Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

SDG 12.3.1.a

Indirect food loss measurement

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Recap: Two-pronged approach for monitoring food losses

Indirect methods:

- ❑ Do not produce food loss data but estimate losses by using other available data
- ❑ Supply Utilization Accounts / Food Balance Sheet approach or modelling approach (e.g. Food Loss Estimation Model)

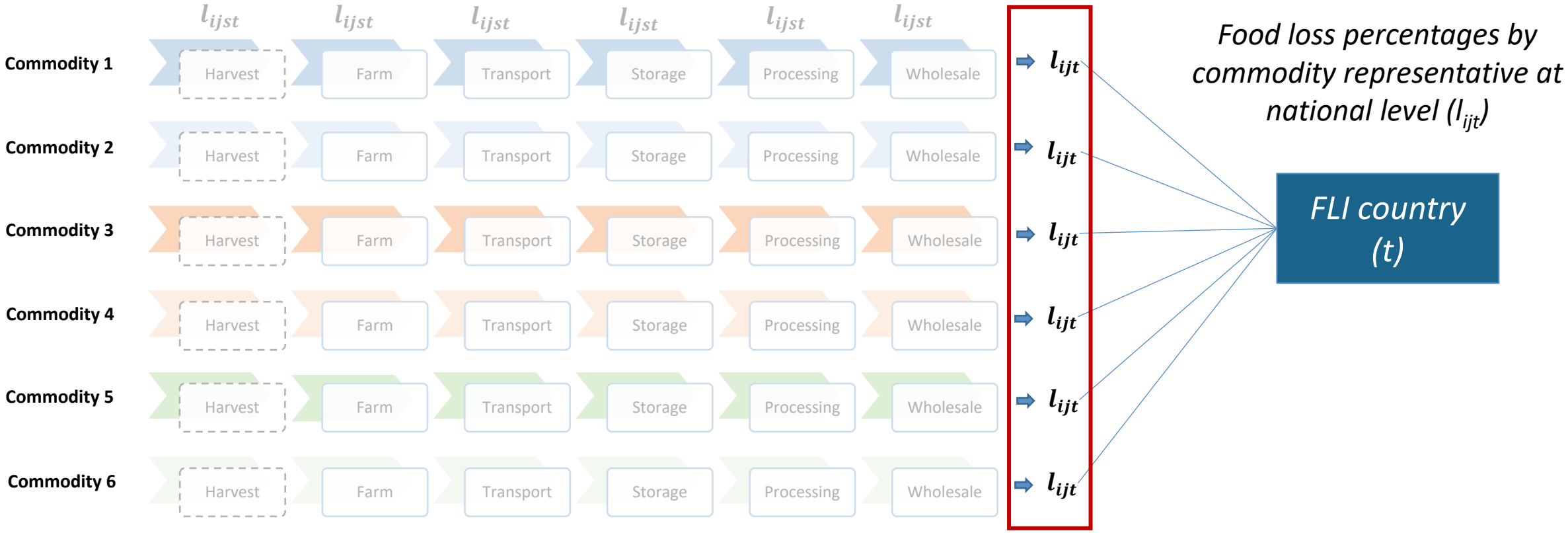
- ➢ Can be used in the short run to have a benchmark estimate
- ➢ Less suited for impact and cross-domain analysis

Direct methods:

- ❑ Produce actual loss data but require more time and resources
- ❑ Data collection on different stages and sectors (agriculture, storage, processing, trade)

- ➢ Relevant for policy making and investment decisions
- ➢ Representative, good quality data that best suited to monitor progress

Indirect methods generate aggregated food loss estimates



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Estimate losses with Food Balance Sheets

Working for #ZeroHunger

Food Balance Sheets conceptual framework

The FBS is a time-referenced food accounting framework whereby supply equals utilisation (in quantities):

