

GAIN-IDS Discussion Paper

Nutritious Agriculture by Design: A Tool for
Program Planning.

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An electronic version of this tool is available at: <http://nutritiousagriculture-tool1.gainhealth.org/>

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1. Introduction: the challenges of linking agriculture and nutrition

Recently, nutrition has moved dramatically up both the global political and development agendas. One of the principal reasons for this is the relatively slow progress in reducing undernutrition and the increasing recognition of the multiple ways in which undernutrition impacts on both individual life opportunities and collective productiveness. That said, tackling undernutrition is a complex challenge. Undernutrition takes a variety of different forms, including chronic and acute hunger, and the lack of essential vitamins and minerals. In turn, undernutrition retards physical and cognitive development (most notably stunting) and contributes to a range of deficiency-related conditions (for example goitre, anemia and xerophthalmia). This subsequently has a direct bearing on the economic progress of the individual, the community and the nation through associated health burdens and the missed or under-exploited opportunities.

Many factors contribute to the inability of people to consume a nutritionally adequate diet, and the body to absorb effectively the nutrients in the foods they do eat. Indeed, the challenges of undernutrition are so varied that no single solution can be effective amongst the available responses. Among these multiple interventions are food-based approaches, on which this paper focuses, including increasing dietary diversity and enhancing the nutritional profile of foods through bio-fortification and/or fortification (Ecker *et al.* 2011: 6). These play a particularly important role in addressing micronutrient deficiencies.

Food-based approaches to reducing undernutrition focus on the ability of people to gain access to nutritious foods, in which agriculture and agri-food value chains play a key role. Interest in how to implement effective agriculture-nutrition interventions that leverage increases in agricultural production to bring about improvements in nutrition and health is far from new. Attempts to identify and act upon potential linkages between agriculture, nutrition and health were evident in the 1980s (Lipton and de Kadt 1988; Longhurst 1988), and at the turn of the century reviews of multiple experiences of linking agricultural interventions to nutritional outcomes were available (see, for example, Berti *et al.* 2004; Bonnard 2001). More recently, development practitioners and researchers have reiterated the message that appreciable economic growth has sat alongside steadily high rates of undernutrition, particularly in South Asia. Overall, improvements in agricultural productivity alone do not seem to translate into improvements in nutrition. Specifically, whilst agricultural growth is strongly associated with improved calorific intake, the link with dietary diversity is less strong (Headey 2011: 14-15). As Ecker *et al.* (2012: 52) highlight: “Neither agricultural growth nor non-agricultural growth is sufficient to improve child nutrition and reduce micronutrient malnutrition as a whole.”

Interest in the better integration of agriculture and nutrition has been renewed for two main reasons. First, there is the impact of food prices on undernourishment. Global food price volatility, particularly evident since 2006, has put additional strain on household budgets and made it more difficult for non-farm households and net food purchasing households to buy the food they need. The G8 meeting at L’Aquila in 2008 put food and nutrition firmly on the agenda, with priority given to sustainable agriculture as the basis for food security, combined with a need for greater investment in agriculture and mobilisation of private sector resources (G8 Summit 2009). Second, development agencies have recognised how undernutrition has been a particularly difficult problem to solve, and that renewed and specific efforts are required, including the linking of agriculture and nutrition more effectively:

¹ See, for example, World Bank (2007: 1-6).

² Following Arimond *et al.*, agricultural interventions are defined “broadly to mean changes purposefully introduced into an existing agricultural system to promote new crops, technologies, management practices, production and marketing methods and other innovations” (2011: 42). An agriculture-nutrition intervention is one which includes purposeful changes in agricultural interventions and in the marketing, promotion and consumption of food with the intention of improving nutritional outcomes.

Evidence shows that alleviating poverty will reduce undernutrition, but alone will not resolve the problem. We will coordinate and integrate our agriculture and nutrition investments to maximize impact and measure the success of our efforts toward achieving this objective (USAID 2010: 9).

Given that the challenges associated with making effective links between agriculture and nutrition have been long-recognised, the need is not to undertake further analysis of the problem, but rather to identify the best ways in which this problem can be overcome. Agricultural projects still largely focus on boosting productivity and farm incomes. Although such efforts now generally recognise the need for farmers to be linked to markets, in effect recognising the importance of the consumer, there remains little or no attention to nutrition. A number of researchers have highlighted the fact that agriculture should consider how the food it produces translates into good nutrition and better health. Developing a simple framework and tools that can be used by agricultural intervention programmers and implementers to measure the degree to which their activities will bring this about is a key stepping stone.

The Institute of Development Studies (IDS) and the Global Alliance for Improved Nutrition (GAIN), with support from the United States Agency for International Development (USAID), have developed “Nutritious Agriculture by Design: A Tool for Program Planning” for assessing and improving the linkages between agriculture and nutrition. In particular, for focusing agricultural projects on the production of crops and livestock that are rich in micronutrients, and their consumption by those whose diets are nutritionally deficient. The tool is designed to be applied to existing and planned agricultural projects that primarily focus on: (i) improving agricultural productivity; and (ii) raising the incomes of farm households, including the households of agricultural labour. The tool aims to identify ways in which agricultural interventions can be made more nutrition-friendly and nutritional outcomes and impacts can be captured through monitoring and evaluation (M&E) frameworks.

The Program Planning Tool employs a value chain to trace ways in which food moves from inputs through production to consumption. This approach examines both ‘pre-farm-gate’ routes from production to consumption – most notably promotion of the production and consumption of micronutrient-dense foods by farm households – and also ‘post-farm-gate’ routes, which involve the movement of food off-farm and through distribution channels to reach households beyond those involved in the production of a particular food.

The Program Planning Tool has been tested by applying it to existing USAID projects in Kenya and Bangladesh. The tool has also been used in a workshop format to examine nutrition linkages in Feed the Future projects in Tanzania. The structure of the tool, the logic that informs it and the insights obtained from these initial field applications are presented in this paper. Section 2 describes the thinking behind the tool, while section 3 provides a walk-through, describing how the tool draws attention to the different pathways from agriculture to nutrition and how these might be addressed by project designers and implementers. Section 4 provides an account of practical ways the tool can highlight opportunities for linking agricultural projects to nutritional goals, and the potential challenges in doing so, drawing on the field applications to date.

³This is referred to subsequently as the Program Planning Tool.

⁴This term is used in preference to ‘off-farm’, because food taken off one farm may be consumed by other farm households.

