prevalence of HIV/AIDS in Uganda has forced many development and health workers to look more carefully at non-traditional delivery channels that can reach vulnerable households. This access was encouraged to ensure delivery of services, but also to train community agents in the sensitivity of the disease and associated stigma. By mainstreaming HIV/AIDS into agricultural EAS, changes in attitudes can be realized, along with a shift in focus on HIV/AIDS from a health to a development lens. The association of an HIV-related stigma might limit opportunities for interactions with agricultural extension agents, thus decreasing the participation of HIV-affected persons in community development activities (Bishop-Sambrook 2004). The NAADS stated: "The extension agent has an important role to play to address the impact of HIV/AIDS on rural farming communities. With this in mind it is important for the extension agent to appreciate that not all households are affected the same way, in fact it has been shown that HIV/AIDS is having many different effects on rural households" (NAADS 2004).

The agricultural EAS organizations are not expected to be involved in the fight against AIDS in a medical capacity, but they can play an extremely important role in preventing, or at least minimizing, the further spread of the infection by educating the farming communities (Qamar 2003). Training manuals on HIV/AIDS and EAS have been developed, particularly for Uganda, which emphasize that the health sector should collaborate with agricultural extension officers to provide advice on how to improve agricultural productivity using new crop breeds and new technologies to reduce labor requirements (Government of Uganda and FANTA 2010). The nutrition community can learn valuable lessons from the global health and HIV/AIDS field.

BOX 6: Gender Informed Nutrition Agriculture (GINA)

GINA was a community-based approach for linking agriculture, nutrition, and gender to improve nutrition outcomes of children under the age of five years in three districts in the southwest of Uganda between 2005 and 2008. This program was supported by USAID, and operated in partnership with the government and local NGOs and universities. The program integrated the Essential Nutrition Actions into core activities, promoted improvements in farm management, and built market linkages. The approach also provided new agriculture techniques and practices through agriculture EAS.

GINA promoted, facilitated, and measured the uptake of several activities that crosscut nutrition, agriculture, hygiene, and sanitation. These activities included: backyard (home) and community gardening; growing and consuming nutrient-enriched food crops (orange-fleshed sweet potato-OFSP); an increased consumption of home or community-produced animal protein; monthly child weighing; and caregiver counseling. GINA had the following outcomes:

At the policy level:

- Formulated and implemented policies to address hunger, food security, and nutrition
- Positioned nutrition in the national development policy frameworks
- Formed multi-disciplinary advisory committees at the local level

At the nutrition level:

- Improved undernutrition in children
- Trained community leaders on essential nutrition actions
- Trained growth promoters
- Improved knowledge on infant and young child feeding practices

At the agriculture level:

- Improved farm management practices
- Increased availability of nutritious foods in households
- Increased technology transfer
- Improved linkages to local markets through farmer groups

The experience from GINA demonstrates that it is possible to achieve positive outcomes related to both agriculture and nutrition with a single integrated project implemented over a relatively short time (four years). It also shows that it is possible and productive to incorporate nutrition activities into District Development Plans (Jackson 2010).

Vietnam

This case study focuses on the Nutrition Improvement Project and its promotion of the VAC gardening system, a highly intensive method of small-scale farming in which food gardening, fish rearing, and animal husbandry are integrated in household plots. Implemented by the National Association of Vietnamese Gardeners (VACVINA), with strong institutional and donor support, the project benefited about 5,588 households in four provinces of Vietnam. The overall goal was to reduce vitamin A deficiency by raising household garden production and consumption of carotene-rich fruits and vegetables and animal source foods, while providing nutrition education for mothers of young children. The project took place in the early 1990s and today the VAC system is considered to be an effective food-based solution for dietary improvement and prevention of malnutrition (Hop, 2003). This case explores the overall project and the critical role that extension agents played in delivering nutrition interventions.

Nutrition and agriculture context

According to the latest UNICES Multiple Indicator Cluster Survey (MICS), 22.7% of children under the age of five years

in Vietnam are stunted, and the country continues to face tremendous challenges in the area of malnutrition (UNICEF 2011). Despite this high level of stunting, there has been remarkable progress in the last two decades in the reduction of micronutrient deficiencies such as vitamin A and iron in women and pre-school-aged children. Today, Vietnam's Vitamin A status is comparable to that of the UK and the USA (Thurnham 2012). Much of this success is attributed to the VAC farming system explored in this country case.

