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CRSP

Review of the Integration of Nutrition in the Feed the Future Implementation Plans for the LCC-CRSP Country Sites

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(photo by Shana Gillette)

1. Introduction

The President's Global Hunger and Food Security Initiative (GHFSI), known as Feed the Future (FtF), aims to reduce global poverty and hunger by stimulating the growth of the agricultural sector and improving the nutritional status of vulnerable populations, including women and young children, in selected target countries. (1) The FtF program functions through governments, development partners, researchers, and other stakeholders that share the resolve to reach the Millennium Development Goals (MDG). Improved agricultural productivity and enhanced market systems that benefit household incomes can contribute to food security and to decreasing malnutrition. The long-term effect of the FtF initiative will depend on its efforts to strengthen human and institutional capacity of target countries, including program monitoring systems, to assure that future economic and environmental crises will be successfully handled.

This chapter describes the nutrition themes and the existing gaps in the available implementation plans for the FtF program in the countries (Senegal, Mali, Ethiopia, Kenya, Tanzania, and Nepal) in which the Livestock Climate Change - Collaborative Research Support Program (LCC-CRSP) projects are located. Tajikistan is a LCC-CRSP site but the FtF implementation plan is not available at this time and a discussion of it cannot be included here. Tajikistan is included only in the initial discussion of nutritional concerns. The FtF nutrition focus was identified by the CRSP Council in 2011 to be of high relevance to the majority of the individual CRSPs, including the LCC-CRSP (2). The CRSP areas of activities that are highly relevant for nutrition include: agriculture productivity, community development, poverty reduction, gender, public health, and research. The LCC-CRSP countries each face unique challenges because of their diverse ecological, social and cultural realities. The FtF initiative takes the diverse settings into consideration by "supporting country led plans, comprehensively addressing the root causes of food insecurity, increasing coordination, utilizing the strength of multi-lateral institutions, and making sustained and accountable commitments (1)". The concept of food insecurity (see the Food and Agricultural Organization's (FAO) definition in the box on right) incorporates four components that must be addressed: availability, accessibility, utilization, and stability of food supply. The diverse challenges to these different components will be addressed in the discussion of the country-specific FtF implementation plans.

> "Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (3)

1.1 FtF indicators of nutrition

Improving nutrition is a critical step in reducing global poverty. As such, 13 nutrition indicators have been identified to evaluate the effectiveness of the FtF initiative (see Table 1). The indicators allow for a partial assessment of changes in national-level commitment to nutrition, human capacity (e.g., staff training in nutrition) as well as nutritional status improvements at the household and individual level. The focus of attention is placed on women of reproductive age and infants and young children under five years of age. The FtF program assumes that information will be available in each country through existing national-level information systems, such as the Demographic and Health Survey (http://www.measuredhs.com/) and UNICEF's Multiple Indicator Cluster Surveys (MICS; http://www.childinfo.org/mics.html), or through activities carried out by local implementing partners. Coordination of the LCC-CRSP projects with other

local data collection will be an important activity to assure that information on diverse indicators is available in each country.

Table 1. Feed the Future objective indicators that are related to nutrition

Type of indicator	National	Household	Women[1]	Children
Government program/ expenditures	% national budget spent on nutrition			# < 5 y reached by USG-supported nutrition programs
	# health facilities that can manage acute undernutrition			
Nutrition education	# trained in child health & nutrition through USG-supported programs			
Food security		% moderate/ severe food insecure		
Diet			Mean # food groups consumed	% 6-23 mo olds with minimal acceptable diet[2]
				% < 6 mo exclusive breastfed[3]
Anthropometry			% underweight[4]	% < 5 y stunted[5]
				% < 5 y wasted[6]
Biochemical status			% anemic[7]	% 6-59 mo anemic[8]

[1] Women of reproductive age, 15- 49 y of age
[2] Minimal acceptable diet is defined as follows: (Breastfed children 6–23 months of age who had at least the minimum dietary diversity & the minimum meal frequency during the previous day) / (Breastfed children 6–23 months of age)
and (Non-breastfed children 6–23 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day) / (Non-breastfed children 6–23 months of age)
[3] Exclusively breastfed: only breast milk with no additional food, water, or other fluids (with the exception of medicines and vitamins)
[4] Underweight: body mass index < 18.5 kg/m^2
[5] Stunted: height-for-age < -2 Z-scores
[6] Wasted: weight-for-height < -2 Z-scores
[7] Anemia in women: hemoglobin < 12 g/dl (< 11 g/dl for pregnant women)
[8] Anemia in children: hemoglobin < 11 g/dl.
Reference (4)

IFPRI:Flickr *A child in Bangladesh receives nutritional supplements.*

IFPRI:Flickr *Little girl eating a sweet potato in Uganda*.

1.2 FtF Nutrition Research Themes

The FtF initiative includes investment in research to support the overall objectives of improving agricultural productivity and market systems as well as to improve the nutritional quality of the food system (e.g., through promotion of improved nutrient-rich varieties of crops). The program recognizes the importance of strengthening institutional and human capacity locally, including extension services, that will permit new knowledge from applied research activities to be shared broadly. Challenges to food production will continue in the future as farmers face more severe consequences of climate change. Developing research capacity to address new threats is vital to the sustainability of the program achievements. However, future threats are not only towards agricultural productivity but also towards health. As an increasing portion of the world becomes urbanized, the challenges to obtain and maintain good nutritional status will change; populations that depend on food markets for the majority or all of their food will need assistance in making dietary and health decisions that optimize their health status. Thus, research activities need to include improving the nutrient quality and food safety of the diet as well as the capacity of the population to make good dietary choices and have the skills for food preparation.

The FtF research agenda includes a number of objectives that are directly related to nutrition – improving the quantity of food available through diminished pre- and post-harvest losses, and improving the quality of foods in nutrients and safety (5). These are expected to have a direct effect on the anthropometric and biochemical nutritional indicators of the population that can be measured with some of the proposed indicators shown in Table 1. Table 2 lists some examples of FtF nutrition-related research objectives. There is a noticeable absence in the research agenda of any work in the areas of (i) educational and other (e.g., economic, policy) approaches to improve consumer choices of food for the household, (ii) efficacy and effectiveness of programs to improve diets of targeted vulnerable groups, and (iii) other areas related to food consumption and utilization. Given the importance of food markets for both rural and urban households, a research agenda is required that reflects the entire continuum of agriculture - including nutrition.

Table 2. Nutrition-related objectives for the FTF research agenda

Objective	Examples of research topics
1) Increase productivity of grain legumes (nutrient-dense foods)	Expand climbing bean range in Africa
	Target key pests/diseases of legumes
2) Increase Micronutrient Density and Bioavailability	High-zinc, high-iron and high-vitamin A rice
	Vitamin A-rich sweet potato
	Iron-enhanced beans
3) Reduce/ prevent agricultural and food safety threats, notably zoonotic diseases and mycotoxin contamination	Aflatoxin resistance
4) Reduce Post-Harvest Losses	Protecting vegetables from pest damage
Reference (5)	

1.3. Nutritional status of infants and young children and women of reproductive age

The individual nutrition challenges of the LCC-targeted countries should be reflected in each of the FtF implementation plans. Data are available on maternal and child nutrition indicators from the individual country Demographic and Health Survey (DHS) studies (2005-2011) and the UNICEF Multiple Indicator Cluster Survey (MICS, 2005). The following sections discuss country differences for a few of the nutrition indicators. There does not appear to be a gender bias in feeding and child care in these seven countries; there

were similar rates of indicators of malnutrition among female and male children. Although there are similar concerns in each country, the following discussion will help prioritize these activities locally.

1.3.1. Stunting

A deficiency in linear growth occurs over time and, colloquially, is referred to as chronic malnutrition. However, the more precise term, stunting, is defined as a height-for-age (HAZ) that is less than two standard deviations below the median value (< -2 z-scores) of the World Health Organization's sex-specific growth reference (http://www.who.int/childgrowth/standards/en/) (6). Stunting has been associated with short-term (cognitive development/school rendition) as well as long-term (maternal mortality, work efficiency) consequences (7,8). The patterns of stunting during the first five years of life are diverse across the seven LCC-CRSP countries (see Table 3). Data are available from the DHS data sets between 2005 and 2011 for Ethiopia, Kenya, Mali, Nepal, Senegal, and Tanzania and the UNICEF Multiple Indicator Cluster Survey completed in 2005 in Tajikistan. The overall stunting rate for children < 5 y of age in Senegal (15.9%) was one-third that of Ethiopia (44.4%) and Nepal (42.7%). The rates of the remaining countries were very similar, within a tight range of 27%-35%. Globally, rates of stunting are higher in rural areas than urban areas. In contrast to all of the other countries that showed a 1.4- to 2.3-fold higher rate of stunting in rural compared to urban areas, the rate of rural stunting was equal to that of urban stunting in Tajikistan. Published research suggests that these ratios may look quite different after they are adjusted for confounding factors. Fotso (9) analyzed DHS data on rural/urban differences in the rate of stunting in 15 sub-Saharan African countries that had dramatic urbanization between 1980 and 2000 (from 22.0% to 35.6%). Of the seven LCC-CRSP countries, only Tanzania and Kenya were included in the analysis. Unadjusted, the rates were higher among rural than urban populations. When the statistical models were adjusted for community wealth, household wealth, and maternal education, the urban-rural differences disappeared in all countries except for Malawi (10). It is reasonable to assume that the unadjusted differences seen between rural and urban settings in the present comparisons may also reflect differences in income and accessibility of food and community resources such as health facilities and educational opportunities, and may disappear with a more complex modeling analysis.

The DHS and MICS surveys are cross-sectional; with all data collected at one time point, they are of limited use in understanding the timing of nutritional insults. The increase in stunting rates between 6-12 mo and 12-18 mo could be caused by the accumulation of additional cases of stunting when they were 12 -18 mo old or it could be caused by a higher 0-12 mo stunting rate in the children who are now 12-18 mo old. Without longitudinal data on individual children, it is not possible to distinguish between these two scenarios. To compare prevalence rates across age groups from cross-sectional data, one would have to assume that conditions that affected nutritional status were similar across the years; this is unlikely to be the case in the seven countries studied. The data in Table 3 reflects children who were alive between 2000 (5 y olds from Senegal and Tajakistan) and 2011(infants from Ethiopia). During this decade, all seven countries were affected by major disasters including droughts and/or floods that led to displacement, loss of crops and livestock, and hunger/famine (e.g., Ethiopia) among millions of people. Each of these cohorts (e.g., < 6, 6-11, 12-23 mo) may have experienced different early nutrition challenges.

