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Linking Agriculture and Nutrition: Value Chain Analysis-Based Tools for Enhancing the Nutritional Impacts of Agricultural Interventions

Jay Daniliuk
USAID, Bureau for Food Security

Rebecca Egan
USAID, Bureau for Global Health
Background

• USAID has long made investments in enhancing agricultural productivity
• Limited evidence of direct and appreciable impacts on nutrition
• Feed the Future has given impetus for better integration of agriculture and nutrition:
  ➢ Value chain thinking can help to realize the potential nutritional impacts of agriculture
  ➢ Key focus on role of the private sector
Multinational private companies
- Disseminate best practices and lessons learned from global experiences
- Agricultural market development and consumer education
- Training modules and business plans
- Expertise in food processing technology and market development

Local SME
- Expertise in local operations, markets and industries
- Local leadership, innovation, and entrepreneurship
- Ensure mass, small-scale production is part of overall plan

USG and other donors
- Facilitate strategic alliances
- Provide technical assistance and training
- Collaborate with other donors and stakeholders

Research and academic partners
- Research and analytic capacity for assessments, monitoring and evaluation of impact
- Laboratory capacity for quality assurance and control

Country governments
- Large-scale program resources and implementation capacity
- Establish enabling environment
- Establish legislation, standards, and regulations
Objective: Identify, enable, and support scalable, innovative public-private partnerships that bridge the gaps between agriculture and nutrition to improve the nutritional status of the poor and undernourished.

Goal: Agriculture growth leads to a reduction in poverty AND hunger
GAIN Vision & Mission

• Driven by the vision of a world without malnutrition
• GAIN’s mission is to reduce global malnutrition through sustainable strategies aimed at improving the health and nutrition of populations at risk, particularly women and children
• Target: 1 billion people

Organizational Strategies

• Establish sustainable large-scale programs that bring proven strategies to reduce malnutrition to scale
• Measurable health impact
• Develop innovative public-private market-based models to extend fortified foods to vulnerable populations
Project Goals

• Create a methodology to review the nutrition sensitivity of agricultural programs along their value chains and determine where market opportunities can help scale up nutritious agricultural interventions.

• Help strengthen public and/or market led agricultural programs to better integrate nutrition

• Thereby, foster private sector-led innovation and strategic multi-stakeholder PPP opportunities that can drive food and nutrition goals in support of the objectives of USG (FTF and GHI).
Two Tools

• **Tool 1:** Nutritious Agriculture by Design: A tool for program planning:
  - Identifying actual and potential nutritional impacts of agricultural interventions

• **Tool 2:** Nutritious Agriculture by Design: A tool for private sector engagement:
  - Identifying opportunities for private sector investments in facilitating access to nutrient-dense foods
Tool 1:
Nutritious Agriculture by Design:
A tool for program planning
Nutritious Agriculture by Design: A Tool for Program Planning

• Applications:
  ➢ Prompt redesign of existing agriculture projects for nutritional impact
  ➢ Enhance specifications for new projects

• Users:
  ➢ Project/program designers and implementers
  ➢ USAID and other donors
Testing the Tool

• Focus on existing agricultural projects
• Interventions applied to Feed the Future priority value chains in select countries:
  ➢ Kenya
  ➢ Bangladesh
  ➢ Mozambique
## Routes from Agriculture to Nutrition

<table>
<thead>
<tr>
<th></th>
<th>Income Route</th>
<th>Consumption Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption of Nutrient-Dense Food by Target Producer Households</td>
<td>Expenditure by farm households on nutrient-dense foods</td>
<td>Own-consumption of the focal nutrient-dense food by producer households</td>
</tr>
<tr>
<td>Consumption of Nutrient-Dense Food by Other Households</td>
<td></td>
<td>Consumption of the focal nutrient-dense food by non-producer households</td>
</tr>
</tbody>
</table>
Structure of the Tool

- Part 1: Basic characteristics of the intervention
- Part 2: Does the intervention aim to increase consumption of nutrient-dense food(s)?
  - Yes: Part 3 - Promotion of consumption of the nutrient-dense food in producer households
  - No:
    - Part 4 and 5: Promotion of consumption of the nutrient-dense food in non-producer households
    - Part 6: Enhancing the nutritional benefits of improving producer household incomes and/or productivity
- Part 7: Assessment of intervention
Key Questions Addressed by the Tool