Institutional context

Funding for the Nutrition Improvement Project, the main platform for the promotion of VAC, was provided by the Government of Australia. FAO and other international organizations provided technical support. The project was administered by two Vietnamese institutions: the National Institute of Nutrition (NIN) and the National Institute of Fruit and Vegetable Production (NIFVP). At the field level, VACVINA was in charge of the project's interventions, including the training and management of extension agents. A national steering committee was formed to oversee the project and serve as a multi-sectoral coordination platform, consisting of representatives from various ministries, including health, agriculture, planning, as well as civil society and local government bodies.

Strategy

The Nutrition Improvement Project was implemented in 1991 in four provinces and included a total of 5,588 households with 3,716 young children (English and Badcock 1998). The overall goal of the project was to reduce vitamin A deficiency in Vietnam, via three areas of intervention:

1. Increasing household garden production, particularly to include more carotene-rich fruits and vegetables;
2. Promoting nutrition education among mothers with children five years of age and under; and
3. Performing baseline and follow-up monitoring of vitamin A status, household-garden production, food intake, and growth patterns of young children.

While the project had no impact on stunting, researchers highlighted the following results observed in participating provinces (English and Badcock 1998):

- Food and nutrient intakes of children, and their nutritional wellbeing, was significantly higher. Children in Khai Xuan were consuming significantly more fruits and vegetables, while protein, vitamin A, and iron intakes were increased.
- Mothers who had participated in the pilot project consisting of the nutrition education program demonstrated a better understanding of healthy nutrition and of the effects of vitamin A.



- The impact on nutrition education and increased household food production appears to have contributed indirectly to a significant reduction in the incidence and severity of acute respiratory infections and the incidence of diarrheal diseases among young children.

Extension agents played a central role in the promotion of home gardens that contributed to household food security by improving the family members' access to food. There is ample evidence to demonstrate how home gardens provide diverse, fresh foods that improve the quantity and quality of nutrients available to the family. Home gardens can provide about 50% of the vegetables and fruits a household needs, including plantains, cassava, taro, sweet potato, and other secondary staples (Marsh 1998).

In the case of the Nutrition Improvement Project, VACVINA was in charge of establishing household gardens based on the VAC system. The acronym 'VAC' is derived from a combination of Vietnamese terms meaning "garden, pond, and animal husbandry." The model was designed in Vietnam to complement what has traditionally been a rice-based diet. Although the first VAC systems sprang out of the Red River Delta, the system was later modified to function in Vietnam's three principal ecological regions: the coastal area, the deltas, and the foot-hills and mountains (ILEIA 1995).

The extension agents focused their efforts on families with young children and on crops rich in carotene, vitamin C, iron, or protein. To showcase farming practices and provide seeds and seedlings, extension agents were charged with setting up community demonstration gardens. Similarly, each community organized small groups of 10 to 20 women. Each group of women elected a leader to organize technical assistance and seed distribution for the project and to aid in motivating mothers to participate in home gardening (English and Badcock 1998).

Extension staff from the Ministry of Agriculture and VACVINA were trained in the cultivation of indigenous vitamin-rich vegetables using low-cost, low-risk methods. Individuals from the government's NIFVP led the training. The National Institute of Nutrition (NIN) performed capacity building with extension agents that centered on nutrition education themes such as food preparation, and nutrition content of crops, among others (English and Badcock 1998).

NIN specialists also trained volunteer community educators in how to collaborate with extension agents in the delivery of nutrition interventions to groups of mothers. The activities were more nutrition-specific and sensitive, including topics such as growth monitoring, education, preparation of weaning food, healthy family diets, growth contests, and radio spots.

The success of the Nutrition Improvement Project lay in its ability to take advantage of existing resources and promote both gardening techniques and nutrition education. Nutrition education is essential for guaranteeing linkages between garden food availability and consumption, and between consumption and utilization (Herforth et al 2012). Contextual issues such as seasonal food shortages, food storage, cooking practices, intra-household food distribution, and prevailing food taboos were also central to the design of the gardens. Training extension agents and community leaders in these two pillars enabled gardens to provide a year-round supply of nutrient-rich foods that were matched to local taste preferences (Marsh 1998).

