Agriculture Can Improve Nutrition

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Global Dietary Shifts

Momentum was produced by the United Nations Integrated Mission in Timor-Leste (UNMIT) in 2012
Total Calories is increasing

Dietary energy supplies (kcal/person/day)

Source: FAO.
Diets are becoming more diverse everywhere

Contributions to total dietary energy supplies (kcal)

Source: FAO.
With increased income, fat and animal source food consumption increases.

Share of food groups in total dietary energy supplies (percentage)

Note: Data refer to households of lowest and highest income quintiles in 47 developing countries. Source: FAO, analysis of household surveys.
Demand for animal foods is increasing

Source of raw data: FAO.

FAO SOFI 2012
A call for “nutrition sensitive” agriculture
Up to now, agriculture, for the most part, has forgotten about nutrition and health.

The world’s farmers have more than doubled cereal production in four decades.

Source: IFPRI
But Agriculture plays many roles, often, competing

Agriculture’s Roles

- Health
- Gender
- Tradition
- Social Culture
- Social

- Economic
  - Income
  - Marketing
  - Trade

- Environmental
  - Soils
  - Water
  - Climate
  - Biodiversity

- Food production
  - Cultivation and commercialization of traditional foods
  - Valuation of environmental services
  - Recognition of traditional and diversified land use

Bread for the world, 2010
What is nutrition sensitive agriculture?

• Aims to maximize the impact of nutrition outcomes for the poor, while minimizing the unintended negative nutritional consequences of agricultural interventions and policies on the poor, especially women and young children.

• It is agriculture with a nutrition lens, and should not detract from the sector’s own goals.
Why agriculture?

• Agriculture is the sector best placed to affect food production and consumption of nutritious foods needed for healthy and active lives.

• Agriculture has the most direct influence and contact with the majority of households in the world where undernourished individuals reside.

• Agricultural-led growth is more pro-poor than non-agricultural-led growth; thereby increasing agriculture’s potential to improve nutrition.

• A large percentage of rural women are employed in the formal or informal agriculture sector.
Nutrition is a multi-dimensional issue but one where agriculture is central.
Food Production in Timor Leste is lower as compared to SE Asia overall. Yields (Mt/ha) have fallen – by 12% and 63% for rice and maize respectively (comparing 2011 yields with the 2009 peak).
Food Insecurity Coping Strategies exist in Timor-Leste

<table>
<thead>
<tr>
<th>STRATEGIES</th>
<th>Covalima</th>
<th>Oecusse</th>
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<tbody>
<tr>
<td></td>
<td>N</td>
<td>Daily</td>
</tr>
<tr>
<td>Reversible strategies</td>
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<td></td>
</tr>
<tr>
<td>Ate cheap foods</td>
<td>82</td>
<td>33</td>
</tr>
<tr>
<td>Reduced meal size</td>
<td>82</td>
<td>26</td>
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<tr>
<td>Reduced number of meals</td>
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<td>Skipped days with out eating</td>
<td>82</td>
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<tr>
<td>Sought assistance from relatives</td>
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<tr>
<td>Food loans/credits from local shops</td>
<td>82</td>
<td>2</td>
</tr>
<tr>
<td>Ate wild foods from bush/forest</td>
<td>82</td>
<td>6</td>
</tr>
<tr>
<td>Ate pawpaw and pumpkin leaves</td>
<td>82</td>
<td>37</td>
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<tr>
<td>Irreversible strategies</td>
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<td></td>
</tr>
<tr>
<td>Ate seeds kept for next planting</td>
<td>82</td>
<td>10</td>
</tr>
<tr>
<td>Bartered household items for food</td>
<td>82</td>
<td>4</td>
</tr>
<tr>
<td>Sold chickens/duck to buy food</td>
<td>82</td>
<td>5</td>
</tr>
<tr>
<td>Sold goats/sheep to buy food</td>
<td>82</td>
<td>2</td>
</tr>
</tbody>
</table>