1. What are the basic characteristics of the intervention?
2. Does the project aim to increase production or consumption of nutrient-dense foods? If so, who will consume these foods?
3. What is the production and consumption of the target food by producer households? Will on-farm consumption of the commodity have an impact on nutrition. Is it a pathway to support? Which populations within the household could benefit?
4. Is there a potential to improve nutrition through increased income and/or productivity?
5. What is the impact on the nutrition of individuals not directly assisted by the project?
6. Summarizes the key findings and action points
Part 1

What are the basic characteristics of the intervention?

1.1 Brief description of the intervention

This first part of the Rapid Assessment Tool clarifies the basic goals and objectives of the intervention and highlights briefly the interactions with nutrition, poor farmers and business.

1.1 Provide a brief description of the intervention. What are its core activities, objectives and goals?
Bangladesh: Cereal Systems Initiative for South Asia (CSISA)

- One of first applications of tool
- Will use throughout to illustrate the application of the tool
- USAID-funded program aimed at promoting intensive rice system farming in Bangladesh
- Focus on:
  - Increased productivity of ponds and paddy
  - Use of short duration rice and introduction of third crops, including maize
  - Promotion of prawn and fish farming
Does the intervention aim to increase production or consumption of nutrient-dense foods? If so, who will consume these foods?

Projects focused on agriculture differ from those focused on nutrition in their starting points and intermediate objectives. Agriculture projects typically focus on the beginning of the value chain, farm production and inputs to farm production. Health/nutrition interventions typically prioritise the end of the value chain, focusing on consumption of food (and absorption of specific nutrients) and particular populations that face nutrient deficiencies beyond energy intake.

Part 2 begins to close this gap by identifying whether the intervention aims to increase the availability of nutrient-dense foods, either by increasing the supply of foods that are nutrient-dense or by increasing the nutritional value of foods currently produced (for example, introducing bio-fortified varieties). To some extent, the definition of nutrient-dense is subjective. However, it is taken here to refer to foods that have appreciable levels of high quality protein and/or that are rich in micronutrients.

2.1 Does the intervention aim to promote increased availability of a nutrient-dense food?

Yes ☐ No ☐
CSISA: Findings from Part 2

- Predominant focus on target producer households
- Not intended to target non-producer households
- A lifecycle approach was not part of the design
- Some programs specifically targeted at women (small ponds, kitchen gardens)
- Considerable focus on promoting complementary products valuable for household nutrition (see findings from part 6)
- Willingness to promote shrimp production (export only) and maize (for animal feed)
Production and Consumption of target food by target producer households

Promoting on-farm production and consumption of nutrient-dense food is one widely-used route to addressing undernourishment. Section 3 examines this route. What evidence is there that the food targeted by the intervention will successfully address the nutritional needs of individuals in the households that produce it? Note that producer households here are taken to include not only farm households that are the direct target of the intervention, but also the households of labour employed by target producers.

3.1 Will on-farm consumption address problems of undernourishment?

3.1.1 For which individuals in the target producer households will the intervention increase consumption of the target food?

- Women in general
- Pregnant or lactating women
- Infants ages 6-23 months
- Children
- Men
- Persons with HIV/AIDS or other health issues
- Other (specify below)
CSISA: Findings from Part 3

• Efforts made to promote fish production alongside shrimp – both carp and small indigenous species
• Expectation that small indigenous species more likely to be consumed on farm
• Proportion of fish consumed in household not tracked
• Some baseline data collected on household dietary diversity
Part 4

Impact of the intervention on nutrition of individuals not directly assisted by the intervention

Interventions may aim to increase the consumption of the target food by individuals in households that are not directly assisted by the intervention, and that access the target food other than through their engagement in its production. The issue of acceptability arises, as it does with consumption in target producer households. However, there are additional issues, such as how food produced on farms reaches consumers. Part 4 of the tool examines whether the links from farm production through to consumption are well thought through and how the intervention ensures that they work. Part 5 repeats this module for interventions that target more than one group of consumers.

