

# From Nutrition Plus to Nutrition Driven: How to realize the elusive potential of agriculture for nutrition?

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## Abstract

**Background.** Agriculture has the potential to have a bigger impact on nutrition status than it currently does. The pathways between agriculture and nutrition are well known. Yet the evidence on how to increase the impact of agriculture on nutrition is weak.

**Objective.** To outline some of the possible reasons for the weak evidentiary link between agriculture and income and to highlight some approaches to incentivizing agriculture to give nutrition a greater priority.

**Methods.** A review of literature reviews and other studies.

**Results.** Agriculture does not have a strong poverty and nutrition impact culture, the statistical links between aggregate agriculture and nutrition data are weak, literature reviews to date have not been sufficiently clear on the quality of evidence admitted, and the evidence for the impact of biofortification on nutrition status is positive, but small. Some tools are proposed and described that may be helpful in raising the profile of nutrition outcomes, building nutrition outcomes into impact assessments of agriculture, measuring the commitment to undernutrition reduction, and helping to prioritize nutrition-relevant actions within agriculture. Leadership in agriculture and nutrition is also an understudied issue.

**Conclusions.** Agriculture has a vast potential to increase its impact on nutrition outcomes. We don't know if this potential is being fully realized as yet. I suspect it is not. Tools that help promote the visibility of nutrition within agriculture and the accountability of agriculture toward nutrition can possibly contribute to moving "from Nutrition Plus to Nutrition Driven" agriculture.

**Key words:** Accountability, agriculture, impact, nutrition

## Introduction

The potential for agriculture to accelerate improvements in nutrition is large. The standard pathways are well known, but are they being accessed and are new pathways being created? This short discussion paper touches on three questions: First, what are the pathways between agriculture and nutrition? Second, is the potential being realized? Third, what can be done to increase the realization of the potential connections? The paper concludes by arguing that we need to move from the era of thinking of improved nutrition as an optional extra for agriculture to one where improved nutrition status of the population is driven by agriculture as its main reason for being. What else is it for?

## What are the pathways between agriculture and nutrition?

The standard pathways are well known [1–5]:

- Greater farm productivity leads to greater farm income, which can generate economy-wide income growth. We know that income growth does improve nutrition status, although in a rather underpowered and hit-or-miss fashion.
- Food prices are lowered as the supply and efficiency of production increase. Lower food prices generate de facto income increases and lead to improvements in nutrition, as in link (a). If the price declines are in fruits and vegetables and fish/livestock/dairy, then there will be additional nutrition impacts as the prices of key micronutrients decline.
- More nutritious production for own consumption. We also know that there is not a complete separation of what is eaten from what is grown. If on-farm income generation is more geared toward high-nutrition-value crops, then we can assume more of these will be consumed from own production.

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d. Production of more nutritious food, with general food consumption effects beyond own consumption. Biofortification is one example of how to potentially increase the supply of key micronutrients without compromising (and even possibly increasing) the supply of macronutrients.

e. Empowering women to enhance nutrition impacts of a.–d. Greater control by women at all stages in the agriculture–nutrition chain will reflect their preferences and priorities more and also lead to their greater control of income. These effects tend to enhance nutrition outcomes.

But how do we make sure these multiple pathways are actually travelled?

### Is this potential for agriculture to impact on nutrition status being realized?

Clearly the potential is there. Is it being realized? For several reasons, this is a difficult question to answer.

First, the impact evaluations of agriculture that are outcome focused at the human well-being level, let alone nutrition focused, are thin on the ground. The Standing Panel on Impact Assessment (SPIA) of the Consultative Group on International Agricultural Research (CGIAR) lists impact evaluations done throughout CGIAR. **Table 1** shows that in the past 7 years for which records are available, evaluations of the impact of CGIAR's work on natural resource management outnumber evaluations of its impact on nutrition or health by five to one. In those 7 years, only five evaluations of the impact of CGIAR's work on nutrition or health are in the SPIA database.

Agriculture is also lagging in the databases of the Poverty Action Lab (J-PAL) and the International Initiative on Impact Evaluation (3ie). Of the 334 randomized evaluations listed in the J-PAL evaluation database,\* only 25 are listed under agriculture (compared with 115 for finance and microfinance, 80 for health, and 80 for education). Of the 82 studies listed in the 3ie database,\*\* 10 are on agriculture. The human level impact evaluation culture in agriculture is relatively weak.

