Learning from Evaluations:
The HarvestPlus Orange-Fleshed Sweet Potato Project in Mozambique and Uganda

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Overview

• The role of evaluations: learning what works and why

• Findings of evaluation of a project to disseminate provitamin-A-rich orange-fleshed sweet potatoes to reduce vitamin-A deficiency

• Implications for cost effectiveness and scaling up
Impact evaluations based on field experiments are an essential learning tool in development economics and public health:

- Evaluation design: To ‘randomize’ or not to randomize?
- Well designed evaluations can identify which program components are effective and why

Evaluations are useful for studying agricultural interventions with explicit nutrition and health outcomes:

- Can attribute causal impacts of agriculture interventions on health outcomes
- Generalizability can be an issue
  - Show findings not driven mostly by local context
  - Calls for multi-country studies or repeated experiments
Evaluating the Impact of Biofortification

• The HarvestPlus Orange-Fleshed Sweet Potato Project
  • disseminate provitamin-A-rich orange-fleshed sweet potato (OFSP) as a strategy to increase vitamin A intakes and reduce vitamin A deficiency
  • OFSP given to 24,000 households in Uganda and Mozambique from 2006 to 2009
  • viability as nutrition intervention depends on crop adoption and diffusion
  • $450 million spent annually on vitamin A supplementation programs

<table>
<thead>
<tr>
<th>Site Selection</th>
<th>Mozambique</th>
<th>Uganda</th>
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<tbody>
<tr>
<td>OFSP in the diet</td>
<td>secondary staple</td>
<td>primary staple</td>
</tr>
<tr>
<td>Vitamin A deficiency in children under 5</td>
<td>71%</td>
<td>28%</td>
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Project Components

Three-pronged OFSP intervention

i. **seed systems**: disseminate OFSP vines, farmer trainings

ii. **demand creation**: trainings on nutrition benefits of consuming vitamin A

iii. **marketing**: including product development

• Varied project intensity to study cost effectiveness
  
  • **Model 1**: Intensive two-year intervention with vine distribution and trainings
  
  • **Model 2**: Less intensive
    
    • identical to Model 1 in year 1
    
    • little activity or costs in year 2

• Differences in implementation
  
  • Mozambique: annual OFSP vine distributions
  
  • Uganda: one OFSP vine distribution in 2007
Evaluation Design

• Cluster randomized design; baseline and endline surveys

• Randomly assigned clusters to Model 1, Model 2, and Control
  – Mozambique: households in church groups (n=703)
  – Uganda: households in farmer groups (n=1594)

• Survey included several components (at least 2 rounds)
  – Socioeconomic Survey
  – Dietary Intake and Nutrition Survey

• In addition to outcomes presented here today, Impact Report (2010) assessed impact on
  – agricultural and nutrition knowledge retention
  – agricultural, nutrition and marketing practices
  – household consumption
  – child feeding practices
HarvestPlus OFSP Project Partners

• OFSP Project Implementation Partner Organizations
  • HarvestPlus: Lead
  • International Potato Center (CIP)
  • Natural Resources Institute (NRI) at University of Greenwich

Mozambique
• World Vision
• Helen Keller International (HKI)

Uganda
• CIP
• VEDCO
• PRAPACE
• FADEP

• OFSP Impact Report (July, 2010) coauthors
  • Alan de Brauw\textsuperscript{1}, Patrick Eozenou\textsuperscript{2}, Daniel O. Gilligan\textsuperscript{1}, Christine Hotz\textsuperscript{2}, Neha Kumar\textsuperscript{1}, Cornelia Loechl\textsuperscript{3}, Scott McNiven\textsuperscript{4}, J.V. Meenakshi\textsuperscript{2}, and Mourad Moursi\textsuperscript{2}

\textsuperscript{1}International Food Policy Research Institute; \textsuperscript{2}HarvestPlus; \textsuperscript{3}International Potato Center; \textsuperscript{4}University of California, Davis.
The project successfully promoted OFSP in Mozambique and Uganda.

