Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

SDG 12.3.1.a Food Loss Index

INTRODUCTION TO THE FOOD LOSS INDEX

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ESS, Food and Agriculture Organization

Objectives of this session

- Understand the SDG target 12.3 and indicator 12.3.1.
- Present the operational definition of food losses for SDG 12.3.1a
- Describe the methodology to calculate the Country Food Loss Index (FLI) and Global Food Loss Index (GFLI) and how to interpret them
- Understand the pieces of information needed to calculate the Country Food Loss Index and the challenges
- Provide the materials and inputs FAO has generated

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SDG 12.3.1.a General Context

Food losses and waste is part of the Agenda 2030

FAO raised awareness on food loss and waste with a global estimate in 2011

SDG Target 12.3 reflects growing attention to the issue

Creation of two indices to measure progress towards this target

FOOD LOSS INDEX

FOOD WASTE INDEX

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Food loss and waste reduction is part of the Agenda 2030

"By 2030…reduce food losses along production and supply chains, including post-harvest losses."

13.2% of global food produced was lost in 2021 (FAO, 2023)

12.3.1.a Food Loss Index

Supply side from harvest up to but not including retail

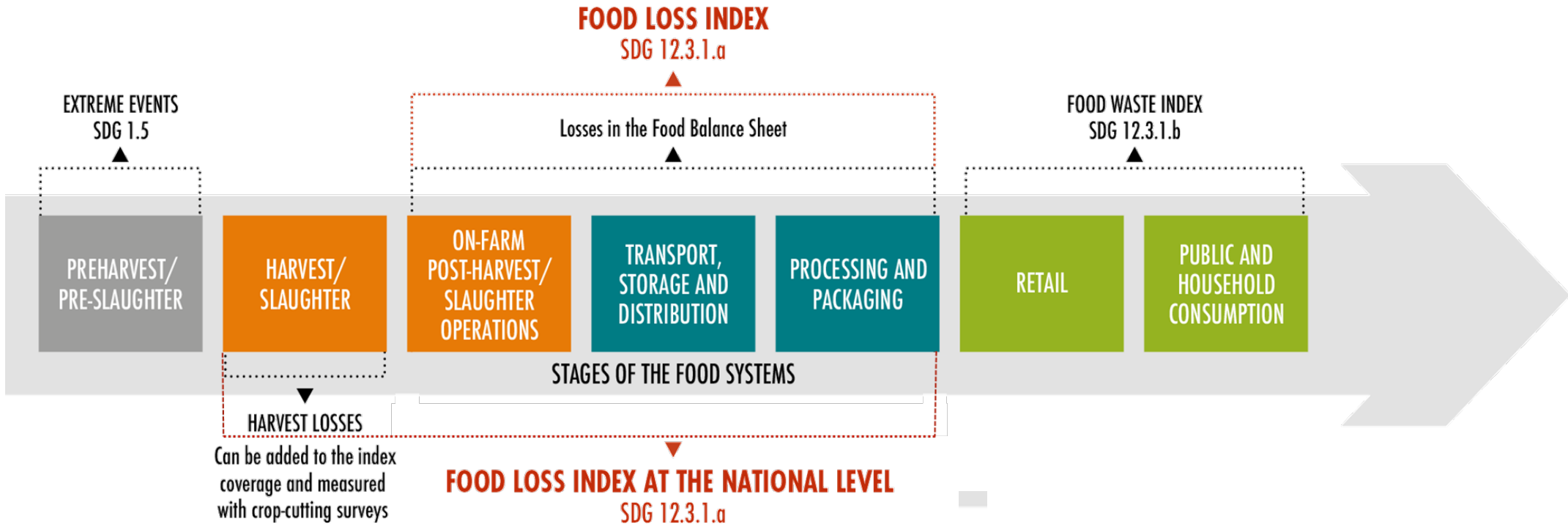
"By 2030…halve per capita global food waste at the retail and consumer levels."

19% of global food supply is wasted (UNEP, 2024)

UN environment 12.3.1.b Food Waste Index

Demand side from retail up to consumption

SDG 12.3.1: Food Loss Index and Food Waste Index



	Definition	Percentage
Food Loss Index	Food quantities that completely exit the supply chain, from post-harvest up to, but excluding, the retail level.	13.2% of global food production
Food Waste Index	Food quantities removed from the food supply chain in the retail, food service, and household level.	19% of global food supply

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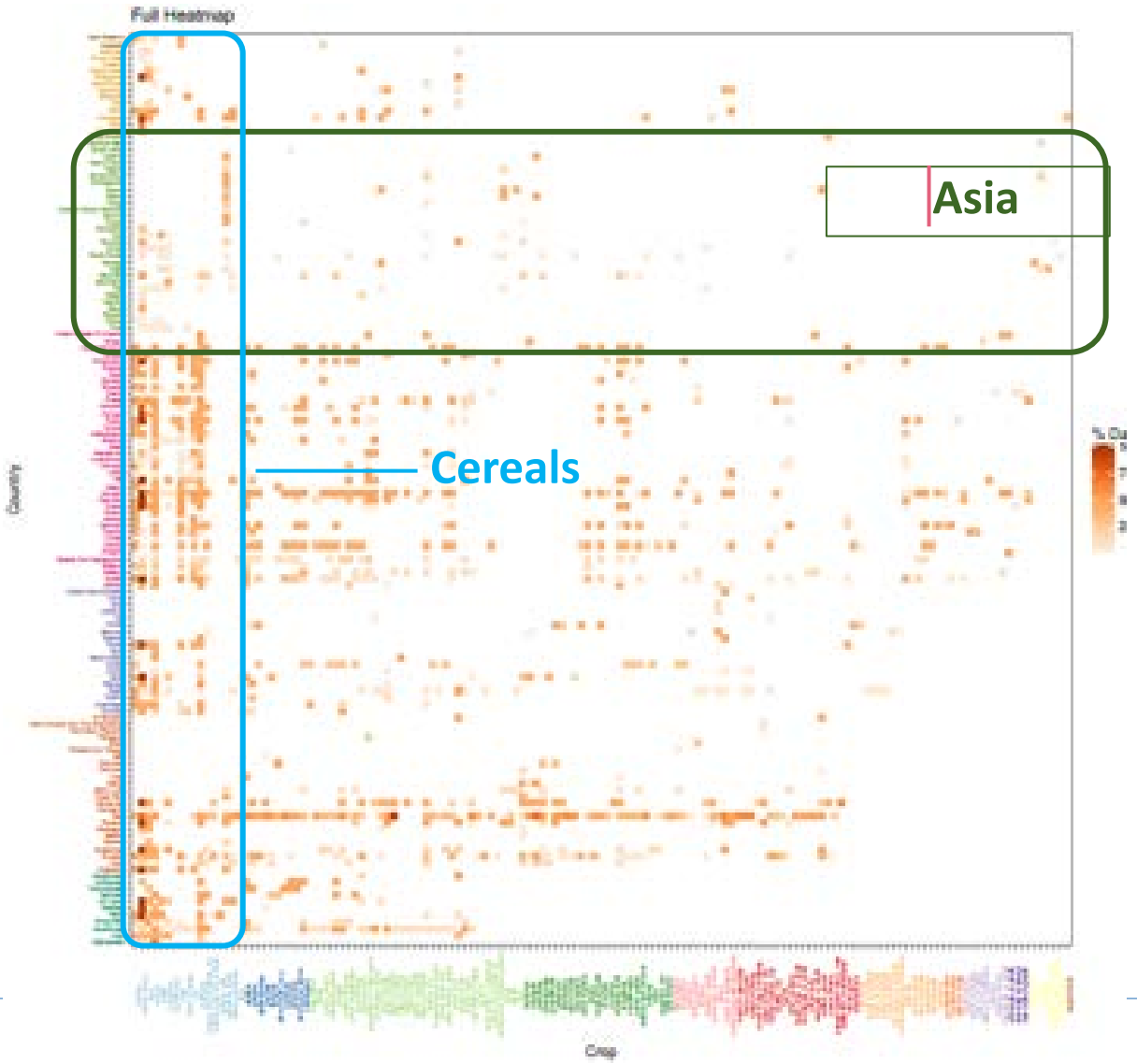
Data Availability

DATA GAPS IN FOOD LOSSES



Officially reported loss data to FAO since 1990:

- All countries (vertical), all products (horizontal)
- No data: white, Available data: coloured square
- Limited information to make sound decisions and monitor progress
- Official data do not allow the break-down by stage of the value chain

