Agriculture-based Approaches to Fighting Undernutrition

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Complementary Strategies

Optimal breastfeeding and complementary feeding

Biofortification:
- Conventional (orange-fleshed sweetpotato)
- Transgenic (Golden Rice)

Micronutrient supplementation

Diversifying diets (enhanced homestead food production)

Food fortification
3 Examples of Agriculture-based programs to address undernutrition:

- Biofortification
- Enhanced homestead food production programs (bring agriculture-health-nutrition together at community and household level)
- Nutrition-sensitive value chains
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# Biofortification: Breeding crops for improved nutrient content

<table>
<thead>
<tr>
<th>Crop</th>
<th>Nutrient(s)</th>
<th>Conventional or GMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweetpotato</td>
<td>Vitamin A</td>
<td>Conventional</td>
</tr>
<tr>
<td>Beans</td>
<td>Iron</td>
<td>Conventional</td>
</tr>
<tr>
<td>Rice</td>
<td>Zinc, Vitamin A</td>
<td>Conventional, Transgenic</td>
</tr>
<tr>
<td>Cassava</td>
<td>Vitamin A</td>
<td>Conventional, Transgenic</td>
</tr>
<tr>
<td>Maize</td>
<td>Vitamin A</td>
<td>Conventional</td>
</tr>
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<td>Wheat</td>
<td>Zinc</td>
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</tr>
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<td>Banana</td>
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<td>Iron</td>
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</tbody>
</table>
Turning Africa Orange!

- Great paucity of population-based consumption surveys

- FAO food balance sheets based on national agricultural statistics:
  - Depend on quality of national agricultural statistics
  - Tend to under-estimate production of secondary and/or seasonal crops – particularly sweetpotato
  - Underestimate real and potential sweetpotato production and consumption
  - Don’t provide disaggregated estimates for infants, young children, women
Existing consumption data indicate high potential for reach of Orange-Fleshed Sweetpotato (OFSP)

• HKI/FFM – children 1-6 having consumed sweetpotato at least once in last 7 days:

  • Niger 40%-65% (different regions)
  • Mali 40% (Koulikoro)
  • Benin 11.6% (national)
OFSP in Mozambique and Uganda (HarvestPlus)

- **Impact evaluation:** randomized trial of 1st HarvestPlus crop

- **Intervention:**
  - Seed systems (dissemination of vines, farmers’ training)
  - Demand creation (nutrition education)
  - Marketing and product development

- Reached 14,000 hh in Mozambique; 10,000 in Uganda

- Dissemination: 2006-09

Source: Dan Gilligan et al. ; Biofortification Conference, Nov 2010
Impact on OFSP Adoption Rate, 2009 Mozambique

- Model 1: 66% compared to control
- Model 2: 69% compared to control

% who retained OFSP vines for next season

Source: Dan Gilligan et al. ; Biofortification Conference, Nov 2010
Impact on Vitamin A Intakes
Children 6-35 months, Mozambique

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Children 6-35 months, Mozambique

Source: Christine Hotz et al.; Biofortification Conference, Nov. 2010
HKI’s Enhanced Homestead Food Production Program
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Objective: improve nutritional status of vulnerable members of low income households through home production of micronutrient (MN) rich crops and small animals, poultry ...

- Nutritional focus now broadened to include **child growth** and not just micronutrient deficiencies
- Emphasis on **year round production** of local micronutrient-rich crops and animal source foods
- Focus on improving **local farming practices** to extent possible
Primary pathways to achieve impact on nutrition:

1. Increased availability of micronutrient-rich foods through increased household *production* of these foods.

2. Increased *income* through the sale of surplus production.

3. Increased knowledge and adoption of optimal nutrition practices including *consumption* of micronutrient-rich foods through *behavior change communication*.

4. Linkages established with local *health services*. 
**Where?** Since 1990, now in four countries in Asia: Bangladesh, Nepal, Cambodia and Philippines.

Launched in Africa in Burkina Faso (with IFPRI) and Tanzania

**Coverage?** Cumulatively more than 5 million people directly reached (950,000 families with majority in Bangladesh)

**Who?** Primarily targets women farmers from poorer households
HKI’s E-HFP Program…

- HKI partners with government field agents and local NGOs for 3 year cycle
- Establish Village Model Farms (serve ~ 40 households)
- Provide seeds, saplings and chicks
- Provide agricultural training in optimal techniques for crops and raising small animals and fowl
- Make market linkages when needed
- Provide links to health services and nutrition behavior change communication
Some results...

Consistently improve:
- Household production of micronutrient-rich foods
- Household consumption of micronutrient-rich foods
- Consumption of micronutrient-rich foods among mothers and children

Some evidence that they improve:
- Income (especially under women’s control)
- Women’s empowerment (HH decision-making)

Inconsistent evidence that they improve:
- Health outcomes
- Nutritional status outcomes (anemia, night blindness)
Challenges in Bringing OFSP & E-HFP to Africa:

- Water is a limiting factor
- Relatively weak public-sector agriculture research and extension systems and low coverage of NGOs
- Realigning extension systems to value smallholder, women farmers
- Sustaining seed systems
  - Special challenges of vegetatively propagated crops like OFSP
- Protecting gardens from livestock
- Evaluation methodology that will capture multiple benefits
Ongoing & Future Work:

- Sweetpotato for Security and Health in Africa (with International Potato Center – CIP)

- Reaching Agents of Change for Orange-Fleshed Sweetpotato (with CIP):
  - Burkina Faso
  - Ghana
  - Nigeria

- Enhanced Homestead Food Production incorporating OFSP in Burkina Faso
Donors:
- United States Agency for International Development
- Bill and Melinda Gates Foundation (through CIP and HarvestPlus)
- IrishAid
- Government of Taiwan
- European Union
Some Resources:

Biofortification:
http://www.harvestplus.org
http://biofortconf.ifpri.info

Orange-Fleshed Sweetpotato:
http://sweetpotatoknowledge.org

Enhanced Homestead Food Production:
http://www.hki.org/reducing-malnutrition/homestead-food-production