$$Total\ Supply = Total\ Utilization$$

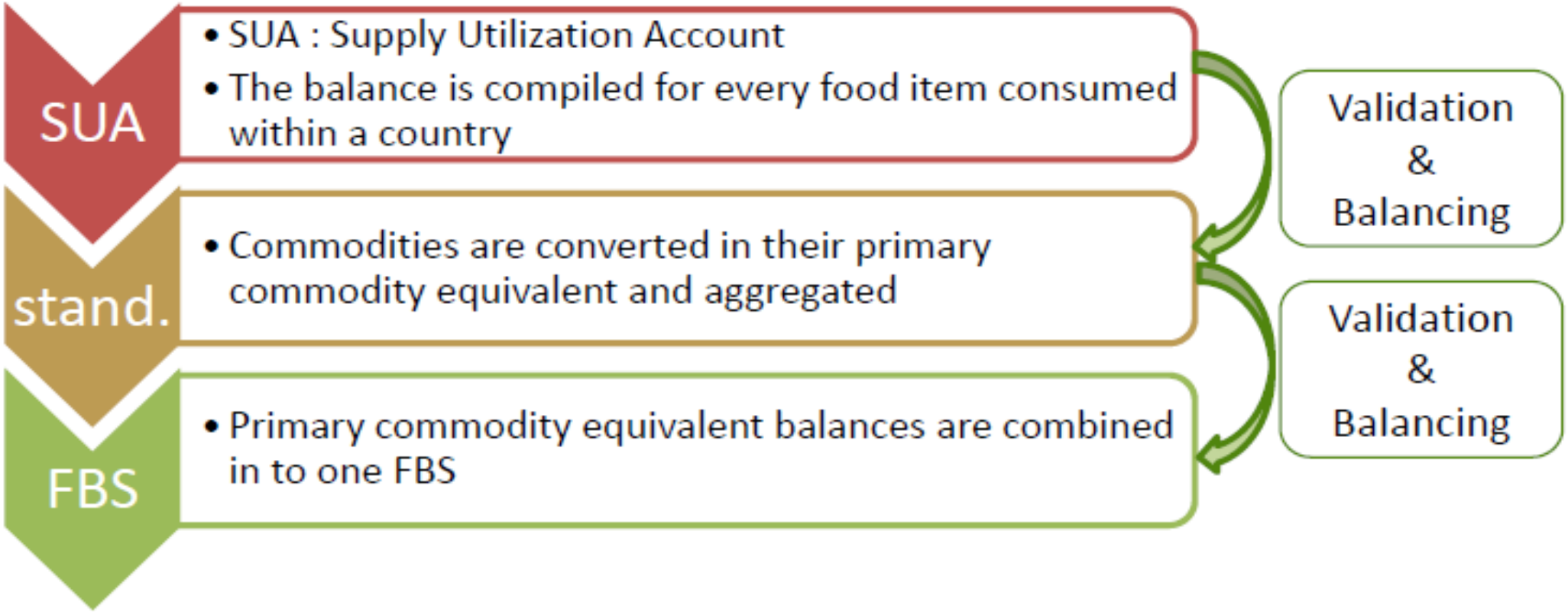
- $Total\ Supply = Production + Imports - \Delta Stock$
- $Total\ Utilization = Food + Feed + Seed + \mathbf{Loss} + Industrial\ Use + Tourist\ Consumption + Residual\ Other\ Use + Imports$

Why work in the FBS framework?

- Data collection tool: FAO annual production questionnaire. No additional country burden.
- Only currently available framework capable of implicitly validating loss data (balancing process)
- Synergy: FBS will be strengthened by improving the Loss component

Food Balance Sheets conceptual framework

FBSs are derived from the SUAs



Food Balance Sheets conceptual framework

- Ideally, the loss component in the FBS is generated from country data
- If no data is available, losses could also be treated as residual in the accounts
- But: This method only provides good estimates if the utilization accounts count with good quality data

China - 2013													Food Balance Sheet			
Item	Pop.	Domestic Supply					Domestic Utilisation						Per Capita Supply			
		Prod.	Imp.	Stock Var.	Exp.	Total	Food	Proc.	Feed	Seed	Losses	Oth. Use	Total		Prot.	Fat
	(1000 persons)	(1000 tonnes)											Kg/Yr	KCal/Day	g/Day	
Population	1,416,667															
Grand Total														3,108	98.04	95.87
Vegetal Products														2,382	58.4	37.1
Animal Products														726	39.64	58.77
Cereals - Excluding Beer		486,280	21,671	(14,349)	2,284	491,318	212,393	10,113	197,082	11,184	20,278	40,267	150	1,416	33.59	5.91
Wheat and products		121,931	7,572	(1,834)	713	126,956	89,386	317	26,694	4,600	3,010	2,948	63	546	17.4	2.9
Rice (Milled Equivalent)		136,873	2,714	(3,998)	565	135,024	109,725	12	12,117	4,679	6,406	2,085	77	797	14.47	2.68
Barley and products		1,699	2,528	(1)	615	3,611	235	3,091	30	49	200	7	0	1	0.03	0
Maize and products		218,624	7,407	(8,516)	252	217,262	9,618	6,693	153,802	1,651	10,295	35,203	7	54	1.17	0.18