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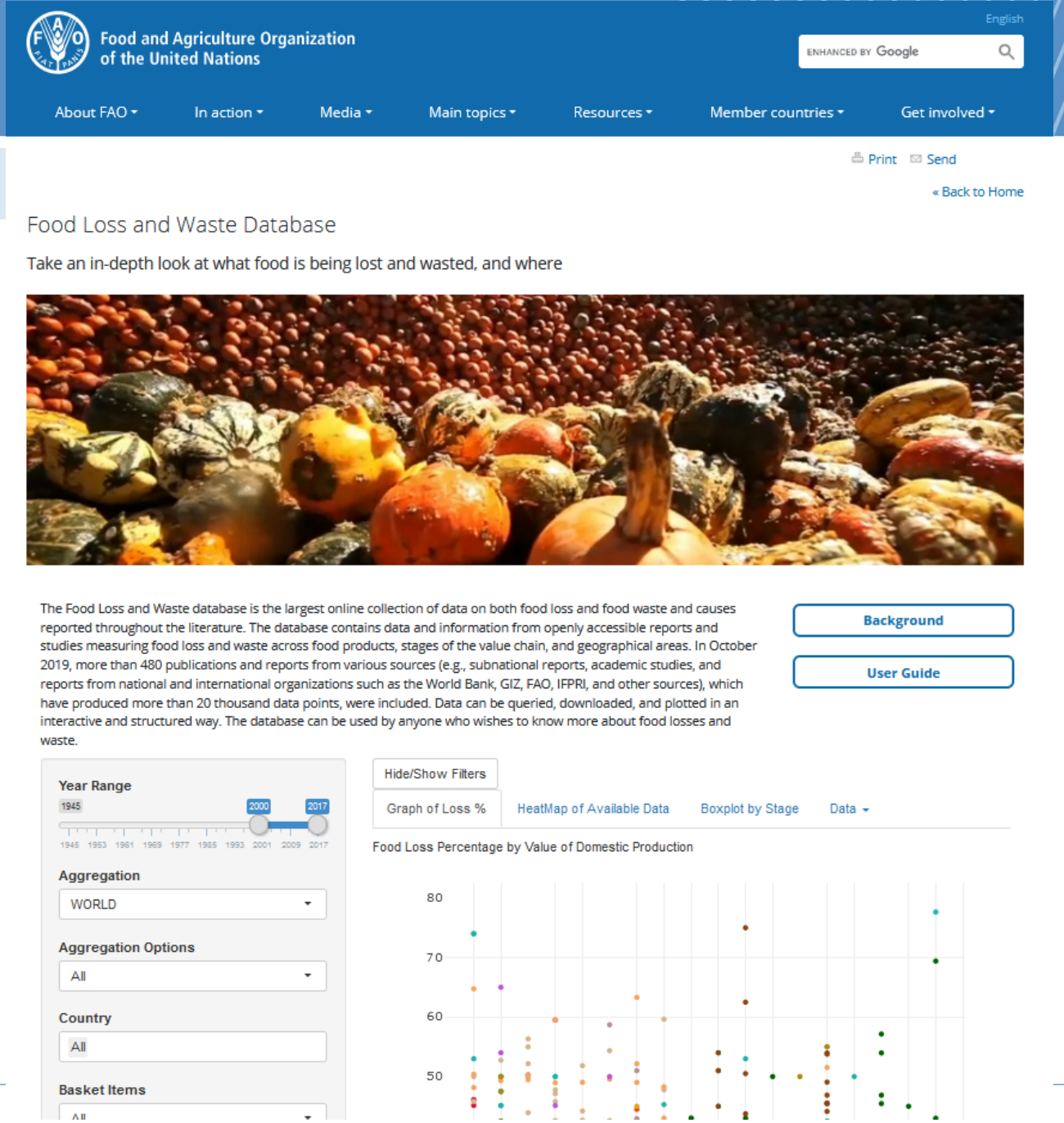
FOOD LOSS AND WASTE DATABASE

FAO generated a global Food Loss and Waste database:

- Largest online collection of data on both food loss and food waste reported throughout the literature
- Data and information from openly accessible reports/studies
- Approx. 20 thousand data points (in March 2025)
- Data can be queried, downloaded, and plotted in an interactive and structured way



PLOT OF LOSS PERCENTAGES AND BOXPLOTS FOR ESCWA COUNTRIES

Year Range
1965 – 2022

Aggregation
WORLD

Aggregation Options
All

Country
Algeria Egypt Iraq Jordan Kuwait Lebanon Libya Yemen Mauritania Morocco Oman Saudi Arabia Sudan Syrian Arab Republic Tunisia United Arab Emirates

Basket Items
All

Commodity (CPC 2.0)
All

Value Chain Stage(s)
All

Method of Data Collection
All

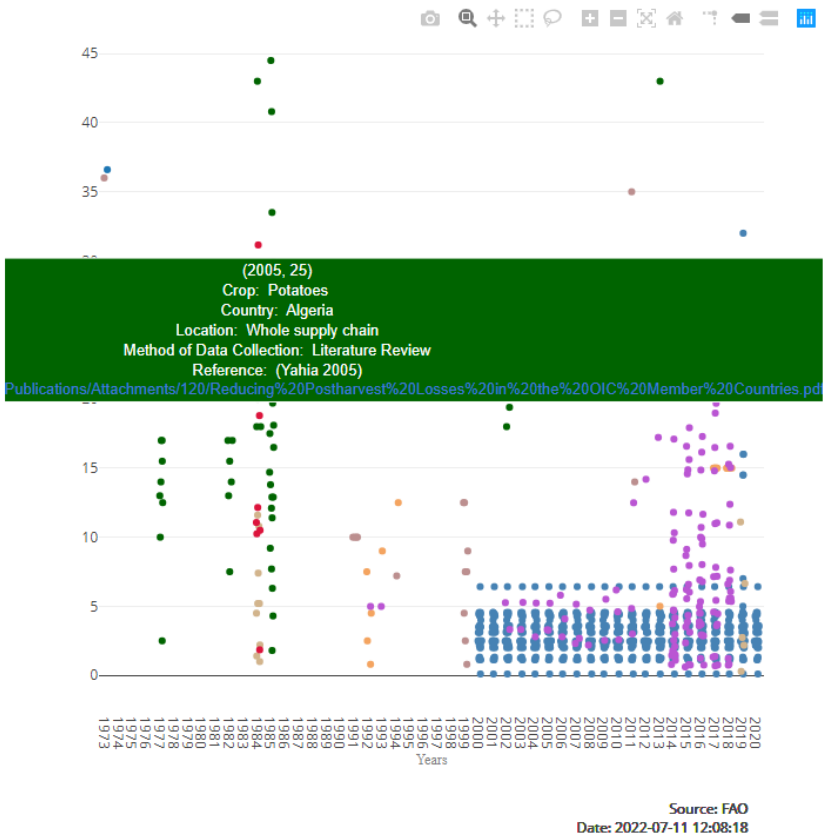
Select to keep only top-10 SDG baskets

Select to show also groups and other

Hide/Show Filters

Plot of loss percentages | Heatmap of available data | Boxplot by stage | Data

Food loss as a percentage of domestic production.



Year Range
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Aggregation
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Aggregation Options
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Country
Algeria Egypt Iraq Jordan Kuwait Lebanon Libya Yemen Mauritania Morocco Oman Saudi Arabia Sudan Syrian Arab Republic Tunisia United Arab Emirates