Oxfam 2008
Staple Crop Consumption Dominates

- **Wheat, rice and maize supplies more than ½ of the world’s food energy**
- Edible seeds of domesticated grasses: maize, sorghum, millets, wheat, rice, oats, teff, barley, quinoa, triticale are the major staple crops of the world
- These staple crops form the basis of most diets – up to 70% of energy intake in typical diet
- High in energy; some have moderate amounts of protein and B vitamins; low in vitamins A, C
Consumption of Self Grown Crops by Farmers in Timor-Leste

Figure 13. Consumption of Self-Grown Crops by Farmers (Oct 2010 – Sep 2011)
Meeting Nutrients: Diet Types

FIG. 4. The insufficiency of common staple foods to meet critical micronutrient needs, expressed as percentages of required nutrient density (RND). Adapted from Uauy-Dagach and Hertrampf [18]

Deckelbaum et al 2006
Interventions: What has worked?

Source: SoL
Pathways linking agriculture to nutrition

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Strength of pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Increasing overall macroeconomic growth</td>
<td>modest effect</td>
</tr>
<tr>
<td>2) Increasing access to food by higher production and decreased food prices</td>
<td>modest effect</td>
</tr>
<tr>
<td>3) Increasing household income through the sale of agricultural products</td>
<td>variable effects</td>
</tr>
<tr>
<td>4) Increasing nutrient dense food production for household consumption</td>
<td>some evidence</td>
</tr>
<tr>
<td>5) Empowering women through targeted agricultural interventions</td>
<td>strong evidence</td>
</tr>
</tbody>
</table>

Source: Adapted from World Bank 2007.
Agriculture GDP Growth has modest effect on undernutrition

Examples of *nutrition sensitive* agriculture

- Diversifying Homestead Food Production
- Utilizing biodiversity
- Fortifying staple crops: Biofortification
- Fortifying major foods post harvest
- Processing foods post-harvest
- Sensitizing value chains for nutrition
- Focusing on women
There are 4 primary ways a person can get micronutrients into their system:

- **Dietary Diversity:** eating a balanced diet
- **Biofortification:** eating foods that have been engineered to have greater amounts of nutrients
- **Supplementation:** taking a vitamin tablet
- **Food Fortification:** through the addition of micronutrients to already consumed staple products
Homestead Food Production

WHY DIVERSIFY HOMESTEAD FOOD PRODUCTION? IMPROVE DIETARY DIVERSITY AT THE HOUSEHOLD AND IN SOME CASES, INCREASE INCOME

• Nutrition and income has improved in some cases but more biological data is needed
• Done in Asia mainly and usually have an education component
• Usually focused on vitamin A or iron
• When livestock and small animal rearing and fish farming are incorporated, increased income generation and nutrition improvements
Changing the Staple Ratio

The Usual Meal

A Better Meal
Where local diets often fall short

- Access to the appropriate quality and quantity of foods are essential for optimal nutrition for infants ages 6 and 24 mo.
- During the period of complementary feeding, most households may be able to provide their young children with sufficient energy and protein from home-produced complementary foods, but many do not feed foods with an adequate energy density or a sufficient number of meals per day.
- Inadequate micronutrient intakes and resulting deficiencies are common because of a lack of sufficient animal source foods, and have been associated with delayed child development.

Lutter C K et al. Pediatrics 2011;128:e1418-e1427
In Timor-Leste

• Major consumed crops include maize, sweet potato, banana, soy, peanut.
• Rich in energy and protein.
• Not sufficient to fill nutrient gap, particularly for growing children.
• Need to fill the gap with tropical fruits, dark leafy greens, fish, eggs and meats that are rich in micronutrients for immunity and cellular function and essential fatty acids for brain development and skeletal growth.
FIG. 5. The effect on micronutrient adequacy of sequentially adding small amounts of nutrient-dense foods, with rice as an example of a staple food. Dietary adequacy is expressed as percentage of required nutrient density (RND). Adapted from Uauy-Dagach and Hertrampf [18].
Dietary Diversity in Timor-Leste