2. Developing and using the Program Planning Tool

The overarching aim of the Program Planning Tool is to provide a framework for use by program designers and implementers that guides the design or adjustment of agricultural interventions towards better linkages with nutrition. The distinctive features of the tool are:

1. It is practical, engaging with agricultural projects and providing a practical tool for strengthening the nutrition focus of agricultural projects and programs.
2. It has a particular focus on mobilising the private sector for realizing agriculture-nutrition opportunities.
3. It focuses on both pre-farm-gate and post-farm-gate opportunities for nutritional outcomes and impacts. Many approaches focus solely or predominantly on promotion of on-farm consumption of nutritious foods. Looking beyond the farm gate allows examination of opportunities to target consumption of nutritious foods by broader population groups.
4. It is value chain based. Whilst many agricultural interventions use value chain approaches to integrate better producers to suppliers of inputs and immediate markets for end products, this approach is used less frequently to focus on improving the forward linkages from farms through to final consumption.

The Program Planning tool was developed for USAID in the context of its Feed the Future (FtF) program. USAID has many projects designed to reduce rural poverty through investments in agriculture that increase yields and raise the incomes of farm households. One of the goals of FtF has been to use these investments more effectively as a means of enhancing food security, and more specifically, reducing undernutrition. Whilst agriculture and nutrition have often been considered different domains with distinct outputs, goals and approaches, FtF aims to “coordinate and integrate...agriculture and nutrition investments”. (Box 1).

Box 1: Feed the Future Priorities

“In order to achieve progress toward our goal, we have identified two key objectives that address the principal determinants of food insecurity: accelerating inclusive agriculture sector growth and improving nutritional status. These objectives have direct causal linkages to sustainably reducing hunger and poverty:

- *Accelerate inclusive agriculture sector growth*: There is broad consensus that achieving the collective goal of sustainably reducing global poverty and hunger will require accelerating inclusive agriculture sector growth. We will measure progress through change in agricultural production, agriculture value added per person (i.e. the income derived from agricultural production), and in the incomes of both men and women in rural areas, including men and women who are very poor.
- *Improve nutritional status* (especially of women and children): Evidence shows that alleviating poverty will reduce undernutrition, but alone will not resolve the problem. We will coordinate and integrate our agriculture and nutrition investments to maximize impact and measure the success of our efforts toward achieving this objective through change in the prevalence of stunted and wasted children and the prevalence of underweight women.”
(USAID 2010: 9)

There are many studies of the linkages between agriculture and nutrition, and there are various tools for assessing the nature and extent of these linkages. Given the complexity of the nutrition challenge, inevitably choices have to be made about how complex tools need to be. The strategy adopted by Le Cuziat and Mattinen in the manual written for ACF International, “Maximising the Nutritional Impact of Food Security and Livelihood Interventions: A Manual for Field Workers”, is to work with this complexity. They define the problem broadly:

Nutritional status is dependent on a wide and multi-sectoral array of factors.... Therefore, any attempt to comprehensively identify linkages between FSL [food security and livelihoods] and nutrition would have to go further than the standard ‘food security’ definition and include, as much as possible, interventions that seek to improve the health status, MHCP [maternal health care practices], or environmental conditions that might be directly or indirectly affecting nutritional status (Le Cuziat and Mattinen 2011: 4).

Given this breadth, the ACF manual has to be directed at a broad range of actors and involve a large amount of planning:

*Perhaps the greatest challenge for the implementation of the guidance given throughout this manual is that no one can do it alone - it requires **preparation, action and collaboration across a variety of sectors and stakeholders** (Le Cuziat and Mattinen 2011: 10, emphasis in original).*

Although this manual is oriented towards field workers, its scope is much greater than this. It is aimed at the development and implementation of nutrition interventions, which involves teams with expertise in all the areas relating to food and nutrition, as well as developing linkages to other agencies and government departments in the country concerned. Tackling the problem of undernutrition is a complex challenge, and a comprehensive approach to tackling it will also be complex.

Similar observations can be made about the Nutritional Impact Assessment Tool (IYCN 2011a) recently developed by the Infant and Young Child Nutrition Project (IYCN). The guidance notes for the tool state that it is “for project designers to use during the design phase of agricultural products” and aims to prompt “consideration of the project’s impacts on the nutrition of vulnerable groups” (IYCN 2011b). Those using the tool are required to summarise the project’s key activities and then to “develop one alternative approach” (IYCN 2011a: 3). The guidance notes refer to different ways in which agricultural projects can promote household food security, although the redesign process itself is left open.

The Program Planning Tool developed by IDS and GAIN adopts a somewhat different approach. It starts from the recognition that agricultural projects continue to be implemented in many countries, that the designers and implementers of these projects are not nutrition specialists, and that their organizations have limited capacities to incorporate nutrition into their agricultural work. The tool provides orientation to designers and implementers, whilst at the same time using this process to encourage better communication within organizations. Thus, it is designed to be used by people who may lack specific knowledge on nutrition, drawing their attention to opportunities of which they may currently not be aware for linking agriculture and nutrition, and the challenges that might need to be addressed in so doing. Instead of providing specific guidelines that have to be interpreted and applied in a range of situations, it poses questions that aim to generate thought processes amongst planners and implementers of agricultural interventions relating to opportunities for demonstrable nutritional outcomes and impacts.

The Program Planning Tool, thus, provides a practical way of focusing value chain-based agricultural interventions so that they not only raise agricultural productivity and incomes, but also contribute more effectively to improving nutrition for both farm households and consumers more broadly. The starting point for the Program Planning Tool is specific agricultural projects, ideally those still in the design phase but also those already up and running and where the focal commodities and regions are pre-defined. As the context of agricultural interventions, including target crops and livestock, and the nature of agricultural systems and farm households, as well as prevailing nutritional challenges are highly diverse, the Program Planning Tool concentrates on drawing attention to opportunities for the designers and implementers of interventions, to consider.

Critically, the tool is not meant to design projects and programs *per se*, but to provide an assessment of the degree to which nutritional impacts have been thought about and integrated into the design. It is very much focused, therefore, at driving a (different) thought process on the part of those engaged in the design and implementation of agricultural interventions.

