Investment Costs and Policy Action for Reaching a World without Hunger (SDG 2)

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Bonn and Rome, March 17th 2021
Overview

1. Progress of the Scientific Group for the Food Systems Summit

2. Cost of ending hunger

3. Understanding the true cost of food

4. Advanced modelling of options and opportunities

5. Outlook
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5. Outlook
1. Mobilizing Science for the FSS, and in FSS Dialogues at national and regional levels and partnerships

2. Engaging in Action Tracks of FSS

3. Evidence-based assessments of action propositions, drawing on science, and diverse knowledge, peer review

4. Contributing to the FSS agenda and to follow-up after the Summit.
Scientific Group’s Papers address key FSS issues

revised after peer review

<table>
<thead>
<tr>
<th>Food Systems – Definition, Concept and Application for the UN Food Systems Summit</th>
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</thead>
<tbody>
<tr>
<td>Healthy diet: A definition for the United Nations Food Systems Summit</td>
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<tr>
<td>AT1 - Ensure Safe and Nutritious Food for All</td>
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<td>AT2 - Shift to Sustainable Consumption Patterns</td>
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<td>AT3 - Boost Nature Positive Production</td>
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<td>AT4 - Advance Equitable Livelihoods</td>
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<td>AT5 - Build Resilience to Vulnerabilities, Shocks and Stress</td>
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See at https://sc-fss2021.org/materials/scientific-group-reports-and-briefs/
Scientific Group partnering with science communities to addresses key FSS issues ...

Emphasis on science opportunities for FS change

<table>
<thead>
<tr>
<th>Briefs from Partners &amp; ca. 20 more to come</th>
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<tbody>
<tr>
<td>In the age of pandemics, connecting food systems and health</td>
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<tr>
<td>Reduction of Food Loss and Waste</td>
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<td>A New Paradigm for Plant Nutrition</td>
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<td>The Bioeconomy and Food Systems Transformation (LAC)</td>
</tr>
<tr>
<td>Ending Hunger by 2030 – policy actions and costs</td>
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</table>

To come:
Briefs on trade, finance, gender, youth, R&D, urban, indigenous fs, farms, oceans, livestock, nexus agro-ecolog, biodiversity...; countries and regions Africa, LAC, Asia; Modelling the food systems changes

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How Much Will it Cost to End Hunger by 2030? 
Actions at marginal costs

• Using the Marginal Abatement Costs Curve (MACC) approach, the 22 interventions were assessed to identify least-cost investment options with the highest potential for reducing POU (hunger)

• Information about the interventions was drawn from best available evidence-based literature, including modelling studies and impact assessments.

Bezawit Chicaibelu, Joachim von Braun, Maximo Torero Cullen, Jose Rosero
## How Much Will it Cost to End Hunger by 2030? Actions at marginal costs – top 12

<table>
<thead>
<tr>
<th>Rank</th>
<th>Interventions</th>
<th>Reduction in NoU (Million)</th>
<th>Average annual investment cost (US$ Million)</th>
<th>Average annual investment costs per capita (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agricultural R&amp;D efficiency enhancement</td>
<td>69.9</td>
<td>888</td>
<td>12.7</td>
</tr>
<tr>
<td>2</td>
<td>Agricultural extension services</td>
<td>81.5</td>
<td>2096</td>
<td>25.7</td>
</tr>
<tr>
<td>3</td>
<td>ICT - Agricultural information services</td>
<td>26.6</td>
<td>698</td>
<td>26.2</td>
</tr>
<tr>
<td>4</td>
<td>Small-scale irrigation expansion in Africa</td>
<td>142.3</td>
<td>3790</td>
<td>26.6</td>
</tr>
<tr>
<td>5</td>
<td>Agricultural R&amp;D</td>
<td>92.0</td>
<td>2960</td>
<td>32.2</td>
</tr>
<tr>
<td>6</td>
<td>Female literacy improvement</td>
<td>2.6</td>
<td>87</td>
<td>33.1</td>
</tr>
<tr>
<td>7</td>
<td>Social protection - Scaling up existing programmes</td>
<td>103.1</td>
<td>3676</td>
<td>35.7</td>
</tr>
<tr>
<td>8</td>
<td>Crop protection - Insects</td>
<td>10.1</td>
<td>700</td>
<td>69.7</td>
</tr>
<tr>
<td>9</td>
<td>Social protection - Establishing new programmes</td>
<td>103.1</td>
<td>9158</td>
<td>88.9</td>
</tr>
<tr>
<td>10</td>
<td>COVID-19 - Social protection</td>
<td>137.9</td>
<td>12255</td>
<td>88.9</td>
</tr>
<tr>
<td>11</td>
<td>Crop protection - Diseases</td>
<td>8.8</td>
<td>875</td>
<td>99.4</td>
</tr>
<tr>
<td>12</td>
<td>Integrated soil fertility management</td>
<td>16.6</td>
<td>1750</td>
<td>105.1</td>
</tr>
</tbody>
</table>
$y = 10,881e^{0.0156x}$