However, with this important caveat in mind, given the absence of longitudinal data, some comparison across age groups is useful to help know where to focus research and intervention activities. The age at which prevalence of stunting is highest over the first five years of life varies by country. Very early stunting (<6 mo) reflects deficiencies in birth length and poor early breastfeeding practices. The seven countries can be divided

into two groups: those with low prevalence of stunting in the first half of infancy (5.2-6.0 % for Kenya, Mali, Nepal, and Senegal) and those with high prevalence (9.7-10% for Ethiopia, Tanzania, and Tajikistan). Clearly, attention needs to be paid to prenatal and early postnatal nutrition in the latter three countries. For example, childhood stunting in Ethiopia is present at birth; this is consistent with the 2011 DHS report that about one-third of births were low birth weight (10). Appropriate interventions may include food and/or micronutrient supplementation during pregnancy to assure adequate birth outcomes, delayed cord clamping to improve iron status in early infancy, promotion of exclusive breastfeeding during the first six months of life, and/or maternal micronutrient supplementation to improve nutrient transfer through breast milk (11). Poor complementary feeding practices that contribute to inadequate macro- and micronutrient intakes and high morbidity may explain high prevalence of stunting in late infancy. The stunting rates are substantially higher during the second half of infancy in Kenya and Nepal – where rates increased four-fold to over 20%. Kenya experienced a drought during the year of the DHS survey (2008) that affected 3.8 million people (about 10% of the population); this natural disaster may explain partly why the rates are much higher than other countries. (12).

The rate of stunting during the 2nd half of infancy doubled from that of early infancy in Tanzania (9.7 to 21.6%) suggesting that a focus on both exclusive breastfeeding and complementary feeding as priorities during infancy is necessary for Tanzania. In contrast, Ethiopian 6- to 12-mo-old infants experienced a much slower increase in stunting, reaching only about 1.2-fold higher (12.2%) in the second half of infancy. The three- to four-fold higher rates of stunting among 6-12 mo olds compared to < 6 mo in Mali and Nepal would suggest that the nutrition programs in these two countries should focus first on weaning foods during late infancy.

Other changes across the 5 years were similar across the countries, with the exception of Ethiopia –the only country with an increase in the stunting ratio between two and three years. This may reflect a continued dietary or health problem in toddlers but may also reflect the effect on these children of the droughts of 2008-2009.

1.3.2. Wasting

Wasting is an indication of a recent insult that has resulted in a low weight for the height of the child (< -2 Z-scores weight-for-height [WHZ]). Wasting is often referred to as acute malnutrition and may reflect inadequate intake of macronutrients as well as recent illnesses. The country patterns of wasting showed diverse patterns across these seven LCC-CRSP countries (Table 3). The overall wasting rate was lowest for children < 5 y of age in Tanzania (4.1%); this was one-third that of Mali (13.7%) and Nepal (11.8%). The rates of the remaining countries were between 5.6 and 9.7%. Senegal, Kenya, and Nepal had the highest rural-urban ratio of wasting; in contrast, Ethiopia had higher rates in the urban than rural areas. There was less rural - urban differences in Mali, Tanzania, and Tajikistan. Rates of wasting were highest in the 12-23 mo olds in all countries except Ethiopia where the highest rates were in older children (36-47 mo olds). Zeitlin et al. (13) reported the challenges of complementary feeding in the second year of life in Bangladesh. The energy from complementary foods did not increase as energy from breast milk decreased between 13 and 18 mo of age, leading to a stagnation in total energy intake. Similar dietary patterns in these countries could contribute to the high rates of wasting.

1.3.3. Anemia

Information was available on prevalence of anemia for five of the seven LCC-CRSP countries (Table 3). In Ethiopia, Nepal, and Tanzania about half of children < 5 y of age (44.2-59.8%) were anemic whereas the West African countries of Senegal and Mali had much higher reported rates (79.2 and 82.2%, respectively). Anemia in women was lower than in children. In Ethiopia, Nepal and Tanzania, rates ranged from 16.6 to 40.1%; rates in Senegal and Mali again were much higher (68.5 and 63.7%, respectively). Rates of any anemia as well as severe anemia did not differ by location for children. Only rates of severe anemia among women in Ethiopia showed a rural-urban difference with a ratio of 3.5. The causal factors of anemia were not reported; however, it is likely that much of the anemia is related to infection as only about half of anemia is thought to be related to iron deficiency (14).

1.3.4. Overweight and obesity

The increase in urbanization, decrease in physical labor, and increase in access to high-energy, dense foods have contributed to the rise in the prevalence of overweight and obesity throughout the world; the African and Asian continents are not an exception. National representative data of the body mass index (BMI) for women of reproductive age are available for the seven LCC-CRSP countries (Table 3). The rates of being overweight ($\geq$ 25 kg/m^2) or obese (> 30 kg/m^2) among adult women are low only in Ethiopia and Nepal. In the other five countries, about one-fifth of women have unhealthy excess weight. The prevalence is higher in the urban centers compared to rural communities; however, it is important to note that it is also present in the rural areas. Understanding how the dynamics of under- and over-nutrition co-exist is a challenge; increasing the availability of food is not the sole answer to the nutritional concerns of many communities in the LCC-CRSP countries.

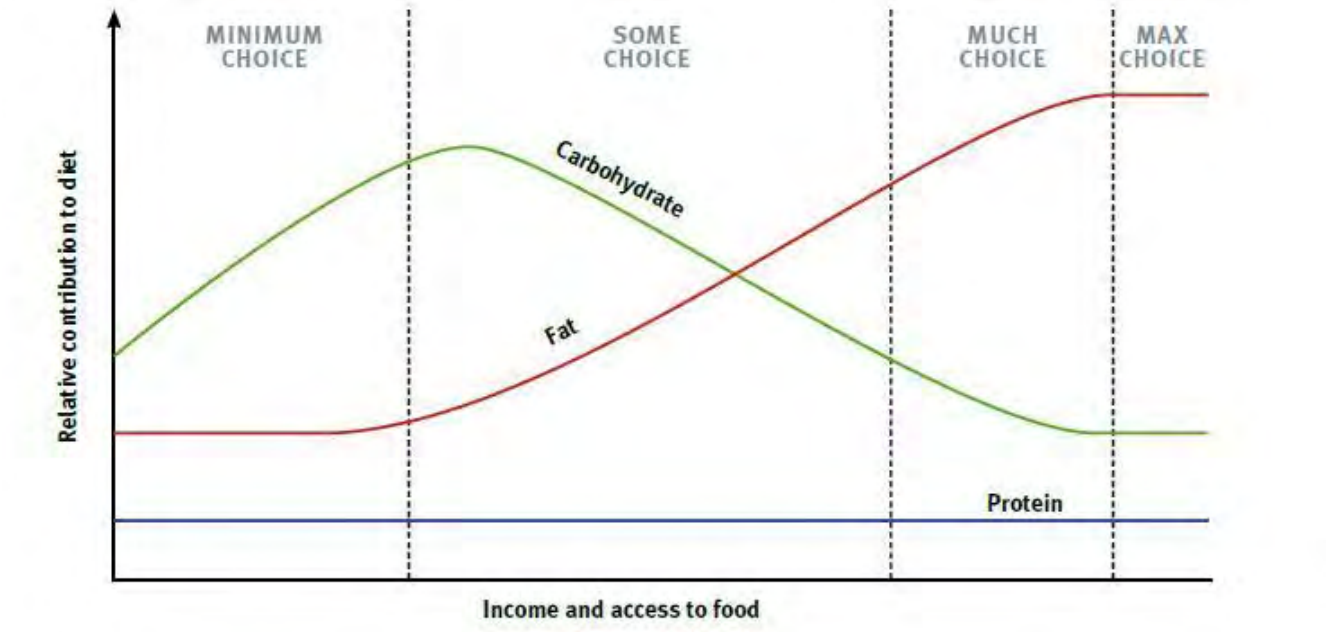

Figure 1. Increase in Food Access Leads to Shift in Dietary Energy Sources
Source: *Achieving food security in the face of climate change: final report from the Commission on Sustainable Agriculture and Climate Change*. 2012 CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Table 3. Stunting, wasting, anemia and overweight in infants, young children, and women in LCC-CRSP countries

	Ethiopia	Kenya	Mali	Nepal	Senegal	Tanzania	Tajikistan
	2011[1]	2008-09[1]	2006[1]	2006[1]	2005[1]	2010[1]	2005[2]
STUNTING							
Total	44.4	29.5	33.9	42.7	15.9	34.9	27.0
By location							
Urban	31.5	21.7	23.9	29.0	8.6	24.3	26.1
Rural	46.2	31.1	37.8	44.6	19.9	37.5	27.3
By age							
< 6 months	10.0	5.4	6.0	5.2	5.2	9.7	10.8
6-11 months	12.2	21.8	17.4	21.5	7.3	21.6	19.4
36-47 months	49.9	28.8	40.9	52.7	20.5	39.9	30.5
48-59 months	57.1	29.1	35.2	55.5	17.9	34.7	31.4
By sex							
Male	54.6	30.4	35.3	41.0	15.7	36.5	28.2
Female	49.1	28.5	32.5	44.5	16.1	33.4	25.6
WASTED							
Total	9.7	5.6	13.7	11.8	7.8	4.1	7.2
By location							
Urban	5.7	4.4	12.7	7.3	6.0	4.5	7.4
Rural	10.2	5.9	14.1	12.4	8.7	4.0	7.1
By age							
< 6 months	5.7	3.4	10.0	2.8	5.4	2.3	8.8
6-11 months	10.2	5.6	22.1	10.3	7.9	7.0	11.1
36-47 months	18.9	3.2	8.0	8.3	4.5	1.7	2.5
48-59 months	16.1	6.3	7.5	7.5	6.3	2.6	2.0
By sex							
Male	11.0	6.4	13.9	11.6	8.7	4.3	7.2
Female	8.4	4.8	13.5	12.0	6.8	3.9	7.2
ANEMIA (< 5 y)							
Total	44.2		82.2	49.1	79.2	59.8	
By location							
Urban	35.2		71.9	41.2	76.7	61.7	
Rural	45.4		86.0	50.2	80.6	59.3	
ANEMIA (Women)							
Total	16.6		68.5	36.2	63.7	40.1	
By location							
Urban	10.9		61.8	29.0	62.3	43.5	
Rural	18.3		72.1	37.5	64.9	38.8	
OVERWEIGHT/OBESE (Women)							
Total**	3.6*	22.0	15.9	6.0	22.1	19.4	
Rural/urban		18/38[3]			14/29[3]	22/39[4]	24/37[5]

*DHS 2005 ** includes both overweight and obese

[1]Reference (15); [2]Reference (16); [3]Reference (17); [4]Reference (18); [5]Reference (19).