Basket Items
All

Commodity (CPC 2.0)
All

Value Chain Stage(s)
All

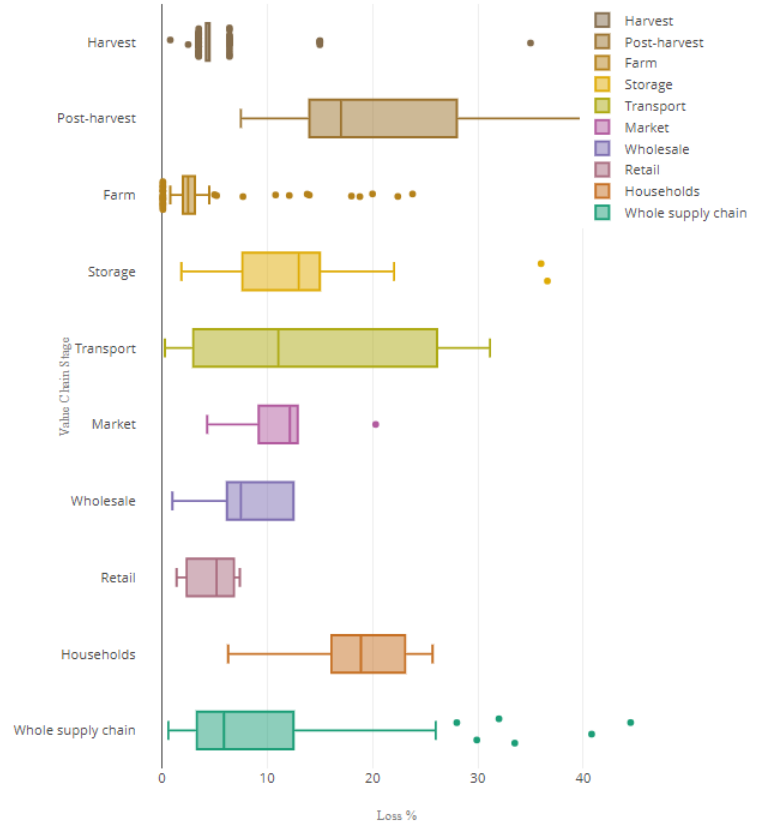
Method of Data Collection
All

Select to keep only top-10 SDG baskets

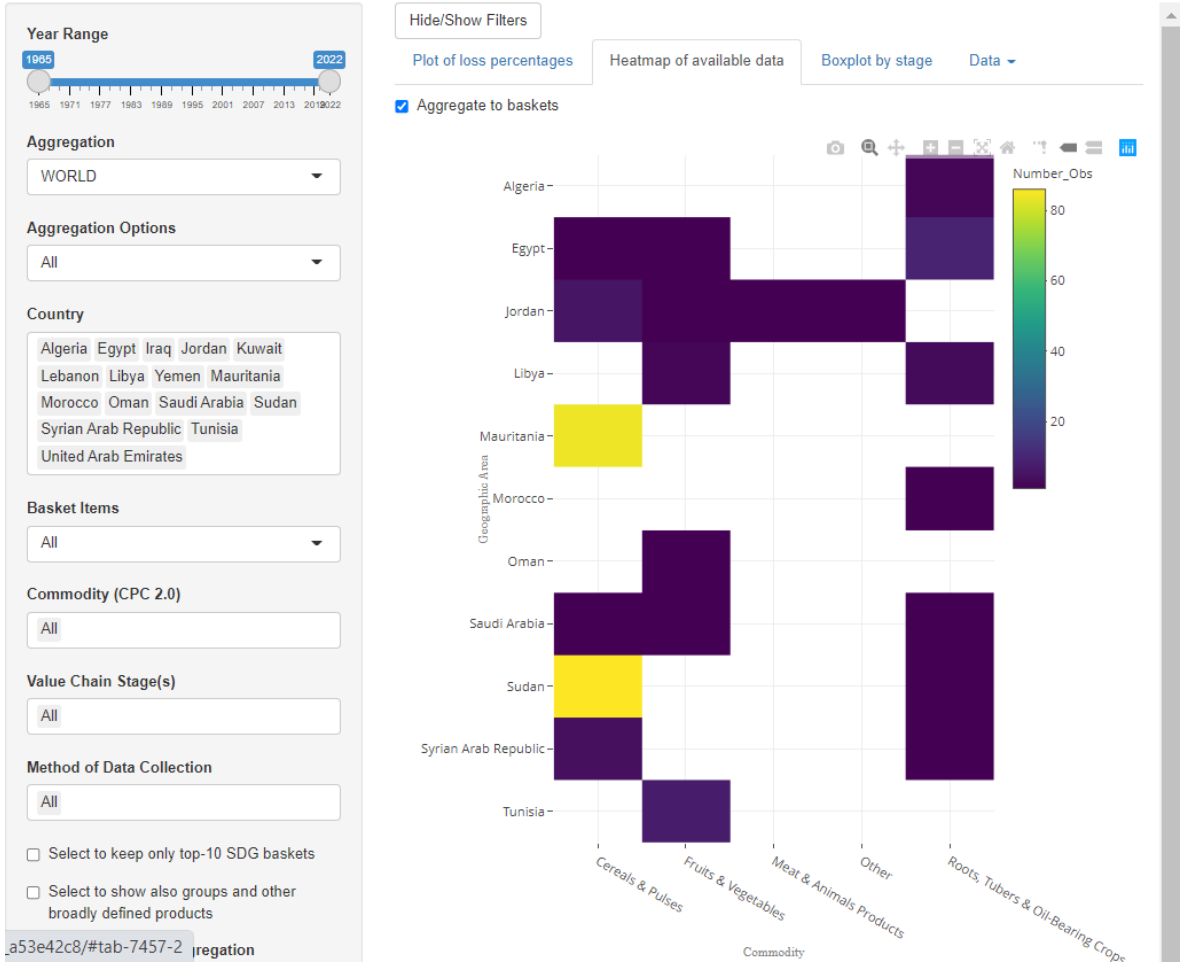
Select to show also groups and other broadly defined products

Hide/Show Filters

Plot of loss percentages | Heatmap of available data | Boxplot by stage | Data



HEATMAP OF AVAILABLE DATA IN ESCWA REGION



- Only 969 data points in the FLW Database for ESCWA countries

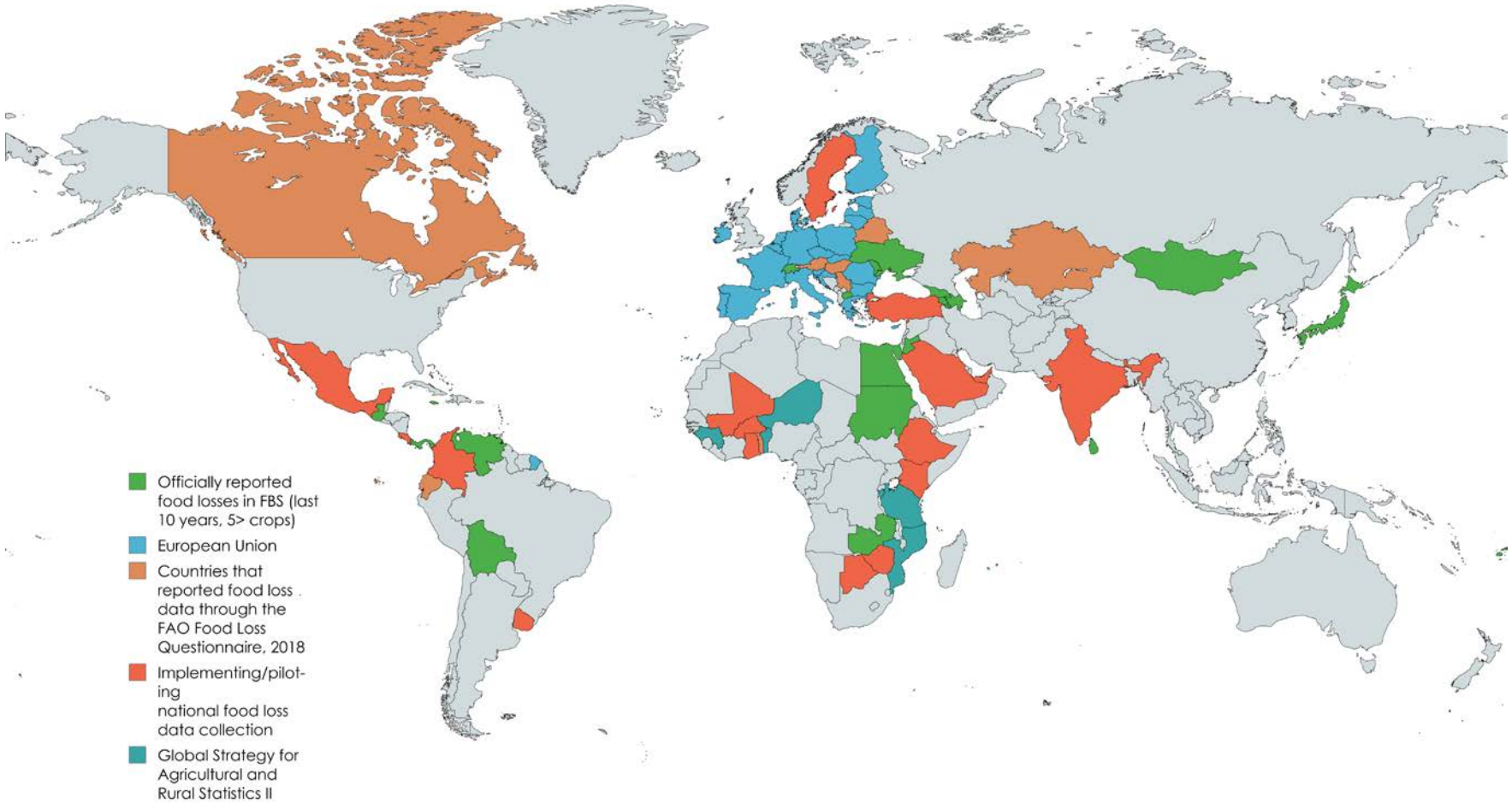
- Of these, app 80% are modelled APHLIS data (Sudan &Mauritania),10% are officially reported data to FAO while 10% was literature review

