Making value chains work for food and nutrition security of vulnerable populations in East Africa

Ag2Nut Webinar

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CIAT
Outline

1. Value chains for Nutrition (VCN): Introduction and background

2. BMZ Project: Making value chains work for food and nutrition security of vulnerable populations in East Africa

3. Market Assessment Study / Willingness to pay
FIGURE 1
Percentage of Population Living in Urban Areas, by Region, 1950–2050


CIAT
Sustainable Food Systems - APR14
Driving Dynamics of Urbanization

**HEALTH**
Urban nutritional “double burden”
- Under-nutrition
- Overweight & obesity

**Urban food safety**

Increased consumption of energy dense cheap and processed food
Background

• **African urbanization** is accompanied by **rapid growth in urban incomes** and by urban (and to a lesser extent rural) **diet diversification**. These trends are similar to those found in Asia, with Asia just somewhat ahead in the same trends.

• Urbanization combined with income increases and diet diversification provides **major opportunities as “motors of growth” for rural areas of Africa**. In Asia this major trend has been leveraged to meet the growth and poverty alleviation targets in rural areas.
The goal of our nutrition sensitive value chain work at CIAT is to improve the diets of vulnerable rural and urban consumers at the base of the pyramid (BoP), specifically women of reproductive age and children 6–59 months old.

This will be achieved through increased consumption of more diverse, safe, and nutrient-dense foods sourced from multiple crops and delivered through market-based solutions, which improve the food and nutrition security, income, and livelihoods of actors along the value chain.

Current VC concepts and frameworks will be enriched by a stronger consumer focus, particularly on nutrition and health.

CIAT’s work on VCs for Nutrition will generate evidence by linking the activities of different stakeholders across the agricultural, nutrition, and health sectors within an integrated system.

Solutions will be developed through public-private collaboration, aimed at enhancing chain efficiency while providing nutritious foods to vulnerable populations.
Short/Long term strategy

**Short term:**
- Closing the knowledge gap: **Assessment of supply and demand constraints** along the different stages of the value chain to access and utilization of nutrient dense, safe and diverse foods by vulnerable urban and peri-urban consumers (incl. nutrient leakages and physical losses, willingness to pay, consumer preferences, distribution etc.).

**Long term:**
- Develop and test **solutions to upgrade target value chains** in order to increase the availability of affordable, safe and nutrient-dense food for target populations.
The nutrition-sensitive value chain

- The products, processes, people and policies which deliver valuable nutrients to vulnerable consumers

- *Innovations and interventions at any point in the chain post farm gate* which address *nutritional improvement* in target population groups where there is evidence that the focal foods are consumed by the (rural and urban) poor
Methodological steps of the VCN approach

1. IDENTIFICATION
   Identify the nutrition problem to be addressed

2. CONTEXTUALIZATION
   Analyze the macro-level food systems context

3. CHARACTERIZATION
   Characterize diets, identifying constraints and relative contributions of key foods

4. EXAMINATION
   Examine nutrition and food safety value-addition

5. PRIORITIZATION
   Prioritize intervention options

Methodological steps of the VCN approach
(based on IFPRI, 2015)
Impact pathway of the VCN approach

<table>
<thead>
<tr>
<th>Activities</th>
<th>Outcomes</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENHANCE DEMAND FOR NUTRITIOUS FOOD</td>
<td>Changes in nutrition, health and care knowledge and practices</td>
<td>Changes in health and nutrition status</td>
</tr>
<tr>
<td>Examples:</td>
<td>Changes in quantities of nutritious food consumed and feeding practices</td>
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<tr>
<td>• Behavior change communication campaigns</td>
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<td>• Institutional feeding</td>
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<td>• Subsidies for consumption</td>
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<tr>
<td>ENHANCE PRO-NUTRITION ADDED-VALUE</td>
<td>Changes in quality and safety regulations of nutritious food</td>
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<tr>
<td>Examples:</td>
<td>Changes in the availability of and access to nutritious food</td>
<td></td>
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<tr>
<td>• Nutrient content</td>
<td></td>
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<tr>
<td>• Food safety risk</td>
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<tr>
<td>• Price / quantity</td>
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</tr>
<tr>
<td>ENHANCE SUPPLY OF NUTRITIOUS FOOD</td>
<td>Changes in production systems and post-harvest practices</td>
<td>Changes in income and economic status</td>
</tr>
<tr>
<td>Examples:</td>
<td>Changes in market opportunities and risk, sales and profits</td>
<td></td>
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<tr>
<td>• Expansion of market opportunities</td>
<td></td>
<td></td>
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<tr>
<td>• Training on production, post-harvest and marketing</td>
<td></td>
<td></td>
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<tr>
<td>• Access to improved inputs and credit</td>
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</table>