A key feature of the tool is the lens it applies to the evidence base that underlies agricultural interventions that aim to, or purport to aim to, achieve nutritional outcomes or impacts. Thus, at various stages, the user is led through the key questions that need to be addressed in order to ascertain (and demonstrate) that agricultural interventions will indeed bring about nutritional improvements in target population groups. One of the key aims here is to distinguish between outcomes and impacts that are assumed, versus those for which there is more concrete evidence. An example of how the evidence base might be questioned is shown in Box 2.

Box 2: The evidence base The tool aims to reveal the evidence base behind the different routes to enhanced nutritional outcomes and impacts. This evidence base consists of a sequence of linked conditions or stages. For example, in the case of promoting on-farm consumption of nutritious foods:

- Is there evidence that increased consumption of the food by the target group will address nutritional deficiencies they possess?
- Is there evidence that the target group will consume more of the food if it is made available to them?
- Is there evidence that the intervention will increase the availability of the food to the target group?
- How will the intervention designers and implementers know if the project has brought about enhanced nutritional outcomes in the target group?

The tool is structured around the different potential pathways from agriculture to nutrition, as described in the next section. Across these pathways, overarching themes are the strength of value chain linkages, gender, monitoring nutritional outcomes and impacts, and the potential role of the private sector. The first three of these themes are widely recognised as important elements of any analysis of agriculture-nutrition linkages. Typically, less attention is given, however, to the role of the private sector. For example, a recent review report on guidance principles for linking agriculture and nutrition, Herforth (2012), finds that these guidelines focus predominantly on interventions by governments, development agencies and NGOs. Little attention is given to the role of the private sector in generating demand for nutritious foods, moving these foods into households through markets and the use of the market as a source of food for undernourished populations. Thus, the review mentions the 'private sector' five times (with a further three mentions of 'private' in the context of public and private partnerships), and 'business' seven times. This compares with 26 mentions of 'rights', 27 of 'gender', 38 of 'smallholders' and 315 of 'women'. Similarly, the terms 'business', 'businesses', 'private sector', 'firms', 'enterprise' and 'enterprises' are in total cited just five times in the main body of the World Bank's report on agriculture and nutrition (World Bank 2007). None of these citations involve specific discussion of how the private sector might play a role in linking agriculture and nutrition.

The Program Planning Tool takes the form of a series of questions in an electronic format that provides prompts and adjusts the flow of questions according to prior responses. In this way, the tool aims to be as user-friendly as possible. The tool is designed to be used with little or no prior training or support, although experiences in Tanzania indicate the value of a prior workshop that explains how the tool is structured and provides an opportunity for a run-through of the analysis at a fairly informal and cursory level. Once the tool has been completed, a report including a summary of action points is generated.

3. Pathways from agriculture to nutrition

Historically, the priority for agricultural interventions has been to reduce rural poverty through increasing agricultural outputs and productivity. Investments have been aimed at improving the quality of farm inputs, implementing enhanced or more appropriate farming and post-harvest practices, and linking producers to markets that are key drivers of the enhancement of farm incomes. Such improvements might be expected to bring about improved nutritional outcomes and impacts through increasing incomes in poor, undernourished households, which would enable them to purchase more nutrient-dense foods and boost farm production. This would allow increased on-farm consumption of these foods and the continued availability of a marketable surplus. The impacts on nutrient intake would, however, be mediated by household decisions over how additional income is spent, and on the types of food farm households produce and consume themselves. Boosting agricultural production should also contribute to improvements in nutrient intake in the wider population and in specific target sub-groups (for example women and infants) by increasing availability and/or reducing the price of nutrient-dense foods. Again, however, the impact is not direct; it depends on what foods farmers produce, the markets they are destined for and how well value chains work between the farmer and the consumer. In addition, any nutritional outcomes will reflect a range of non-food-related factors, including care practices, health provision and sanitation.

Analysis of many of the factors mitigating the link between agriculture and nutrition – for example sanitation and the provision of health services – are beyond the scope of this paper, and indeed of the Program Planning Tool. The Program Planning Tool focuses on issues within the realm of agriculture, and on the linkages through agri-food value chains, to food consumption and nutrition.

Exploring these factors requires examination of the ways in which agriculture works through to nutrition and the factors that can impede the distinct pathways through which nutritional improvements can occur. The World Bank report (2007: 12) identifies five potential pathways from agriculture to nutrition: improvements in the diets of farm households (both through increased production of products produced on the farm and increased purchases of food enabled by rising incomes); empowering women; increased food availability and lower food prices in the domestic economy; and economic growth.

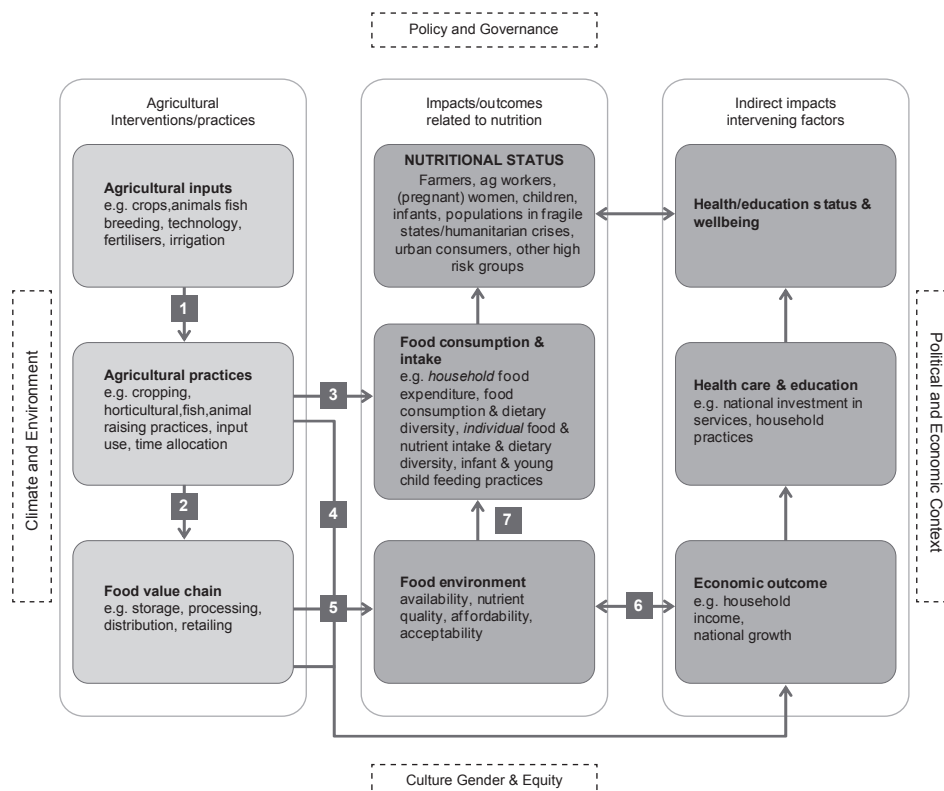
A recent attempt to map the complexities of agriculture-nutrition linkages is shown in Figure 1. This conceptual framework was developed in the context of a review of research on ‘agriculture for improved nutrition’, although the approach is equally applicable to agriculture projects and programs. Of particular relevance for the Program Planning Tool is the fact that the authors of the review not only focused on links out of agriculture to food and nutrition, but also argued that:

