Metadata of Indicator 12.3.1
Global Food Loss Index

Please note that this is a temporary file. It will be replaced by a final version that will be published on the UNSD website.

1. Institutional Information

1.1. Agency responsible for global compilation of the indicator or time series specified below:
Food and Agriculture Organization of the United Nations

1.2. Contact Person: Carola Fabi, Dorian Kalamvrezos Navarro

1.3. Email address: carola.fabi@fao.org; Doriankalamvrezos.Navarro@fao.org


2. Goals and Targets addressed

2.1. : Indicator name and number

   Indicator 12.3.1: "Global Food Loss Index"

2.2. : Target name and number:

   Target 12.3 “By 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.”

2.3. : Times series (if applicable): by 2030

2.4. : Linkages with any other Goals and Targets: The reduction of food losses and waste will impact a number of other SDGs that target either resilience to disaster losses, more efficient resource use, reduction of hunger by increasing the availability of food or reduction of greenhouse gas emissions, solid waste treatment, including SDGs or targets 1.5, 2, 6, 11.6, 13 and 17.

3. Definition and method of computation

3.1. : Definition:

   Index of the changes in the food losses percentages along the supply chain of key commodities over time.

   The indicator is computed as a ratio of Food Loss Percentages in the current year and the Food Loss Percentages in the base year according to a standard fixed-base index formula.

   FAO proposes to define food losses to be measured in the framework of SDG indicator 12.3.1. as:
• Food losses are all the crop and livestock human-edible commodity quantities that, directly or indirectly, completely exit the post-harvest/slaughter production/supply chain by being discarded, incinerated or otherwise, and do not re-enter in any other utilization (such as animal feed, industrial use, etc.), up to, and excluding, the retail level. Losses that occur during storage, transportation and processing, also of imported quantities, are therefore all included. Losses include the commodity as a whole with its non-edible parts.

The Global Food Loss Index scope within food chains is described as follows:

• The Global Food Loss Index for SDG monitoring and reporting purposes will be aligned with the Food Balance Sheets framework, starting with postharvest operations on the farm up to but not including the retail level,
• The scope of the index at the national level narrows down to 10 key commodities set by the countries in five headings for comparability.
• At country level, countries can include harvest losses in the scope of the index through ad hoc surveys and by adjusting the concept of production.
• Pre-harvest losses are covered by Target 1.5. Moreover, pre-harvest losses refer to the concept of potential production that cannot be used for the indicator.
• A separate Food Waste Index is being developed to cover food waste at the retail and consumption level.

3.2. Concepts

The following concepts are adopted for the calculation of indicator 12.3.1:

- **Quantitative food loss and waste** – is the decrease in mass of food (FAO’s Conceptual Framework for Food Losses and Waste).
- **Loss** takes place from the point of maturity up to but excluding the retail stage (the meaning of ‘maturity’ for livestock and fish must be defined). For the indicator and the data collected loss is measured in percentage terms (id).
- **Agriculture production** data for crops refer to the actual harvested production from the field orchard or garden, excluding harvesting and threshing losses and that part of crop not harvested for any reason.
- The **value of production** which serves as weights is equal to production quantities multiplied by a reference price. The reference prices used in the GFLI are international dollar prices calculated using the Geary Khamis equation method and based on FAOSTAT production and produce price data. Value of production is also the default selection criteria for the ten key commodities by country.
- The GFLI is based on the international **Central Product Classification** version 2.1 expanded. Commodities are further grouped according to FAO’s Food Groups used in the Supply Utilization Accounts and Food Balance Sheets.
3.3. Method of computation:

SDG 12.3 for a single country, called Food Loss Index (FLI), is a fixed-based index as follows:

\[ \text{FLI}_{it} = \frac{FLP_{it}}{FLP_{i0}} = \frac{\sum_j l_{ijt} * q_{ij0} * p_{j0}}{\sum_j l_{ij0} * q_{ij0} * p_{j0}} * 100 \]