2. Country-specific FtF implementation plans

The above discussion on nutritional status indicators illustrates the need for diverse approaches to reduce malnutrition in LCC-CRSP countries. Although mothers, infants and young children are vulnerable in all of the LCC-CRSP countries, the severity, timing, location, and type of nutritional problems vary. FtF implementation plans need to consider the local context to prioritize the nutrition problems to address first. Local collaborations will be key to assure the relevancy of activities and documentation of results. The following section reflects on (i) the available country-specific FtF plans related to improving nutritional status, (ii) the specific nutrition needs and challenges that each country faces as identified by the FtF documents and a review of recent scientific literature, and (iii) the gaps between the plans and the needs. The 2010 FtF Implementation Plans, 2010 FtF Strategic Reviews, and the 2011-2015 Multi-year Strategy Plans were available for all of the LCC-CRSP countries except Tajikistan.

2.1. Senegal

In 2001, 23% of the population lived in and around Dakar; by 2015, this is expected to reach 50% (20). Even with a rapidly growing urban population, agriculture, directly or indirectly, provides the livelihood for the majority of Senegalese (85%). Agriculture has been the focus of poverty alleviation programs by the Senegalese government to increase production and food security over the last decade (e.g., Great Agricultural Offensive for Food and Abundance" (GOANA). These agricultural initiatives have not had a clearly designed nutrition focus. However, since 2000, Senegal has made substantial strides in improving the nutritional status of its population through the World Bank-funded Nutrition Enhancement Program (NEP). (21). The program expanded access to a variety of nutrition activities for vulnerable populations (especially children under five years of age). Community-based nutrition activities are carried out by community agents who do monthly growth monitoring and evaluation of children under two years of age, home visits of malnourished children, community cooking demonstrations, and other health service activities. In 2006, only 15% of children < 5 y in rural areas were reached; by 2011, 50% of children received community-based services. The program reported a 30% increase in exclusive breastfeeding and at least 40% of pregnant women and children were sleeping under bed nets.

Weihler (22) provided a qualitative situational analysis of nutrition-related activities in Senegal by the Ministry of Health and non-governmental partners. Senegal is expected to meet the MDG by 2015. The country has national policies to support infant feeding and breastfeeding practices have dramatically improved since the 1990s. However, continued support is needed for in-service training as well as better evaluations to document what is working and where programs are not as successful. In contrast to breastfeeding, there is a dearth of information on the adequacy of complementary feeding in Senegal, with no detailed studies on the quantity and quality of diets or their ability to meet nutrient requirements. There has been progress in addressing micronutrient deficiencies with the support for vitamin A fortification of oil, zinc supplements to treat diarrhea (although no preventive program exists), iron-folate supplementation for pregnant women, promotion of dietary consumption of iron-rich foods, as well as intestinal parasite and malaria control. The continued high rates of anemia suggest that additional efforts are needed.

2.1.1. Senegal FtF Implementation Plan

The box on the right lists the core areas in which FtF investment is focused in Senegal. The focus of the 2011-2015 strategy was changed substantially from the initial 2010 Implementation Plan and now closely integrates agriculture and nutrition (20,23). The focus for agriculture productivity and value added markets is on rice, maize, millet and fisheries. The FY 2010 was the first year that funds were dedicated directly to nutrition. The FtF integrated efforts will be focused on two areas of the country that have the highest agricultural potential and the highest poverty and undernutrition rates: Senegal River Valley and the Southern Forest Zone.

FtF core areas for Senegal
*Increase agricultural productivity & market linkages
*Increase coverage of Essential Nutrition Actions & integrate nutrition into agriculture value chains
* Enhance policy environment
* Improve rural infrastructure & access to finance
* Increase institutional and human capacity

Given the success of the NEP initiative, part of the FtF plans related to nutrition will include support of the expansion of NEP activities. The FtF supports nutrition activities at the community, health facility, and national policy levels (see Table 4). Integrating nutrition and agricultural activities will increase coverage and amplify program effects to improve the quality and diversity of the diet. The focus of FtF community-based and health facility-based activities are focused on prevention as the majority of deaths in young children are related to mild and moderate malnutrition (24). By the end of the FtF in 2015, it is expected that Senegal will meet its MDG target of a 50% reduction in hunger (as measured by prevalence of underweight).

The national level activities focus capacity building at the governmental and non-governmental levels. The 2011-2015 plan includes building local capacity in health policy, food industry, and higher-level training through agriculture university-level and training institutions. Although it is mentioned that some of these institutions have nutrition, it is not clear how much of the capacity building will be targeted to nutrition.

Table 4a. Activities related directly to nutrition that are supported through FtF in Senegal[1]

Community	Institutional facilities	National
Expansion of NEP	Enhance community-clinic referral linkages	Develop community health policy
Increased agriculture productivity and market linkages for rice and maize (millet and fisheries as a secondary priority)	Essential Nutrition Actions (ENA: iodine, exclusive breastfeeding, adequate CF, nutrition during illness/severe malnutrition, vitamin A for women and children, iron for women and children)	Formalize food fortification policy framework and regulations[2]
	Increase technical capacity of nutrition service delivery staff	Expansion of infrastructure that will increase access to nutrition counseling and care facilities
	Enhanced training of agricultural extension staff in nutrition	Monitoring & evaluation system
	Local production of enriched post-weaning supplementary foods	Higher education-level training

[1]Reference (20)
[2]FY 2009 presidential decree making it compulsory for manufacturers to fortify soft wheat flour with iron/folic acid and edible oils with vitamin A

2.1.2. The unique food and nutrition situation in Senegal

Agricultural production in Senegal is focused on exports - primarily peanuts (30% of production), a crop with a low value-chain profitability. The agricultural sector does not meet the domestic food market needs due to low soil fertility and irregular rains and has to import a high percentage (70%) of its food. The high dependency of the country on the world food market makes the population vulnerable to food price fluctuations. This is true even for rural communities that are affected by unstable prices earned for their export crops as well as the fluctuating prices for food that they must purchase for their families. About 39% of rural household expenditures are on food. (25). High food prices are problematic because of low income (26). In rural Senegal today (25), consumption of imported foods is more common, including powdered milk, tea, coffee, sugar, rice, and other cereals. Fatimata estimated that only 10% of rural households studied were able to produce all of the cereals needed for home consumption; the remaining 90% purchased from the market. One-third (34%) of households purchased rice. In this study, household food purchases increased with higher incomes of both men and women. Fish is the principal type of animal source foods in Senegal, accounting for 70% of total animal protein consumed. The annual per capita fish consumption is 26 kilograms compared to a worldwide average of 16 kilograms and is highest among SSA countries.

The results from the Millennium Villages Project (MVP) demonstrate the importance of considering local context when designing interventions. The MVP villages received sustained integrated interventions in agriculture, health, education, gender equality, and infrastructure and business development to help the communities meet the MDG (27). Although stunting rates dropped by 43% overall in the nine MVP countries, stunting remained unchanged in the Senegal site (baseline vs. 3 years: 30 vs. 31%). A recent analysis by Remans et al. (28) suggested that the MVP interventions were less effective for communities that had a high dependence on cash crops; further analyses are needed to understand the diverse responses across sites. These MVP results support the FtF approach to focus not on subsistence farming but on increasing rural incomes through strengthening markets and infrastructure so that households are able to purchase sufficient food. This also emphasizes the need to increase household nutrition knowledge to purchase adequate diets for their vulnerable members. Both improvement of income and knowledge are essential. In contrast to the MVP results, the NEP initiative documented improved nutritional outcomes among young children. The initiative documented an increase in exclusive breastfeeding (34% to 63% in five years, 2006-2011) and improved 0-24 mo weight gain in targeted children (29). At baseline, 50% of targeted children had adequate weight gain; after five years of the program, this increased to 80%. However, situations in the country are diverse; severe nutrition problems remained in some areas, as documented by the Standardized Monitoring and Assessment of Relief and Transitions (SMART) survey in 2008 in which wasting rates were over 15% in one of seven departments studied (30).

2.1.3. Gaps between FtF Implementation Plan and nutrition needs

The growing appreciation that agriculture and nutrition need to be closely linked has resulted in the 2010 FtF including nutrition as part of the agriculture development program. Activities to increase specific commodities were considered with a rationale that included nutrition. The dramatic change in the FtF plans from 2010 to 2011-15 suggests substantial input from experts in nutrition. It is important that nutrition input in the form of an in-house expert be available to the Mission as these plans are carried out. Given the important role of nutrition that has been recognized by FtF initiative, it is vital that expertise be available to

oversee the diverse activities in capacity building and integrating nutrition into health and agriculture-related programs.

There is a need for better monitoring and evaluation which requires trained personnel. Weiler (22) suggested the following areas of research are needed: (1) research for adapting training materials and programme protocols to programmatic needs; (2) improve and carry out monitoring and evaluation that identify effective programme components; and (3) apply these findings in developing, expanding and improving effective programmes. This last item requires support for higher level education – including MSc and PhD programs. Continued support of young professionals is needed to assure professionals in the future. There needs to be a plan for the sustainability of the NEP program – which includes integrating community workers into a formal system and implementing a sustainable training program.

There appears to be no recognition of the growing problem of overweight in Senegal. With the rapid increase in urbanization (expected to be 50% by 2015), there should be some mid-term plans to address this concern, which will have dramatic effects on the health services in the future as diabetes and other chronic diseases become prevalent. The FtF plan discusses collaborations with programs that address acute need but there is no thought given to the overall nutritional status of the population, the implications of moderate/mild malnutrition or the inevitable changes that will be faced by the country in the near future as half of the population becomes urban. Given the relatively low rate of stunting in Senegal compared to other countries in SSA, it seems prudent to begin to have a more comprehensive view of the nutrition situation. Interventions that help consumers make good food choices work to address both under- and over-nutrition.

Finally, given the very high rates of food that is purchased in the urban and rural settings, discussion needs to be given to how to provide education on how to purchase the best foods for least cost. This is a country that should have as a strong focus of its nutrition education, the concept of "best buy". Experience could be learned from examples in Latin America (see http://peru.nutrinet.org/banco-de-conocimiento/noticias/260-compra-17-08-09).

2.2. Mali

In contrast to Senegal which imports the majority of its food, Mali produces sufficient cereals to meet its domestic market. Small farmers make up 90% of all agricultural production (31). Despite adequate production at the national level, accessibility to sufficient food is a problem for some of population even when food prices are low. Poverty is a rural problem in Mali; in 2001, the rate of poverty in the rural areas were almost four-fold higher to that of urban areas (73% vs. 20%) (32). Overall, 55% of the population is classified as very poor.

Agriculture makes up 45% of the GDP; however, it is estimated that up to 80% of the population will benefit directly or indirectly from improved agricultural production and markets (31). To address poverty and food insecurity, the government of Mali initiated the Agriculture Framework Act and the National Agricultural Investment Program (*Plan National d' lnvestissement. Prioritaire du Secteur Agricole;* PNIP-SA). The approach has five priority areas: capacity development, investment, production and competitiveness, training and research, and food security & nutrition education. Nutrition is also addressed by the Ministry of Health's Health and Social Development Plan II which focuses on preventive interventions and control of micronutrient deficiencies (REF: FANTA 2: Mali CMAM Review Nov 2010). The multisectoral national

nutrition policy aims to improve the nutritional status of women and young children; the emphasis on micronutrients is iron and iodine.