A framework should accommodate the linkages between agriculture, food and nutrition among all people in LMICs, farmers and non-farmers, rural and urban, inside and outside the food value chain. This contrasts with some existing conceptual frameworks for the interaction of agriculture and nutrition which focus on short food chains in rural communities. In these frameworks, the production of food by farmers has the potential to influence nutrition of members of the household, either through direct consumption or by generating income which allows them to buy food locally (Hawkes et al. 2012: 9).

This is very much the approach adopted for the Program Planning Tool, which is concerned with both the impacts of agricultural programs on nutrition in the immediate beneficiary households, and also the potential for improving nutritional outcomes in non-beneficiary households by focusing on post-farm-gate value chains and how food might reach such households.

The left-hand column identifies three points in the agri-food value chain at which agricultural interventions might make a difference to the quantity and/or quality of food produced and its movement into food markets, namely agricultural inputs, agricultural practices and the food value chain. For an analysis of agriculture nutrition linkages, the crucial questions relate to how food moves from the agricultural system through to consumers and into consumption and uptake, which then impacts on nutritional status. In other words, the arrows mark the pathways from agriculture to nutrition. Maximising the nutritional impact of agricultural interventions then involves recognising the different pathways identified by the arrows and explicitly considering how agricultural projects and programs might be changed to strengthen these and, in some cases, prevent negative impacts that undermine such relationships.

Figure 1: Research chain for agriculture and nutrition



Source: Hawkes et al. (2012: 12), with modifications.

⁵ Similar lists of pathways are provided by Le Cuziat and Mattinen (2011: 43), by Arimond et al. (2011: 43) and by Ecker et al. (2011: 7-11)

The pathways that are important to the Program Planning Tool have been numbered in Figure 1, serving to identify the thinking that informed the tool's design. For each of the linkages, the challenges that are posed for program designers and implementers are discussed. The way in which the Program Planning Tool enables these challenges to be identified is then described.

The Program Planning Tool begins by asking respondents to summarise the main aims of the project and identify different points along the value chain where interventions are to take place. After this introduction, the tool examines in turn each of the identified pathways in Figure 1, as described below.

3.1. Increasing production of nutrient-dense foods

Agricultural interventions are predominantly designed to increase the productivity and production of food crops and/or livestock. The Program Planning Tool is designed to focus such interventions more effectively on the challenges of combating micronutrient deficiencies. The second section of the tool starts off the analysis by addressing the issue of whether or not the intervention aims to increase production of foods that are nutrient-dense. Such an outcome could be achieved through:

- Greater production of nutrient-dense food, through enhanced productivity and/or increased acreage, which is already being produced by beneficiary households.
- Introduction of new nutrient-dense food to producer households, whether as the principal market-oriented food, as an additional/complementary food, or as food intended primarily for household consumption.
- Increasing the nutrient value of new or existing food through bio-fortification or other means of introducing new varieties or breeds with greater nutritional value. Examples include sweet potatoes rich in pro-vitamin A, or nutrient enrichment of rice using enriched zinc fertilizer.

Part two of the Program Planning Tool asks program designers and implementers whether the interventions in which they are engaged are designed to increase production of nutrient-dense foods, whether options for doing this exist and whether consideration is being given to the nutritional implications of different choices of focal crops or livestock.

3.2. Pre-farm-gate consumption of nutrient-dense foods

Arrow 3 in Figure 1 shows the pathway from agricultural practices directly to food consumption and nutrient intake. In other words, this is the pre-farm-gate consumption route. Agricultural interventions that increase the production of nutrient-dense foods open up the possibility of increased consumption and nutrient intake by the direct beneficiary households. However, such an outcome is far from inevitable. As USAID's IYCN Project has argued:

Agricultural projects are often justified on the grounds that the food produced will accomplish some combination of improving household food security and improving nutrition. Rarely, however, do agricultural projects actually measure these effects. In fact, even in retrospect, it is not always clear whether a given project had a positive or negative effect on food security and nutrition levels of food-insecure households and undernourished individuals (IYCN 2011c).

Households may increase their output of nutrient-rich foods without necessarily increasing their own consumption of such foods, such as when all increased production is marketed. Furthermore, there may be variable gender impacts on nutrition within the household, for example on men as opposed to women and infants. In fact, it is not unknown for agricultural interventions to promote market orientation to the extent that consumption by producer households declines (IYCN 2011b: 2). Bonnard concludes her analysis of agriculture-nutrition linkages by arguing that specific efforts need to be made to raise nutritional awareness in beneficiary households:

An activity or set of interdependent activities, that successfully link agriculture and nutrition will most likely...have a well-designed agriculture component – effective at generating output, income, or value added [and] a well-designed nutrition component [that] should provide appropriate services, including well-tailored education, to address specific, local malnutrition issues (Bonnard 1999: 9).

In light of this, some agricultural interventions focus on promoting the cultivation of complementary crops that are not intended to provide income (or at least not to present a substantive income stream) so that the household trade-off between consumption and income is mitigated. One example of this is the promotion of kitchen gardens. Given that such initiatives tend to be implemented regardless of whether the intervention promotes production of a nutrient-dense food for local consumption or not (for example, the focus might instead be on staple foods, on foods for export or even on non-food items), this question is raised in Part 6 of the Program Planning Tool, which is discussed in Section 3.3 below.

Part 3 of the tool starts (in Part 3.1) by considering the evidence that the food whose production is being promoted is likely to lead to nutritional improvements in producer households, and by specific individuals therein, by specifically exploring the following questions:

- Do members of the beneficiary households actually suffer from nutritional deficiencies that would be addressed by the food whose production the intervention is designed to increase?
- Is there evidence that the beneficiaries would consume more of this food were it to be made available to them?
- Is there evidence that the food would be acceptable to the beneficiary households?