The limitations of the Food Balance Sheets to report SDG 12.3.1.a

- With the Food Balance Sheets, **losses can be estimated backward** for all years for which food balance sheets are available
- The food loss estimates **might be less suited to actually monitor progress** towards SDG 12.3.1.a on Food Losses (quality of the data available for the accounts and estimation errors)
- The **information is not detailed enough** to provide any orientation to reduce food losses and design policies (no information about where losses happen and why)
- Good food loss data, in turn, will help to improve Food Balance Sheets

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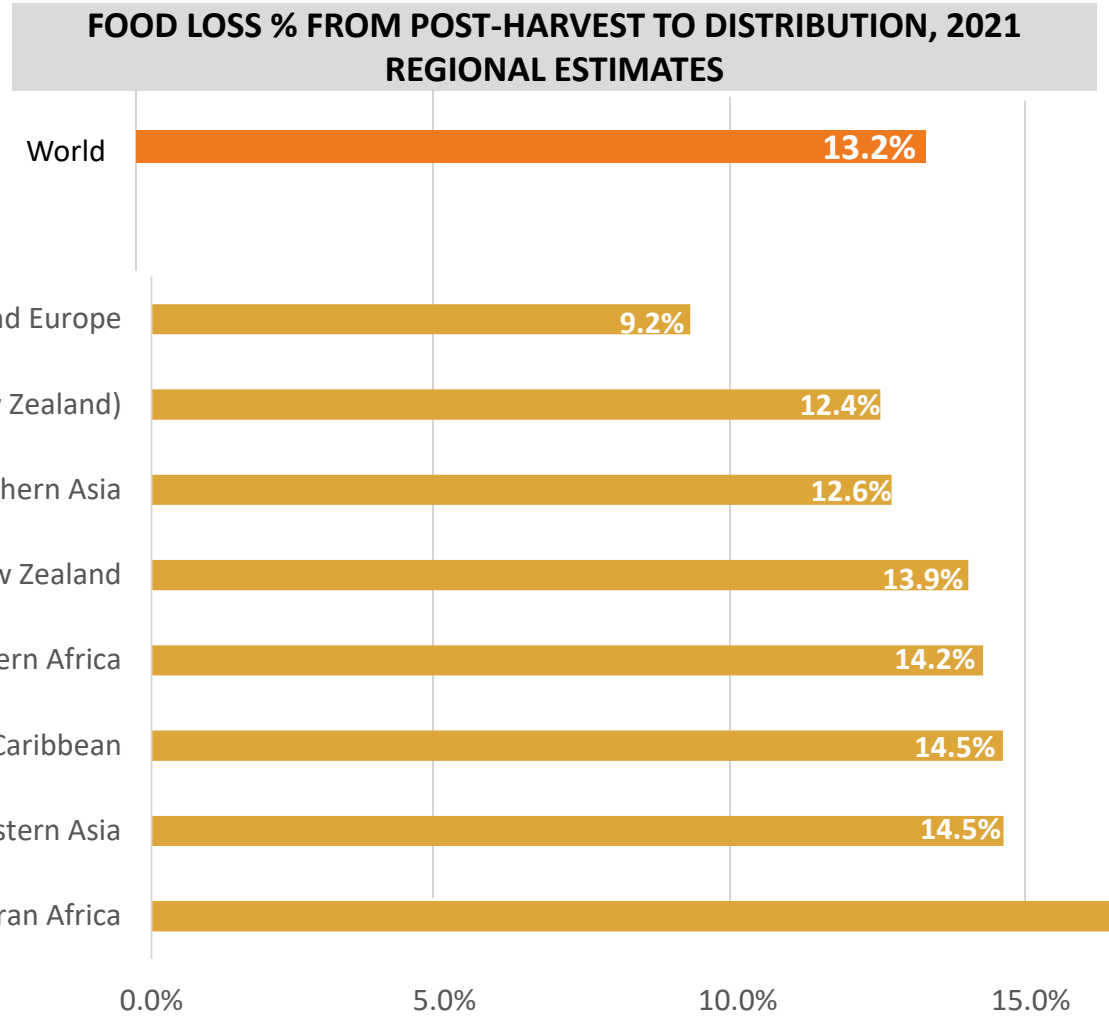
SUSTAINABLE DEVELOPMENT GOALS