4.1 (Pt. 1) Is there a nutritional impact on individuals that are not directly assisted by the intervention?

4.1.1 Does the intervention specifically aim to increase consumption of the target food by individuals outside of producer households directly assisted by the intervention?

Yes ☐ No ☐
CSISA:
Findings from Parts 4 and 5

• Activities not oriented to post-farmgate consumption
• Obtaining high prices likely to be more important than targeting sales towards undernourished population groups
• Anecdotal evidence that fish products were sold predominantly to urban markets and that fish becoming even more of a luxury for the poor
Nutritional impacts through increased income and/or productivity

So far, the tool has focused on how increases in consumption of the target food can affect nutrition, both in target producer households and within consumers more generally. Many agricultural interventions primarily aim to increase incomes and/or productivity of producers, with a particular focus on inclusion of poor and vulnerable farmers. Increased income may translate into improved dietary diversity through purchases and consumption of nutrient-dense foods in general. This part of the assessment examines routes to nutritional impacts in individuals in producer households that are directly assisted by the intervention.

Note that producer households here are taken to include not only farm households that are the direct target of the intervention, but also the households of labour employed by target producers.

6.1 Does the intervention directly target poor producer households?

Yes ☐ No ☐
CSISA: Findings from Parts 6

- Impact of program on farm household incomes clear and closely monitored
- Considerable efforts to promote production of nutrient-dense foods on-farm:
  - Behaviour change communication
  - Kitchen gardens
  - Orange fleshe sweet potato on pond dykes
  - High level of gender awareness
- Baseline for diet quality established
Program Planning Tool: More General Findings

• Tool very good at getting those involved with agricultural interventions to start thinking about nutrition and to challenge their assumptions
• There are some ‘low hanging fruit’: low-cost and easily implemented changes that might enhance nutritional impacts and/or enable these to be monitored
• More profound changes to promote nutrition in agricultural interventions are more problematic:
  ➢ Requires the reallocation of resources
  ➢ May be trade-off between boosting farm incomes and nutritional impacts
  ➢ Requires the donor to require that nutritional impacts are achieved and monitored
Tool 2: Nutritious Agriculture by Design: A tool for private sector engagement
Nutritious Agriculture by Design: A Tool for Private Sector Engagement

- Identify specific market opportunities for locally producing and distributing nutrient-dense foods to people with nutritional deficiencies
- Identify value chain challenges that need to be overcome in order to make these opportunities feasible
Two Stage Process

- Initial assessment of feasibility
- Definition of detailed business plans
Structure of the Tool

• Part 1 – Defining products and routes to potential nutritional outcomes

• Part 2- Assessment of value chain challenges:
  ➢ Agricultural inputs
  ➢ Production
  ➢ Post-harvest handling
  ➢ Processing
  ➢ Distribution and marketing
  ➢ Consumption

• Part 3- Business case

• Part 4 – Overall assessment
Part 1: Defining Products and Routes to Potential Nutritional Outcomes

- Definition of focal products
- Identifying links to target consumers and potential contributions to nutrient intake
- Compilation of available evidence on affordability, reach and acceptability
The Starting Point

Product

Agricultural Commodity 1  Agricultural Commodity 2  Agricultural Commodity 3  Agricultural Commodity 4
**Product:** Fresh and boiled tubers, Golden bread, Juice, Juice blends with corn, fruit, Biscuits, OFSP flour

**Focal Commodities:** OFSP

- High in beta carotene
- Significant potential for value chain development
- Long-term investment in development of agricultural production
- Synergies with development of export markets?
- On-farm consumption
**Nutrition Product:** Cashew butter, cashew snack bars, Lipid-based nutrient supplements (LNS)

**Local Commodities:** Cashew Nuts

- Good source of protein and fatty acids
- Efforts to scale-up domestic production
- Predominantly an export crop
- Scope for broken kernels to enter local value chains?
- On-farm consumption
Focal Product: Dried mango, Mango bars, Mango juice

Definition of Focal Commodities: Mango

- Good source of vitamin A and essential minerals
- Much of focus on development of an export sector
- Domestic market mainly supplied through informal market channels
- Scope for routing of export rejects to local markets?
- On-farm consumption
Target Consumers: Orange-Fleshed Sweet Potato

