Agriculture and Nutrition Working Together to Improve Nutritional Outcomes: The Global Landscape

Marie Ruel, IFPRI

AGRICULTURE-NUTRITION-GLEE
Washington, DC, June 18th, 2013

Photo: HKI
THE CHALLENGE
Challenges in Global Environment

- Persistent hunger: ~ 870 million people chronically undernourished (FAO 2012)
- Growing, urbanizing population
- Changes in food consumption patterns
- Food price volatility
- Climate change – increased occurrence of shocks

- Focus on Feeding 9 Billion People (↑yields, productivity)
- Need to focus also on ↑access to high quality diets
165M children stunted (1 in 5 children)

Malnutrition is responsible for 45% of < 5 deaths (3.1M)

32.4M babies born SGA (27% births in LMICs); responsible for 20% of stunting

Childhood obesity is on the rise

MN deficiencies persist (zinc, VA, iodine, iron) affect growth, survival, health, cognitive development, productivity
Stunting Rates Slowly Decreasing, but Numbers Increasing in Africa

2.1% annual rate of reduction is not fast enough to reach WHA target

Source: Lancet Nutrition Series 2013
Wasting in Children <5 Years is Still Unacceptably High

52 million children under 5 are wasted, 19 million severely wasted

Source: Lancet Nutrition Series 2013
Lancet Paper 2: Interventions Across the Lifecycle

**Preconception care**: family planning, delayed age at first pregnancy, prolonging of inter-pregnancy interval, abortion care, psychosocial care

- Folic acid supplementation
- Multiple micronutrient supplementation
- Calcium supplementation
- Balanced energy protein supplementation
- Iron or iron plus folate
- Iodine supplementation
- Tobacco cessation

**WRA and pregnancy**

- Delayed cord clamping
- Early initiation of breast feeding
- Vitamin K administration
- Neonatal vitamin A supplementation
- Kangaroo mother care

**Neonates**

- Exclusive breast feeding
- Complementary feeding
- Vitamin A supplementation (6–59 months)
- Preventive zinc supplementation
- Multiple micronutrient suppletions
- Iron supplementation

**Infants and children**

- Decreased maternal and childhood morbidity and mortality
- Improved cognitive growth and neurodevelopmental outcomes
- Increased work capacity and productivity
- Economic development

**Disease prevention and treatment**

- Malaria prevention in women
- Maternal deworming
- Obesity prevention

**Management of SAM**

- Therapeutic zinc for diarrhoea
- WASH
- Feeding in diarrhoea
- Malaria prevention in children
- Deworming in children
- Obesity prevention

**Delivery platforms**: Community delivery platforms, integrated management of childhood illnesses, child health days, school-based delivery platforms, financial platforms, fortification strategies, nutrition in emergencies

**Bold=Interventions modelled**

**Italics=Other interventions reviewed**

Source: Lancet Nutrition Series 2013
34 Countries Account for 90% of Global Burden of Malnutrition

Scaling up 10 nutrition-specific interventions to 90% coverage in 34 high-burden countries would reduce stunting by 20%
We need to find solutions beyond targeted nutrition-specific interventions and beyond the health sector
We Need to Leverage Relevant Sectors

GoVERNANCE

Agriculture & Food Security
Social Protection
Poverty Reduction
Health

WORK MULTI-SECTORALLY

GENDER

Water & Sanitation
Environment & Climate Change
Private Sector
Trade/Fiscal Policies

Source: World Bank 2011
WHAT CAN AGRICULTURE DO TO IMPROVE NUTRITION?
Agriculture can affect nutrition through multiple pathways

- Provides *food*: increases food availability and access (own production)
- Provides *income*: from agriculture wages and/or marketing of commodities produced
- Affects *food prices*: which affect income of net sellers and purchasing power of net buyers.
- Can affect *women’s social status and empowerment*
- Can affect *women’s time*
- Can affect (and be affected by) *women’s health and nutritional status*

Source: Lancet Series 2013; adapted from Gillespie, Harris and Kadiyala 2012
Agriculture Can Improve Nutrition: Through Increases in Income