**Table 8: Household diet diversity previous 30 days, % households**

<table>
<thead>
<tr>
<th>Food groups</th>
<th>Covalima</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Oecusse</th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>N</td>
<td>Ate Rarely</td>
<td>Ate Somewhat</td>
<td>Ate Often</td>
<td>Did not eat</td>
<td>N</td>
<td>Ate Rarely</td>
<td>Ate Somewhat</td>
<td>Ate Often</td>
<td>Did not eat</td>
</tr>
<tr>
<td>Cereals</td>
<td>159</td>
<td>2</td>
<td>1</td>
<td>96</td>
<td>1</td>
<td>149</td>
<td>7</td>
<td>34</td>
<td>59</td>
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<tr>
<td>Vitamin-A vegetables</td>
<td>159</td>
<td>31</td>
<td>46</td>
<td>14</td>
<td>9</td>
<td>150</td>
<td>8</td>
<td>51</td>
<td>2</td>
<td>39</td>
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<tr>
<td>Roots/tubers</td>
<td>159</td>
<td>28</td>
<td>35</td>
<td>16</td>
<td>21</td>
<td>150</td>
<td>10</td>
<td>35</td>
<td>1</td>
<td>54</td>
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<tr>
<td>Green leaves</td>
<td>159</td>
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<td>7</td>
<td>92</td>
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<td>150</td>
<td>9</td>
<td>64</td>
<td>8</td>
<td>19</td>
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<tr>
<td>Other vegetables</td>
<td>159</td>
<td>9</td>
<td>16</td>
<td>75</td>
<td>-</td>
<td>150</td>
<td>11</td>
<td>56</td>
<td>10</td>
<td>23</td>
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<tr>
<td>Pulses/legumes</td>
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<td>26</td>
<td>10</td>
<td>36</td>
<td>149</td>
<td>15</td>
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<td>2</td>
<td>59</td>
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<tr>
<td>Vitamin-A fruits</td>
<td>159</td>
<td>25</td>
<td>49</td>
<td>25</td>
<td>1</td>
<td>150</td>
<td>12</td>
<td>48</td>
<td>3</td>
<td>37</td>
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<tr>
<td>Other fruits</td>
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<td>150</td>
<td>7</td>
<td>48</td>
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<tr>
<td>Meat/poultry</td>
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<td>15</td>
<td>150</td>
<td>9</td>
<td>72</td>
<td>2</td>
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<tr>
<td>Eggs</td>
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<td>40</td>
<td>42</td>
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<td>13</td>
<td>150</td>
<td>14</td>
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<td>Sea foods</td>
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<td>33</td>
<td>19</td>
<td>15</td>
<td>150</td>
<td>9</td>
<td>26</td>
<td>8</td>
<td>57</td>
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<tr>
<td>Milk/ milk products</td>
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<td>38</td>
<td>17</td>
<td>2</td>
<td>43</td>
<td>150</td>
<td>10</td>
<td>8</td>
<td>-</td>
<td>82</td>
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<tr>
<td>Oils/fats</td>
<td>158</td>
<td>11</td>
<td>22</td>
<td>65</td>
<td>3</td>
<td>150</td>
<td>5</td>
<td>39</td>
<td>17</td>
<td>39</td>
</tr>
</tbody>
</table>
Animal Source Proteins make huge contributions to improving nutrition
Fruits and Vegetables

Rich in micronutrients – vitamins and minerals as well as health promoting properties

BUT....

Need to consume an abundance

Young, World Bank 2011
Agricultural biodiversity’s is one avenue towards dietary diversity

- Agrobiodiversity contain wide varieties of species and within species, diverse varieties that contain different levels of nutrients
- For rural farming populations, can provide diverse foods straight from the source or potentially, additional income to purchase foods (often netbuyers)
Loss of agrobiodiversity is profound

--

WHAT ABOUT TIMOR-LESTE?

A CENTURY AGO
In 1903 commercial seed houses offered hundreds of varieties, as shown in this sampling of ten crops.

