Nutrition-sensitive Agriculture: Maximizing nutritional outcomes from food systems

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Reductions in Poverty and Undernutrition

- Extreme poverty rates have been cut by more than half
- 17,000 fewer children will die today than on any given day in 1990
- In 2015, 91% of the global population is using an improved drinking water source, compared to 76% in 1990.

And, yet…

• A projected **702 million** people still live in **extreme poverty**
• Nearly **800 million** people around the world are **chronically undernourished**
• At least **159 million** children under five are **stunted**
• About **1 billion** people still **chronically hungry**; even more **overweight** and **obese**
• **Two billion** people suffer from micronutrient deficiencies

So, why should we care about nutrition?

45% of child deaths - that's nearly half - are due to undernutrition!

Not to mention...

Malnutrition has many **short term** and **long term** consequences
They are five

Improved nutrition drives economic growth

Better nutrition

Investment = $1

Economic development

Return = $16

Sources:
Malnutrition has two faces

Patrick Webb, and Steven Block PNAS 2012;109:12309-12314
Forms of malnutrition

MALNUTRITION IN ALL ITS FORMS

- **Child Stunting**: Low height for age
- **Child Wasting**: Low weight for height
- **Child Overweight**: High weight for height
- **Adult Overweight**: Carrying excess body fat with a body mass index ≥ 25
- **Micronutrient Deficiency**: Iron, folic acid, vitamin A, zinc, iodine below healthy thresholds
- **Adult Obesity**: Carrying excess body fat with a body mass index ≥ 30
- **Noncommunicable Diseases**: Diabetes, heart disease, and some cancers

Source: Global Nutrition Report, 2016
Conceptual framework for nutrition

Optimal Nutrition

Diet

Disease

Food

Care

WASH

Health

Macro level social, economic, political contexts and policies

Nutrition-sensitive programming

- Scaling up of ten core nutrition interventions to 90% coverage may result in only a 20% reduction in stunting in the 34 countries where 90% of world’s undernutrition is concentrated (Lancet 2013).
- Underlying contributors to undernutrition must also be addressed → Need multi sectoral efforts and approaches

How can the agriculture sector contribute?
How does agriculture affect nutrition?

**Food consumed**
- Calories
- Protein
- Micronutrients

**Farm income invested in...**
- Diverse diet and nutrient-rich foods
- Health and WASH services and products

**Gender in agriculture**
- Maximizing women’s control of income
- Managing demand of women’s time and energy
Agriculture-to-Nutrition Pathways

Key components of the enabling environment:
- Food market environment
- Natural resources environment
- Health, water, and sanitation
- Nutrition/health knowledge and norms

High agricultural production and malnutrition can be counter-intuitive

Food production in Tanzania

Prevalence of malnutrition in Tanzania

http://www.unsystem.org/SCN/archives/tanzania/ch09.htm
Agriculture as a source of food: Homestead food production

- Producer households more likely to consume a diversity of foods than non-producing households
- Home production associated with better household and women’s dietary diversity; however market access may play a more important role in dietary quality
- Production decisions influenced by market prices, relative costs and risks, productive assets, preferences, and cultural norms
- Processing and storage impact food access and nutrient content
Agriculture as a source of income

- Improved year-round income to meet household needs, including diverse, nutritious foods, and health care
- Assumes nutritious foods and health services are accessible and affordable – reflects the importance of generating demand for nutritious foods to stimulate timely supply
Cost of good nutrition

Only individuals in high-income countries consume the recommended 5 servings of fruits and vegetables

(Miller et al. 2016)
Cost of good nutrition

Households in low-income countries pay more for fruits and vegetables than those in HICs.
Agriculture affects gender

Control over assets and use of income
• Women’s control lead to better diets for women and children

Time use & childcare
• Tension between earning income and childcare

Female energy expenditure
• Physical work compromises pregnancy and lactation nutrition
Food Systems
Food system challenges