Prevalence of stunting in children aged 0-5 years and GDP per person

A 10% increase in GDP/PC leads to a 6% reduction in stunting

Source: Lancet Nutrition Series 2013
Income Growth Can Have Unintended Consequences on Risks of Overweight & Obesity

A 10% increase in GDP/PC leads to a 7% increase in overweight and obesity in women

Source: Lancet Nutrition Series 2013
Countries with Policy Support for Agriculture Have Greater ↓ in Stunting

Analysis of 29 developing countries, 1980-2007

Source: Webb and Block, 2011
At Global Level

- Economic growth – and investments in promoting agriculture growth – are necessary to improve nutrition, but they are *not sufficient*

- We need to do a lot more to ensure that agriculture growth and investments in agriculture and food systems are *nutrition-sensitive*

- We also need to complement these efforts with nutrition-sensitive *targeted agricultural programs* that reach the poorest of the poor.
EXAMPLES OF INITIATIVES, GUIDANCE AND REVIEWS ON HOW TO IMPROVE NUTRITION THROUGH FOOD SYSTEMS
Guidance on Nutrition-Sensitive Agriculture

**NUTRITION-SENSITIVE GOALS**

1. Invest in women
2. Access to high nutrient content food
3. Enhance dietary diversity
4. Incorporate explicit nutrition objectives and indicators

**Examples of “nutrition sensitive” activities to be incorporated into Bank ag. projects**

I. Raising Ag. Productivity
   - Biofortification and fortified fertilizers
   - Home economics extension
   - Time saving technologies (esp. for women tasks)

II. Linking farmers to markets
   - Fruits, vegetables, fish, livestock, pulses
   - High nutrient orphan crops, wild crops
   - Post-harvest food fortification
   - Home grown school feeding
   - Food safety (e.g. aflatoxin control)

III. Reducing risk and vulnerability
   - Backyard gardens/small animals

The forthcoming WBG Agriculture Action Plan (2013-15) institutionalizes this approach

Source: Yurie Tanimichi Hoberg, World Bank, Meeting of the Minds on Improving Nutrition through Food Systems, Geneva, March 2013
Source: Noreen Mucha, Defining nutrition-sensitive development, Meeting of the Minds on Improving Nutrition through Food Systems, Geneva, March 2013
Source: Noreen Mucha, Defining nutrition-sensitive development, Meeting of the Minds on Improving Nutrition through Food Systems, Geneva, March 2013
Value Chain Approach to Improve Nutrition

FIG. 1. Value chain approach to improve nutrition [19, 20]
Agriculture and Food Policy Support to Nutrition (Herforth et al)

1. Increase incentives for sustainable production, distribution, and consumption of diverse, nutritious and safe foods

2. Monitor dietary consumption and access to diverse, nutritious, safe foods

3. Build capacity to improve nutrition through food and agriculture sector with adequate financing

4. Support multi-sectoral strategies to improve nutrition within national, regional, local government structures

5. Include measures that protect and empower the poor, and women
IMPROVING NUTRITION THROUGH NUTRITION-SPECIFIC AGRICULTURAL PROGRAMS AT COMMUNITY LEVEL
Targeted Agricultural Programs: Integrating agriculture and Nutrition at Household and Community level
Improving Nutrition
Through Empowerment of Women

There is evidence that men and women allocate food and other resources differently.

Evidence shows:
- Positive associations between women’s empowerment and maternal and child nutrition
- Negative associations between women’s disempowerment (e.g. domestic violence) and child nutrition
- Positive impacts of cash transfers and agricultural programs on measures of women’s empowerment

Source: Lancet Nutrition Series 2013

Photo credit: A. Quisumbing
Example from HKI’s Homestead Food Production Program in Bangladesh

**Program:**
- Production-focused: micronutrient-rich vegetables, small livestock production
- Nutrition education to promote consumption
- Focus on women: income generation, empowerment
- Nutrition objective: Improve diet diversity, micronutrient intake

**Impact:**
- Tripled vegetable production; increased income
- 73% of gardens managed by women
- Improved food security for 5 million people
- No evidence of impact on child nutritional status