Second, the aggregate data on the impacts of agricultural growth on income or nutrition status are inconclusive. Across-country econometric work reported in the 2008 World Development Report [6] shows that a 1% gain in GDP originating in agriculture generates a 6% increase in overall income for the poorest 10% of the population. This compares with a 4% increase in overall income for the next poorest, and 3% for the subsequent decile. In stark contrast, GDP growth

\* [http://www.povertyactionlab.org/search/apachesolr\\_search?view=grid&filters=type:evaluation](http://www.povertyactionlab.org/search/apachesolr_search?view=grid&filters=type:evaluation) (as of May 4, 2012).

\*\* [http://www.3ieimpact.org/3ie\\_funded\\_evaluations.html](http://www.3ieimpact.org/3ie_funded_evaluations.html) (as of May 4, 2012).

TABLE 1. Consultative Group on International Agricultural Research (CGIAR) impact assessment studies, 2003–09

Year	Focus of study		
	Natural resource management outcomes	Income or poverty outcomes	Nutrition or health outcomes
2009	4	5	2
2008	5	2	1
2007	9	3	2
2006	4	0	0
2005	3	0	0
2004	0	2	0
2003	1	3	0
Total 2003–09	26	15	5

Source: <http://impact.cgiar.org/> (as of May 4, 2012).

originating in nonagricultural sectors generates zero growth for the poorest 10% of the population, a 1% increase in income for the next 10%, and a 2% increase thereafter. A more recent empirical study [7] comes to similar conclusions. Using across-country econometric evidence, they reported that “Irrespective of the setting, a one percent increase in agricultural per capita GDP was found to reduce the total \$1-day poverty gap squared by at least 5 times more than a one percent increase in GDP per capita outside agriculture.” In contrast, a longitudinal study from Brazil [8] found that growth in the service industries caused the greatest reduction in poverty for the 1985–2004 period. An across-country regression framework [9] found that growth in labor-intensive sectors was the most poverty reducing. A study of India's experience [10] found that before 1991, rural growth was more poverty reducing than urban growth, but for the post-1991 period the reverse held true. One of the few recent careful studies [11] on agricultural growth and nutrition (as opposed to income) found that “sectoral growth effects do not seem to explain much of the variation in aggregate growth–nutrition outcomes, at least in the short run. We did find long run (levels) evidence of a much larger elasticity between malnutrition and agricultural growth relative to nonagricultural growth, but this pattern disappeared in shorter run episodes, except for adult BMI.”

So the evidence seems to point to positive impacts of agricultural growth on the income of the poor, but it is less clear when it comes to nutrition outcomes.

Third, the literature reviews that have been conducted are of good quality in general, but are not systematic in terms of protocols for inclusion and exclusion, grouped around outcomes and interventions. A meta-evaluation [12] of the general impacts of agricultural interventions provides a good example of the kind of studies needed to more systematically explore agriculture–nutrition links. These kinds of

reviews might throw up things we did not know. For example, a new systematic review of agricultural interventions that actually seek to improve nutrition status [5] found only 23 evaluations between 1990 and 2010 that were able to establish a credible counterfactual (2 biofortification, 16 home gardens, 3 fisheries, 1 dairy development, and 1 animal husbandry). The review tells us in detail that very few agricultural interventions set up to influence nutrition actually have the counterfactuals to assess whether or not they did, and that when they did, fewer than half of the interventions had a positive impact on the nutrition indicator chosen. So half of all agricultural interventions *with the express purpose of improving nutrition* (unlike the policies we are reviewing here) have a zero impact on nutrition status. Clearly the agriculture–nutrition community needs to up its impact evaluation game.

Fourth, we don't yet know enough about the nutrition impacts of the most promising direct link between agriculture and nutrition, biofortification. An extensive *ex ante* study [13] reviews the evidence around the theory of change of biofortification and uses these assessments to construct optimistic and pessimistic assessments of costs per disability-adjusted life-year (DALY) averted and then compares these with supplementation and fortification interventions. Biofortification comes out relatively well under the optimistic scenarios—but not under the pessimistic ones. The impact of orange-fleshed sweet potato (biofortified sweet potato) on vitamin A intake and serum retinol in Mozambique is positive and credible [14, 15]. Similarly, in a multicountry study, protein-fortified maize led to an increase in the rate of growth in height and weight of children of families cropping the fortified maize compared with those growing conventional maize [16]. These results are encouraging, and we need to see more positive stories before large scale-outs.