⁶ Referred to subsequently simply as food or foods.

Part 3.2 draws the attention of designers and implementers of agricultural interventions to the well-documented risk that increasing market opportunities may, in some circumstances, actually reduce producer household consumption of the target food. The tool asks whether this risk has been assessed, and if it is present, what steps have been taken to prevent or mitigate it.

Part 3.3 specifically asks questions about challenges relating to securing inputs, adopting improved production practices and providing the storage that would increase and sustain the production and consumption of the target nutrient-dense food.

Part 3.4 takes up issues of monitoring and evaluation (M&E), posing questions for designers and implementers of agricultural interventions as to whether a baseline nutritional assessment of direct beneficiary households has been undertaken, and whether indicators of nutritional outcomes and/or impacts are included in the intervention's M&E. Both of these are required if demonstrable nutritional improvements in beneficiary households are to be achieved.

3.3. Improving nutrition through income generation by farm households

The pathway from agriculture to improved nutrition through increasing producer household incomes is represented in Figure 1 by Arrows 4, 6 and 7. First, increases in output translate into increases in farm income (Arrow 4). If some of this income is devoted to market purchases of nutrient-dense foods (Arrow 6), then improvements in consumption and intake may be realized. The logic to this 'production-for-income' route is summed up by the World Bank report on agriculture-nutrition pathways:

As agricultural households become more market oriented, production-for-own-consumption becomes less significant relative to income from the sale of what is produced. Technology becomes more important relative to the household's resource endowment, and the selection of crops to be grown is based principally on their tradability and the price they are expected to command in local markets. Extra income may be used to buy more food, higher-quality (more nutrient-dense) foods, or both; the balance between the two affects the final impact of this additional income on the household's consumption of energy and micronutrients (World Bank 2007: xiii).

Analyses of agricultural interventions involving the promotion of cash crops indicate that, whilst these are linked to increases in both household income and household food expenditure, the nutritional impacts are not clear and improvements in child nutrition are "limited and mixed" (World Bank 2007: 20). Various studies have argued that agricultural interventions that increase household incomes are not, by themselves, necessarily effective in reducing undernutrition. Bonnard's (Bonnard 1999: 9) contention (cited above) on the need for well-designed nutrition components as part of agricultural interventions applies equally to this pathway. Indeed, reviewing the effectiveness of agricultural interventions in improving nutritional outcomes, Berti et al. (2004), indicate that positive nutritional outcomes and impacts tend to be associated with having nutrition as an explicit objective of the project and by investing in a broad range of household assets. Furthermore, where interventions aim to raise incomes by increasing production, productivity and sales of nutrient-dense foods, there is a real risk of reduced on-farm consumption of these foods.

Part 6 of the Program Planning Tool presents a series of questions which encourage the designers and implementers of agricultural interventions to consider ways to ensure that increased farm productivity and income translate into nutritional improvements in direct beneficiary households. These include:

- Does the intervention target poor households and/or individuals therein (for example women and/or infants) and, if so, how? Targeting the poorest households may be the best route to addressing undernutrition, but the goal of increasing farm incomes might be achieved more easily by targeting better-off households.
- What evidence is there that increased income will lead to increased consumption of nutrient-dense foods in the household?
- Is there a clear understanding of the nutrient deficiencies in the target households, and what is the evidence base for this?
- What are the mechanisms through which the project expects to promote increased consumption of nutrient dense foods and what specific investments will be made in these? This includes the option of increased production of complementary foods through investments in kitchen gardens, rearing of small animals, etc.
- Are there risks that the agricultural intervention could lead to a decline in the consumption of nutrient-dense foods, for example through market sales, purchase of foods of low nutrient density, etc.? If yes, what specific efforts are made to offset this risk?
- How will the impact of the intervention on household food expenditure and nutrition be assessed and monitored?

3.4. Post farm-gate consumption

Arrows 5 and 7 in Figure 1 identify the pathway from agricultural interventions to the food consumption of households (and individuals therein, for example women and infants) that are not the direct beneficiaries of agricultural interventions. It was argued above that, in many overviews of agriculture-nutrition linkages post-farm-gate consumption is only considered in a very general sense in that increased production of nutrient-rich foods should increase overall availability in the marketplace and in turn reduce prices. This lack of emphasis on how food might be channelled to undernourished populations beyond the farm gate is borne out by the reality of agriculture-nutrition interventions in which the specific beneficiaries are restricted to farm households, and possibly those of wage labourers employed on beneficiary farms. Thus, Arimond et al. (2011: 44) concluded that “[m]ost of the studies identified in this review documented nutrition impacts of agricultural interventions...through increased household production and then consumption and/or through increased income.”

In Figure 1, the link between agricultural production and consumption of food off the farm is established in the ‘food environment’ box. Hawkes et al. define the food environment as follows:

This refers to the foods that are available to consumers (including those who may be producers) in specific settings (e.g. at home, at work, in retail stores, in schools), the nutrient quality of that food, the prices of that food (affordability) and the information and promotion about those foods (acceptability). It does not refer to national levels of, for example, food availability, or world food prices, but the immediate environment in which consumers access foods and information about them (Hawkes et al. 2012: 9).

Interventions aimed at improving linkages between agriculture and nutrition could include a focus on the challenges of delivering food that is available, affordable and acceptable to particular groups beyond the farm gate. Achieving these goals requires an understanding of post-farm-gate value chains and how to make them 'work better' in facilitating increased consumption of nutrient-dense foods by households beyond the direct beneficiaries of agricultural interventions.

The value chain approach, through its analysis of specific market mechanisms and linkages, informed the design of the Program Planning Tool. In Figure 1, food moves out from the farm environment into the food value chain, to the food environment and from there into food consumption and nutrient intake. There are various undernourished populations that do not benefit directly from agricultural interventions, including rural non-farm populations and the urban undernourished, as well as the many rural poor (landed and landless) who are not incorporated into agricultural projects or programs. There are conceivably opportunities to reach these post-farm-gate groups through better linkages between agriculture and nutrition. For example, efforts to promote orange-fleshed sweet potato (OFSP) in sub-Saharan Africa have not only focused on consumption by producer households, but also consumption in the broader population, and especially in groups that are deficient in vitamin A (see, for example, Hawkes and Ruel 2012). Such efforts have included interventions along the value chain, with farm households, traders, food processors, formal and informal retailers and consumers. The Program Planning Tool employs a value chain approach to identifying such post-farm-gate opportunities for linking agriculture and nutrition.