<table>
<thead>
<tr>
<th>Target Group</th>
<th>Product</th>
<th>Nutritional Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undernourished 1000 day groups/children</td>
<td>Porridges</td>
<td>Vitamin A (Other nutrients)</td>
</tr>
<tr>
<td>Poor rural consumers/households</td>
<td>Fresh/Boiled tubers</td>
<td>Vitamin A (Other nutrients)</td>
</tr>
<tr>
<td></td>
<td>Juice/Juice blends</td>
<td></td>
</tr>
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<td></td>
<td>Juice/Juice blend</td>
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</tr>
<tr>
<td></td>
<td>Golden Bread</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biscuits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Porridges</td>
<td></td>
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</tbody>
</table>
Routes to Potential Nutritional Outcomes: Golden Bread

- OFSP puree preserves nutrient content
- Golden Bread consists of blend of OFSP puree and wheat flour
- Golden Bread already offered in some bakeries/food fairs in Maputo
- Some distribution of Golden Bread in distribution schemes
- Evidence of consumer acceptability
- Affordability an issue – higher price than regular bread:
  - Need to create value in the eyes of the consumer
- Distribution a key issue especially in targeting individual consumers
- Scope for product differentiation/development?
Structure of the Tool

• Part 1 – Defining products and routes to potential nutritional outcomes

• Part 2 - Assessment of value chain challenges:
  ➢ Agricultural inputs
  ➢ Production
  ➢ Post-harvest handling
  ➢ Processing
  ➢ Distribution and marketing
  ➢ Consumption

• Part 3- Business case

• Part 4 – Overall assessment
Part 2: Assessment of Value Chain Challenges

• Mapping of value chains

• Assessment of challenges:
  - Agricultural inputs
  - Production
  - Post-harvest handling
  - Processing
  - Distribution and marketing
  - Consumption
Value Chain Mapping: Golden Bread

CONSUMERS

SUPERMARKETS  
SMALL SHOPS  
SCHOOLS EMPLOYERS  
PUBLIC DISTRIBUTION

BAKERIES

OFSP PUREE PROCESSORS

INFORMAL TRADERS

FARMERS

VINE PRODUCERS  
VINE AGGREGATORS  
NGOS/IMPLEMENTERS
Golden Bread: Agricultural Inputs

• Significant investment in breeding of appropriate varieties:
  ➢ Drought tolerance
  ➢ Agronomic suitability
  ➢ Consumer acceptability

• Need to shift to commercial system to supply vines....

• ....still largely pre-commercial and needs to be scaled-up

• Many complimentary inputs are imported:
  ➢ High price
  ➢ Unreliable supply

• Access to improved inputs a major constraint for many producers
Golden Bread: Agricultural Production

• Supply of OFSP remains limited though expanding—need to scale-up production
  ➢ Farmer training
  ➢ Integrate producers into value chains

• Need to promote farmer adoption:
  ➢ Strong incentives
  ➢ Defray risks

• Strong support program for OFSP....

• ....but limited in scope

• Risk of varietal deterioration over time

• Wheat mainly imported – price issues
Golden Bread:
Post-Harvest Handling

• Need to integrate producers into traders and markets for tubers
• Lack of on-farm storage....
• ....sell at lower prices on spot markets
• No apparent transportation problems – easy to transport
• Need for better and more integrated storage facilities that are nutrient-sensitive (light and heat for Pro vitamin A)
Golden Bread: Processing

- Production of OFSP puree a new operation
- Alternatives:
  - Bakeries
  - New actors – pulp processors
- Some bakeries already involved at an experimental level
- Small number of local processing firms
- Need for enhanced/more appropriate mashing technology
- Need to adapt established processing methods to be more nutrient-sensitive
- Need to disseminate concept and techniques on wider scale to bakery sector
Golden Bread: Distribution and Marketing

• Currently most distribution through health programs, development agencies, etc.
• Limited private sector involvement to date....
• ....at least without donor support
• Market still experimental - concept not proven
• Bakery sector well-developed and innovative
• Retail sector well-developed in urban areas....
• ….and signs of development of bakery sector in rural areas
• Uncertainty as to scale of consumer demand
• Scope for marketing at household and individual consumer levels
Golden Bread: Consumption

• Sufficient evidence of consumer acceptability:
  ➢ Sensory trials
  ➢ Test markets

• Price remains a considerable potential impediment, especially for the poor

• How will use differ to regular bread – true substitutes?