Overall then, weak and poorly organized evidence makes it hard to assess whether the potential for agriculture to increase its impact on nutrition is being realized, but my sense of the center of gravity is that agriculture is underperforming in its impact on nutrition.

### **What can be done to increase the realization of this potential?**

So what needs to be done to increase this potential? For example, how do we make the optimistic assumptions around biofortification's theory of change a reality? Although technical ideas around how to dovetail nutrition and agriculture are necessary, they are not sufficient. What is needed to make the agriculture and nutrition innovations work together is institutional innovation to facilitate and generate political pressure.

Fundamentally, getting agriculture and nutrition together is a political problem. But how can the political

pressure for agriculture and nutrition to work together be generated and sustained?

### ***Map nutrition outcomes in real time***

New methods for monitoring nutrition outcomes are needed. Real-time monitoring of nutrition outcomes makes nutrition harder to ignore and can guide action to reduce malnutrition. Mindful of the past successes and failures of nutrition monitoring and what it takes to sustain them in terms of organizational incentives to collect and use nutrition-relevant data, we need to work with the web 2.0 community (e.g., Frontline SMS\*) to identify, develop, and test new monitoring possibilities afforded by mobile technologies and cloud computing (see Bhawsar [17] for a review). If effective, these methodologies will be particularly valuable in fragile contexts where events change rapidly and unpredictably and where conventional data systems are extremely weak. Fresh streams of nutrition data will keep the issue in the public mind and put pressure on agriculture to act.

### ***Capitalize on the increasing need to demonstrate impact in Millennium Development Goal terms***

More and more donors are emphasizing impacts of intervention on outcomes rather than only inputs and outputs. The impacts have to be framed within the Millennium Development Goals and therefore have to be able to show impact at the human level (see, for example, the Department for International Development [DFID] Multilateral Aid Review [18]). I imagine that donors will put more pressure on the CGIAR and National Agricultural Research institutes to demonstrate the impact of agricultural research and development on human well-being. This creates an opportunity for advocates of closer links between agriculture and nutrition within the donor community: insist on agricultural projects and programs being evaluated in terms of nutrition outcomes. There will be pushback along the lines of “The causality chain is too long, attribution is too difficult, and we don't have the skills.” All of these are challenges, of course, but they are not insurmountable [19]. The International Food Policy Research Institute (IFPRI) commercialization of agriculture studies from the 1980s showed that these analyses can be done and shared some methods on how to do it [20].

### ***Develop diagnostic tools to help identify the points of greatest leverage of agriculture on nutrition***

We have heard many policymakers complain that because nutrition is such a multisector issue, they lack guidance on how to prioritize and sequence action so that it addresses binding constraints in the context within which they work. This is precisely the dilemma

\* <http://www.frontlinesms.com/>

faced by Ministries of Finance in stimulating economic growth. Practical work undertaken by the economic growth diagnostics community [21] shows the way forward for nutrition. We need processes and tools to develop typologies for action and then ways of deciding how to sequence and prioritize them in ways that are sensitive to capacity and political opportunities.

One simple typology for action is highlighted in **table 2**, which has two critical axes over which to map the landscape: whether food output and input markets are functioning well or not, and whether women are disempowered and excluded from decision-making.

If markets are functioning well, then what is grown does not have to be closely matched to what is eaten (production and consumption are separable). Here the task is to maximize farm income in a sustainable way and to influence diet choices via information, education, and communication activities. If markets are really thin, then what is eaten is much more dependent on what is grown, and the task is to directly influence the upstream and downstream agricultural investment choices. If male–female power relations are really skewed against women, then their preferences are discounted and their entrepreneurship is denied. Where women are relatively empowered, the task is to influence them as decision makers for nutrition. Where they are not empowered, the task is to support them to be in decision-making positions.

Within each cell in **table 2** are suggestions for key elements of a strategy. The actual strategy developed will be determined by the context—nutritional needs,

agricultural possibilities, political space, capacities at the organization and institutional levels, and fragility of context (conflict and environmental).

#### *Develop indicators to measure commitment to nutrition*

Strategies guide policy, legislation, resource allocation, and civil society action. But these commitments can only be realized through implementation. How can fidelity to these commitments be assessed? If they could, they would provide nutrition stakeholders with an effective transparency and accountability tool. Work by the Institute of Development Studies (IDS) and Action Aid to develop hunger reduction commitment indices [22] might have potential here. Obviously, working out the key components of such an index and establishing the most effective ways of collecting credible data on commitments and of communicating the results are challenges. But if they can be met, the indices promise the ability to enhance media attention to nutrition and agriculture.