- Data covers
  - 11 countries (Algeria, Egypt, Jordan, Libya, Mauritania, Morocco, Oman, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia)
  - 31 value chains covering 4 food groups (most data is for cereals and pulses)

Conclusion:

- There is a high need for increased measurement in the region
- Identify areas for possible collaboration

Food Loss Data availability and reporting: Global



Sources: FAO and FAOSTAT

Food Loss Data availability and reporting: ESCWA

Sources: FAO and FAOSTAT

FOOD LOSS AND WASTE IN THE CONTEXT OF SUSTAINABLE FOOD SYSTEMs

70% *Countries identifying food loss and waste as a priority area the National Pathway documents*

Food Systems Summit

Source: https://www.fao.org/datalab/en

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SDG 12.3.1 a Definitional Framework

FOOD LOSS DEFINITION – SDG 12.3.1.a

Conceptual definition: "Food loss is the reduction of quantity and quality of food"

→ *Strives for conceptual completeness*

Operational definition:

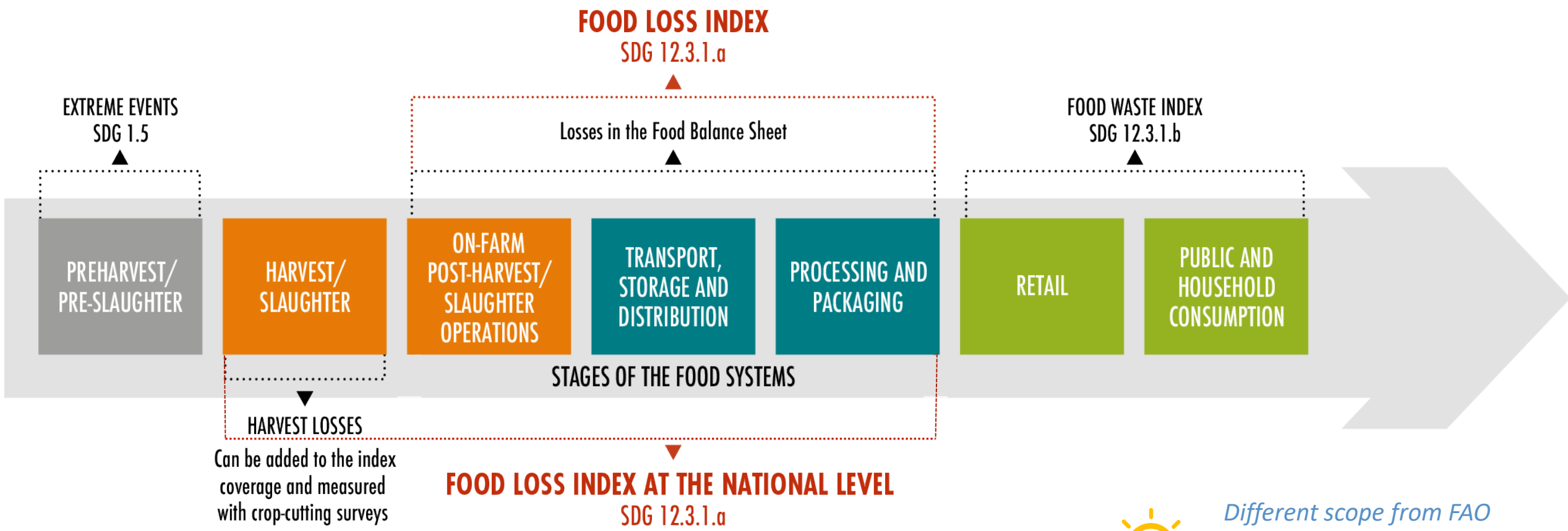
- Quantities, not qualitative nor economic losses.
- Separates food losses and food waste by stage, not by causes or intentionality.
- Tracks losses by commodity along its supply chain.
- Considers edible and non-edible parts as losses.
- Food that is sent to any other utilization (non-food utilizations) is NOT considered a loss.

Operational definition: *"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**.*

Removed from the human food supply chain" means one of the following end destinations: landfill, controlled combustion, sewer, litter/discards/ refuse, co/anaerobic digestion, compost/aerobic digestion or land application

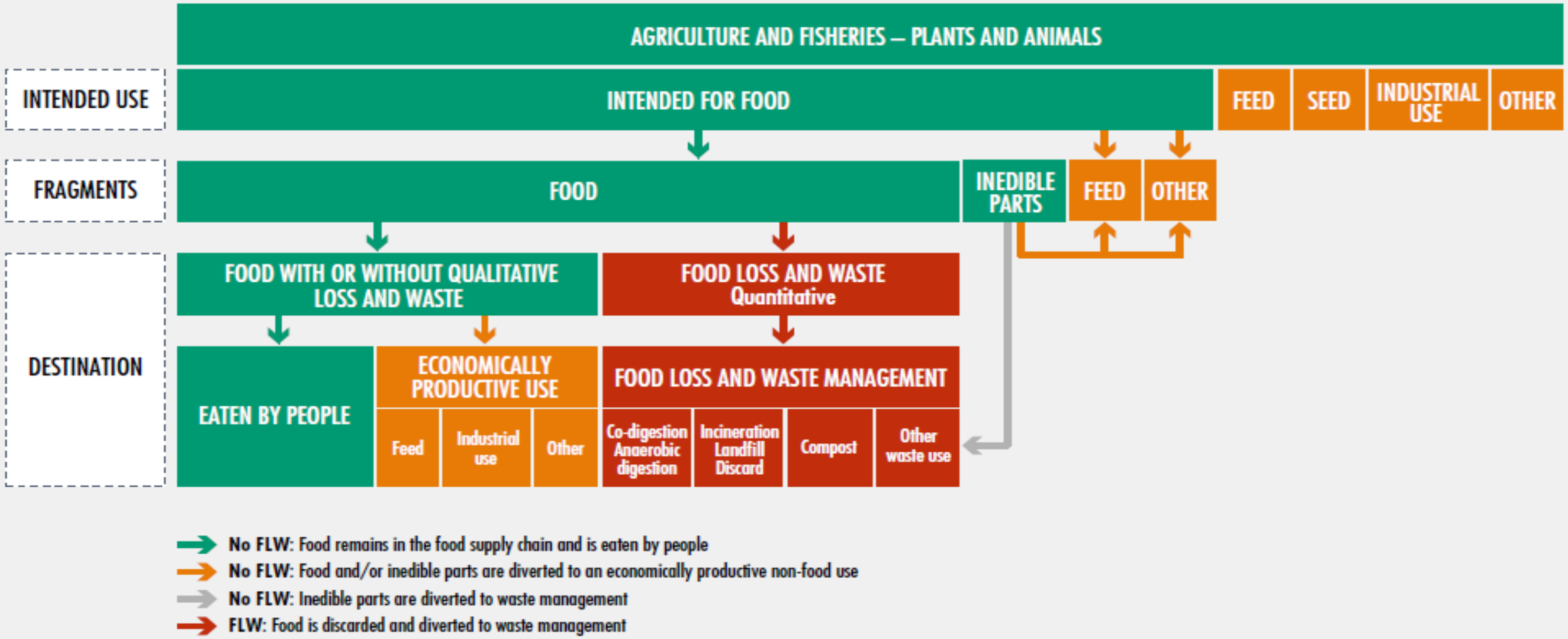
*Losses that occur during storage, transportation and processing, also of imported quantities, are therefore all included. Losses include the commodity **as a whole with its non-edible parts**."*

SCOPE OF THE FOOD LOSSES INDEX



Different scope from FAO 2011 Study (included Harvest, Food Loss and Food Waste)

SCOPE AND CONCEPTS OF FOOD LOSSES



FOOD LOSS DEFINTION FOR EACH COMMODITY GROUP

	Cereals, pulses	Roots, tubers	Fruits, vegetables	Animal product	Fish and fish product
Pre-harvest losses	Losses of mature crops before harvesting (eaten, rotten, affected by climate)	Losses of mature crops before harvesting (climate, pest and diseases, animals)	Losses of mature crops before harvesting (climate, pest and diseases, animals)	Losses at bearing, rearing	
Primary product					
Harvest losses	Losses during the harvesting process (fallen on the ground)	Losses during the harvesting process (left in the ground)	Losses during the harvesting process (left, fallen on the ground, grading during harvesting)	Egg harvesting/ milking/ pre-slaughtering losses (transport) and slaughtering losses	Losses at the time of catch occurring at ponds/landing centers/ boats
Post-harvest losses	Produce removed and discarded in grading, cleaning, packaging, processing, storage, transportation along the supply chain (on-farm and off-farm stages) up to retail (but excluding retail)				

COMMON QUESTIONS

Is this a food loss or not?