• Will consumption and demand be driven by nutrition?

• Need for strong promotion and marketing investment

• Concerns about potential impact on on-farm consumption of OFSP
Structure of the Tool

• Part 1 – Defining products and routes to potential nutritional outcomes

• Part 2- Assessment of value chain challenges:
  ➢ Agricultural inputs
  ➢ Production
  ➢ Post-harvest handling
  ➢ Processing
  ➢ Distribution and marketing
  ➢ Consumption

• Part 3- Business case

• Part 4 – Overall assessment
Part 3: Business Case
Golden Bread

• More nutritious substitute for standard bread
• Production and fundamental consumer acceptability challenges with OFSP addressed
• Need to upscale production and integrate into value chains…
• ….might exports be an important facilitator of this process?
• Currently at ‘proof of concept' phase
• Evidence of consumer acceptability and demand…
• ….but not at the substantive market level
• Need for comprehensive and rigorous market-based consumer studies
Business Case
Golden Bread

• Some evidence of business interest in commercialisation....
  …but with donor support

• Routes to commercialisation:
  - Gradual adoption by small-scale bakers
  - Wholesale adoption by bakery sector/large-scale bakers

• Key role of OFSP puree:
  - New intermediaries within value chain
  - Technological innovations
Structure of the Tool

• Part 1 – Defining products and routes to potential nutritional outcomes

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  ➢ Agricultural inputs
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  ➢ Post-harvest handling
  ➢ Processing
  ➢ Distribution and marketing
  ➢ Consumption

• Part 3 – Business case

• Part 4 – Overall assessment
## Part 4: Overall Assessment

<table>
<thead>
<tr>
<th>Condition</th>
<th>Golden Bread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree to which product meets a nutritional need in a relevant population group</td>
<td>Enhanced nutritional value Evidence of nutritional impact unclear</td>
</tr>
<tr>
<td>Degree to which nutrition of producer households might be enhanced through consumption of the focal agricultural commodity</td>
<td>High Potential to enhance nutrient intake of producer households</td>
</tr>
<tr>
<td>Closeness of product to being ready for testing and marketing</td>
<td>Product ready, for commercialization</td>
</tr>
<tr>
<td>Level of prior experience in successful production and/or consumption of the product</td>
<td>Experience on pilot scale only</td>
</tr>
</tbody>
</table>
## Overall Assessment

<table>
<thead>
<tr>
<th>Condition</th>
<th>Golden Bread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree to which serious obstacles identified along value chain</td>
<td>Need for effective value chain linkages for supply of OFSP puree</td>
</tr>
<tr>
<td></td>
<td>Need to expand significantly to commercial scale</td>
</tr>
<tr>
<td></td>
<td>Aggregation by traders unproven</td>
</tr>
<tr>
<td></td>
<td>Consumer demand unproven</td>
</tr>
<tr>
<td>Level of existing or planned private investment</td>
<td>High degree of readiness with donor support</td>
</tr>
<tr>
<td>Stage of Value Chain</td>
<td>Private Sector Action</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Agricultural inputs</td>
<td>Upgrade vine and other input supply networks</td>
</tr>
</tbody>
</table>
| Production           | Establish/up-scale commercial farms and establishing out-grower schemes | Facilitate smallholder linkages  
|                      |                       | Support to smallholder upgrading |
| Post-harvest handling| Upgrade storage facilities | Access to credit |
| Processing           | Establish substantive puree manufacturing capacity  
|                      | Adapt baked goods manufacture | Training  
|                      |                                 | Information dissemination  
|                      |                                 | Demonstration plants  
|                      |                                 | Access to credit/grants |
| Distribution and marketing | Establish distribution networks through retailers, schools/workplaces and public distribution | Information dissemination  
|                      |                                 | Demonstration sites  
|                      |                                 | Legislative action |
| Consumption          | Product promotion | Support for promotional campaigns  
|                      |                                  | Market testing |