- Unsustainable use of resources – fossil fuels, water, soil, agro-chemicals
- Huge contribution to greenhouse gas emissions through agri-food system
- Degradation of biodiversity – both wild and agro-biodiversity
- Enormous food wastage
- Poor nutritional quality of food
- Food distribution: skewed & unequal
Changes that can be made in food systems to achieve dietary goals: Examples...
<table>
<thead>
<tr>
<th>Dietary Goal</th>
<th>Food System Elements</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Food Production</strong></td>
<td><strong>Food Storage, Transport and Distribution</strong></td>
</tr>
<tr>
<td>Increase fruit and vegetable consumption</td>
<td>Invest in mixed and integrated cropping systems, especially where markets are poorly developed</td>
<td>Invest in distribution infrastructure to strengthen local markets; develop public procurement mechanisms to ensure fruits and vegetables are served in public institutions</td>
</tr>
<tr>
<td>Increase legumes/pulses consumption</td>
<td>Improve varieties to boost yields</td>
<td>Train farmers on management practices to reduce loss during storage to insect damage or improper drying</td>
</tr>
<tr>
<td>Increase consumption of higher protein grains, micronutrients and fiber</td>
<td>Incentivize production of underutilized grains; promote biofortification using conventional breeds</td>
<td>Develop more efficient threshing and milling technologies for underutilized grains</td>
</tr>
<tr>
<td>Encourage balanced consumption of safe milk and dairy products</td>
<td>Improve availability of animal health services; ensure women can have title to or, at least, some say in decisions about the animals they milk and care for</td>
<td>Invest in infrastructure to ensure safe transport of milk from farm to cooling center</td>
</tr>
<tr>
<td>Replace saturated and trans fats with unsaturated fats</td>
<td>Switch investments in palm oil to oils with healthier fatty acid profiles</td>
<td>Encourage cooperatives between healthier oil producers and consumers to lower prices.</td>
</tr>
<tr>
<td>Reduce consumption of high calorie, nutrient poor sugary drinks and salty snacks</td>
<td>Use competition laws to combat excessive concentration in the agribusiness sector</td>
<td>Tax transportation of high-calorie, nutrient-poor sugary drinks and salty snacks</td>
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</table>

In summary

To maximize nutrition outcomes from food systems:

- Increase and diversify food and income sources
- Promote the use of income for nutrition-related food and non-food needs
- Support gender-equitable roles and responsibilities in use of HH income
- Strengthen institutional frameworks and government policies to make key nutritious foods more affordable
- Target nutrition-sensitive interventions – know the context
Thank you!

For more information, visit: www.spring-nutrition.org
USDA Food & Nutrition Service
Domestic Nutrition Assistance Programs

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October 2016
United States Department of Agriculture

Secretary of Agriculture
↓
Under Secretary of Food, Nutrition and Consumer Services
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Deputy Under Secretary
↓
Administrator
↓
Regional Offices:

MARO MPRO MWRO NERO SERO SWRO WRO
NJ CO IL MA GA TX CA
Food, Nutrition, and Consumer Service (FNCS)

- Food and Nutrition Service (FNS)
  
  and

- Center for Nutrition Policy and Promotion (CNPP)

**FNCS Vision: To End Hunger and Improve Nutrition in America**
Mission:

*We work with partners to provide food and nutrition education to people in need in a way that inspires public confidence and supports American agriculture.*
USDA – FNCS Key Priorities

- Help Americans Eat Smart and Maintain Healthy Weight
- Preserve Public Trust in Our Programs
- FNCS is an Efficient, High Performing and Adaptable Organization
- Reduce Food Insecurity by Helping Feed those in Need
- Civil Rights – Ensuring Access, Equality and Respect in FNS Programs and Activities
FNS Program Priorities

Nutrition

Integrity

Program Access

Civil Rights
Food & Nutrition Service
Administers 15 Nutrition Assistance Programs
One in four people are touched by FNS Programs

School Lunch
SNAP
Summer Food Service Program
Women, Infants and Children (WIC)
Supplemental Nutrition Assistance Programs (SNAP)

The Cornerstone Program:

- Employment and Training
- SNAP ED
- Disaster SNAP
- Farmers Markets
Food and Nutrition Service

Child Nutrition Programs:

● School Breakfast Program (SBP)

● National School Lunch Program (NSLP)
  - Afterschool Snacks
  - Fresh Fruits and Vegetables Program
  - Seamless Summer
  - Special Milk Program

● Child and Adult Care Food Program (CACFP)

● Summer Food Service Program
Food and Nutrition Service

USDA Foods

- The Emergency Food Assistance Program (TEFAP)
- Commodity Supplemental Food Program (CSFP)
- Food Distribution Program on Indian Reservations (FDPIR)
- Nutrition Services Incentive Program (NSIP)
Food and Nutrition Service

- Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)
- Farmers Market Nutrition Program (FMNP)
- Senior Farmers Market Nutrition Program
Food and Nutrition Service

Nutrition guidance and education are emphasized in all FNS Programs with the help of the Dietary Guidelines for Americans

The Dietary Guidelines for Americans are:

● Jointly published every five years by USDA and DHHS

● Designed for nutrition and health professionals to help individuals two years and older and their families to consume a healthy, nutritionally adequate diet

● Used by policy makers in developing federal food, nutrition and health practices and programs

● The basis for federal nutrition and education materials designed for the public and for nutrition education in USDA food programs and the DHHS
The Dietary Guidelines