$R^2 = 0.7009$

Graph showing the relationship between intervention cost per undernourished individual (in US$ per capita) and the number of undernourished individuals (in millions). The graph includes various intervention categories such as Agricultural R&D, Social protection, Crop protection, and more.

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Learning From Progressing Countries

Low- and middle-income countries that reduced hunger (PoU) by more than 50 percent 2001-18, had high...
- Economic growth (6%)
- Agricultural growth (4.5%).
- Gov. capital investment growth (9%)
- Education; health exp. growth (8%)
- Crop yields (80% higher than others)

Hunger reduction goes hand in hand with improvements in policy on sectoral, human and macro-econ. development

Bezawit Chichaibelu, Joachim von Braun, Maximo Torero Cullen, Jose Rosero
1. Donors and affected partner countries must **double their investments** from now until 2030 - by about **USD 14 billion more per annum**, low and middle income countries by about **25 billion per annum**

2. In countries with hunger problems, **agriculture** must be a focus; donors and partner countries should agree on, and implement **efficient packages of investment and policy measures**.

3. Bring forward investments in **social security** to address acute hunger; and in research and training, because that takes time to take effect.

4. Scientific Group and partners - research on innovative financing

Source: [Ending Hunger by 2030 – policy actions and costs](#). Joachim von Braun (ZEF), Bezawit Beyene Chichaibelu (ZEF), Maximo Torero Cullen (FAO), David Laborde (IFPRI), Carin Smaller (IISD, CERES). Policy Brief, Oct 13, 2020
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The hidden costs of food
What impacts are hidden behind current food prices?

Nowadays, there is a difference between the market price of food and its comprehensive cost to society.

Environmental Costs:
- Climate Change
- Biodiversity Loss
- Degradation of Land and Freshwater pollution

Social Costs:
- Nutricional insecurity
- Social inequality

These hidden costs propagate failures within the food system:

Poor production and distribution practices:
- Reductions in crop diversity and resiliency
- Food loss

Promotion of convenience and throw-away culture:
- Food waste
- Pollution
- Consumption-production dissociation
The true cost of food
Is sustainable food more expensive?

An effort to price food based on the principle of true cost could:

- Minimize the mismatch between who causes pollution and who pays for it.
- Promote more sustainable means of production.
- Empower actors at the end of the chain to make choices in line with SDG 12: Responsible Production & Consumption

Based on FAO’s long term projection:

- overall, food prices are likely to be higher in the future (mainly due to increase of demand)
- sustainable production drives prices down (less demand for meat, reduction of FLW,) and up (less yield enhancing technologies, sustainable intensification) with an **overall higher prices** over a longer period of time -> but no externalities are accounted for in BAU that gives a false picture!
The true cost of food
How to successfully price the true cost of food?

What is needed:

- Agreed methodologies to understand the price gap between current and “true” price
- Policies to propose effective pricing mechanisms and assess the impacts of true pricing (e.g. taking RCPs into account) on different regions and societal groups
  - Investigating possible effects on sensitive groups
  - Exploring policies that could ensure true pricing leads to less pollution, less waste, and a positive restructuring of the food chain
- Exploratory studies to highlight ways to operationalize true cost successfully and steer the debate in a constructive direction
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Modeling a Transformative Agenda

Where we are

Current Food Systems

Choice of indicators
Link with the data platform

How we get to . . .

Transformation Process

Choice of instruments
- Changing incentives through prices
- Changing income distribution

Where we want to be

Transformed Food Systems

Choice of targets and the objective function
Quantification Framework for Food Systems

Food system as an economic activity
Impacts on jobs and finance

Impacts on human life
Impacts on inequalities and health

Nature and climate
Impacts on the planet and the biosphere

Assessing systemic risk
Impacts on resilience

Extended concept: One Health with zoonotic disease
### Questions to be Addressed by the Model