2.2.1. Mail FtF Implementation Plan

The core FtF investment areas for 2011-2015 are shown in the box to the right. The emphasis for FtF value-chain activities are on sorghum/millet, rice, and livestock; these are areas believed to have the greatest effect on reducing poverty, increasing agricultural GDP growth, and improving nutritional status of the vulnerable population. Increased income is expected to result from improved markets, through expansion of value chains, and improved regional trade. The focus of the FtF is the rural smallholder to increase the participation of the very poor.

Mali FtF core areas
* Strengthen priority value chains
* Address high levels of nutritional deficiencies
* Improve enabling environment
* Build education & research capacity

In FY 2010, there was interest in FtF initiatives to integrate additional components, especially in nutrition. The focus in nutrition is on preventive services. FtF will work towards increasing the capacity of government and non-governmental agencies to be able to carry out the expanded programs. There is a focus on broad-based approach that will increase agricultural productivity, amplify economic growth and food security, and contribute to related behavior change communications programs in agriculture and nutrition.

The FtF included "near-term" capacity building in agricultural research, economic and policy analysis, agribusiness management, and natural resources management. The training will be in country as well as in the US/other country universities. In the multi-year strategy for 2011-2015, nutrition training is supported in country. USG/Mali focus is on the areas of Sikasso, Mopti and Timbuktu as well as two communes of Segou (31). The multi-year (2011-2015) strategy focuses on nutrition during pregnancy and the first two years of life. There are strategies to improve maternal and child care and dietary diversity through social behavior change campaigns and strengthening health services, as well as influence outcomes through multi-sector policy advocacy and improved agriculture-related incomes.

Behavior change promotion through all possible channels ("no missed opportunities") requires coordination with diverse sectors to assure a consistent message. In addition, support of local industry development of nutrient-rich infant complementary foods to improve the diet is being considered. The support of nutrition will include training of staff and support of existing preventive nutrition activities (such as the *Semaine d'Intensification des Activites Nutritionnelles* [SIAN], Child Nutrition Weeks for growth measurement and counseling, vitamin A supplementation, and diarrhea kits), other facility- and community-based nutrition programs, prevention and treatment of childhood illnesses, nutrition rehabilitation services, and ante- and post-natal service delivery. There are also activities that cross ministries including support of development of laws and technical assistance with fortification of wheat flour, and enforcement of fortification of salt with iodine.

Table 4b. Activities related directly to nutrition that are supported through FtF in Mali[1]		
Community	**Institutional facilities**	**National**
Implement programs to: Increase agriculture productivity Diversify crops Increase access to water Reduce post-harvest losses	Continue to support strengthening of service delivery of maternal, child and reproductive health services, including nutrition services	Work with other donors and partners to support an elevated inter-sectoral nutrition that can effectively promote and coordinate nutrition policy
Strengthen communities' capacity to prevent and manage malnutrition and govern health resources and facilities	Assist millers, processors, traders and marketing: Improve marketing of products, including complementary and fortified foods	Operational research to determine effective interventions to improve anemia prevention and treatment efforts at the community level through the Scaling-Up Nutrition (SUN) process
Plan a behavior change communication strategy to reduce under-nutrition, link to interventions above	Integrate delivery of health education and behavior change messages into credit service platforms	Continue to provide technical support to the Ministry of Health to re-evaluate ten-year health strategy and to plan for the next ten years with stronger emphasis on role of nutrition in health
		Support to enact and enforce industrial food-based fortification legislation
[1]Reference (31)		

2.2.2. The unique food and nutrition situation in Mali

The etiology of very poor infant and young child nutritional status in Mali includes inaccessibility to diverse food because of poor agricultural production, low purchasing power, poor pregnancy outcomes, and poor child-care practices. Inadequate maternal nutrition has severe repercussions on birth outcomes. UNICEF data (2006-2010) documented a rate of 17% low birth weight newborns (35); LBW is a primary determinant of subsequent growth.

Daily energy consumption is below recommended levels in Mali (33). Increasing per capita energy consumption to recommended levels (from 2,571 to 2,770 kcal/person/day) has been estimated to increase per capita GDP growth rate between .034-1.48 %/y (34).

Increased income-generating activities among Mali women have resulted in mixed outcomes for child nutrition, depending on the type of income- generating activities, who has control over income made, and child-care practices while the mother is working. In a recent study, an increase of 1 hour in time spent on maternal income-generating activities was associated with a decrease of 0.1 height-forage z-score and a 50% reduction in the odds of the child's having an animal protein intake of more than 10 g (odds ratio = 0.5). However, maternal control over income and the capacity to cultivate peanuts, a cash crop, had a beneficial effect on children's weight-for-height z-scores. (36)

2.2.3. Gaps between Mali FtF Implementation Plan and nutrition needs

Substantial attention is given to nutrition in the Mali multi-year (2011-2015) FtF strategy. The target population is appropriate with activities focused on regions with the highest rates of malnutrition, and among pregnant women, infants, and young children. However, it appears that funds are not in the core FtF to adequately address nutrition. The plan states that FtF will "leverage non-Feed the Future funding to

implement a learning agenda to better understand the root causes of malnutrition and the impact of specific interventions" (31). If nutrition is core to FtF, funds should be there. In addition, there appear to be a few gaps between what is planned and the needs of the country.

First, the 2010 FtF plan suggested that there is inadequate expertise in the Mission and locally to address nutrition concerns of Mali. The multi-year strategy document states that the Mission has expertise in behavior change; however, it is not clear that the staff member has sufficient expertise in nutrition to assist all of the nutrition-related components of FtF. Substantial effort also should be given the building local capacity in nutrition, at the household, professional staff, and university levels. The development of local researchers who can cross sectors is needed to work within the multi-sectoral approach of the government and FtF. This will require commitment to post-graduate training in nutrition and substantial training locally.

The 2010 Plan states "Working with US universities is essential for technology transfer, training and assistance in livestock, aquaculture and fisheries, millet/sorghum and related human resources management." (32) It is also essential for nutrition. The multi-year strategy FtF document describes the need for nutrition, but it is substantially less developed than the agricultural section, leading to the risk that it will receive less attention and funds. No specific reference is made to nutrition higher education (in contrast to agriculture). Second, the research agenda in nutrition appears to be limited to one very specific research question (operational research on whether improving existing health service coverage can decrease anemia rates). This appears to be through the Health Care Improvement Project format which is an interesting approach to improve health services. In contrast, the agriculture research questions related to management practices and improved crops and livestock are ample and numerous.

Given the diverse nutrition and dietary problems that were discussed earlier including reference to poor feeding behaviors and problems of dietary diversity for women and children, and the implication of integration of nutrition education into diverse sectors and through diverse mechanisms (not only health services) nutrition research in the FtF is substantially underdeveloped. The documents suggest that there is a substantial gap in the Mission's understanding of the nutrition situation; nutrition expertise appears to be needed to understand the contributing factors to the local nutrition situation.

Third, the behavior change messages will focus on water quality and treatment, care and feeding during episodes of diarrhea, infant and young feeding practices, maternal nutrition, and dietary diversity. This gives the impression that many messages may be produced, diluting the effectiveness of a campaign. A few key messages should prioritize the most important needs based on local knowledge. Previous research on feeding during episodes of diarrhea from multiple countries during the 1980's suggests that this may not be a successful intervention (37); focusing on infant diets in general (most likely a much larger problem) may be a more effective approach to improving children's nutritional status.

Communication campaigns need to include "how" messages, a component that is typically missing. Families need practical advice on how to achieve the outcome of interest – be it water treatment or healthier birth weights. If much of the education intervention will happen through the volunteer health workers, there needs to be thought given upfront to the sustainability of the program and the mechanisms for renewed training. It is not clear if their sole source of income will be through the selling of health products and the continued access to those products.

Fourth, although dietary diversity is recognized as important, no data are presently available to measure this outcome at baseline; future data collection appears to be at the project level. It is difficult to understand how FtF will be able to document any change in women's (or children's) diets without baseline data.

2.3. Ethiopia

Ethiopia is one the poorest countries in the world with a per capital annual income of $170 (38). In contrast to Senegal, which will soon have half of its population living in urban centers, more than 85% of the Ethiopian population lives in rural areas. The country is described as having three areas: production, pastoral, and hungry. There are substantial challenges to addressing the problem of food insecurity in Ethiopia, including small land holdings (average < 1 hectare and 1/3 with < 0.5 hectares), lack of access to irrigation and inputs, low yields, absence of road infrastructure contributing to the weak markets, and extremely high levels of illiteracy. However, it also has been one of the fastest growing economies in Africa and the percent of the population that lives under the poverty line is dropping (now at 38.7%).

Diao (39) suggested that the government of Ethiopia should focus on development of staple crops and livestock as the priority for poverty reduction. Growth in agricultural production will require investments in roads and markets. Given the heterogeneous nature of the country, diverse responses are needed to decrease poverty. The "hunger" area of the country, where staple food availability is 50% of the national average, has 50% of the poor. Market development is needed to increase availablilty of food to purchase and improve food prices in the hunger area. In addition, balanced approaches are needed to improve agriculture and increase other means of income generation. Holmes et al. suggested that although Ethiopia has instituted the Productive Safety Net Programme (PSNP) to provide food and cash transfers to chronically food insecure households, the effect of food price crises is not completetly eliminated because the purchasing power of that cash declines with increasing food prices, thereby diminishing the effect of the program. Given the vulnerability to climatic disasters, 12 M people depend on food aid during the year (40).

The Ethiopian government has been strongly decentralized to the woreda (district) level since 1991 and supports a large extension system in rural areas that often includes three agricultural and two nutrition extension workers in a village. Extension agents are trained in crop, livestock, and natural resource management; health extension workers are trained in growth monitoring, family planning, micronutrient supplementation and deworming campaigns, and home environment interventions among other activities. The nutrition extension workers are part of the National Nutrition Program, which also supports health services nutrition programs, broad-based institutional and capacity building, development of a nutritional surveillance system, and most recently a food fortification initiative.

2.3.1. FtF Implementation Plan for Ethiopia

The core areas of focus for the FtF in Ethiopia are shown in the box to the right (41). Agricultural Growth-Enabled Food Security is focused on agricultural productivity and prioritizing the following value-chain commodities: maize, wheat, coffee, honey, and chickpea. Programs within the "Linking to Vulnerable Markets" focus on preparing chronically food insecure households and pastoralist communities to participate in improved markets as well as in other income generating activities.