Impact pathway of the VCN approach (based on IFPRI, 2015)
Making value chains work for food and nutrition security of vulnerable populations in East Africa

• **Donor:** BMZ/GIZ and A4NH

• **Team:**
  - International Centre for Tropical Agriculture (CIAT)
  - Kenya Agricultural and Livestock Research Organization (KALRO)
  - Ugandan National Agricultural Research Organization (NARO)
  - University of Hohenheim, Germany
  - University of Goettingen, Germany
  - Nutreal & Azuri: Private processors in Kenya and Uganda (Small & medium enterprises)
  - Local Universities in Kenya and Uganda
  - Farmers
Project Goal

✓ To improve diets of vulnerable rural and urban consumers at the base of the pyramid (BoP), especially women of reproductive age (15-49 years) and young children

✓ The project’s goal will be achieved through:
  ➢ Increased consumption of more diverse, safe, and nutrient-dense foods sourced from multiple crops and delivered through market-based solutions, which improve the food and nutrition security, income, and livelihoods of actors along the value chain.
  ➢ Public-Private-Partnership (PPP)

✓ The first case study applying the IFPRI value chain for nutrition framework
Specific objectives

1. To improve the dietary quality especially for women and children. 
   (Indicator: Dietary diversity scores; dietary micronutrient intake)

2. To enhance food safety and reduce nutrient loss in bean-based products
   ➢ Indicator: Prevalence of contaminants in food crops dried using SBD versus traditional method 
     (e.g. mycotoxins)
   ➢ Indicator: Nutrient loss resulting from traditional drying process versus using SBD 
     ➢ Vitamin A, C, B1, B9-HPLC and other analysis

3. To improve economic returns in target value chains, through 
   (Indicator: Change in farm income from sale of the target produce):
   1. Improved quality,
   2. Reduced costs and post-harvest loss,
   3. Increased output, sales, and profits along the value chain, leading to 
      improved income and employment along the entire value chain

4. Women empowerment (Indicator: Level of women empowerment using Women 
   Empowerment in Agriculture Index (WEAI) and “Longwe” framework)

5. To promote the consumption of nutritious bean-based products 
   among different vulnerable consumer groups
The project value chain model

- **Farmers groups**
  - **Efficient solar dryers** (food safety & loss; nutrient value, & profitability; reduce drudgery in drying)
  - **Inclusive business model**

- **Processor (SME)**
  - **Solar dryer**
  - **Private Sector** (processing nutritious, safe, & quick to cook porridge flour)

- **Wholesalers/Retailers**
  - **Research: Right pricing and point of sale**

- **BoP Consumers**
  - **Research: Nutrition gap among BoP consumers**
  - **Consumer preference & WTP**
  - **Gender Equity**

**NUTRITIOUS & AFFORDABLE PRODUCT!**

**Increased consumption of a nutritious & safe product**
## Impact Pathways

### Activities

**Enhanced Demand for Nutritious Food**
- Communication behavior change for consumers based on consumer & market studies
- Dissemination of nutrition information for the new product

**Enhanced Pro-Nutrition Added Value**
- Nutrient leakage analysis
- Critical points of contamination and Food safety analysis
- Food loss analysis
- Use of SBD dryer

**Enhanced Supply of Nutritious Foods**
- Targeting a new consumer category (BoP)
- Training on post-harvest handling
- Market research to support marketing of the new product

### Outcomes

**Enhanced Demand for Nutritious Food**
- Improved knowledge on nutrition, health, and practices
- Increased quantities of nutritious foods consumed by the BoPs

**Enhanced Pro-Nutrition Added Value**
- Reduced post-harvest loss
- Increased production of nutritional quality produce
- Increased availability of safe and nutritious products by the BoP

**Enhanced Supply of Nutritious Foods**
- Change in post harvest practices
- Change in production systems
- Change in marketing opportunities, risks, sales, and profits
- Accessible nutritious products

### Impacts

- Improved health and nutrition status of vulnerable population at the base of Pyramid (BoP)
- Improved income and economic status of value chain actors