Use model-based estimates to compile the Food Loss Index

Working for #ZeroHunger

The global food loss estimation model:

- FAO developed a global Food Loss Estimation Model to estimate food losses at the regional and global level
- The model uses all official available information, literature data and auxiliary variables
- It aims to provide food loss data while countries start to put data collection efforts in place and more good quality data on food losses becomes available
- Data scarcity is still a considerable limitation: only regional estimates could be disseminated



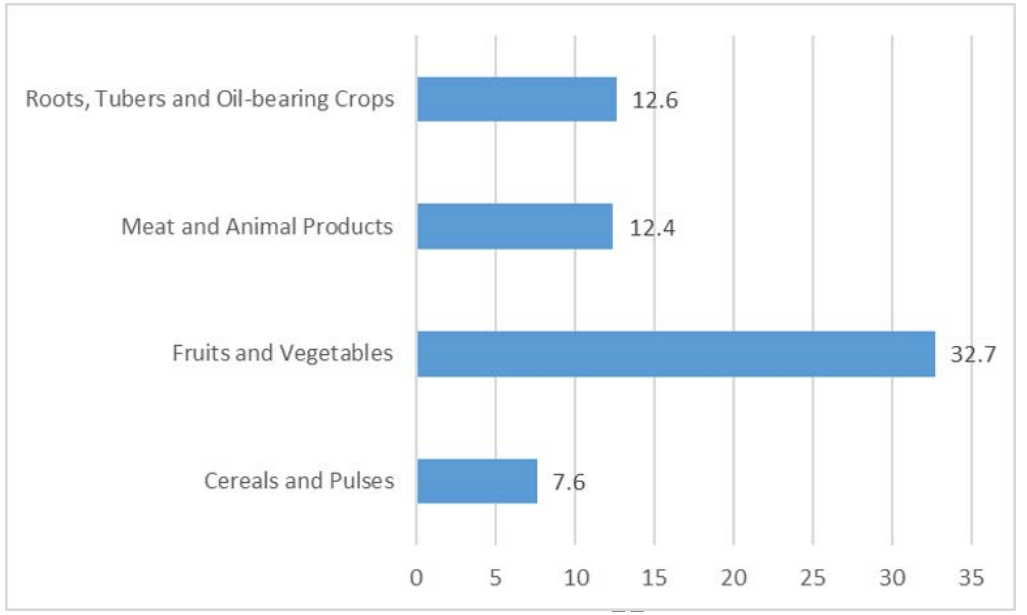
Food loss estimation model

FAO developed a random effect model to estimate the loss percentages of all countries commodities and years

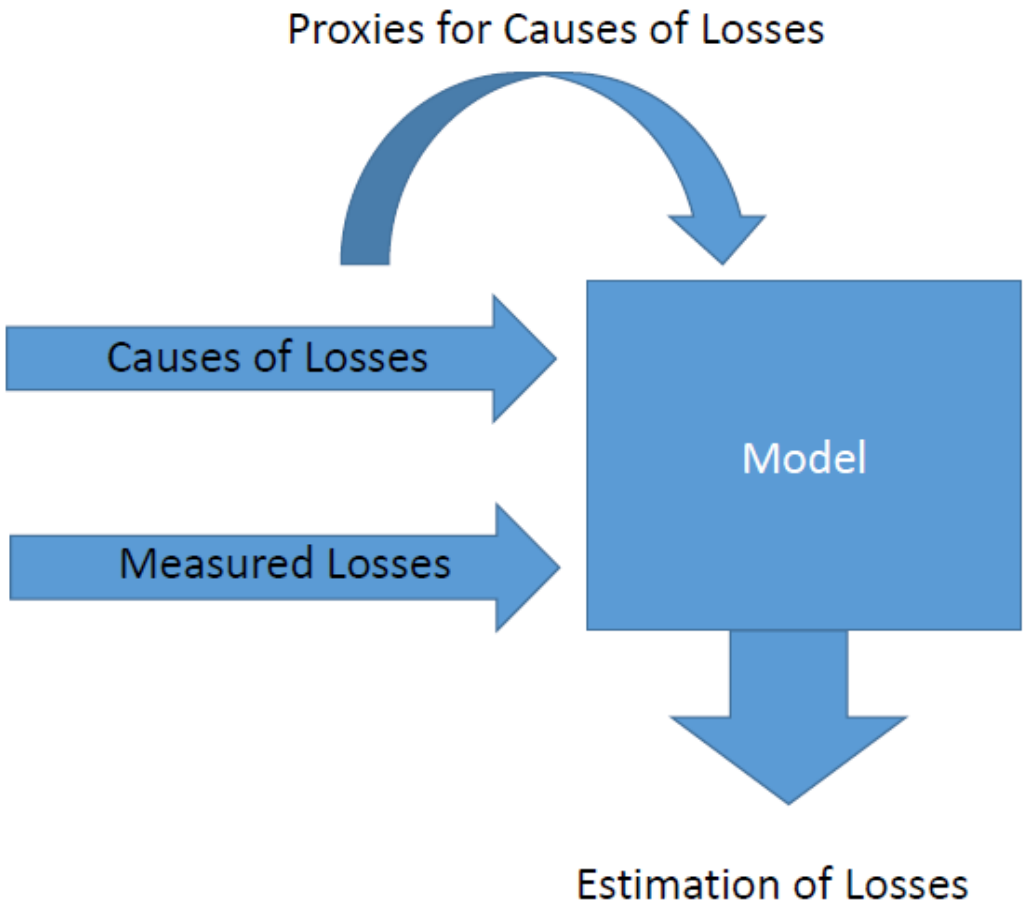
$$LossRatio \sim \boldsymbol{Country} + Product + Year + auxiliary\ variables$$