Ethiopia FtF Core Areas
* Agricultural Growth-Enabled Food Security (agricultural productivity & value-chains)
* Linking the Vulnerable to Markets
* Policy and Capacity Enabler

The "Policy and Capacity Enabler" activities are focused on (1) building the capacity of the governmental, private and non-governmental agriculture sectors to improve policy analysis and program implementation and (2) carrying out analytical studies and impact assessments that will inform policy decisions.

The FtF activities will be focused in the Oromia region, in 83 high-potential AGP *woredas* (districts), with linkages to additional *woredas* in nearby vulnerable areas (42). Although activities are targeted for the production area (and therefore more food secure) of Ethiopia, the area has some of the country's lowest nutritional indicators. The FtF document states "While cognizant of the need for continued support to poor, vulnerable populations, the strategy posits a *Development Hypothesis* that increased investment in "Productive Ethiopia" can spur overall rural economic growth, which will lead to increased prosperity across all three Ethiopias when linked to efforts to promote greater economic opportunities for vulnerable populations in "Hungry and Pastoral Ethiopias." (41). The assumption is that increased production and improved markets will lead to an overall country growth that will create new employment opportunities for the poorer regions of the country. The "spillover" benefits for these other regions are assumed to be (i) increased demand for migrant farm labor, (ii) non-agricultural products and services, and (iii) reduced food prices. The integration of nutrition and agriculture will in part be carried out by the agriculture extension workers in addition to nutrition extension workers who will be trained to promote behavior change in food use, storage, and preparation. These activities will be in addition to the agriculture and health related work already done by these agents.

The description of nutrition activities under FtF is very limited in comparison to the previous two country reports. USAID/Ethiopia Mission will address nutrition challenges in Ethiopia with a stand-alone nutrition project, as well as complementary nutrition "wrap-around" activities funded through FTF activities. The Empowering New Generations with Improved Nutrition and Economic Opportunity Project (ENGINE) will focus on: advocacy for institutional building to strengthen nutrition programs and policies; "improvement of quality and delivery of nutrition and health care services; prevention of undernutrition through community-based nutrition care and practices; and adoption of a rigorous and innovative learning agenda" (41). The project will provide technical assistance to FTF agriculture and food security field activities to ensure coordination and strengthened linkages between food security, nutrition and access to livelihood and economic opportunities for target populations. By building nutrition programming into the diverse agricultural initiatives through the wrap-around approach, the skills of agriculture extension workers can be used.

Nutrition is not identified as one of the policy areas of focus "crucial to achieve agriculture growth and food security".

Table 4c. Activities related directly to nutrition that are supported through FtF in Ethiopia[1]

Community	Institutional facilities	National
Programs in nutrition care & practices	Improve nutrition and health care services	Advocacy for nutrition programs and policies
Agriculture extension staff behavior change program	Training of agriculture & nutrition extension staff	Establishment of baseline for surveillance of FtF effects
Increased agriculture productivity/market access in Oromia region; income-generation activities in other areas		
Reference (41)		

2.3.2. The unique food and nutrition situation in Ethiopia

Almost half (47 percent) of the rural population does not meet its basic food needs (42). The very diverse ecological zones define the varying food security problems. Although significant progress has been made in a number of nutritional indicators, Ethiopia has the highest children stunting rates among the other LCC-CRSP countries, as well as some of the highest wasting rates (41). Environmental crises (such as drought) leading to seasonal food scarcity and poor child feeding practices that contribute to inadequate intakes and high morbidity both contribute to the low anthropometric indices seen among infants and young children. Ethiopia also has micronutrient deficiency rates that are of public health importance, with particular concern for iodine deficiency because of its widespread prevalence and the severity of its consequence. Other concerns include zinc and iron deficiencies.

The seasonal variation in access to food for young children was illustrated dramatically in a study on herders from the southeastern part of the country (43). When sufficient food and water exists for the animals to produce milk, the average intake of animal milk fed to a young child of 1 year was 0.85 liters per day. This provided about two-thirds of the mean daily energy (560 kcals) and 100% of the protein required (27g) by a child of this age. In the dry season, average milk intake fell to 0.22 liters per day which provided only 145 kcals (16% of energy) and 7g protein (50% of protein). In a drought year this seasonal reduction in intake was far more pronounced and by the end of a drought year milk intake in young children had fallen to only 100ml/day.

Interventions that address the WHO guiding principles for complementary feeding practices and behaviours, as well as prenatal influences on growth, are also needed in Ethiopia. One study from the rural Sidama region reported that few children were exclusively breastfed for 6 months or received the recommended minimum number of times of meals containing the recommended number of food groups. Animal products were not consumed. The lowest intakes of micronutrients in this young group were for vitamins A and C, and calcium (43).

Iodine deficiency is a serious problem in Ethiopia for all ages, caused by inadequate iodine intake as well as in some areas the intake of goitrogenous substances, including cassava (44). The most recent nationwide survey found an overall goiter rate of 40%, with 46% ≤ 20 μg/l urinary iodine, the threshold for severe prevalence in a population. Only 4.2% of households used iodized salt. Although the government of Ethiopia has now passed a law mandating iodization of all salt, the health problem is far from resolved as salt production and distribution remain inadequate.

Other micronutrient deficiencies are common among the population due to poor quality diet and have substantial impact on society. In a recent study, about 53% of the pregnant women from the Sidama zone in southern Ethiopia were zinc deficient. The majority of the explained variability of serum zinc was due to dietary factors like household food insecurity level, low dietary diversity and low consumption of animal source foods. The risk of ZD was 1.7 (95% CI: 1.0-2.7) times higher among women from the maize staple diet category compared to the Enset staple diet category (45). Other researchers have shown that maternal cognitive function is significantly decreased with zinc deficiency (46).

2.3.3. Gap between the Ethiopia FtF Implementation Plans and Nutrition Needs

Whereas the FtF program is meant to address two issues (growth of the agricultural sector and improvement in nutritional status of the population), these issues do not appear to be the focus of the FtF strategy for Ethiopia. The 2011-2015 document states "While the focus of FTF strategy will be to support agriculture-led growth throughout Ethiopia, there are multiple cross-cutting focus areas, such as nutrition and climate change, that are important determinants or enablers of food security" (41). The placement of nutrition as a cross-cutting focus area similar to climate change alters its status as a priority. This change in priorities is in direct contrast to the approach of Senegal for example, even though the nutritional status of the population is substantial better in Senegal than Ethiopia. The Mission should reconsider the priority it has given to nutrition.

The Ethiopia FtF program does not appear to recognize the substantial social and economic costs of the malnutrition to Ethiopia. The lack of inclusion of any support for iodine fortification and education of the community is concerning. Recognition of the problem and the work of other institutions, if that is appropriate, should be mentioned.

The program depends substantially on using agricultural extension agents for a communication behavior change campaign related to food use, storage, and preparation. There is no discussion of how the roles of agriculture and nutrition agents will be coordinated as they are not under the same government office. In addition, there is no discussion of the work load of these individuals and the implications of adding additional responsibilities. These agents are widely used by different government and non-governmental organizations. It is not clear how much additional work they can take on.

There is little to no discussion of the role of disease as a cause of childhood malnutrition, which appears to be an important consideration in Ethiopia. The comment that farmers are a segment of the population not traditionally reached by nutrition programming is simply not true in Ethiopia. The majority of the population farms and the health extension workers reach their community farmers daily on health and nutrition activities.

Finally, the overall approach assumes a "trickle-over" effect. The program assumes that improved rural economic growth in one region will increase the prosperity across all of Ethiopia if promotion of greater economic opportunities is carried out in vulnerable populations. It seems that there is also the likelihood that the existing nutrition and wealth gap between regions will widen. From a nutrition perspective, the program appears to not provide solutions for the most vulnerable – at least in the short run.

2.4. Kenya

Similar to Senegal, the urban sector of Kenya is rapidly increasing (22% in 2010; 47). Although the country is expected to reach middle-income status this decade (48), problems of undernutrition continue to co-exist with overnutrition in the urban areas. Another consequence of the rapid urbanization of the country is the outmigration of male household members to the city, leaving women as the sole managers of the farms (40% of smallholder households; (49).

In contrast to most other sub-Saharan African countries, Kenya has well established higher education nutrition programs with local researchers and professionals ready to implement national level programs in

maternal and child health. Agriculture accounts for 26 % of Kenyan GDP and the government has created the Agricultural Sector Coordination Unit to coordinate activities across the multiple agriculture-related ministries (50). A new Food Security and Nutrition Policy will improve coordination of government and private sector initiatives to improve food security and nutrition by addressing limiting factors including: low agricultural productivity; inadequate financial and extension services and infrastructure; increased demand because of population growth and urbanization; continued poverty; and poor governance. In response, the Ministry of Public Health and Sanitation is piloting its *Scaling Up Nutrition (SUN) Framework* for action. The short-term goals of the Division of Nutrition within the Ministry of Public Health and Sanitation include a 20 percent decrease in malnutrition among < 5 y old and 100 percent coverage of vitamin A supplements by 2012. Other government priorities are improved child-feeding, reduction in acute malnutrition, and elimination of iodine deficiency.

2.4.1. FtF Implementation Plan for Kenya

FtF activities aim to increase economic status and improve nutrition through increased productivity of staple crops and livestock, improved market access and trade, and growth in non-agriculture related sectors. Nutrition is a direct player as one of the filters for selection of value chains to support and it is assumed that an outcome of increased productivity of nutrient-rich food in the market, increased household purchasing power, and decreased presence of aflatoxins (which have been linked to malnutrition (51) will be improved nutrition status.

Kenya core FtF area
* Improve agricultural environment
* Expand markets and trade (including regionally)
* Improve value-chain productivity of nutrient-rich agricultural commodities
* Increase purchasing power of poor households
* Improve post-harvest practices to reduce aflatoxins
* Encourage economic transformation from subsistence production towards integration

As is the case of the other FtF countries, FtF activities in Kenya are focused on specific regions. The criteria used to select the regions are unique in each country, but each has included always an indicator of nutrition. In Kenya, the following filters were used: 1) highest number of poor households with severely malnourished children, 2) high volumes of staple food production, and 3) most ethnically diverse population. The selected target areas are one "high rainfall" zone and one "semi-arid" zone that have a great need for interventions and potential for responding to interventions that will lead to growth and poverty reduction. The value chains that will be supported will be identified through an analysis of which has the greatest potential for income potential (including profitability and market demand), and ability to increase the number of producers. In addition to the financial considerations, the nutritional value and its effect on food security will also be considered. The priorities will include horticulture, dairy and maize for Kenya's high rainfall zone; and drought-tolerant crops (e.g., sorghum/millet and root crop systems), horticulture, and drought-tolerant maize for the semi-arid zone. There is a need for financial services, post-harvest bulking, market access, and knowledge transfer so that small farmers will increase production, hire land labor, and help increase incomes of others.