- Cereal is sorted out **due to poor quality** and used as **animal feed (e.g cattle)**.
  A: No
- Discarded meat parts are sent to **pet food industry**.
  A: No
- Fruits are graded out and sent **to any non-food industry (further resource utilization)**.
  A: No
- Discarded food from wholesale markets is sent to **bioenergy producing** plants?
  A: No
- Discarded food from wholesale markets is sent to **compost**.
  A: Yes
- Are **egg shells** considered a food loss?
  A: No

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SDG 12.3.1 a Country Food Loss Index

SDG 12.3.1.a Food Loss Index

Initial challenges for establishing the SDG Food Loss Index:

1. Lack of shared and internationally agreed concepts and definitions
2. Lack of international guidelines on how to define and collect postharvest losses and waste data at national level
3. Complexity of measurement: cost, multiple dimensions (stages of the value chain, typologies of actors, product characteristics, value chain length and complexity)
4. Reporting both the national and international indicators in a comparable way
5. Lack of data

Current data situation:

1. Definition was established and endorsed
2. Guidelines were drafted and are available
3. An approach to optimize data collection with a data collection strategy is proposed (items, critical loss points)
5. Nationally representative data is still very scarce (7% official data reported yearly in FAOSTAT, 42 Countries reported in **2023**)

COUNTRY FOOD LOSS INDEX – main features of the indicator

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

Required components:

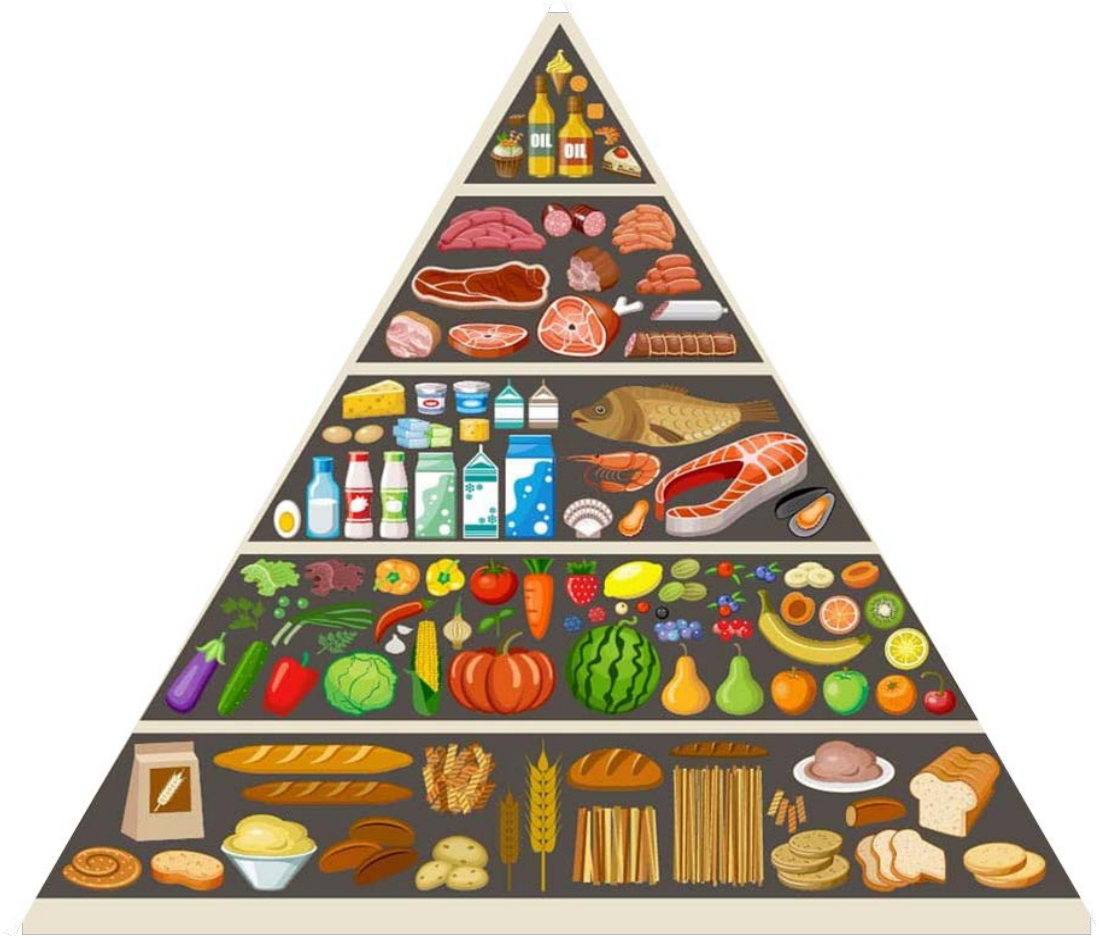
i) Selecting the **Basket of Commodities**

ii) Choosing the **Base Year**

iii) Compiling the **Weights**

iv) **Collecting data** and estimating food losses percentages at national level for each commodity over time

1) SELECT THE COMMODITIES BASKET FOR THE COUNTRY FLI



Comparability

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

Relevance

Countries determine the ten commodities by analyzing:

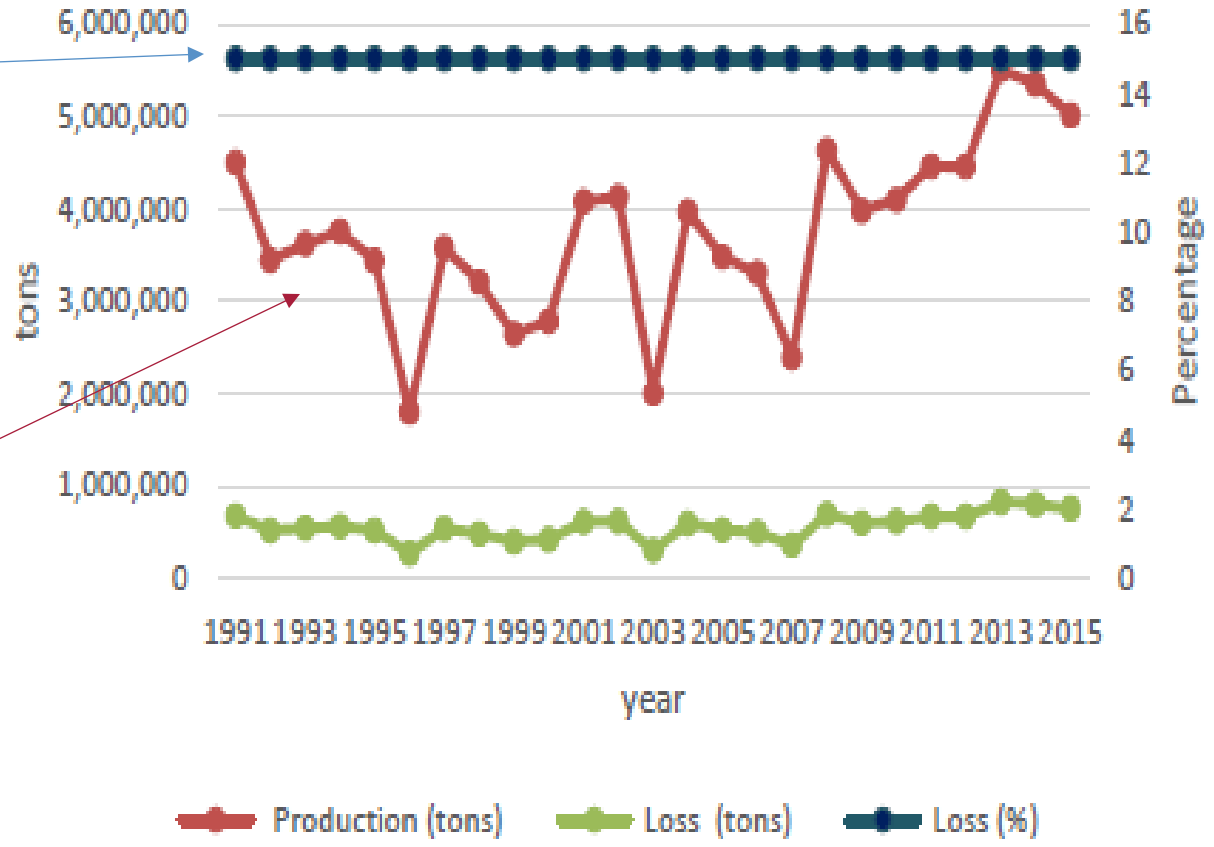
- Policy focus
- Economic relevance
- Food security relevance