Source: Millions Fed, IFPRI 2009; www.ifpri.org/millionsfed
Lancet Nutrition Series 2013: Results of Review of Nutritional Impacts of Targeted Agriculture Programs

<table>
<thead>
<tr>
<th>Have impacts on several underlying determinants of nutrition:</th>
<th>Livelihoods, income, food security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet quality, women’s empowerment</td>
<td></td>
</tr>
</tbody>
</table>

...and complement essential global efforts to enhance agricultural productivity – increasing producer incomes while protecting consumers from high food prices

Evidence of impacts on nutrition is inconclusive

Except for vitamin A

Likely due to weaknesses in design, targeting, implementation, evaluation

Source: Lancet Nutrition Series 2013
Meta-Analysis of Impacts of Agricultural Programs on Child Anthropometry

Stunting

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Experimental Events</th>
<th>Total</th>
<th>Control Events</th>
<th>Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random [95% CI]</th>
<th>Risk Ratio M-H, Random [95% CI]</th>
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</thead>
<tbody>
<tr>
<td>English and Badcock 1998</td>
<td>109</td>
<td>229</td>
<td>109</td>
<td>229</td>
<td>28.2%</td>
<td>0.88 [0.74, 1.04]</td>
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</tr>
<tr>
<td>Kassa et al. 2003</td>
<td>34</td>
<td>93</td>
<td>35</td>
<td>92</td>
<td>8.2%</td>
<td>0.72 [0.50, 1.03]</td>
<td></td>
</tr>
<tr>
<td>Low et al. 2007</td>
<td>34</td>
<td>498</td>
<td>34</td>
<td>498</td>
<td>44.1%</td>
<td>1.00 [0.89, 1.13]</td>
<td></td>
</tr>
<tr>
<td>Olney et al. 2009</td>
<td>107</td>
<td>264</td>
<td>82</td>
<td>194</td>
<td>19.5%</td>
<td>0.96 [0.77, 1.19]</td>
<td></td>
</tr>
<tr>
<td>Total [95% CI]</td>
<td>640</td>
<td>1329</td>
<td>373</td>
<td>737</td>
<td>100.0%</td>
<td>0.93 [0.84, 1.04]</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.00; Chi² = 3.93, df = 3 (P = 0.27); I² = 24%
Test for overall effect: Z = 1.30 (P = 0.19)

Figure 3. Meta-analysis for the effect of agricultural strategies to improve household food production on child stunting; M-H: Mantel-Haenszel.

Wasting

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<thead>
<tr>
<th>Study or Subgroup</th>
<th>Experimental Events</th>
<th>Total</th>
<th>Control Events</th>
<th>Total</th>
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<tbody>
<tr>
<td>Olney et al. 2009</td>
<td>39</td>
<td>264</td>
<td>22</td>
<td>193</td>
<td>33.3%</td>
<td>1.30 [0.80, 2.11]</td>
<td></td>
</tr>
<tr>
<td>Kassa et al. 2003</td>
<td>17</td>
<td>102</td>
<td>12</td>
<td>71</td>
<td>23.6%</td>
<td>0.99 [0.50, 1.93]</td>
<td></td>
</tr>
<tr>
<td>English and Badcock 1998</td>
<td>19</td>
<td>485</td>
<td>10</td>
<td>229</td>
<td>20.6%</td>
<td>0.94 [0.44, 1.98]</td>
<td></td>
</tr>
<tr>
<td>Low et al. 2007</td>
<td>15</td>
<td>498</td>
<td>15</td>
<td>243</td>
<td>22.5%</td>
<td>1.49 [0.24, 0.98]</td>
<td></td>
</tr>
<tr>
<td>Total [95% CI]</td>
<td>90</td>
<td>1329</td>
<td>736</td>
<td>964</td>
<td>100.0%</td>
<td>0.91 [0.60, 1.38]</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.07; Chi² = 5.06, df = 3 (P = 0.17); I² = 41%
Test for overall effect: Z = 0.43 (P = 0.66)

Figure 5. Meta-analysis for the effect of agricultural strategies to improve household food production on child wasting; M-H: Mantel-Haenszel.