Parts 4 and 5 of the tool focus on routes to improving nutrition in households that are not the direct beneficiaries of the interventions. This has five key elements:

1. Identifying the potential beneficiaries, recognising that distinct value chains may be involved in making the target food accessible to particular target consumers. These might include formal markets, informal markets and non-commercial channels.
 2. Making explicit the nutritional needs of the potential post-farm-gate beneficiaries and the evidence that increasing access to the food will lead to demonstrable nutritional improvements. This repeats the logic of the questions in Part 3.1.
 3. Identifying and addressing the challenges along the value chain involved in distributing and marketing the food to the target groups. This addresses the issues of affordability, acceptability and availability referred to above.
 4. Identifying and addressing the challenges in storing, transporting and processing the food. These challenges exist on the farm, as discussed by Le Cuziat and Mattinen (2011: 49), but tend to increase as the food moves further along the value chain.
 5. Identifying and addressing the challenges along the value chain involved in maintaining or enhancing the nutritional value of the food. This addresses issues related to nutrient loss, bio-availability, fortification, etc. in marketing and distribution, and also in storage, transportation and processing.
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As with other parts of the tool, users are made to examine the ability to demonstrate any claimed nutritional outcomes and impacts, in this case on population groups that are not direct beneficiaries of the intervention. Thus, questions are posed as to whether a baseline nutritional assessment has been undertaken and whether nutritional indicators are included in the project or program’s M&E.

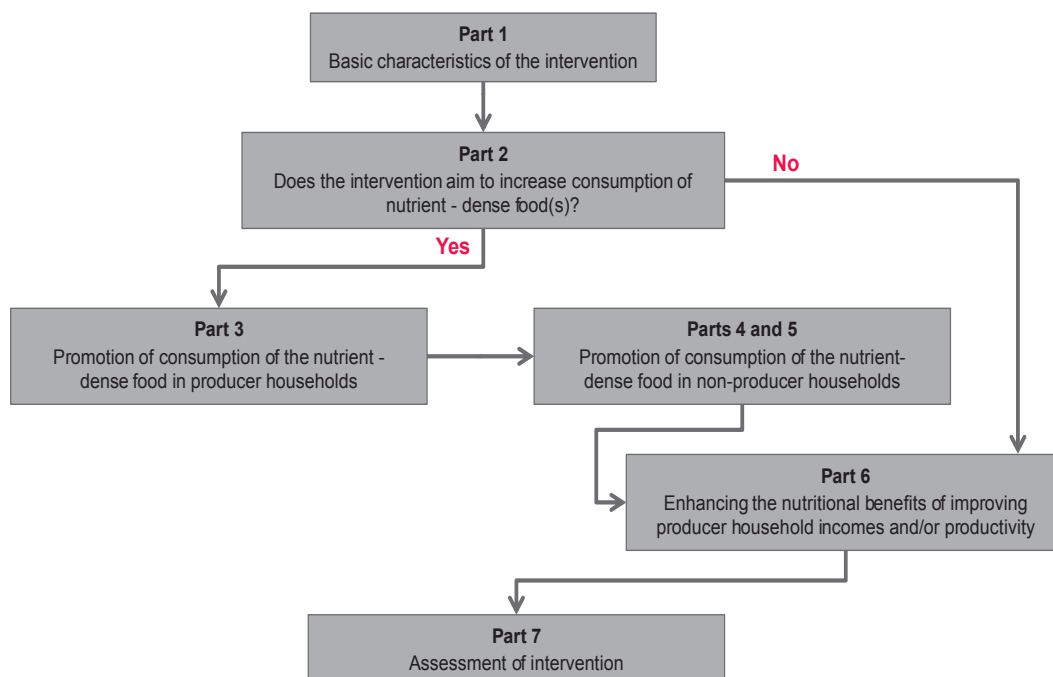
3.5. Identifying areas for further action

Part 7 provides a summary of the results of the assessment. It takes the answers registered in Parts 2 through 6 of the tool and generates suggestions for further action. It draws the attention of designers and implementers to areas where greater consideration might be given to the potential for achieving better nutritional outcomes and where further evidence might be collected to inform the intervention. This part of the assessment tool not only provides a summary of the strengths and weaknesses of the intervention, but also provides specific recommendations for further reflections on the assumptions and evidence base underlying the intervention.

3.6. The sequence of tool application

The overall design of the tool is presented in Figure 2. There is a printed version of the tool, and also a digitized version. The Program Planning Tool consists of seven parts that are ordered sequentially. The tool can be downloaded from the GAIN website at <http://nutritiousagriculture-tool1.gainhealth.org/>.

Figure 2: Outline of the Program Planning Tool



⁷The Hawkes et al. (2012) review mentions “value chain(s)” fifty times. The term is not used once in the World Bank (2007) report.

4. Using the Program Planning Tool

Trial uses of the Program Planning Tool in Kenya and Bangladesh and in a workshop format in Tanzania have provided credence to its utility in highlighting the potential that existing agricultural interventions have for enhancing their impacts on nutrition. The trials also highlighted the need for any nutritional impacts and outcomes to be demonstrable; backed-up with evidence and measureable through inclusion of appropriate indicators in M&E. Another outcome of the trial applications was that they served to identify the challenges in using the tool.

A major benefit of using the tool is simply that it raises awareness of the potential for focusing agricultural interventions more effectively on nutritional goals. In practice, this is easier said than done. Linking agriculture and nutrition brings together two distinct disciplinary domains that are typically institutionally separated in national governments, international organizations and donors such as USAID. In the past, agricultural initiatives have tended to focus on production in order to augment the overall *availability* of food and, at the same time, increase the productive capacity of poor people to increase incomes and improve livelihoods. Conversely, nutrition interventions have focused on improving the *nutritional quality* of food and implanting remedial actions in order to address the specific and immediate nutritional needs of vulnerable groups. Bridging the gap between these two approaches and perspectives requires simultaneous attention to both production and consumption and the intervening processes that link them. Producing food is not the same as preserving the nutritional quality of food along the value chain and getting it into the mouths of those who need it. Below, each of the pathways to achieving this are discussed in turn.