2) FOCUS ON FOOD LOSS PERCENTAGES

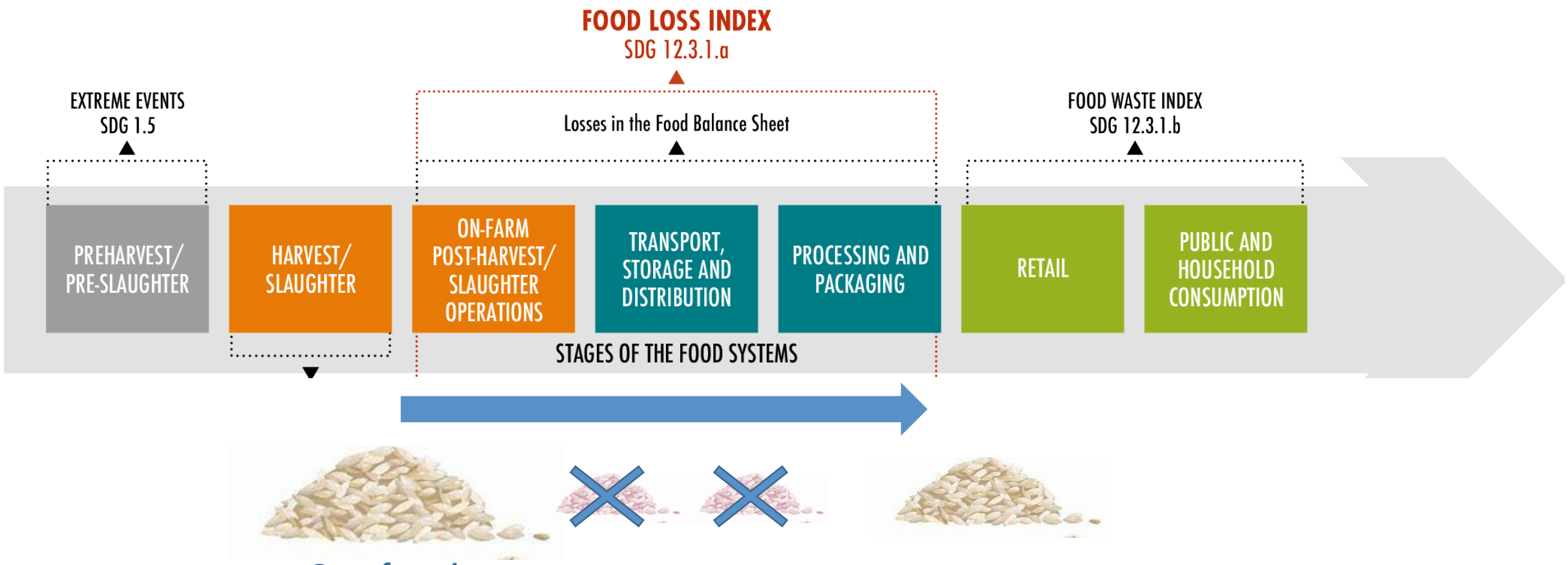
Percentage losses versus total losses:

Percentage Losses l_ijt are set here using a constant factor of 15%. You can see that loss quantities fluctuate with production.

- → *Lower production would than mean lower loss volume, **but without tackling the causes** of losses*
- → *We don't want to have the **noise of production fluctuation** in the food loss index*
- → *With food loss percentages we **focus on structural food losses** (independently of level of production)*



4) Nationally representative data - Food losses in the supply chain approach



Out of total production

How much was lost until reaching retail stage? → Percentage losses

SDG 12.3.1.a - FOOD LOSS PERCENTAGE AND INDEX

$$\textbf{Food Loss Index (FLI)} = \frac{Food\ loss\ percentage\ of\ the\ current\ year}{Food\ loss\ percentage\ of\ the\ base\ year}$$

$$\textbf{Food Loss Percentage (FLP)} = Average\ food\ loss\ percentage\ of\ 10\ commodities\ in\ 5\ food\ groups$$

- Uses the loss percentages instead of loss volumes
- Covers 10 commodities in 5 food groups
- Covers all losses along the supply chain
- Allows for international comparability by food group
- **Most critical: data of the commodity food loss percentages to be produced by the countries**

COUNTRY FOOD LOSS INDEX

The Country Food Loss Index (FLI) is a fixed-base weighted index (Laspeyres-type) widely used in official statistics:

$$FLI_{it} = \frac{FLP_{it}}{FLP_{it_0}} * 100$$

j = commodity
i= country
t = year

$$FLP_{it} = \frac{\sum_j \boldsymbol{l_{ijt}} * (q_0 * p_0)}{\sum_j (q_0 * p_0)}$$

- The FLI measures trends in percentage losses over time, comparing a national average Food Loss Percentage (FLP) in the current year to the same percentage in the base year.
- A FLI < 100 means that a country has met the SDG target 12.3.1.a

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SDG 12.3.1 a Global Food Loss Index

GLOBAL FOOD LOSS INDEX

Countries' FLI must be aggregated for SDG monitoring by regions and for the world.

This is part of FAO's custodial role.

$$GFLI_t = \frac{\sum_{i=1}^{G} FLI_{it} * w_i}{\sum_{i=1}^{G} w_i} * 100$$

Where:

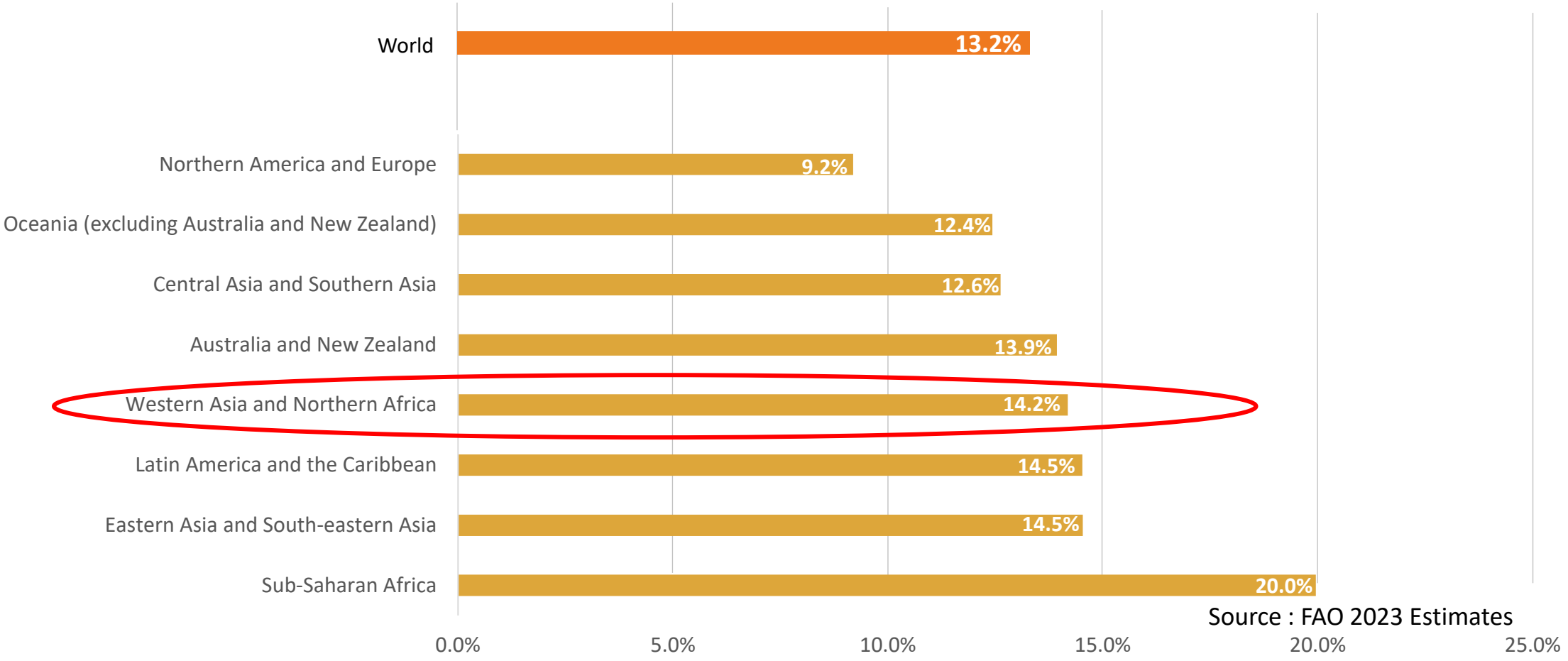
- w_i are the country weights equal to the total agricultural value of production

- **Aggregates** Country Food Loss Indices
- Weighted by agricultural **value of production**

If no data is available:

- **Global Food Loss Model** estimates food losses for the countries
- These are placeholders and will be replaced once countries provide own **estimates**