*Impact pathway of the VCN approach (based on IFPRI, 2015)*
Knowledge base established to understand:

- Why the target nutrient-dense foods are not consumed by specific vulnerable consumer groups
- Why foods cost what they do
- How nutrient quality, quantity, and safety of foods change along the value chain from production to final consumption.
  - Lab analysis to conduct nutrient leakages along the value chain
  - HACCP Analysis to identify the critical points of contamination
  - Lab analysis to identify level of contamination at the identified points
Characterization of diets & consumption patterns of target vulnerable populations

• Identify specific micro- and macronutrient deficiencies (the nutrition problem)

• Identify opportunities for improving dietary quality by enhancing the supply of and demand for specific foods and identifying unmet market opportunities

• “Value propositions” for increasing consumer acceptability of nutrient-dense products

• “willingness to pay” and demand of the bean-based product
Nutritional value enhanced along bean-based value chains through the introduction of energy-efficient, low-cost solar drying technology.

Advantages of the Solar Bubble Dryer (SBD) over traditional drying

- Enhanced food safety
- Enhanced nutrient value
- Reduces postharvest losses
- Eliminates weather risk—during the wet season.

-SBD dries grains approx. 2 times faster than open sun-drying
Solar drying technology (training and installation) at Azuri ltd.
Support provided to private sector Small and Medium Enterprises (SMEs) for developing, testing, and launching in informal markets novel bean-based products that are nutritious, convenient, safe, and affordable.

- Development of the SME’s strategic plan
- Market opportunity for the product
- Product definition
- Product prototype
- Consumer testing
- Product launch
- Scaling up
Using LINK methodology to link farmers with profitable market:
Chain-wide collaboration enhanced through new partnerships and more inclusive business models linking smallholder farmers to promising informal market segments for nutrient-dense processed products.

Win – win situation for farmers and processors
Capacity of project partners and key actors innovation platforms strengthened through training and mutual learning for participatory design and large-scale implementation of solutions aimed at increasing the availability, affordability, safety, and quality of selected nutritious foods in bean corridors of Kenya and Uganda.
Target numbers to be reached

- **Rural and urban consumers:**
  - The project expects to reach an estimated 50,000 rural and urban consumers by the end of the project.
  - Reach 2 and 3 million consumers in Uganda and Kenya respectively, within three years after the project.

- **Smallholder farmers**
  - Reach 7,000 in Uganda and 5,000 in Kenya.
Outline

1. Value chains for Nutrition (VCN): Introduction and background

2. BMZ Project: Making value chains work for food and nutrition security of vulnerable populations in East Africa

3. Market Assessment Study / Willingness to pay
Purpose of the study

• To understand the Base of Pyramid (BoP) market, consumers and outlets:

  a.) BoP Consumers
  • Type of porridge flour they consume
  • Porridge flour attributes that are important to them
  • Preferred point of purchase
  • Preferred flour packaging size
  • How much the BoP consumers are willing to pay for nutritious porridge flour
  • Impact of nutrition information on consumer’s willingness to pay for the porridge flour
  • …
b.) Outlets

• Is there market for the porridge flour, and how can it be characterized?
  ➢ Product prices
  ➢ Market size and trends: traded volumes
  ➢ Types of porridge flour in demand: varieties; packaging type
  ➢ Packaging sizes

• Type of porridge flour in the market (composition-ingredients; fortified or not)

• Who are the competitors of flour suppliers (processors): local, suppliers from other regions
Study sites

• Survey was conducted in urban of Nairobi, Kenya and Kampala, Uganda between July - September 2016

• Covered 4 informal settlements (Base of Pyramid) in each country

• Kenya:
  • Kibera, Mathare, Mukuru kwa Njenga, and Kawangware

• Uganda:
  • Bwaise, Kawempe, Kamwokya, and Kawaala
Who was interviewed?