Where:

- \( FLP_{it} \) is the average food loss percentage of the country in the current year
- \( FLP_{i0} \) is the average food loss percentage of the country in the base year
- \( i = \) country,
- \( j = \) commodity, the GFLI will cover the top 10 commodities in five main categories
- \( t = \) year, 0 is the base year
- \( l_{ijt} \) is the loss percentage (estimated or observed) of commodity \( j \) in country \( i \) year \( t \)
- \( q_{ij0} \) is the production quantities by country, commodity in the base period
- \( p_{j0} \) is the average 2004-2006 international price by commodity (at international $)

To aggregate the FLI into the global (GFLI) or a regional (RFLI) index, the country indices are aggregated using weights equal to the total value of agricultural production in the base year.

\[ GFLI_t = \frac{\sum_i GFLI_{it} * w_i}{\sum_i w_i} * 100 \]

The weights for the GFLI reflect the economic importance of the country’s agricultural value of production at international dollar prices relative to the rest of the world\(^1\). For the FLI and FLP, the weights are the value of the focus commodities at international dollar prices. The weight is fixed in the reference year. The weighting pattern was chosen based on the efficiency of markets operating in economic terms, rather than based on contribution to diets (caloric or protein value), environmental factors or other non-market valued opportunity costs.

One of the challenges in effectively measuring the progress of the GFLI is the coverage of commodities. Countries will not be able to measure losses of all commodities in their production system and the key commodities can differ across countries, while international comparability is needed. The proposal for the index to cover ten commodities by country in five groups ensures the index relevance to the countries while providing some degree of international comparability.

3.4. Rationale and interpretation

The 2030 Sustainable Development Agenda has emphasized the importance of sustainable production and consumption systems as efficient food systems, on the supply side and the consumption side, contribute to food security and sustainability of natural resource since agriculture is a major user of land and water.

The indicator looks at the trend in structural losses. It monitors progress on the supply side of food chains, as it measures if the share of agriculture production that does not reach the retail stage in 2030 has increased or decreased with respect to the base period and by how much. The numerator of the indicator indicates the level of losses and informs on the magnitude of the problem.

A greater efficiency of the food supply chain has also implications for all producers whether looking at efficiency in large-scale producers for export markets or in small-scale production units relevant for poverty and food insecurity reduction goals.

4. Disaggregation

4.1. Disaggregation

Sub-indicator 12.3.1 must be disaggregated by product and stage of the supply chain at the country level. Countries will likely gain the most value from the disaggregated Food Loss Percentage at the sub-national level by geographic area or agro-ecological zone, points of the value chain (farm, transport, markets, processors), economic sectors (small-holders or traditional sector versus large and commercial farms/firms).

\(^1\) The method for compiling international dollar prices is described in FAO (1993)
5. Sources and data collection

5.1. Sources and data collection

Sub-indicator 12.3.1 targets several populations along the food supply chain: producers, transporters, storage operations, processors and wholesalers. The primary data source for the index are loss quantities in the Food Balance Sheets as collected by FAO through its Annual Production Questionnaires to the countries.

FAO advocates for a survey based and nationally representative collection of data. Other data collection methods can be used for cost-efficiency, such as experimental design and estimation models. Recommendations by stages are in the methodological document attached. In summary the most appropriate data sources are: 1) annual agricultural surveys (and their equivalent on captures and aquaculture) and censuses, 2) ad hoc or strengthened sample surveys tailored to the various tracts of the supply chain and focus commodity (e.g. National Industry Processing surveys or Value Chain surveys), 3) administrative data, 4) additional information from case studies and scientific literature for modelling purposes.

In the current estimation of the GFLI, several sources of data were used: officially provided data in the Food Balance Sheet framework, other national data, information from case studies and scientific literature.