The focus of nutrition activities lie primarily in the expected benefits from improved nutrient-rich value chains and increased income and productivity so that families can access better quality and more diverse diets. The Kenya office appears to have substantial activity in decreasing disease (through the WASH program) as well as through HIV-related activities. While both of these are important determinants of nutritional status,

it is not clear that there is any specific consideration of nutrition in these programs or any nutrition expertise integrated into them. There is also some reference to a behavior change initiative to improve infant and young child feeding through educational messages through the Mission's Agriculture, Business and Environment Office (ABEO). This will be linked to possible support of food fortification (unknown fortificants) however the expertise in the ABEO in nutrition is not mentioned.

In addition, FtF will be coordinating with the Office of Population and Health (OPH) to take advantage of their support of the nation-wide community-based Nutrition Assessment Counseling and Support (NACS) system. This works to link health services with communities to address childhood malnutrition effectively as seen with the Nutrition and HIV surveillance program that supports capacity building of community workers in growth monitoring to assure quality data for evaluation of the Ftf effects on nutrition. Micronutrient deficiency problems are addressed through food-based approaches as well as through supplementation programs through health services. FtF will be focusing solely on the two target regions.

Table 4d. Activities related directly to nutrition that are supported through FtF in Kenya[1]

Community	Institutional facilities	National
Programs in growth monitoring through surveillance system of Nutrition, HIV	Improve health care services & community linkages for better service	Support nutrient-rich value chains
	Training in nutrition assessment for the health care staff	Fortification of foods (not clear which or with what)
	Supplementation programs	Establishment of surveillance of FtF effects.
Reference (50)		

2.4.2 Unique food and nutrition situation in Kenya

Qualitative research by Webb-Girard et al. (52) suggested that mothers' food insecurity directly affects infant feeding behaviors. Food insecurity women reported that exclusive breastfeeding was insufficient for an infant during the first six months of life [odds ratio (OR), 2.6; 95% CI, 1.0, 6.8], that exclusive breastfeeding for that duration would be harmful for the woman (OR, 2.7; 95% CI, 1.0, 7.3), and that to exclusively breastfeed for 6 months would require an adequate diet (OR, 2.6; 95% CI, 1.0, 6.7). Mothers worried about milk insufficiency, infant hunger, and the need for a better diet than they had to sustain exclusive breastfeeding. The experience of food insecurity is an important barrier to the recommendation to exclusively breastfeed for 6 months; nutrition education and possibly food supplements during lactation are needed to overcome this barrier.

Wasting overall is comparatively low (seven percent) in relation to the other SSA countries, but remains a government priority for its 2030 goals. Kenya had an HIV prevalence rate among women in 2009 of 8% which has stabilized over the past few years (53). Infant and young child malnutrition is related to mother-to-child transmission of the virus (estimated to be 27 percent of positive women) as well as indirect effects of maternal infection due to reduced household income, diminished maternal health (54), and capacity to provide adequate child care. Wasting rates are highest during the second year of life when complementary foods are rapidly replacing breast milk, indicating poor infant feeding practices in food safety and/or food quality. A Global Livestock-CRSP study demonstrated the importance of diet quality among older children (8 y) for outcomes other than just growth (55). Meat supplements improved cognitive function and physical activity of the children, most likely due to its high content of iron, zinc, and riboflavin.

There are regional differences in rates of malnutrition; for example it is ten-fold higher in North Eastern Province (20% between 6-8 mo of age) compared to Western Kenya (2%) (50). In the farming community, mean infant birth weight was significantly lower than in the pastoral community and a significantly higher proportion of newborns weighed less than 2.5 kg (56). Similar to Senegal, overweight or obesity affects almost one-quarter (22%) of women – this however is primarily seen in the urban areas.

2.4.3. Gap between the Kenya FtF Implementation Plans and Nutrition Needs

In addition to the economic impact of the increased agricultural productivity and value chains in the Kenya FtF strategy, the team has included a consideration of nutritional value and potential nutritional impact. The Kenya team has given thought to the source of data for the indicators included in the document (e.g., PEPFAR). This is a great improvement over the 2010 plan which did not include any nutrition indicators (57). However, the plan is sparse in the specific nutrition activities to occur. It seems that there is little real new integration of nutrition besides development of messages through the agriculture office. The language of the text is quite hesitant in discussion of funds that are available for nutrition, which is of concern.

The document says little about the nutrition education that will take place. Research coming out of Kenya, as noted above, clearly indicates substantial barriers to good infant and child feeding practices. The expertise and plans of ABEO should be elaborated more clearly so that it is apparent that adequate support is available to address these barriers.

There is no recognition of the concern for the urban sector and growing obesity in the country. As mentioned above, nutrition education on healthy eating on limited budgets (best buy) may be of interest.

Unlike Tanzania and Nepal, the Kenya FtF strategy does not appear to have specific nutrition targets. What is included is the following: "At the end of the Strategy period – September 30, 2015 – but subject to the availability of projected FTF funding, FTF in Kenya will have:

1. Reached an estimated 502,000 vulnerable Kenyan women, children, and family members …
2. Reached more than 230,000 children with services to improve their nutrition …
3. Helped significant numbers of additional rural populations to achieve improved income and nutritional status …

Clearer outcomes are needed to know exactly what is expected to improve.

2.5. Tanzania

Similar to Kenya, agriculture accounts for about one-quarter of GDP of Tanzania and provides directly or indirectly labor for 75% of the population (58). About one-third (34%) of the Tanzanian population is below the poverty line. Undernutrition is an important contributor to poverty; an estimated 2.65% of the GDP is lost primarily in the agriculture sector due to diminished cognitive and physical development from undernutrition. Seven percent of the total national budget is spent on agriculture. While the country is self-sufficient in maize, its productivity as well as the net production of rice needs to be increased. The National Strategy for Growth and Poverty Reduction (MKUKUTA) includes focused attention on the southern corridor as a potential area for growth. *Kilimo Kwanza* (Agriculture First) is a public-private partnership in the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) that aims to increase agricultural

productivity and market competiveness and diminish food insecurity through support of "clusters" of profitable agricultural farming and related businesses. The partnership is expected to benefit smallholder farmers in the corridor. There is substantial support for the partnership from international companies, including General Mills, Yara International, Unilever, Syngenta, DuPont, Land 'O Lakes, Monsanto, and SAB Miller.

2.4.1. FtF Implementation Plan for Tanzania

Almost all of the funding (80 percent) for the FtF activities in Tanzania will be targeted to the SAGCOT region in support of *Kilimo Kwanza (Agriculture First)* initiatives (58). The areas of focus of FtF activities are shown in the box to the right. FtF will support rice, maize, & horticulture value chains to improve production, processing, access to markets, and management of natural resources. Rice is the primary staple of FtF; it is a grain that is grown by about 20 percent of farmers, consumed widely, and Tanzania has the opportunity to compete well in the regional market. FtF will also support horticulture and maize value chains. The horticulture value chain is dominated by women and is an important opportunity to increase their incomes. Maize is the principal staple in the Tanzanian diet and is grown by 2/3 of the farmers. Fortification of maize flour at private milling enterprises offers an interesting opportunity for FtF to improve nutrition status of the population. These agriculture activities will overlap with the Mission's other nutrition programs in the SAGCOT area to increase the effectiveness of the FtF programs. Training of staff in both the health and agricultural sectors will be supported through FtF.

Tanzania core FtF areas
* Systems transformations for selected value chains
* Nutrition for pregnant women & children< 5 y
* Agriculture support services & capacity building
* Enabling policy environment

Analysis by Alderman et al. (59) estimated the effect of increased income and nutrition interventions in decreasing young child malnutrition from data from northwestern Tanzania. Improved young child nutrition was associated with the presence of higher incomes and the presence of young child nutrition interventions (in this case, feeding centers).

FtF has clearly set targets to reduce malnutrition, including a reduction in underweight and stunting among infants and young children < 5 y of age and anemia among women (reduce the prevalence of underweight and stunting among children aged 6 to 59 months from 49 percent to 39 percent in the FTF target regions over next 5 y; reduce maternal anemia by 20 per cent in target regions over the next five years). These targets will be reached through the diverse activities related directly and indirectly to nutrition. FtF is targeting an increase in production of rice (25%), maize (10%), and horticulture products (20%) which will affect household food availability as well as purchasing power from augmented market participation. The FtF activities include support of fortification (although types of fortificants are not mentioned) and blending (with other staples such as cassava, sorghum and millet) of maize flour at medium size milling businesses to improve the quality of diets of vulnerable populations and expand access to institutional markets. The target population includes people living with HIV/AIDS (PLHA), pregnant/lactating mothers, and infants of weaning age. It will also strengthen institutions and industry groups supporting the agro-processing sector; of which General Mills is a leading private partner.

The Tanzania FtF program recognizes the importance of nutrition education. The outreach and behavior change initiatives will work with families to educate them on improving the quality of their diet through what

is grown on the farm as well as what is purchased in the market. Data will be collected on the "percentage of households with adequate food consumption". Behavior change activities to be scaled up include a focus on exclusive breastfeeding, adequate complementary feeding, iron needs (including use of supplements) of pregnant women, and sensitizing men on child nutrition. Two indicators to be used in the evaluation will include: "(i) the proportion of infants under six months who are exclusively breastfed; (ii) the proportion of mothers who take iron supplementation for more than 90 days during pregnancy and the post-partum period. The improvement of the quality of the diet will also be supported through activities to enhance community gardens, small animal (poultry and livestock) farming, and food processing and preservation (e.g., food fortification, drying and granaries). The indicator to be used will be "the percentage of children 6 to 23 months who receive a minimum acceptable diet" (although this is a minimalist indicator). In the selected corridor, there will be an integration of agriculture and health and nutrition activities targeted to Households with children < 5 y of age on hygiene, infant and young child feeding practices, and access to nutrition and health services. Numerous programs will support these activities including the Global Health Initiative, the USAID HIV/AIDS FTF wraparound and School Feeding Program, the State Department Scaling Up Nutrition Support, USDA Food for Education, and Peace Corps Nutrition Education.

The nutrition program includes institutional capacity building among those institutions that are responsible for nutrition (local and district level government authorities, civil society organizations) and includes the identification of gaps in understanding of how to deliver effective integrated programs.