- 300 Consumers in each country
- Consumer survey was at household level
- 200 Outlets in each country
- Outlets targeted wholesale and retail shops
  - Kiosks,
  - Mom& pop shop
  - Supermarkets
  - Wholesalers
Some key study results
BoP Consumers
Composition of porridge consumed

- Composition of porridge flour consumed by children (6-23 months), children (2-5 years), and women of reproductive age:
  - Kenya: Millet porridge flour is the most consumed
  - Uganda: Maize & millet; only maize; only millet flour

- Less than 10% of consumers use porridge flour with 4 or more ingredients

- Much less percentage when considering food groups
- Mom & Pop shops are the main point porridge flour purchase followed by supermarkets, own processing, and wholesalers

- A higher percentage of consumers would prefer to purchase their porridge flour from supermarket
Top 2 main reasons for Preferred Place of purchase

- Convenience
- Price
- Nutrition
- Food safety
Preferred porridge flour package sizes

- 1kg and 500 grams are most preferred
## Reasons for Preferred package sizes- Ke, Ug

<table>
<thead>
<tr>
<th>Package Size</th>
<th>Reasons for preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>250g</td>
<td>Its affordable</td>
</tr>
<tr>
<td></td>
<td>Readily available</td>
</tr>
<tr>
<td>500g</td>
<td>Its affordable</td>
</tr>
<tr>
<td></td>
<td>Avoid expiry</td>
</tr>
<tr>
<td>1kg</td>
<td>Lasts longer</td>
</tr>
<tr>
<td></td>
<td>Its affordable</td>
</tr>
<tr>
<td>1.5kg</td>
<td>Lasts longer</td>
</tr>
<tr>
<td>2kgs</td>
<td>Lasts longer</td>
</tr>
<tr>
<td>2.25 kg</td>
<td>Lasts longer</td>
</tr>
</tbody>
</table>

- Affordability is Key!
## Porridge attributes important to BoP consumers

<table>
<thead>
<tr>
<th>Porridge flour attribute</th>
<th>Kenya (%)</th>
<th>Uganda (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price (inexpensive)</td>
<td>76.2</td>
<td>44.2</td>
</tr>
<tr>
<td>Price (expensive)</td>
<td>3.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Small packaging (&lt;1kg)</td>
<td>18.2</td>
<td>7.8</td>
</tr>
<tr>
<td>Large packaging (&gt;=1kg)</td>
<td>36.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Only one ingredient</td>
<td>17.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Two ingredients</td>
<td>9.2</td>
<td>20.3</td>
</tr>
<tr>
<td>More than two ingredients</td>
<td>44.2</td>
<td>23.5</td>
</tr>
<tr>
<td>Fortified flour</td>
<td>11.9</td>
<td>2.5</td>
</tr>
<tr>
<td>Labelling (with expiry dates etc.)</td>
<td>25.1</td>
<td>12.2</td>
</tr>
<tr>
<td>Long Shelf life</td>
<td>22.8</td>
<td>5.9</td>
</tr>
<tr>
<td>Labelling Food safety (passed through food safety checks)</td>
<td>8.6</td>
<td>41.0</td>
</tr>
<tr>
<td>Texture in the mouth (with debris)</td>
<td>3.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Sour</td>
<td>25.1</td>
<td>7.8</td>
</tr>
<tr>
<td>Texture in the mouth (smooth)</td>
<td>38.6</td>
<td>28.1</td>
</tr>
<tr>
<td>Tasty</td>
<td>58.8</td>
<td>49.7</td>
</tr>
<tr>
<td>Appealing color (96% respondents-prefer brown porridge)</td>
<td>34.3</td>
<td>30.0</td>
</tr>
<tr>
<td>Precooked/Fast cooking flour</td>
<td>2.3</td>
<td>17.0</td>
</tr>
<tr>
<td>Not forming lumps during cooking</td>
<td>13.5</td>
<td>8.2</td>
</tr>
<tr>
<td>Packaging that rodents/insects can’t get in</td>
<td>9.9</td>
<td>5.5</td>
</tr>
</tbody>
</table>
Consumer willingness to pay (WTP) for improved flour
Experiment

• Multi-composite porridge flour
  (Improved variety)
  • Kenya: 6 Ingredients
  • Uganda: 5 ingredients

• Conventional porridge flour:
  • Kenya: Millet flour
  • Uganda: - Millet flour
    - Maize flour

• Consumers were stratified into two:
  With and without nutrition information
### Consumer WTP for improved vs. conventional flour (1 kilogram of flour)