Lessons learned

- **Community engagement:** Understanding the context and working with the community from early on is crucial for the sustainability of home gardening activities. Projects should develop a two-way information flow and collaboration platforms to disseminate knowledge among extension agents, group leaders, women gardeners, and their families.
- **Government buy-in:** To scale up home gardening projects, governments must provide basic policy support through appropriate research and EAS, providing basic access to land and water, and supporting land use regulations, especially in urban areas.
- **Economical gardens:** Extension agents should promote reliance on local materials for soil, water, and pest management. Local household or community seed production should also be encouraged to minimize handouts.
- **Gender dynamics:** Understanding the gender dynamics and societal norms in terms of taboos, intra-household food distribution, resource control, and others, are elements that need to be considered when designing home garden projects.
- **Nutrition education:** The most successful home gardening activities are those that incorporate nutrition education and awareness of the design and implementation of homestead gardens. For this, there is a need for effective collaboration between the health and the agriculture sectors.

Appendix Two: EAS Nutrition Survey

QUESTIONS ABOUT EXTENSION SERVICES YOU AND YOUR ORGANIZATION HAVE BEEN INVOLVED WITH.

These series of questions will ask you questions to determine if you have worked, trained or researched extension services in the country where you and your organization are working or have worked.

1. What is the name of your organization, project or institution?
2. Name of the person completing this survey?
3. Job title of the person completing the survey?
4. Which countries do you work in? (Please list the countries where you and your organization/project work).
5. Do you work with or train rural extension agents?
6. If you do train or work with extension agents, what specifically does your organization/project do?
7. Where has this training or work been conducted? Please list countries, and divisions. (National, Subnational, District, Community levels)
8. Have you done any analysis or research on rural extension services and nutrition or home economics?
9. If yes, what was the analysis/research? If there is a specific report or published paper, please include the reference and location of where the information can be sourced/downloaded.
10. Where has this research been conducted? Please list countries, and divisions. (National, Subnational, District, Community levels)

QUESTIONS ABOUT EXTENSION SERVICES IN THE COUNTRY WHERE YOU WORK.

These next series of questions will ask you about extension services in the country (or countries) where you and your organization are working or have worked.

11. What can rural extension do to ensure that people have access to and consume nutritious food?
12. What extension approaches have been used for delivering nutrition and home economic INTERVENTIONS to populations in the country where you have worked?

13. What GOOD PRACTICES can you share where extension agents have had direct nutrition and/or home economic activities within their core work?

14. What models exist for functional collaboration between ministries such as the Ministry of Health and the Ministry of Agriculture in providing nutrition within extension?

15. If you work in a SUN country*, does the government focal point for nutrition contribute to collaboration between relevant Ministries in a way that results in actual programming of nutrition-sensitive agricultural activities in the country's Ministry of Agriculture portfolio?

*<http://scalingupnutrition.org/countries-involved>

16. How do nutrition/home economics extension agents coordinate and/or duplicate work with rural workers from other sectors, e.g. rural health?

17. What nutritional MESSAGES/INFORMATION are shared with farmers and other clientele by extension agents or other actors/community workers?

18. What GOOD PRACTICES can you share where extension agents have played or are playing a role in the sharing of important messages/knowledge/information related to nutrition security?

19. What tailored messages can be communicated by extension agents to vulnerable populations with special diet requirements such as pregnant and breastfeeding women and infants?

20. What are the cost implications of including nutrition messages or activities into extension agent activities?

21. Are there providers have specialized nutrition or home economics extension staff to educate clientele on nutrition or home economics? If yes, what do they do and who pays for their services?

22. What TRAINING programs exist (pre- or in-service) for home economics and/or nutrition directed towards extension agents?

23. What CAPACITIES are needed to integrate nutrition into rural extension at the individual, organizational, and system levels?

24. What are some good practices in developing these capacities from your perspective?

25. Do you think agriculture extension a viable mechanism to deliver nutrition information at households? If yes, why? If no, why?
26. What percentage of extension agents are women in the country/district where you work?
27. Do the women extension agents have different roles compared to men?
28. Do female extension agents mainly reach men or women clientele?
29. What challenges are faced by existing extension services to incorporate nutrition and home economics? (e.g., training and supervision quality issues, constraints to work performance such as lack of transportation, task overload, supply bottlenecks, high extension agent turnover, challenges with targeting, etc.)
30. What opportunities are available for strengthening these services?