80 YEARS LATER
By 1983 few of those varieties were found in the National Seed Storage Laboratory.*

* CHANGED ITS NAME IN 2001 TO THE NATIONAL CENTER FOR GENETIC RESOURCES PRESERVATION

SOURCE: RURAL ADVANCEMENT FOUNDATION INTERNATIONAL
Biofortification

- Biofortification is the development of staple crops with increased micronutrient density through crop management, breeding and genetic approaches
- Most successful so far: Orange fleshed sweet potato in Mozambique, Malawi and Uganda
- Next up, Golden Rice in the Philippines
Harvest Plus Variety Development

<table>
<thead>
<tr>
<th>Target Crops, Nutrients, Countries, &amp; Release Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bean</td>
</tr>
<tr>
<td>Cassava</td>
</tr>
<tr>
<td>Maize</td>
</tr>
<tr>
<td>Pearl Millet</td>
</tr>
<tr>
<td>Rice</td>
</tr>
<tr>
<td>Sweet Potato</td>
</tr>
<tr>
<td>Wheat</td>
</tr>
</tbody>
</table>
Fortification

- Vehicle is something consumed by many – milk, flour, noodles, sugar, oil
- Often requires partnership with the private sector
ONGERA INTUNGAMUBIRI
AGIRE UBIZIMA BWIZA

Koresha agasashi 1
incuro 2 cyangwa 3
buri cyumweru

Vanga n’ifunguro
rigiyeye kugaburwa

BURI GASHASHI GAFILE IGARAMA 1

| Vitamin A  | 400μg |
| Vitamin D  | 5.0μg |
| Vitamin E  | 5.0mg |
| Vitamin C  | 30.0mg |
| Vitamin B1 | 0.5mg |
| Vitamin B2 | 0.5mg |
| Niacin     | 6.0mg |
| Vitamin B6 | 0.5mg |
| Vitamin B12| 0.9μg |
| Folic Acid | 150.0μg |
| Iron/Feri  | 10.0mg |
| Zinc       | 4.1mg |
| Copper     | 0.56mg |
| Selenium   | 17.0μg |
| Iodine     | 90.0μg |

Ntuyikoreshe mu gye agasashi irimo kacite cyangwa kangiritse

Igenewe abana bafite amezi
6 kugera kuri 23 y'amavuko
Uburemere 1 g

Yakoze na
Piramal Healthcare
K-1 Addl, MIDC Area, Mahad – 402 302
Dist. Raigad, Maharashtra, India

MINISTRY OF HEALTH
Improving Nutrient Content and Sometimes, Income Generating

• **COOKING**
  – Oil for fat soluble vitamins
  – Vitamin C with iron

• **PROCESSING**
  – Thermal processing, mechanical processing, soaking, fermentation, and germination/malting
  – Increase the physicochemical accessibility of micronutrients, decrease the content of antinutrients, such as phytate, or increase the content of compounds that improve bioavailability
    – Parboiling
    – Yogurt, jams etc

• **STORING**
  – Solar drying, sun drying, storing
Nutrition Sensitive Value Chains
A Woman’s Burden

• Nutritional benefits increase when women can strike a balance between the time they give to agricultural tasks and the time they give to child and family care.

• Child nutrition often improves when income is put in the hands of a woman.
Approaches for further exploration

- **Integrated agro-forestry systems** that promote the sustainable exploitation of nutrient-rich non-wood forest products
- **Integrated farming systems** exploiting the synergies of horticulture, aquaculture and small livestock rearing
- **Improved microeconomics** of the household for self-consumption, to improve the nutritional quality of the family diet
- **Education and social marketing strategies** that strengthen local food systems and promote cultivation and consumption of local micronutrient-rich foods
- **Breeding programmes** of selected crops and livestock with enhanced nutritional quality
- **Improved post-harvest management** to reduce losses in terms of quantity and nutrients content
Rural Extension Services for Nutrition

• Great idea, but practical?
• Who should take responsibility?
• Demand driven...
Education and Engaging Communities

• Dietary diversity strategies are more effective when paired with education and messaging.
• Engage communities through participatory approaches and transferring knowledge.
• Breaking social norms and behavior change are challenging but not impossible!
Thank you!