1. Follow a healthy eating pattern across the lifespan
2. Focus on variety, nutrient density and amount
3. Limit calories from added sugars and saturated fats and reduce sodium intake
4. Shift to healthier food and beverage choices
5. Support healthy eating patterns
Food and Nutrition Service

- Price Support & Surplus Removal
- Nutrition Education
- Economic Benefits
- State Nutrition Action Coalitions (SNAC)
- Tribal Nutrition Action Coalitions (TNAC)
Food and Nutrition Service Websites
Biofortification: Better Crops, Better Nutrition

Howarth Bouis, Ph.D.
Founding Director, HarvestPlus

Date or other info
Dietary Diversity

Why are Mineral and Vitamin Deficiencies Such A Significant Public Health Problem?
Non-Staple Food Prices in India Have Risen by 50% Over 30 Years
Cost-effective: central one time investment
Biofortified crops released in 30 countries
In-testing in another 25 countries
Nutritious crops released in 30 countries; in testing in another 25
What is the Way Forward? Mainstreaming
Thank You!
West Africa Integrated Pest Management (IPM) Cowpea Program:
Discovery pipeline to scaling

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Cowpea

- Protein source
- Production limited by pest insect complex
- Challenges of pesticide use
- IPM strategies
  - Understanding systems
  - Developing solutions
  - Scaling strategies
Solutions

• Discovery
  – Understanding pest biology leads to discovery of effective solutions

• Solutions
  – Biocontrol agents
  – Biopesticides
  – Educational solutions
  – Other

• Scaling of Solutions
  – Systems approaches
• Biocontrol agent pipeline – all pests of cowpea
• Discovery of natural enemies

• Assessing their performance using a biocontrol pipeline

• After 2 years of confined testing
  – First experimental releases of the parasitic wasps (parasitoids) *Therophilus javanus* (32,000) and *Phanerotoma syleptae* (17,000)
  – Benin and Burkina Faso
### Farmer-based interventions - Biopesticides

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1st rainy season Cowpea yield kg/ha</th>
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</thead>
<tbody>
<tr>
<td>Unsprayed control</td>
<td>522.95 ± 28.20a</td>
</tr>
<tr>
<td>Chemical control (Decis®)</td>
<td>868.62 ± 68.09b</td>
</tr>
<tr>
<td>Neem oil</td>
<td>826.42 ± 52.80b</td>
</tr>
<tr>
<td>Jatropha oil</td>
<td>867.90 ± 28.29b</td>
</tr>
<tr>
<td>MaviMNPV</td>
<td>875.12 ± 47.83b</td>
</tr>
<tr>
<td>Neem oil + MaviMNPV</td>
<td>1082.10 ± 58.78c</td>
</tr>
<tr>
<td>Jatropha oil + MaviMNPV</td>
<td>1096.30 ± 26.05c</td>
</tr>
</tbody>
</table>

*Farmer-based interventions - Biopesticides*

- Neem oil made in Benin
- Pod borer specific virus
Biopesticide Value Chain
(Bio-Phyto, Glazoue, Benin)

• 130 tons of neem seeds collected per year
  – 800 women

• Neem oil extraction,
  – 500 liters per week

• Biofertilizers
  – Useful and income-generating by-products
  – Nematicidal effect
  – Over 110 tons sold
  – Supply cannot cover demand
Viral Biopesticide

- Women and youth groups mass-produce *Maruca vitrata*, infest larvae with the virus
- Sell the dead larvae to the social enterprise for extraction, purification, and use
- Training and compliance with regulatory requirements
Farmer Interventions in IPM

- Need scalable educational strategies
- Strategies that can be passed off to partner groups
  - Easy to use and deploy
  - Expert knowledge to end user
  - Local language
  - Scalable in a highly cost-effective manner
Knowledge Chains

Scientific Animations Without Borders

Experts → Content → Scalable Deployment Strategies → End Users
- Field pest control strategies (e.g., neem and biocontrol) and storage solutions for cowpea pest management
United States Department of Agriculture

Foreign Agricultural Service

Studies on Educational Content

- Content acceptability studies
- Learning gains studies across multiple countries
- Adoption, long-term retention, and economic studies in progress

(Studies have been performed in collaboration with ISU, MSU, IITA, INERA, INRAN, ASTU, IIAM, etc.)
Accessible and scalable content

- Systems of pass-off to other groups
- Broadly applicable beyond cowpea IPM
- SAWBO system used by the WHO, Ministries of Health and Agriculture, NGOs, “NGOs of one”, global TV stations, US-based programs, etc.
- Farmers Interface App
Research to Deployment - Sustainable and Scalable IPM Solutions

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