SDG 12.3.1 Global Food Loss Index

Training Workshop on Agriculture, Nutrition, and Land Holding and Use to Support the Sustainable Development Goals (SDGs) 2030 in the Arab Region

Amman, Jordan July 1-5, 2018

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Governance and Institutional architecture

“By 2030 halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses”
State of Play: SDG 12.3 target and indicators

Food Loss Index
Focuses on the supply side of the market and decreasing losses in the supply chain

“By 2030, ...

Waste Index
Focuses on retail and consumer sectors and improving the efficiency on the demand side of the supply chain

“...halve per capita global food waste at the retail and consumer levels.”

“...reduce food losses along production and supply chains, including post-harvest losses.”
Challenge: Boundaries of the food supply chain in the operational definition of the GFLI

Losts in SDG 12.3

- Harvest losses can be added to the loss coverage and measured with crop-cutting surveys
- Harvest losses
- Pre-harvest / Pre-slaughter
- Harvest / Slaughter
- On-farm post-harvest / slaughter operations
- Transport
- Storage
- Distribution
- Processing & Packaging
- Extreme events
different SDG (1.5)

Losts in the FBS fw

Retail

Public and household consumption

Waste

Uncertain boundaries here!
Definitions
Definitions: Food Losses

**FAO AGRICULTURAL STATISTICS**

- **Food losses**: Crop and livestock product losses cover all quantity losses along the supply chain for all utilizations (food, feed, seed, industrial, other), up to the retail/consumption level. Losses of the commodity as a whole (including edible and non-edible parts) and losses, direct or indirect, that occur during storage, transportation and processing, also of relevant imported quantities, are therefore all included.

**2016 DEFINITIONAL FRAMEWORK**

- **Food loss and waste (FLW)**: The decrease in quantity or quality of food.
- **Food losses**: in the production to distribution segments of the FSC is mainly caused by the functioning of the food production and supply system or its institutional and legal framework.

Definitions differ for qualitative losses, non-edible parts, value chain boundaries – treatment of pre-harvest and harvest losses.
Global & Country Food Loss Index
FLI - Main principles and methodology

1. Focuses on 10 key commodities in 5 main groups
2. Measures Food Loss Percentages (FLP) and not on total losses
3. Monitors changes in the Food Loss Percentage over time
4. Based on nationally representative loss percentages along the supply chain
Indicator 12.3.1

• A Food Loss Percentage can be interpreted as the percentage of production that does not reach the retail stage.

Steps to compiling the Index if the data exists:
1. Select Basket of commodities and compile weights
2. Compile Food Loss Percentages
3. Compare Food Losses over time  
   Food Loss Index
Indicator 12.3.1 – Loss percentages

• Step 1: loss percentages of each commodity at country level

  • Percentage losses versus total losses

  • $l_{ijt}$ is the loss percentage (estimated or observed)

  • Where: $j =$ commodity, $i =$ country, $t =$ year
Step 2: Compile the **Food Loss Percentage (FLP)** of the whole basket of commodities at country level:

\[
FLP_{it} = \frac{\sum_j l_{ijt} \times (q_0 \times p_0)}{\sum_j (q_0 \times p_0)}
\]

- The FLP is composed of several commodities
- The FLP is the average loss of these commodities
- Not all commodities have the same importance - weights
Step 3 : Calculate the country Food Loss Index

\[ FLI_{it} = \frac{FLP_{it}}{FLP_{it_0}} \times 100 \]

- Where:
  - \( i = \text{country}, \ t = \text{year} \)
  - \( t_0 \) is the base year (set at 2015 for the SDG monitoring)
  - \( FLP_{it} \) is the country Food Loss Percentage
- The country FLI shows the change in the food loss percentage over time (compared to a base period)
Countries’ FLI must be aggregated for SDG monitoring by regions and for the world, which will be done as part of FAO’s custodial role.

\[ GFIL_t = \frac{\sum_{i=1}^{G} FLI_{it} \cdot w_i}{\sum_{i=1}^{G} w_i} \times 100 \]

- Where:
  - \( w_i \) are the country weights equal to the total agricultural value of production
FLI - Monitoring trends

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<tbody>
<tr>
<td>FLP</td>
<td>5.7%</td>
<td>5.7%</td>
<td>5.6%</td>
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<tr>
<td>FLI</td>
<td>100.0</td>
<td>99.9</td>
<td>99.8</td>
<td>99.7</td>
<td>99.6</td>
<td>99.5</td>
<td>99.4</td>
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<td>99.2</td>
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Food Loss Percentage

Food Loss Index
Food Loss Index (year t) = \frac{\text{Food Loss Percentage}_i(\text{year } t)}{\text{Food Loss Percentage}_i \text{ (Baseline year)}} \times 100
Each commodity’s supply chain can be disaggregated down to stage. Estimates for the different stages can come from various instruments and tools.

Nationally Representative Loss percentages ($l_{ijt}$) by commodity

Weighted Aggregation of all commodities in the country basket $\Rightarrow$ FLP

$$\text{Food Loss Percentage}_{it} = \frac{\sum_j l_{ijt} \times \text{weights}_{t=0}}{\sum_j(\text{weights}_{t=0})}$$
## Recommended measurement tools by stage of the value chain