Source: Girard et al, 2012
Meta-Analysis of Impacts of Agricultural Programs on children’s vitamin A status

Figure 3.1 Forest plot of differences between project and control areas in serum retinol concentrations (micrograms/dl.) among children under five

Source: Masset et al. 2012
Biofortification for Improved Nutrition

Photo: Julie Ruel-Bergeron
High adoption rates (Mozambique, 2009)

Model 1

Model 2

Control

68% retained vines in next season

Source: Gilligan et al. forthcoming
Large impact on intake of OFSP in children 6-35 months, Mozambique

Source: Hotz et al. 2012
Vitamin A intake doubled

Children 6-35 months in Mozambique

- Model 1
- Model 2
- Control

Vitamin A (μg RAE per day)

Source: Hotz et al. 2012
Reduced Prevalence of children 3-5 y with Low Serum Retinol in Uganda by 9 PP

<table>
<thead>
<tr>
<th>Treatment Effect</th>
<th>$Pr(\text{serum retinol} \leq 1.05 \mu\text{mol/L})$</th>
<th>$Pr(\text{serum retinol} \leq 1.05 \mu\text{mol/L})$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control for infection (CRP, AGP)</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Controls for deworming, age, vitamin A supplements</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>472</td>
<td>396</td>
</tr>
<tr>
<td><strong>$R^2$</strong></td>
<td>0.095</td>
<td>0.148</td>
</tr>
</tbody>
</table>

Source: Hotz et al. 2012
Burkina Faso HKI Enhanced HFP program

AIM:

- Increase year-round availability of: MN-rich vegetables (OFSP, green leafy), small livestock eggs; dairy
- Income generation: sale of surplus production
- Increase knowledge & promote optimal nutrition practices (incl. intake of MN-rich foods)
- Target, engage and empower women
- Use different social network channels for diffusion of information within villages

Impact evaluation: Cluster randomized trial
What Have we Learned?

Agriculture does not automatically improve nutrition; we need to make agriculture nutrition-sensitive – Recommendations from Lancet 2013:

• Include specific, clear nutrition goals and nutrition interventions (e.g. BCC; distribution of MN-fortified products)

• Target right age group, for as long as possible within the first 1000 days

• Target, engage, empower women (include men as well); focus on social and gender equity

• Use agriculture programs as delivery platforms for other inputs and services (e.g. distribute fortified products; link to health services; integrate WASH, etc.) (integrate or co-locate?)
<table>
<thead>
<tr>
<th>Guidance on Improving Nutrition through Agriculture (Anna Herforth et al.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Include nutrition goals and indicators &amp; prevent harm</td>
</tr>
<tr>
<td>2. Assess local context to identify needs</td>
</tr>
<tr>
<td>3. Target vulnerable, focus on equity</td>
</tr>
<tr>
<td>4. Foster inter-sectoral collaboration</td>
</tr>
<tr>
<td>5. Maintain and improve resource base</td>
</tr>
<tr>
<td>6. Empower women</td>
</tr>
<tr>
<td>7. Promote production diversification</td>
</tr>
<tr>
<td>8. Enhance nutrient content &amp; prevent loss along the value chain</td>
</tr>
<tr>
<td>9. Expand market access for vulnerable groups</td>
</tr>
<tr>
<td>10. Incorporate nutrition promotion and education</td>
</tr>
</tbody>
</table>
Where Do we Go from Here?

- We have a momentum: global consensus, new initiatives, committed donors, experienced NGOs and other implementers, and skilled researchers

- We have opportunities and examples of success on how to bridge the agriculture-nutrition divide; need to innovate in program design, implementation and evaluation

- We have challenges; our biggest challenge AND opportunity is to work together - cross-sectorally (how?)

- We need to do much better at documenting successes – and failures through rigorous, credible evaluations; we need the evidence for advocacy and to stimulate investments
Now is the time to unleash the real potential of agriculture to improve nutrition!