Food Loss Estimates 2021: Global and by Region

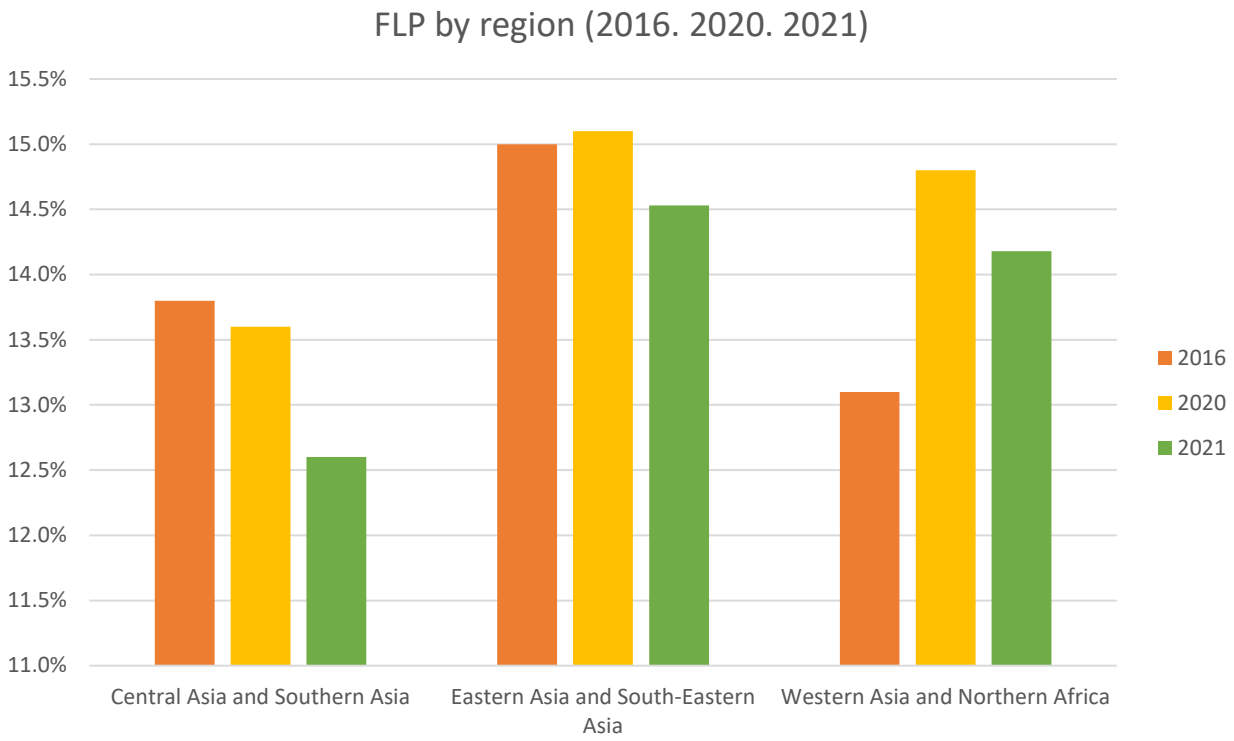


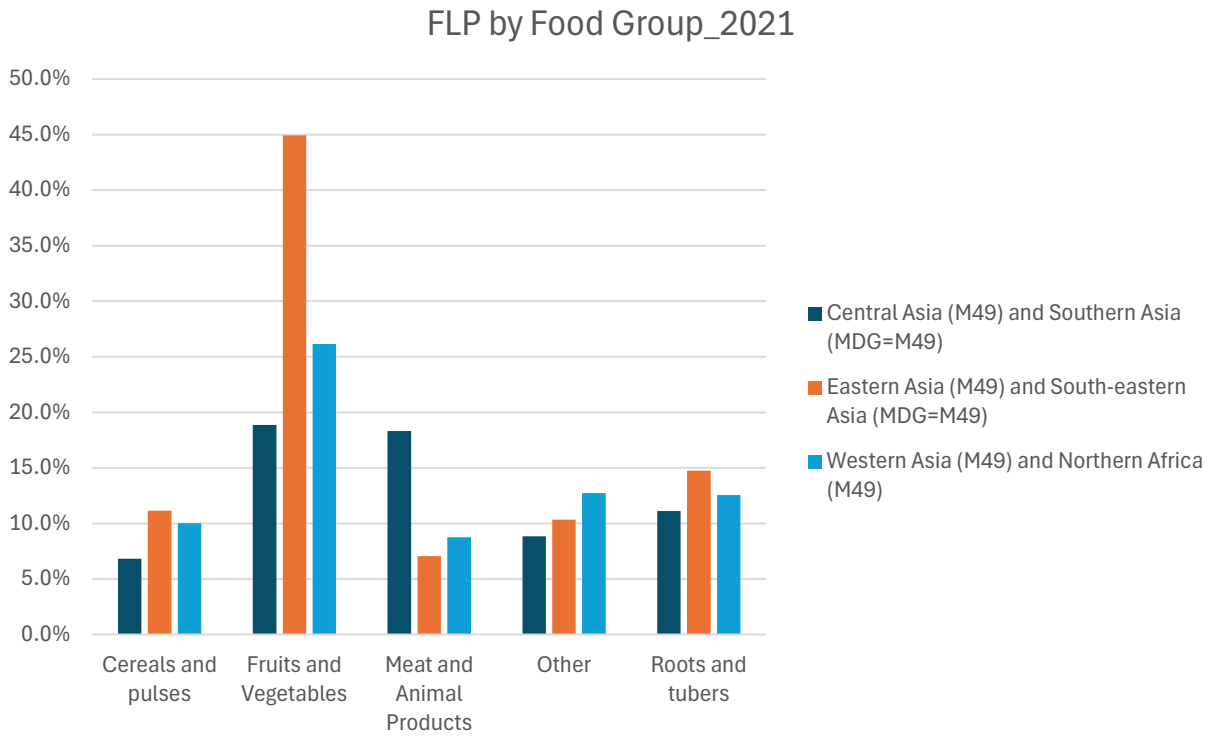
Source : FAO 2023 Estimates

Global and Regional Food Loss Percentages (2016, 2021)

- Globally FLP is at 13.2%
- Not much change since the first estimates of 2016 (13%)
- In the 2021 estimates:
  - Highest losses are in SSA at 19.95%
  - It was the region with highest losses in 2016
  - Lowest losses are in Northern America and Europe at 9.19%

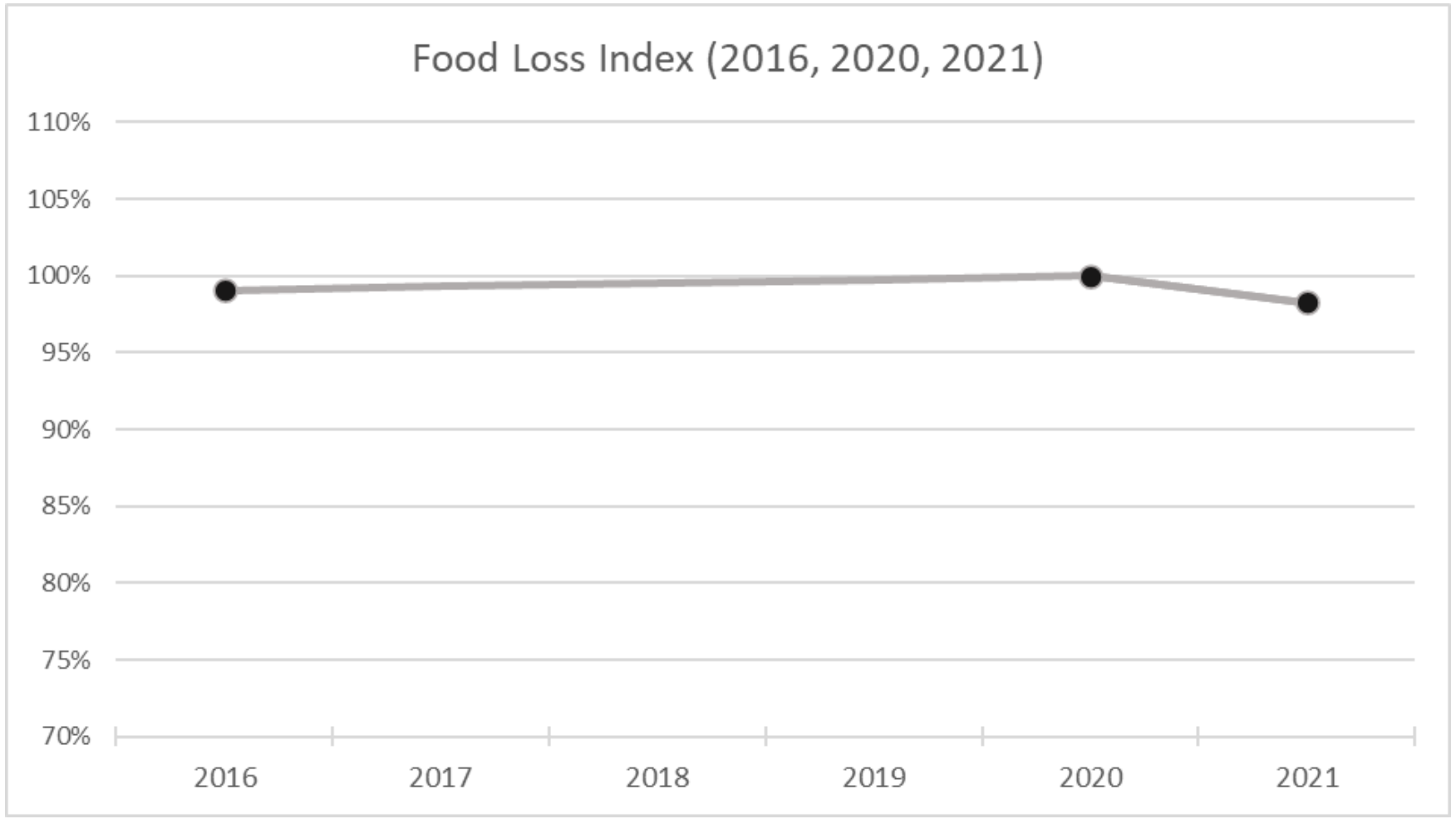
Food loss percentages by sub-region and by Food Group