<table>
<thead>
<tr>
<th>The objective function 4 components for transformed food systems</th>
<th>Targets and Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sufficient calories for all</td>
<td>Calories availability per capital per household (consistent with PoU) above minimal energy requirement</td>
</tr>
<tr>
<td>Healthy diets for all</td>
<td>• Share of population we can afford a healthy diet (consistent with SOFI 2020)</td>
</tr>
<tr>
<td></td>
<td>• Regionalized diet structure by food group</td>
</tr>
<tr>
<td>Adequate incomes for all to access healthy diets</td>
<td>As previously, but includes a set of income-oriented instrument (see next slide)</td>
</tr>
<tr>
<td>Sustainable environment</td>
<td>• Carbon credit for agriculture, based on NDC</td>
</tr>
<tr>
<td></td>
<td>• Water constraint for agriculture</td>
</tr>
<tr>
<td></td>
<td>• Land Use constraint for Biodiversity</td>
</tr>
</tbody>
</table>
What Types of Model Are Needed

• Criteria of selection
  • A structural & equilibrium model
  • A dynamic model
  • A multi-country model to capture international linkages and leakages
  • A clear set of constraints

• Role of households
  • Household representation should be relevant
What Types of Model Are Needed

• Economic model is core
  Nexus of incentives and income generation → Dynamic General Equilibrium Model

• MIRAGRODEP with household representation
Country Coverage
3-tier approach

**Tier 1.**
Exhaustive household datasets (35 countries LMIC)

**Tier 2.**
Representative household distribution (36 countries, LMIC)

**Tier 3.**
Aggregated results (High income countries, rest of the world)
Modelling Food Loss reduction
A detailed representation of post harvest losses within the food system considering various nodes, internationalization of some value chains and complex input output relations.

Reducing post harvest losses changes availability of food, modify cost structure within and across value chains, could reshuffle international comparative advantages, and provide new income opportunities by increasing the efficiency of the system. Still, complex interactions leads to unexpected trade-offs...
A consistent accounting framework to identify specific pattern and guide policy actions

Globally: 376 $billion dollars of losses

- Crops
- Livestock
- Processed Food

<table>
<thead>
<tr>
<th>Crops</th>
<th>Middlemen</th>
<th>Processors</th>
<th>Livestock</th>
<th>On Farm</th>
<th>Processors</th>
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</table>

Source: MIRAGRODEP FSS dataset, Laborde and Torero (2021)
A central scenario and some variants to identify various contributions

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>PHL50</td>
<td>Reduction by 50% of PHL rates at all nodes</td>
</tr>
<tr>
<td>PHL50P</td>
<td>Reduction by 50% of PHL rates at the farm level</td>
</tr>
<tr>
<td>PHL50M</td>
<td>Reduction by 50% of PHL rates at the Middlemen level</td>
</tr>
<tr>
<td>PHL50T</td>
<td>Reduction by 50% of PHL rates at the Processors level</td>
</tr>
<tr>
<td>PHL50CRP</td>
<td>Reduction by 50% of PHL rates at all nodes for CROPS only</td>
</tr>
<tr>
<td>PHL50LVS</td>
<td>Reduction by 50% of PHL rates at all nodes for Livestocks only</td>
</tr>
<tr>
<td>PHL50DVG</td>
<td>Reduction by 50% of PHL rates at all nodes for developing countries only</td>
</tr>
</tbody>
</table>
Illustration on a macroeconomic indicator: A 50% reduction in physical PHL will increase global welfare by 0.36%.

Source: MIRAGRODEP simulations, Laborde and Torero (2021)
Illustration on **agricultural sector** indicators:
Less losses, more supply, lower prices and will free labor force
But volume effects will still benefit African farmers

Source: MIRAGRODEP simulations, Laborde and Torero (2021)
The price of healthy diets are falling globally, and in larger proportion than current diets price index, boosting consumption.

Contrasted effects on land use, but net emissions gains (6 Megatons CO2eq per year)

Source: MIRAGRODEP simulations, Laborde and Torero (2021)
Country level analysis show various interactions between goals, market responses and trade-offs and synergies (selected indicators)

Source: MIRAGRODEP simulations, Laborde and Torero (2021)
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Outlook: What next to expect from Scientific Group

A. An Agenda Paper for the Pre-Summit and Summit
   i) Role of Important science and innovation breakthroughs
      for food systems (e.g. genomics, plant nutrition, animal
      production and health, biosciences, earth sciences, remote
      sensing, AI & robotics, digitization, remotes sensing, big
      data, health and nutrition science, behavioral research, etc.)
   
   ii) Identifying and evaluating promising propositions for
       actions in support of desired food systems
       transformations

B. Scientific Days July 8/9 with all stakeholders