Box 3: Kitchen and community gardens as a means to facilitate consumption of nutrient-dense foods by Kenyan milk producers

The Kenya Dairy Sector Competitiveness Program (KDSCP) has explored the promotion of kitchen and community gardens by producer households. These gardens are seen as having two benefits. First, dairy production results in a large volume of manure that needs to be disposed of as part of good disease management and production practices. This manure has potentially great value as a fertilizer. Second, kitchen and community gardens can be an effective mechanism to enhance production of fruit and vegetables both for household consumption and to supplement income, especially of women. At the current time, efforts to promote kitchen and community gardens have been pursued at a relatively small scale, predominantly through promotional activities and training as part of routine farmer field schools. There is, however, considerable scope for these to be up-scaled.

4.1. Production and on-farm consumption of nutrient-dense foods

The most direct pathway from agriculture to nutrition is the production and on-farm consumption of nutrient-dense foods. This immediately raises the issue of the choice of crops to be promoted in an agricultural intervention. The trial applications of the tool raised a number of options relating to this:

1. Focusing on nutritious foods that also provide substantial scope for the enhancement of household income through market sales. USAID projects in Kenya and Bangladesh provide numerous examples of such crops, including beans, milk, fruit, vegetables and fish (Henson *et al.* 2012b; Henson *et al.* 2012a).
2. Developing complementary foods which are primarily oriented to household consumption on-farm and, consequently, circumvent the trade-off between own-consumption and market sales. There are numerous examples of this strategy in USAID agricultural interventions in Kenya and Bangladesh, including the promotion of kitchen gardens (see Box 3) and the production of poultry and small ruminants. In Bangladesh, some aquaculture projects promoted the rearing of small indigenous fish species for domestic consumption in ponds that were predominantly used for the commercial production of shrimp or fish.
3. Increasing the nutritional value of foods already grown by beneficiary households, notably through bio-fortification. For example, in Bangladesh the production of rice using zinc-enhanced fertiliser has been promoted, whilst in Kenya farmers have been encouraged to produce OFSP rather than more traditional white varieties.

Some of the projects examined in the trial applications of the tool included specific efforts to promote consumption of these foods, for example raising awareness about nutrition and/or food preparation methods, albeit often at a relatively small scale. One example of such interventions was the incorporation of health and nutrition into farmer field schools (Henson *et al.* 2012b). This is discussed further below.

The trialling also revealed the need for indicators of nutritional outcomes and impacts to be incorporated into the M&E of agricultural interventions, not only to ensure that these are demonstrable, but also to facilitate processes of learning such that effective strategies for the integration of agriculture and nutrition can be identified. Agricultural interventions focused on enhancing productivity and farm household incomes are likely to include indicators in their M&E that reflect these goals – for example physical output, yields, sales revenue, household income, etc. Unless nutrition is an explicit objective of an intervention, appropriate outcome and impact indicators are unlikely to be monitored. This is seen, for example, with USAID's agricultural programs in Kenya and Tanzania. Until recently, these interventions were not required to show impacts on the nutrition of direct beneficiary household (Henson *et al.* 2012b). Unsurprisingly, therefore, their M&E tended not to include nutritional outcome and impact indicators. Whilst some of these interventions did have some nutritional components, for example the promotion of kitchen gardens, there were little or no efforts even to capture changes in food consumption patterns.

A final and more complex issue associated with the better integration of agriculture and health is the potential trade-off between the goals of boosting farm household incomes and enhancing consumption of nutrient-dense foods. The goal of income maximisation is best served through selecting crops and/or livestock for which net income per hectare is highest. It may be the case that the most profitable crops are those which have lower nutritional value, or are not consumed by the household (for example because they are directed to export markets and are not an established part of the local diet) or are not directed to human consumption at all (for example animal feed, cotton, etc.). This implies that the incorporation of nutritional goals into agricultural interventions requires some fundamental reassessment of goals (and the processes by which these are set) and careful management of trade-offs and expectations. More likely, however, it requires that the hierarchy of priorities within agricultural interventions will need to change. Thus, as Le Cuziat and Mattinen suggest:

Instead of basing your crop selection only on local climate (e.g. drought tolerance, disease resistance), taste preference and cost, take into account the nutritional content of the crop and the prevalence of micronutrient deficiencies in the area. For instance, maize is a good source of energy but it contains less protein, vitamins and minerals than e.g. millet or sorghum (2011: 45, emphasis in original).

Drawing the attention of project designers and managers to the scope for nutritional improvement will not lead to changes in practice unless the incentive structure underlying the intervention is adjusted in a realistic fashion.

4.2 Increasing household income

In poor farm households, boosting income can be seen as a necessary but not sufficient condition for the enhanced consumption of nutrient-dense foods. However, the trial applications of the tool in Kenya and Bangladesh made it clear that many agricultural interventions assume that increased income will lead to improved diet and enhanced nutrient intake (Henson *et al.* 2012b; Henson *et al.* 2012a). In most cases there was little concrete evidence collected to substantiate this assumption, and nutritional outcome and impact indicators were largely absent from M&E efforts.

However, a number of the agricultural interventions supported by USAID in Kenya, Bangladesh and Tanzania did include interventions directed specifically at promoting increased consumption of nutrient-dense foods. The example of raising awareness about health and nutrition in farmer field schools was identified above. The KDSCP provides a specific example of this, and illustrates the potential complementarities between agricultural and nutrition/health interventions. Thus, the KDSCP was approached by an NGO that focused on public health. Making time available in its farmer field schools was a relatively easy and virtually costless way to raise awareness on nutrition among the farmers with which it worked. Interestingly, the KDSCP reported that attendance at field schools, especially by women, increased once nutrition and health had been incorporated into the program.

Linking distinct agriculture and nutrition activities that operate in the same geographic areas and amongst the same target populations could be a highly effective way of enhancing the nutrition outcomes and impacts of agricultural interventions. Indeed, many of the implementers of agricultural interventions who consulted as part of the trial applications of the framework remarked that they lacked the skills and experience to raise awareness about nutrition and behaviour change communication more broadly. Not surprisingly, therefore, some interventions that had an explicit nutrition knowledge component, for example USAID's horticultural sector program in Kenya, partnered with and paid for the services of external providers with specific skills in this area.