Table 4e. Activities related directly to nutrition that are supported through FtF in Tanzania[1]

Community	Institutional facilities	National
increase the quantity of food available (25 percent for rice, 10 percent for maize and 20 percent for horticulture) through increased productivity/inputs	Fortification and blending of maize at medium sized mills for preparation of foods for vulnerable populations	Policy reform related to food regulation, markets, trade
Increase income through improved markets/ infrastructure	Training on iron-rich foods, iron-folate supplements for pregnant women for health workers, agriculture extension workers, others	Bring nutrition to policy forefront
Nutrition outreach & behavior change activities for improved maternal diets, child feeding practices (EBF, CF, diversity), & sensitization of men about child nutrition, aimed at reducing stunting and maternal anemia		
Community gardens & animal production among small land holders		
Reference (58)		

2.4.2 Unique food and nutrition situation in Tanzania

In comparison to the other LCC-CRSP countries, rates of early stunting were highest in Tanzania (9% < 6 mo) and affecting almost half of all children (48%) by the end of the second year of life (60). In contrast, the prevalence of wasting was lowest, suggesting different challenges to adequate nutrition than found in countries such as Mali that experience high prevalence of wasting. Poor child feeding practices are common in Tanzania (61). Pastoral communities of the Simanjiro district in northern Tanzania were interviewed about child feeding. The greatest risk of being malnourished was noted to be between 2-3 y of age when breastfeeding was commonly discontinued, which is consistent with DHS statistics (60). In these communities, mothers reported introducing corn gruels as early as two months of age; half of the mothers add cow's milk to the gruels. In the World Food Programme's Comprehensive Food Security and Vulnerability Analysis (CFSVA) for Tanzania (62), timely introduction of complementary foods was associated with food security status of the household. Among those reporting poor food consumption, households reported much lower rates of timely introduction of complementary foods. On average, only 67 percent of children between 6-8 months in these households received complementary foods. Delayed feeding and poor quality of complementary foods are important determinants of stunting.

High maize gruel consumption introduces not only the risk of infectious diseases from bacterial contamination but also of toxic exposure to fumonisin mycotoxins. Kimanya et al. (63) recently published estimates of exposure based on fumonisin concentrations and normal dietary intakes of infants in northern Tanzania. Infants who were estimated to have been exposed to fumonisins intakes above the 2 mg/kg bodyweight (the provisional maximum tolerable daily intake) had lower lengths (- 1.3 cm) and weights (- 328 g) at 12 months of age that those with lower intakes. (64). Education that promotes dietary diversity - including the use of diverse grains as the base for complementary foods – will contribute to an enriched micronutrient intake, a decrease in the exposure to toxins and other detrimental food components that are widely present (including fumonisin in maize, cyanide in cassava, and goitrogenic compounds in diverse foods), and will contribute to improved growth in infants and young children. Another important determinant of children's nutritional status was malaria, which was associated with a two-fold increase in the risk of stunting (Odds ratio=1.9; 95% CI: 1.1-3.2) in Tanzania (65).

Maternal nutrition is also a concern in Tanzania. Prevalence of underweight among women of reproductive age was highest among those households reliant on agro-pastoralism (11.2%), daily work (10.6%) and aid (10.6%).(66) On the other hand, overweight/obesity affects almost one-fifth of the adult women of reproductive age, demonstrating the growing importance also of the nutrition transition for the health of the Tanzania population. In a recent study by Keding et al. (67), the presence of changing dietary patterns and increasing problems of overweight and obesity is occurring not only in the urban communities but the initial stages are also being seen in rural areas. Consumption of foods purchased outside the home was noted, including breads and cakes that were deep fried (such as doughnuts and *chapatti).* Although intakes of animal source foods were limited, the increasing use of low cost vegetable oils is being seen in rural Tanzania and is correlated with body mass index and will be related to increasing prevalence of chronic diseases in the population.

The impact of purchased foods will affect not only adults. Colecraft et al. demonstrated that purchased foods, often of inferior nutrient quality, made up a substantial portion of the complementary foods for infants and young children in rural Ghana (68). The overweight/obese epidemic is beginning to be seen among children. Up to 6% of 6-9 y old children were overweight/obese in two urban areas (69).

2.4.3. Gap between the Tanzania FtF Implementation Plans and Nutrition Needs

The Tanzania FtF Multi-year strategy provides clear evidence of the importance that the Mission places on integrating nutrition and agriculture and markets/business. The attention to nutrition policy, maternal and child nutrition, and cross-sector initiatives provides hope that this program will achieve its goal of improving both food security and nutritional status of the country.

The FtF appears to be cognizant of the need to integrate value chain market development with nutrition education activities. However, the participation in the food markets brings two sides – one is the production of improved foods such as complementary foods that are fortified or mixed for improved nutrient value. These appear to be targeted to institutional markets for distribution – but should be made available to the general public at an affordable price. There is also a growing market of low nutrient value products (e.g., fried breads) that are widely available and rapidly entering the diet of rural as well as urban populations. Nutrition education is needed to help families make wise choices about their diets. With the public-private partnerships, there is the potential for losing sight of the activities that will help the wider population reduce poverty and improve nutritional status and those activities that will help a selected smaller portion of the population expand into the regional and international markets.

Food safety is briefly discussed in the plans but may need additional attention to assure safe products in small to medium size producers. The discussion above of fumonisin should be considered in the preparation of complementary foods for infants. Fortification programs require monitoring. The FtF suggests fortification of maize flour, however the fortificant in not mentioned. Continued attention is needed, as is seen in the example of iodine in salt, for which there remains concerns about maintaining adequate levels in the universal salt iodization program (70).

Higher education level training is needed of nutritionists who are capable of bridging the diverse sectors in their work. The FtF plans clearly delineate plans to enhance the institutional capacity of the National Agricultural Research Services and Sokoine University of Agriculture to improve agricultural productivity. Similar plans to support nutrition are not delineated.

2.6. Nepal

As the poorest country in South Asia, two-thirds of the Nepalese population experience food security for part of the year. The majority of the population (80%) obtains their livelihood from agriculture which makes up one-third (38%) of GDP (71). Household food security is challenged by geography, limited infrastructure, natural disasters, climate change that affects the glaciers, male outmigration, and social discrimination among the most vulnerable populations (women, lower castes). The country has experienced a national food deficit since the 1980's. Even though the lowlands (Terai) produce grains, there were food deficits in 2010 and rates of anemia in childhood were still high in some districts. Behavioral and cultural practices that limit food access to vulnerable populations are contributing factors to malnutrition. The end of civil war has allowed the country to progress. Successful initiatives often include female community health volunteers (FCHVs) and community forest user groups (CFUG). The National Health Sector Plan II (2010-2015) is focused on achieving the health-

Nepal FtF strategy:
A: Increase agricultural productivity
B: Build capacity for delivering nutrition and hygiene education
C: Provide Literacy and entrepreneurship training

related Millenium Development Goals. The nutrition priority areas are:

1. Micronutrient initiatives (Vitamin A and zinc supplementation, iron fortification and salt iodization)
2. Breastfeeding and complementary feeding practices
3. Maternal and infant nutrition
4. Hygiene and sanitation, food safety and preparation
5. Nutrition education in training curriculums for health care workers
6. Education on nutrition, dietary diversification and locally available nutritious foods

Previous and ongoing programs funded through USAID have had positive effects on income, food production, and dietary intakes (diversity, quality and quantity of food), and nutritional status of women and children. Examples of these programs are Action Against Malnutrition through Agriculture (a home gardening, small livestock production, and nutrition education initiative); Nepal Flood Recovery Program and Smallholder Irrigation Market Initiative (an initiative with small-scale irrigation, high value crop production and marketing, infrastructure, and health and nutrition training), and Education for Income Generation program (an entrepreneurial-based literacy and life skills education).

The lower Hills and Terai regions have lower poverty and undernutrition rates than the upper Hills districts; however, the population density is greater and therefore a higher absolute number of people are affected by malnutrition in the former areas. Other donors have prioritized the mountain areas and are carrying out activities primarily on improved economic access and infrastructure.

2.6.1. Nepal FtF Implementation Plan

The FtF strategy is focused on districts in the Terai and lower Hills in the Far-Western, Mid-Western, and Western Regions (71). These districts were chosen due to high "(i) sub-regional hunger indexes, (ii) the existence of the practice of selling assets as a coping strategy, (iii) high levels of adult male outmigration, and (iv) higher numbers of female-headed households. These areas are highly populated and experience high levels of poverty yet have the potential to benefit from the interventions. The Far-Western and Mid-Western Regions are priority areas for investment for the government of Nepal.

The strategy is three-fold and is targeted to small landholders. The first component is to increase the number of crop cycles and increase productivity in high value vegetables, as well as to improve production through integrated farming approaches for rice, maize, and pulses. Where appropriate, the program will also support small livestock. The increased productivity is expected to increase household consumption as well as to increase income through market sales. The choice of value chains to support was based on (1) unmet demand, (2) potential to increase production, (3) country priority for investment, (4) role in nutritional content and contribution to the usual diet, (5) produced by a large number of smallholders, and (6) high potential for selected districts. The initiative also includes a capacity building component for community agents to deliver nutrition and hygiene education to targeted households. The training of change agents (private sector suppliers, government extension workers, lead farmers) will provide continuity of program activities for the future to deliver extension services and inputs and output systems for targeted farmers. A business development fund will help support the expansion of the change agent influence. The program will also train and empower facilitators and volunteers to become "change agents" in nutrition and hygiene education for their communities. The country has successfully used community-level volunteers and community facilitators to deliver public health services. Volunteers deliver household-level training packages on nutrition and health whereas the community facilitators recruit and train the volunteers and give refresher

courses. There are over 45,000 Female Community Health Volunteers (FCHVs) in Nepal that serve as the foundation of preventive and limited curative care. Finally, the strategy includes a third component that will provide literacy and entrepreneurship training that will target vulnerable groups (e.g., youth, women, lower caste and ethnic minority groups).

The program integrates the interventions in agriculture and nutrition so that the same households will benefit from each. The impact on nutrition is expected to occur through multiple routes: 1) increased production of nutritious foods for home consumption; 2) increased purchase of nutritious market foods with increased income from agricultural sales; and 3) receipt of nutritious foods by program beneficiaries, 4) more equitable intra-household resource allocation, and 5) improved food preparation and food safety (hygiene), and 6) promotion of locally available nutritious foods. Previous projects have shown improved nutrition in households that grow vegetables for the market; 20% of the produce is consumed in the home. In addition, cultivation of vegetables is more profitable than cereals and thereby provides an increased income for households. Under NFRP, when farmers switched from cereals to producing vegetables, their incomes increased by 200 percent (71). Enhanced literacy and life skills and entrepreneurial training of vulnerable groups will help them take advantage of program activities. Previous Mission programs have demonstrated the benefit to poor rural women that interventions in literacy, numeracy, and life skills training can have, empowering women to make financial and health decisions for the family.

The joint activities among the targeted households of the FtF and Global Health initiative (GHI) will support community-based programming on nutrition, maternal, newborn, and child health, family planning, water, sanitation and hygiene, home-based gardening and behavior change communication.