#### *Build the next generation of nutrition–agriculture champions*

One common element of nutrition success stories is effective nutrition leadership. Leadership seems to be necessary, although not sufficient, for sustained improvements in nutrition. Leadership is needed to build teams to secure the financial and political resources to undertake and respond to nutrition monitoring, to develop and communicate nutrition strategies, and to be accountable for commitments to

TABLE 2. Organizing and prioritizing action to enhance the impact of agriculture on nutrition

	Weak food markets	Strong food markets
Gender exclusion	<p>Biofortification to get more micronutrients into local food supply without significant challenging of gender asymmetries in power</p> <p>Reduce gender asymmetries with respect to decision-making around agriculture—traits, crops, technology, information, time use, storage, and consumption properties—food production will map more closely into food consumption needs. Focus on institutions that can help women articulate voice, promote accountability to those voices, and be responsive to those voices</p>	<p>Reduce general gender asymmetries in power to:</p> <ul style="list-style-type: none"> <li>» Increase farm income and overall rural income</li> <li>» Increase impact of farm income on nutrition</li> </ul> <p>Use rights, legislation, and representation at the basic level and at the underlying and immediate levels of nutrition status determination to rebalance male–female power relations</p>
No gender exclusion	<p>Agricultural extension and research more closely linked to linear growth-promoting diets</p> <p>Behavior change on farm production to link it more closely to linear growth-promoting diets (e.g., dairy, fruits and vegetables, livestock, aquaculture)</p> <p>Biofortification</p> <p>Ensure that women are involved in market-strengthening interventions</p>	<p>Maximize farm income through production of what is most profitable—make sure risk mitigation and management mechanisms are in place</p> <p>Undertake behavior change on diet and health where it has the greatest leverage</p>

those strategies. How can nutrition champions and leaders be developed? Mindful of related efforts in health [23], we need to begin analyzing how leadership in nutrition works, how to generate more of it, and how to embed it in agriculture. It is not a coincidence that so many involved in the IFPRI commercialization studies came out of graduate programs that emphasized cross-sectoralism and cross-disciplinarity. With perhaps the exception of Cornell, training people to think and analyze and act to connect nutrition and agriculture is a key missing ingredient in today's graduate programs. Where is the next generation of leaders going to come from?

## Conclusions: From Nutrition Plus to Nutrition Driven?

It is not clear how the Harvest Plus biofortification program got its name. It may have been an attempt to reassure the agricultural community that in striving for additional nutritional impact there would be no tradeoff with yield. Even if that was not the reason for the name of HarvestPlus, in my experience this kind of thinking is prevalent in much of the agricultural establishment. Agriculture, they say, is about food production, less about income generation, and certainly has nothing much to do with purposively affecting nutrition. It is, in fact, about all three. The first (food production) is especially important for nutrition where markets for food are weak. Here, what is grown is what is available for consumption. The

second (income generation) is especially important for purchasing nutrition inputs in semisubsistence systems and beyond where markets work fairly well. The third (improved nutrition status) is, I would argue, the ultimate purpose of agriculture. Yes, agriculture can improve nutrition by increasing the local availability of key foods and by increasing the income of the poorest, but it can do more. It can focus on nutrition by making choices about which crops to invest in, which areas to invest in, whom agricultural extension is directed toward, and who has access to inputs and markets. Without this nutrition focus, the effects of agriculture on nutrition status will be more miss than hit.

There will be tradeoffs between these goals, but ultimately there has to be a convergence of understanding and commitment that agriculture is essentially about reducing hunger and malnutrition. We need to move from a situation where each outcome has its own nonoverlapping constituency to a situation where each is seen as a tactical route toward the strategic goal of improved nutrition and where context rather than ideology and habit dictates tactics.

We need to move from the era of thinking of improved nutrition as an optional extra for agriculture to one where agriculture and food production is driven by nutrition as its sole *raison d'être*. We need to move beyond the framework of Harvest Plus, which is a useful stepping stone, to one where the harvest is driven by the need to improve the nutritional status of the world's poorest people. We need to move beyond Nutrition Plus to Nutrition Driven: this paper has offered some ideas for how to do this.

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