6. Comments and limitations

6.1. Comments and limitations

Food losses are an extremely complex phenomenon to measure because they are multi-dimensional and data collection is costly.

A major limitation is data availability. The reported data accounts for a small percentage or the data needs: only 23 countries out of 185 reported on losses in 2016 for one commodity or more and only 4.4% of loss factors in the SUA/FBS database are officially reported, all others being estimated.

The index is limited in scope as harvest losses cannot be included in the international indicator for comparability reasons. Moreover, the index covers ten key commodities in each country, because requesting regular loss data for a larger number of crops would be a difficult and unsustainable exercise for most countries.

The index covers quantitative losses only, that challenging enough to measure. Qualitative and economic losses are also very relevant but less consistent out of the scope of the indicator.

This indicator is particularly challenging for countries because it requires several surveys to collect all the necessary information along the supply chain. The most appropriate data sources would be an ensemble of surveys however, most countries lack the capacity and resources to carry out this exercise. A suite of statistical and modelling tools, combined where possible with administrative records will have to be used.

7. Current data availability/Indicator Tier

Tier III: Indicator for which established methodology and standards still need to be developed.

Data is still not available in a systematic and harmonized fashion. The methodology is in the process of being established.

7.1. Please mark the box indicating the Tier of this indicator

- Tier I
- Tier II
Please indicate for how many countries the data for this indicator are already currently available on a regular basis.

Not yet applicable. Some data is provided from available suitable surveys in selected countries.

Breakdown of the number of countries covered by region is as follows:

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<thead>
<tr>
<th>Region</th>
<th>Number of countries</th>
<th>Nature of data</th>
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<td>World</td>
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<td>Africa</td>
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<td>Northern Africa</td>
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<td>official</td>
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<tr>
<td>Sub-Saharan Africa</td>
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<tr>
<td>Eastern Africa</td>
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<td>official</td>
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<tr>
<td>Middle Africa</td>
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<td>official</td>
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<tr>
<td>Southern Africa</td>
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<td></td>
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<tr>
<td>Western Africa</td>
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<td>official</td>
</tr>
<tr>
<td>Americas</td>
<td>3</td>
<td>official</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
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<tr>
<td>Caribbean</td>
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<td></td>
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<tr>
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<td>unofficial and official</td>
</tr>
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<td>unofficial and official</td>
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<td>official</td>
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8. Responsible entity

8.1. Data provider
   National Statistical Offices

8.2. Data compiler
   Food and Agricultural Organization of the United Nations

9. Data collection and data release calendar

9.1. Dates when source collection is next planned.
   Loss data collection is already taking place though FAO's annual Agriculture Production Questionnaire in April every year.
   The loss section needs to be strengthened and broken down by stage of the value chain.
   For this reason it is foreseen that a separate data collection exercise may start after the indicator has been upgraded.

9.2. Expected dates of release of new data for this indicator, including the year (or, ideally, the quarter/month when the next data point associated with the indicator will become available).
   To be determined.

10. Treatment of missing values

10.1. Treatment of missing values
   To be determined.

10.2. Global/International context only:
   To be determined.

11. Sources of differences between global and national figures

11.1. Sources of differences between global and national figures
   Not yet applicable.
12. **Global estimates and obtaining data for global monitoring**

12.1. **Global and regional estimates**

FAO developed a loss imputation model to estimate losses of all countries and commodities and compile the Global Food Loss Index for SDG regions and commodity groups. The model builds on loss data provided by the countries to the FAO within the annual Agriculture Production Questionnaires, loss factors available in the scientific literature and from case studies, and a set of 200+ explanatory variables. The model is a fixed effect model that selects the explanatory variables using a random forest algorithm. Where there is no information at all for a country-commodity combination, the model is applied to a cluster of commodities and the countries’ estimated loss percentages will be equal to the cluster’s at global level.

12.2. **Obtaining internationally comparable data for global monitoring**

Not yet applicable.

13. **References**

13.1. **References**