#### KENYA

<table>
<thead>
<tr>
<th>Study Site</th>
<th>Mean (USD)</th>
<th>Mean (USD)</th>
<th>(%)</th>
<th>Mean (USD)</th>
<th>(%)</th>
<th>Mean (USD)</th>
<th>(%)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millet flour+</td>
<td>0.99</td>
<td>1.72</td>
<td>73.4</td>
<td>1.64</td>
<td>65.1</td>
<td>1.76</td>
<td>77.3</td>
<td>12.2</td>
</tr>
<tr>
<td>Improved flour++</td>
<td>0.91</td>
<td>1.42</td>
<td>56.4</td>
<td>1.46</td>
<td>61.0</td>
<td>1.47</td>
<td>61.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Premium above millet</td>
<td>1.01</td>
<td>1.64</td>
<td>63.2</td>
<td>1.51</td>
<td>50.3</td>
<td>1.67</td>
<td>66.0</td>
<td>15.6</td>
</tr>
<tr>
<td>Premium above millet</td>
<td>0.88</td>
<td>1.40</td>
<td>59.7</td>
<td>1.41</td>
<td>61.3</td>
<td>1.43</td>
<td>63.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Overall</td>
<td>0.94</td>
<td>1.55</td>
<td>64.1</td>
<td>1.51</td>
<td>60.2</td>
<td>1.58</td>
<td>67.3</td>
<td>7.0</td>
</tr>
</tbody>
</table>

**Notes:** + Millet flour is made of millet only; ++ Improved flour is multi-composite flour made of 6 ingredients from 5 food groups

Overall, consumers are willing to pay 64% premium for improved flour above conventional flour.

Effect of nutrition information is positive albeit small.
# Consumer WTP for improved vs. conventional flour

(1 kilogram of flour)

## UGANDA

<table>
<thead>
<tr>
<th>Study sites</th>
<th>Mean (USD)</th>
<th>Mean (USD)</th>
<th>Mean (USD)</th>
<th>(%)</th>
<th>Mean (USD)</th>
<th>(%)</th>
<th>(%)</th>
<th>Mean (USD)</th>
<th>(%)</th>
<th>(%)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall</strong></td>
<td><strong>0.57</strong></td>
<td><strong>0.81</strong></td>
<td><strong>1.31</strong></td>
<td><strong>62.2</strong></td>
<td><strong>1.25</strong></td>
<td><strong>54.2</strong></td>
<td><strong>118.9</strong></td>
<td><strong>1.37</strong></td>
<td><strong>69.3</strong></td>
<td><strong>140.4</strong></td>
<td><strong>15.1</strong></td>
</tr>
<tr>
<td>Bwaise 11</td>
<td>0.56</td>
<td>0.85</td>
<td>1.27</td>
<td>49.6</td>
<td>1.15</td>
<td>36.3</td>
<td>106.2</td>
<td>1.38</td>
<td>63.4</td>
<td>147.2</td>
<td>27.1</td>
</tr>
<tr>
<td>Kawempe 11</td>
<td>0.56</td>
<td>0.84</td>
<td>1.24</td>
<td>46.5</td>
<td>1.29</td>
<td>53.3</td>
<td>131.5</td>
<td>1.19</td>
<td>40.8</td>
<td>112.5</td>
<td>-12.6</td>
</tr>
<tr>
<td>Kamwokya</td>
<td>0.59</td>
<td>0.77</td>
<td>1.32</td>
<td>72.4</td>
<td>1.24</td>
<td>62.3</td>
<td>110.3</td>
<td>1.40</td>
<td>82.2</td>
<td>136.2</td>
<td>19.9</td>
</tr>
<tr>
<td>Kawaala</td>
<td>0.58</td>
<td>0.80</td>
<td>1.42</td>
<td>77.3</td>
<td>1.30</td>
<td>63.1</td>
<td>126.6</td>
<td>1.50</td>
<td>87.9</td>
<td>161.1</td>
<td>24.9</td>
</tr>
</tbody>
</table>

Notes: + Maize flour is made of maize only; ++Millet flour is made of millet only; +++ Improved flour is multi-composite flour made of 5 ingredients from 4 food groups

Overall, consumers are willing to pay 62% premium for improved flour above conventional flour (millet); >100% premium compared to maize flour

Effect of nutrition information is substantial (15-22% premium)
Factors considered when deciding the WTP for improved flour

• Over 80% of consumers were willing to pay more for the improved porridge flour because it has multiple ingredients.

• More than 50% of the consumers explicitly indicated the new flour is nutritious hence reason why they are willing to pay more for it.

• In Uganda, 20% of consumers cited color as one of the reasons why they would pay for it (they like the color).

- Nutrition is key!
- Sensory characteristics: color
Thank you