Appendix Three: Interview Questions

Background

1. Please provide a brief overview of your organization and your specialization.
2. Please describe any programs or projects you have worked on that involved extension and nutrition with respect to:
 - a. Geographic scope (countries, regions)
 - b. Project duration
 - c. Main objectives and activities/interventions related to nutrition and extension
 - d. Whether and how extension agents were involved in the project (e.g. training, education)
 - i. Extension service model
 - ii. Scale (national, subnational, district, community levels) and number of extension agents

Approaches to Integrating Nutrition into Extension

1. *Effective practices/models.* What extension approaches have been used for delivering nutrition and home economic interventions to populations in the country where you have worked (in addition to any previously mentioned)?
 - a. Are there extension service providers that have specialized nutrition or home economics extension staff to educate clientele on nutrition or home economics?
 - i. If yes, what are their core responsibilities and who pays for their services?
2. *Extension agent responsibilities* related to nutrition and/or home economics:
 - a. What are examples/good practices of extension agents that have had direct nutrition and/or home economic activities included as part of their core work?
 - b. What are examples of nutritional messages/information that extension agents (or other actors/community workers) share with farmers and other clientele?
 - c. What are the cost implications of including nutrition messages or activities into extension agent activities?
3. *Training, skills, and capacities*
 - a. What training programs exist (pre- or in-service) for home economics and/or nutrition directed towards extension agents?
 - b. What capacities are needed to integrate nutrition into rural extension at the individual, organizational, and system levels?
 - i. Human resources and skills
 - ii. Institutional capacity/coordination
 - iii. Financial resources
 - c. What are some good practices in developing these capacities?

4. Institutional aspects & collaboration

- a. What models exist for functional collaboration between ministries such as the Ministry of Health and the Ministry of Agriculture in providing nutrition within extension?
 - i. What types of policies enable this collaboration?
- b. If you work in a SUN country*, does the government focal point for nutrition contribute to collaboration between relevant Ministries in a way that results in actual programming of nutrition-sensitive agricultural activities in the country's Ministry of Agriculture portfolio?
- c. How do nutrition/home economics extension agents coordinate and/or duplicate work with rural workers from other sectors, e.g. community health workers?

5. Gender considerations

- a. What percentage of extension agents are women in the country/district where you work?
- b. Do the women extension agents have different roles compared to men?
- c. Do female extension agents mainly reach men or women clientele?

Moving Forward

1. What can rural extension do to ensure that people have access to and consume nutritious food?
2. Do you think agriculture extension is a viable mechanism to deliver nutrition information at households? Why or why not?
3. What are major challenges to incorporating nutrition and home economics into extension?
4. What opportunities are available for strengthening these services?
5. Do you have any recommendations for additional experts or resources/reports that we should consult?