Source : FAO 2023 Estimates

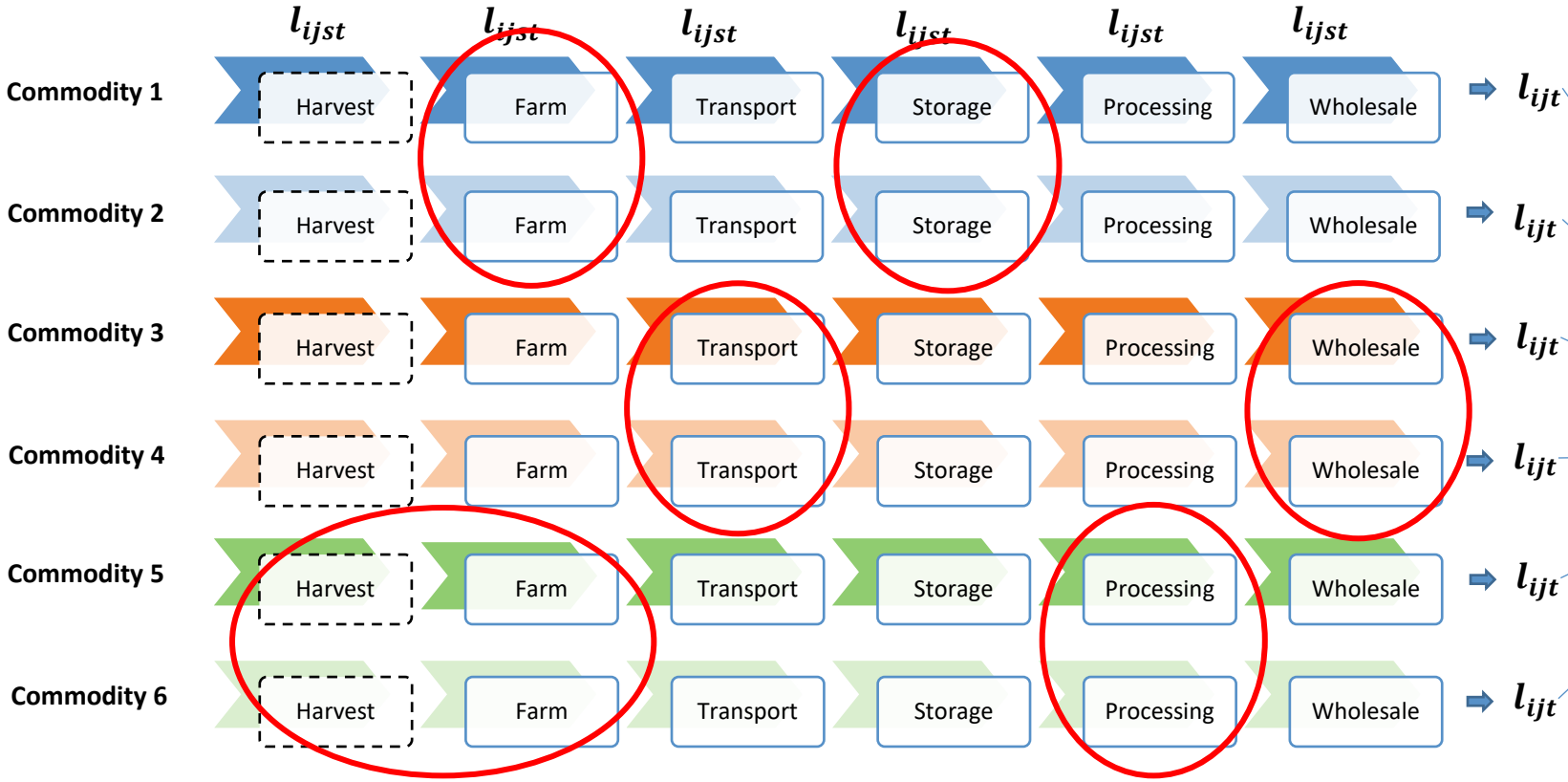
Global Food Loss Index (2015=100)



Challenges in building the indicators

- Choosing the Base Year
- How to select the 10 Commodities
- Compiling the Weights
- Collecting data and estimating losses at national level for each commodity across time

Data requirements along the supply chain



Food loss percentages by commodity representative at national level (l_{ijt})

***FLP** country (t)*

It is recommended to specify the data needs, and optimize data collection efforts → reduce costs

Data collection strategy is needed to set these priorities and optimize resources

DATA COLLECTION EFFORTS ARE KEY

Data collection efforts are key to obtain the country loss percentage *l_ijt.*

Which is the priority of FAO´s technical assistance to the countries.

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SDG 12.3.1 a

FAO work

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TECHNICAL ASSISTANCE FROM FAO FOR COUNTRIES FOR SDG 12.3.1.a MONITORING AND REPORTING

Countries:

Technical assistance to countries on:

i) Design data collection strategies
ii) Design and implement data collection methods and instruments
iii) Data integration/validation/aggregation

Global:

FAO, as custodian, is providing:

i) The framework for international comparability, monitoring and reporting
ii) Methods to fill data gaps

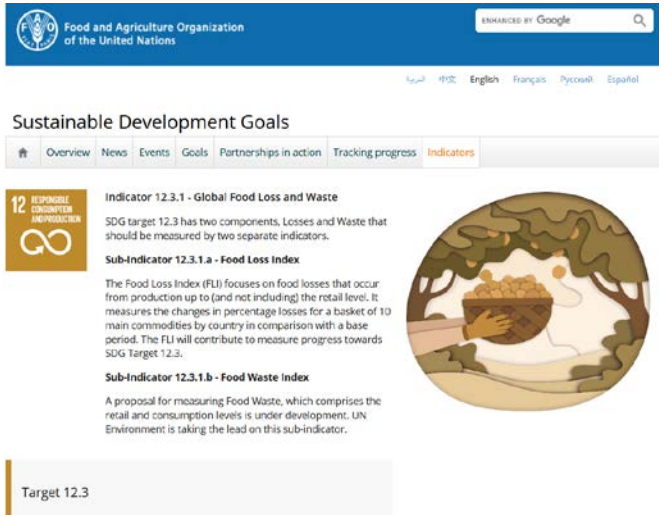
Technical support SDG 12.3.1.a:

- FL definitional and conceptual framework
- FAO Case study methodology for FL assessment
- Guidelines for Data Collection Strategy
- Data Collection Guidelines (Cereals, Fruits & Vegetables, Animal Products, Fish and Fish Products)
- Methodological innovations

- SDG 12.3.1a Methodology
- Food Loss and Waste data base
- SDG 12.3.1.a Reporting mechanism and instruments
- SDG 12.3.1.a Global and regional estimation model

MATERIALS AND LINKS

SDG 12.3.1 a website
(guidelines, e-learning, questionnaires, reports, ..)



http://www.fao.org/sustainable-development-goals/indicators/1231

Technical Platform on the Measurement and Reduction of FLW

http://www.fao.org/platform-food-loss-waste/en/

State of Food and Agriculture (SOFA) 2019
Food Loss and Waste

http://www.fao.org/publications/sofa/2019/en/

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Thank you very much!

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