4.3. Increasing consumption of nutrient-dense foods by off-farm households

It was noted above that relatively little attention has been given to post-farm-gate pathways in efforts to integrate agriculture and nutrition, even when the interventions are designed to increase marketable surpluses of foods. There are two reasons for this. First, including nutritional factors in decisions about marketing and identification of potential consumers might involve a direct trade-off between the objectives of boosting farm incomes and the targeting of nutritionally deficient households off-farm. An income-maximising strategy might be to sell output through channels that lead to middle or high-income consumers who are not nutritionally deficient. In other cases, products may be oriented to export value chains, or indeed to non-food markets. Markets and products are chosen because they present the best opportunities to increase and sustain farm incomes, not because they are directed at those who are nutritionally in need.

Second, there may be very real challenges in effectively targeting households that are nutritionally deficient, and individuals within those households (for example pregnant and lactating women and infants) even more so. Thus, even if agricultural interventions were to be aware of the potential for channelling food post-farm-gate in ways that reduce undernutrition, achieving this would require a new set of skills and a shift in focus from the farm household to post-farm-gate value chains. It would require the capacity to identify and analyse the value chain linkages that exist or might be created to link production with the target consumers. Furthermore, targeting these consumers would involve meeting the challenges of delivering food in forms that are accessible, acceptable and affordable and also ensure that the nutritional value of the food is preserved as it moves along the chain. It is not evident that the staff implementing many agricultural interventions have the skills and experience required to take on these tasks. This raises questions as to whether staff with these skills should be integrated into the teams designing and implementing agricultural interventions or whether this expertise should be acquired through collaborations with other organisations that already have these skills.

The trialling of the Program Planning Tool did, in fact, identify some efforts to target nutritionally deficient households and individuals. These occurred when the consumption issue was an integral part of the overall program, and where the nutritional needs of consumers beyond the farm gate were placed at the centre of the intervention. An example of how this might be done is through the promotion of orange-fleshed sweet potato. It requires:

- Interaction with actors at multiple points along the value chain: input suppliers, farmers, traders and retail outlets, as well as work with consumers. Coordinating multiple point selection and identifying incentives for each of the value chain actors.
- Promotion of the nutritional value of the food in its various forms.
- Easy identification of the product as being different from competing products. In other words, consumers are able to identify the nutritional value of the product through its colour.
- Increased costs of production offset by higher prices such that farmers gain some benefit from producing this product for sale.
- Market promotion as a means to reduce the risks facing traders and retail outlets in selling the product.

Other examples of direct targeting the poor as a market for nutrient-dense food are sales to schools and hospitals and to groups that are the target of other (often poverty or health-related) interventions, for example orphaned children, widowed women and women with HIV/AIDS. In some cases there may be explicit efforts to integrate agricultural interventions into these wider interventions as a means of enhancing the food security and/or nutritional status of the beneficiaries. In others, these target groups are seen as an effective way in which to establish market linkages within the locality of production.

Amongst the trial applications of the Program Planning Tool, the one intervention that stood out as having a nutritional focus that specifically targeted potentially nutritionally deficient consumers was the KDSCP (Henson et al. 2012b). Whilst the primary aim of the KDSCP was to boost milk production and to integrate producers into commercially sustainable value chains, efforts were also made to increase consumption off-farm. At certain times of the year, the supply of milk exceeded market demand and the needs of the formal dairy processing and distribution sector. Boosting overall market demand for milk, engaging with the informal milk distribution sector and establishing new distribution mechanisms were seen as ways to rectify this problem. Thus, the KDSCP has promoted the packaging of milk in ways that are more appropriate for poor consumers (see Box 4) and the use of chilled milk dispensers that permit milk to be distributed in a sanitary manner to low-income communities. Efforts have also been made to rejuvenate Kenya's school milk program. Cutting across all of these initiatives, there have been milk promotion campaigns, a major focus of which is the nutritional value of milk and other dairy products.

Box 4: Appropriate packaging as a means to target poor consumers

In Kenya, milk from formal sector processors is generally packaged in Tetra Classic packs in quantities of half or one litre. The size and cost of this packaging can make milk inaccessible to poorer consumers. These problems were identified by the KDSCP through market and consumer perceptions surveys, on the basis of which support was provided to small and medium-sized processors in the formal and informal sectors, directed at use of smaller (often 200ml) plastic pouch packaging that is significantly cheaper. As a result, milk could be sold at lower prices, typically through traders and small retailer outlets. The packaged milk enhances and preserves the microbiological, nutritional and organoleptic quality of the milk, especially in the informal sector.

⁸ As discussed by Hawkes and Ruel (2012) and many others.

Efforts to achieve nutritional outcomes and impacts in off-farm households, however, raise more profound questions over the design of agricultural interventions. All efforts to target off-farm households and individuals identified through the trial applications of the tool essentially started from the standpoint of agriculture. Thus, they aimed to integrate existing efforts to boost production of a pre-defined food into value chains to the final consumer. This work might usefully be complemented by intervention strategies that start with the nutritional needs of particular population groups in households and then work back to agricultural production.

5. Conclusions

The Program Planning Tool presents a practical framework in which the designers and implementers of agricultural interventions can reflect on the scope for achieving demonstrable nutritional impacts within and beyond the households with which they immediately engage. Application of the tool facilitates ‘thought processes’ in the minds of designers and implementers over whether more can be done to integrate nutrition into their agricultural interventions and raises questions about the assumptions made with respect to the likely nutritional consequences of their activities. This places the emphasis on being able to demonstrate in real terms which people benefit nutritionally and by how much. At the same time, the tool aims to identify concrete ways in which agricultural interventions can be adjusted in order to enhance their impacts on nutrition. Attention is given to ‘low hanging fruit’: relatively small and resource-light changes that might enable greater nutritional outcomes or impacts to be achieved and/or that can be captured through the intervention’s M&E. At the same time, users of the framework are encouraged to ‘think big’, identifying larger scale and more wholesale changes to the design and/or implementation of the intervention that might achieve the more substantive integration of agriculture and nutrition.

Whilst the tool has been tested and trialled in three countries, there will inevitably be ways in which it can be refined and made more user friendly. Moving forward, therefore, efforts will be made to monitor and capture the experiences of those who employ the tool, and revisions made on an ongoing basis. This will be facilitated by the fact that the tool will be housed centrally by GAIN, with users accessing and downloading the latest version of the tool on the occasion of each application. More generally, both IDS and GAIN welcome feedback on the tool, as well as more general experiences with assessing the nutritional impacts of agricultural interventions.

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