<table>
<thead>
<tr>
<th>Stage</th>
<th>Recommendation</th>
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</table>
| Farm        | • Harvest losses - Crop-cutting surveys<br>  
                 o Different yield, different definition of production  
                 • Post-harvest losses – Sample surveys<br>  
                 o Relevant when there are very many small actors  
                 o May cover on-farm storage, on farm transportation  
                 o Can be complemented by experimental design or two-stage sampling practices  
                 • Post-harvest losses – complete enumeration<br>  
                 o Large commercial farms that keep accounting records (few) |
| Storage     | • Losses and quantities stored<br>  
                 • Model or experimental design<br>  
                 o Inventory of storage facilities with their characteristics  
                 o Controlled experiment of the various products, length and storage con  
                 • Administrative data<br>  
                 o Very large storage facilities  
                 o Accurate accounts and records  
                 • Farm sample survey (on-farm storage)<br>  
                 o Smallholder farms (large population, small quantities)  
                 • Auxiliary data: Administrative data<br>  
                 o Weather at harvest  
                 o Monthly Prices |

### Transport
- Losses and quantities: Sample survey of the trucks
- Measuring a sample of product at destination

### Wholesale
- Agreement with the private sector<br>  
  o Quantities sold through the market, discarded product  
  • Sample or traders in the wholesale markets

### Processing
- Agreement with the private sector<br>  
  o Companies accounting records  
  o Complete enumeration or experimental design
Building the Index
Understanding data needs

• Reduction of losses falls into several policy objectives:
  • Improving competitiveness and value-added of agricultural producers and value chain actors;
  • Increase the efficiency of supply chains through logistics, infrastructure, and equipment
  • Address risks that come from changes in the climate and economic conditions.
  • All while improving the welfare of the population, particularly those in extreme poverty or with severe food shortages.

• Which policy applied - affects the data needs
Selecting the Basket of Commodities

• Setting a common basket of goods for global monitoring is a challenge:
  • the same commodities are not relevant for all countries
  • loss statistics cannot cover the entire basket
• Trade-off between relevance at country level and comparability across countries

Comparability

Build the international basket under 5 headings:

1. Cereals & Pulses;
2. Fruits And Vegetables;
3. Roots, Tubers & Oil-Bearing Crops;
4. Animals products; Fish and fish products
5. Other crops (stimulants, spices, sugar, etc.)

Relevance

Countries determine the two commodities in each heading

Policy focus
Economic relevance
Food security relevance
Default Basket relevance

- The default process is to:
  - Compile value of production for every commodity (in the base year)
  - Group commodities by category and rank them
  - Select the top 2
## Selecting the Basket of Commodities

<table>
<thead>
<tr>
<th>Category</th>
<th>World Commodities</th>
<th>India Commodities</th>
</tr>
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<tbody>
<tr>
<td>Cereals &amp; Pulses</td>
<td>Wheat, Maize (Corn)</td>
<td>Rice, Paddy, Wheat</td>
</tr>
<tr>
<td>Fruits &amp; Vegetables</td>
<td>Asparagus, Cabbages</td>
<td>Mangoes, Mangosteens, Guavas</td>
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<tr>
<td>Other</td>
<td>Almonds, In Shell, Chestnuts, In Shell</td>
<td>Sugar Cane, Bananas</td>
</tr>
<tr>
<td>Roots, Tubers &amp; Oil-Bearing Crops</td>
<td>Soya Beans, Groundnuts, Excluding Shelled</td>
<td>Potatoes, Groundnuts, With Shell</td>
</tr>
<tr>
<td>Animals Products &amp; Fish and fish</td>
<td>Meat Of Cattle With The Bone, Fresh Or Chilled</td>
<td>Meat, Buffalo, Meat, Cattle</td>
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Selecting the Basket of commodities, nationally

• Countries can go beyond the top 10 or revise the basket
  • Keep international reporting to a minimum but focus on a larger number of supply chains if needed
  • Policy focus can shift
  • Over a 10 year period the highest value products under the Fruits and Vegetables category changed for 40% of countries.
• Similar commodities (walnuts and pistachios; goats and sheep; etc) will likely be similar in perishability, but economic factors may trigger differences loss
Compiling the Weights

• Weights give each commodity its relative importance
• Fixed in the reference year: The index changes only if percentage losses change
• Several kinds of weights are possible
Choices of Weights

Economic value – emphasis on losses that are market driven, bias towards higher valued commodities, commodity groupings adjust against bias; also useful for ascertaining benefits-costs of policy

Other Weights can be applied in parallel to show impact of changing losses on policies

• Contribution to diets (caloric or protein value) - bias towards meats and staples, no emphasis on fruits and vegetables which might need more resources to grow & transport, higher energy consumption

• Environmental factors (water or C02) – Bias against meats and fruits and vegetables and nuts, as well as production systems by country
Challenge: measuring the loss percentage $l_{ijt}$

• Most critical is $l_{ijt}$ nor is it trivial to obtain the data
Data collection methods: Guidelines on the measurement of losses

Measuring $l_{ij}$ is at the core of the matter.

- Range of surveys and sample-based statistical tools
- To obtain nationally representative loss estimates in a cost-effective manner
- Grounded in the National Statistics Systems
- Drawn from 40 years of methodological literature and field practice

### Grains

Published and tested

### Fruits and Vegetables, Milk and Meat, Fish and products
Training course on postharvest losses surveys for grains

This material for in-classroom training on the measurement of harvest and post-harvest losses for food grain targets decision makers, survey managers, questionnaire designers, trainers of field staff and data analysts interested or involved in the measurement of food losses.

Training course on SDG 12.3.1 Global Food Loss Index: in progress
Next steps

1. Further improvements on the methodological proposal based on feedback from countries
2. Pilot testing the Guidelines on Fruits and Vegetables, Milk and Meat, Fish and products
3. Pilot testing the Food Loss Index:
   • India, USA, Turkey
4. Revised submission to the IAEG-SDG by November 2018
Questions?

For more information on the SDG indicator and all things presented in this workshop, please contact the SDG 12.3 Focal Point: Ms. Carola Fabi (carola.fabi@fao.org) FAO ESS-Statistics Division