Impact on OFSP Adoption

- Estimates are average impacts from Model 1 and Model 2. There was no statistically significant difference between Model 1 and Model 2 adoption rates in either country.

![Bar chart showing OFSP adoption rates in Mozambique and Uganda](image)

- % control group farmers adopting OFSP, 2009
- % increase in project farmers adopting OFSP, 2009
Share of OFSP in sweet potato area

Mozambique, 2006-2009

- Model 1: ΔM1 = 54.2%
- Model 2: ΔM2 = 56.7%
- Control: ΔC = -0.1%

Impact:
- M1: 54.3%***
- M2: 56.8%***

Uganda, 2007-2009

- Model 1: ΔM1 = 47.6%
- Model 2: ΔM2 = 42.9%
- Control: ΔC = 1.8%

Impact:
- M1: 45.8%***
- M2: 41.1%***

Impact on OFSP Land Area Cultivated

- Project increased share of OFSP in sweet potato area cultivated:
  - by 54-57 percentage points in Mozambique
  - by 41-46 percentage points in Uganda

- Households substituted OFSP for white or yellow SP
  - limited area expansion
  - improves micronutrient quality of dietary staples
### Impact on Vitamin A Intakes, Children Age 6-35 Months

#### Mozambique, 2006-2009

<table>
<thead>
<tr>
<th>Model</th>
<th>Baseline</th>
<th>End of project</th>
<th>Impact</th>
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<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td>ΔM1 = 222</td>
<td>M1: 241 μg RAE/d **</td>
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<tr>
<td>Model 2</td>
<td></td>
<td>ΔM2 = 183</td>
<td>M2: 202 μg RAE/d **</td>
</tr>
<tr>
<td>Control</td>
<td>ΔC = -19</td>
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#### Uganda, 2007-2009

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<th>Model</th>
<th>Baseline</th>
<th>End of project</th>
<th>Impact</th>
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<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td>ΔM1 = 137</td>
<td>M1: 192 μg *</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td>ΔM2 = 169</td>
<td>M2: 224 μg **</td>
</tr>
<tr>
<td>Control</td>
<td>ΔC = -55</td>
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- **Project increased vitamin A intake of young children**
  - by 202-241 μg RAE/day in Mozambique
  - by 192-224 μg RAE/day in Uganda

- **Large effect**: equivalent to child’s daily requirements of vitamin A (210 μg RAE/day)

- **Increased vitamin A intake due to OFSP**
  - OFSP 78% of total vitamin A intake in Mozambique
  - OFSP 53% of total vitamin A intake in Uganda
Cost Effectiveness of OFSP Models

- Model 2 is much more cost effective than Model 1
  - No significant difference between Model 1 and Model 2 in OFSP adoption, nutrition knowledge, increase in vitamin A intakes
  - Model 2 was cheaper to implement by almost one-third

- Further cost savings from Model 2 are possible

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<th>Cost per Beneficiary</th>
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<th>Uganda</th>
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<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
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<tr>
<td><strong>Average Cost per Beneficiary</strong></td>
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<tr>
<td>Actual</td>
<td>97</td>
<td>65</td>
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<tr>
<td>With cost savings, broad diffusion</td>
<td>26</td>
<td>13</td>
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<tr>
<td><strong>Marginal Cost per Beneficiary</strong></td>
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<tr>
<td>Actual</td>
<td>40</td>
<td>27</td>
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<tr>
<td>With cost savings, broad diffusion</td>
<td>8</td>
<td>5</td>
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Ongoing Research from OFSP Evaluation

• Role of risk aversion and gender differences in access to land on OFSP adoption

• Role of social networks in adoption and diffusion through access to OFSP and nutrition information

• Search for ‘Model 3’
  Plans to scale up with lighter integrated intervention, greater focus on crop diffusion