Appendix Four: List of Stakeholders Interviewed

Type	Name of Organization	Name	Title
Academic	University of Il – NSRL	Bridget Owen	Associate Director
Academic	London International Development Centre (LIDC)	Jeff Waage	Director
Academic	University of KwaZulu Natal	Maryann Green	Prof & Senior Research Associate School of Agriculture, Earth and Environmental Sciences
Academic	Earth Institute	Pedro Sanchez	Director TropAg
Academic	University of Maryland	William Rivera	Expert on extension services
CGIAR	IFPRI	Alan deBrau	Senior Research Fellow
CGIAR	IFPRI	David Spielman	Senior Research Fellow
CGIAR	CIP	Jan Low	Leader Sweetpotato for Profit and Health Initiative (SPHI)
NGO	GFRAS	Kristin Davis	Executive Secretary
Donor	World Bank	Riikka Rajalahti	Sr. Agricultural Specialist in Innovation Systems at ARD
Donor	USDA, Division of Family and Consumer Sciences, Strengthening Families, Farms, Communities and the Economy	Cindy Reeves	National Program Leader for Nutrition & Health
Donor	World Bank	Diego Arias	Task Team Leader (Senior Agricultural Economist)
Donor	World Bank	Anna Herforth	Nutrition Specialist Health, Nutrition and Population
Government	SNEA	Ana Garcia	Home Extensionist
Government	Columbia Center Africa	Belay Begashaw	Former Minister of Agriculture, Ethiopia
Government	MOA SESAN Guatemala	Efrain Cifuentes Juarez	Provincial Delegate
Government	Ministry of Agriculture, Kenya	Felicia W. Ndung'u	Assistant Director of Agriculture, Home Economics Sub-division, Nutrition and Appropriate Technology
Government	Malawi Department of Agricultural Extension Services (DAES) and Malawi Forum or Agricultural Advisory Services (MAFAAS)	Paul Fatch	Principal Agriculture Training Officer for DAES and Secretary General for MAFAAS
NGO	Winrock/Sasakawa Africa Fund for Extension Education	Mercy Akeredolu	Coordinator
NGO	AVRDC	Jen Luoh	Researcher
NGO/Contractor	World Vision	Carolyn Macdonald	Nutrition Director in its Health and WASH
NGO/Contractor	SPRING-USAID	Elizabeth Williams	Country Manager
NGO/Contractor	Save the Children	Hugh Bagnall-Oakeley	Senior Hunger Policy and Research Adviser
NGO/Contractor	Action Against Hunger	Julien Morel	Senior Food Assistance & Policy Advisor
NGO/Contractor	Semilla Nueva	Kristin Lacy	Administrative Manager
NGO/Contractor	Digital Green	Lakshmi Iyer	Deputy Director-Strategy & Innovation
NGO/Contractor	World Vision	Raymond Owusu	Nutritionist Programme Specialist of WV Ghana
NGO/Contractor	African Green Revolution Alliance (AGRA)	Rebbie (Harawa)	Programme Officer for Soil Health
NGO/Contractor	DAI	Robert Salerno	Development Specialist

Type	Name of Organization	Name	Title
NGO/Contractor	CRS	Rupert Best	Senior Technical Advisor – Agriculture and Environment
NGO/Contractor	Farm Radio	Sheila Huggins Rao	AFRRI Program Coordinator
NGO/Contractor	Catholic Relief Services (CRS)	Valerie Rhoe	Senior Technical Advisor
UN	FAO	Charlotte Dufour	Food Security, Nutrition. & Livelihoods Officer
UN	REACH	Joyce Njoro	Senior Programme Officer, REACH Inter-agency Initiative on Child Hunger & Undernutrition
UN	FAO (Guatemala)	Luisa Samoya	Nutrition Specialist
UN	FAO (Rome)	Magdalena Blum	Research and Extension Division
UN	FAO	Stacia Nordin	Nutrition Officer (Food Security & Policy)
UN	FAO (Malawi)	Solange Heise	Nutrition Consultant

Appendix Five: Extension Training Programs

The following table illustrates some of the existing home economics and nutrition training programs for extension agents in Africa, as identified by survey respondents:

Country	Institution	Training Program
Ethiopia	WUR-CDI	2 weeks course in Agriculture-Nutrition Linkages
Malawi	Bunda College of Agriculture	MSc and BSc in Nutrition and Food Scienc
Malawi	Lilongwe University of Agriculture and Natural Resources	MSc and BSc in Nutrition and Food Science
Malawi	Natural Resources College	Diploma in Nutrition and Food Science
Uganda	Makerere University	<ul style="list-style-type: none"> • Training programs in applied human nutrition and community nutrition • Bachelor of Science in Nutrition • Bachelor of science in Applied Human Nutrition
Uganda	Bukalasa Agricultural college	Diploma in Nutrition
Uganda	Kyambogo University	<ul style="list-style-type: none"> • Training programs in applied human nutrition and community nutrition • Bachelor of Science in Nutrition • Bachelor of education (Home Economics)- in-service • Bachelor of Vocational studies (Home economics with Education) • Diploma in education (home economics) • Bachelor of Science in Nutrition and Dietetics
Numerous countries	Extension Staff	<ul style="list-style-type: none"> • Fortnightly trainings to share and update knowledge and information • Participatory training, sharing of best practices and a way forward for a sustainable community • In service Home Economists are given training on a monthly basis

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