The integration of diverse on-going programs will support the FtF activities, including the CRSP activities in integrated pest-management, horticulture, natural resources, and nutrition. The Nutrition-CRSP will be conducting the evaluation research on the effect of the agricultural interventions on nutrition outcomes, working on improving national and local nutrition capacity, and strengthening policies and programs that integrate agriculture, health, and nutrition in Nepal.

The Nepal FtF specified nutrition targets to reach. These include:

(1) Improved nutritional status:
By 2015, # of underweight children in target region reduced from 42% to 29%
(2) Improved access to diverse & quality foods:
Proportion of population below minimum level of dietary energy consumption 40% (2005) to 25% (2015)
(3) Improved nutrition-related behaviors:
Prevalence of exclusive breastfeeding of children under 6 months 31% (2006) to 60% (2015)

Increased production of high nutrient value foodstuffs (vegetables, lentils, and animal source food products) is expected to improve the access to diverse and quality foods. The addition of nutrition and hygiene education, a key component in the intervention, will help facilitate the use of the foods especially among the vulnerable household members. The FtF document includes examples of activities to increase consumer demand and improve nutrition-related behaviors, including: 1. Surveys on consumer preferences, demand, and knowledge about the nutritional value of the foods; 2. Mass media campaigns and community level campaigns on nutritional benefits of promoted foods, good child feeding behaviors (e.g., breastfeeding, complementary feeding), nutritional requirements of women and children, and harmful feeding behaviors (e.g., low weight

gain in pregnancy); 3. Food preparation training and food safety (building skills); and 4. Innovative marketing and engaging institutional markets (e.g., schools). Additional Global Health Initiative funding has been dedicated for nutrition and hygiene interventions in FtF target districts, including improving the interpersonal communication and counseling skills on nutrition and hygiene of change agents, developing radio-based mass media campaigns on nutrition and hygiene, water improvement systems, community based gardening and food production techniques, and improving food preparation techniques.

Table 4f. Activities related directly to nutrition that are supported through FtF in Nepal[1]

Community	Institutional facilities	National
Community-based programming on nutrition, maternal, newborn, and child health, family planning, water, sanitation and hygiene, home-based gardening and behavior change communication	Promote sale of nutritious foods to nutrition programs that target vulnerable populations as program beneficiaries	"Drive" Ministry of Agriculture and Cooperatives to incorporate nutrition "mindset" in operations
1) increased production of nutritious foods for home consumption; 2) increased income for the purchase of nutritious foods; and 3) more equitable intra-household resource allocation and 4) promotion of locally available nutritious foods	Capability building and supplier network connections – in agriculture	CRSP – work on policies and programs that integrate agriculture, health, and nutrition
	Training of community-level staff in agriculture as well as nutrition/health	
Reference (71)		

2.6.2. Unique food and nutrition situation in Nepal

The nutritional status in Nepal is similar to that of Ethiopia. Stunting rates are extremely high, affecting more than half of the population (56%) by the end of the 4th year of life. Although wasting is not common in early infancy, the prevalence rate rapidly increases and is the highest among the LCC-CRSP countries by 12-23 mo of age (25%). This is undoubtedly a combination of acute food insecurity and lack of dietary diversity as well as poor child feeding practices. Almost one half (41%) of the population has a daily energy intake that is less than the minimum requirement (2144 kcal/d; 72;73). There is diversity in the severity of the problem across the country, depending on the region, the caste/ethnic group, and economic status. Bishwakarma examined national DHS surveys and found that the regional rate of women's literacy explained 60% of the regional variance in stunting. Other factors that together explained 75% of the regional variance included road accessibility and food production (74).

Overweight/obesity is uncommon in Nepal. In contrast, underweight is prevalent with 24% of women of reproductive age having a low BMI (have less than 18.5 kg/sq meter) and one in seven women with height of < 145 cm (a risk for obstructed birth and maternal mortality) (73). This is substantially higher in the Terai area where about 43 % of women have a low BMI (75).

Although the prevalence of goiter and iodine deficiency has decreased with salt fortification program, mild iodine deficiency remains a problem, especially among women of reproductive age in Nepal (76). In addition, the risk of excess intake of iodine exists due to common fortification of market products. Surveillance of the iodine status of the population needs to continue to be of concern for hyperthyroidism in children. Ongoing monitoring is essential.

Anther micronutrient concern is zinc deficiency. In a sample of 500 non-pregnant Nepalese women, more than three-quarters of the women were zinc deficient. Rice, a major contributor of zinc in the diet, also contributed 68% of phytate consumed daily (77). In this same sample, only about 12% of the women were anemic and only about half of that was associated with diet (78).

2.6.3. Gap between the Nepal FtF Implementation Plans and Nutrition Needs

Substantial space and effort is given to the recognition that nutrition is paramount for the FtF program and Nepal. The agriculture and nutrition programs appear to be running simultaneously; it is not clear exactly how much integration will occur and how much will occur in parallel. For example, it is not clear that the agriculture extension staff are knowledgeable about nutrition.

Details on the expected work on nutrition policy are very limited. There is a note that the FtF will "drive the Ministry of Agriculture and Cooperatives to incorporate nutrition mindset in operations". It is not exactly clear what is suggested by this statement. The CRSP programs are expected to work on policies and programs that integrate agriculture, health, and nutrition; however, no additional details are given.

The research given to the CRSP programs are all related to agricultural issues. The only research that is suggested for the Nutrition CRSP is related to the evaluation of the nutrition effects of the agricultural interventions. This seems to assume that everything is known and there are no applied research questions, similar to those seen in agriculture. There is a reference that FTF Nepal may invest additional funds into the CRSPs that are disseminating technologies to farmers. It would be appropriate that funds be made available for any applied nutrition intervention research that is needed.

Nutrition training appears to be limited to the FCHVs. Nutrition training should be wider spread so that other change agents are knowledgeable. Higher education opportunities for Nepalese researchers should include training of nutrition professionals.

3. Recommendations for the LCC-CRSP to define its niche within the FtF initiative

There is clearly an opportunity to learn from the diverse country missions on how they "think" about nutrition. The range goes from a very integrated approach (Tanzania) to very targeted traditional nutrition (Senegal/Mali) to very little attention (Ethiopia). CRSP brings the possibility of training, integration of sectors, identification of applied research, and innovative approaches from other projects (women visiting women (E Africa – to Ghana). Some Missions have spent considerable effort in thinking about nutrition and working to integrate it with agriculture, education, economy, and/or other sectors of society. Lessons learned should be shared with other missions that have struggled with the integrated approach of FtF.

Clearly there needs to be a conversation between the mission and the CRSP programs so that the research activities are closely tied to the local needs and evolve appropriately. Whereas there appear to be numerous examples of agricultural issues that are addressed, the tie to nutrition is substantially weaker. There is a noticeable absence in the research agenda of any work in the areas of (i) educational and other (e.g., economic, policy) approaches to improve consumer choices of food for the household, (ii) efficacy and effectiveness of programs to improve diets of targeted vulnerable groups, and (iii) other areas related to food

consumption and utilization. Given the importance of food markets for both rural and urban households, a research agenda is required that reflects the entire continuum of agriculture and nutrition.

The specific research agenda for FTF includes a number of objectives that are directly related to nutrition – improving the quality of foods, food safety, and the nutritional indicators among the population. What is not evident is how the local counterpart plays a role in developing this agenda and how the research and training are integrated so that there is increased research capacity locally. This requires commitment to building the fundamental knowledge base of agriculture, nutrition, and health locally and should be part of planning from the initiation of activities.

The FTF recognizes the need for monitoring systems to evaluate progress in meeting the initiative goals. The emphasis appears to be on developing central and external monitoring and evaluation capacity rather than building local capacity. The LCC-CRSP has the opportunity to provide training in both program design and evaluation, conducting research and building capacity in the subject matter. The minimal presence of training in nutrition is of concern and should be incorporated in all of the LCC-CRSP as well as other FTF programs. Nutrition will not be part of the monitoring or really integrated if expertise is not available to assist in its integration into policies and plans.

The FTF objective indicators have only a limited number of nutrition assessments: 13 out of 83 indicators are related directly to nutrition. These are collected through existing information systems including DHS as well as the implementing partners. A wider assessment would provide more information to understand the reality. For example, the indicators on training only include information about USG-supported activities and do not document what other activities may be occurring through other funders. There is a focus only on < 5 y, with some indicators of first 2 y of life. However, there is no information on birth outcomes or maternal mortality. Of great concern is that not all of the FtF plans clearly indicate the source of their indicators and in some cases it is clear that baseline values are not available.

FTF has a defined capacity building strategy that incorporates the principles outlined in the box on the right. The capacity building strategy may be inadequate in the FTF initiative. Where there is substantial discussion of capacity building at the community level (extension workers, staff in the field, farmers), there is little discussion of the urgent need to strengthen the research institutions and human capacity at the university level. With few exceptions, there is a dearth of advanced training in nutrition in Africa. The ability of sub-Saharan Africa to move forward in a sustainable manner requires trained professionals in the related fields. The CRSP should pay special attention to training mechanisms at the undergraduate and graduate level of committed staff to build the long-term local research capacity. As an example of a CRSP program that integrated training and research with development, *Enhancing Nutrition through Animal Source Food Management (ENAM),* trained 56 undergraduate and 8 MSc students and 1 PhD nutrition student over the four years of the project. All of these individuals are now in diverse positions in the government and private sectors (79).

Capacity building principles
(1) strengthen capacity of poor farmers and rural households to take advantage of new scientific innovations and technologies
(2) develop capacity at the individual, organizational, and network levels
(3) integrate capacity development and research investments to maximize impact
(4) consider capacity needs for monitoring and evaluation

Sustainability of projects should reflect not necessarily the continuation of specific project activities but instead it should reflect the progress made and the momentum to continue improving. Recognition is needed of the time it takes to make change in feeding/eating behaviors, diets and nutritional status. Project commitment should be longer than 1 or 2 years to allow projects an opportunity to train sufficient staff who can continue after the project. The CRSP should organize its research support to maximize presence in one place.

Integrating nutrition and agriculture is challenging. It is relatively easy to have it side-by-side (bring ministries together to discuss) but it is not easy to truly integrate. Does nutrition play a role in determining crop support? Does income generation feed back into nutrition choices? How are decisions about markets influenced by nutrition? How are agricultural and nutrition decisions linked to programs such as preschool/school lunches? Are the sectors talking to each other?

In summary, although maternal and child nutritional problems were similar across the LCC-CRSP countries, there were important differences in time, type and severity of insult, and the environmental, social, cultural, and political contexts under which the problem occurs. Each of these factors can be used to design appropriate responses that are formed for specific contexts (80). In these settings, many infants had suboptimal nutrient intakes, poor dietary diversity, and are subjected to poor hygiene. Interventions that take into account the local context will be responsive and effective in improving the nutritional status of the target population.

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