- An estimated 13.3% of all food produced is lost between the farm and prior to the retail stage
- Estimates by food group are available at global level

FOOD LOSS % FROM POST-HARVEST TO DISTRIBUTION, 2020
GLOBAL ESTIMATES BY COMMODITY GROUPS



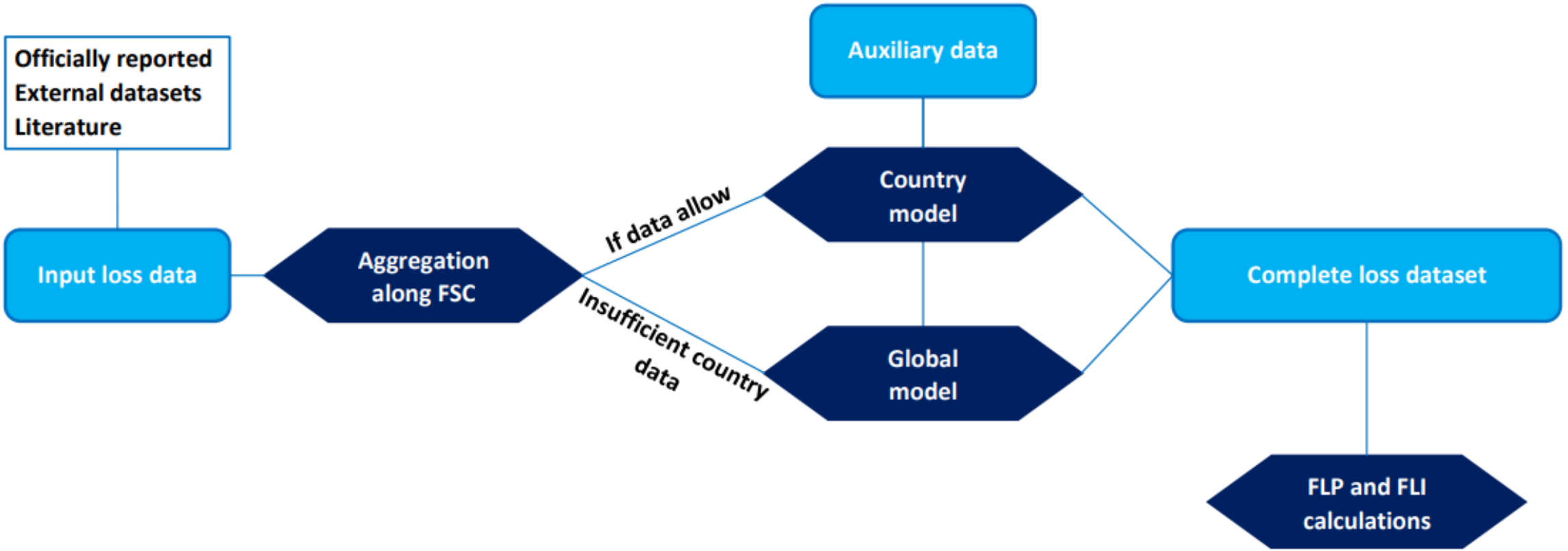
Food loss estimation model high level description



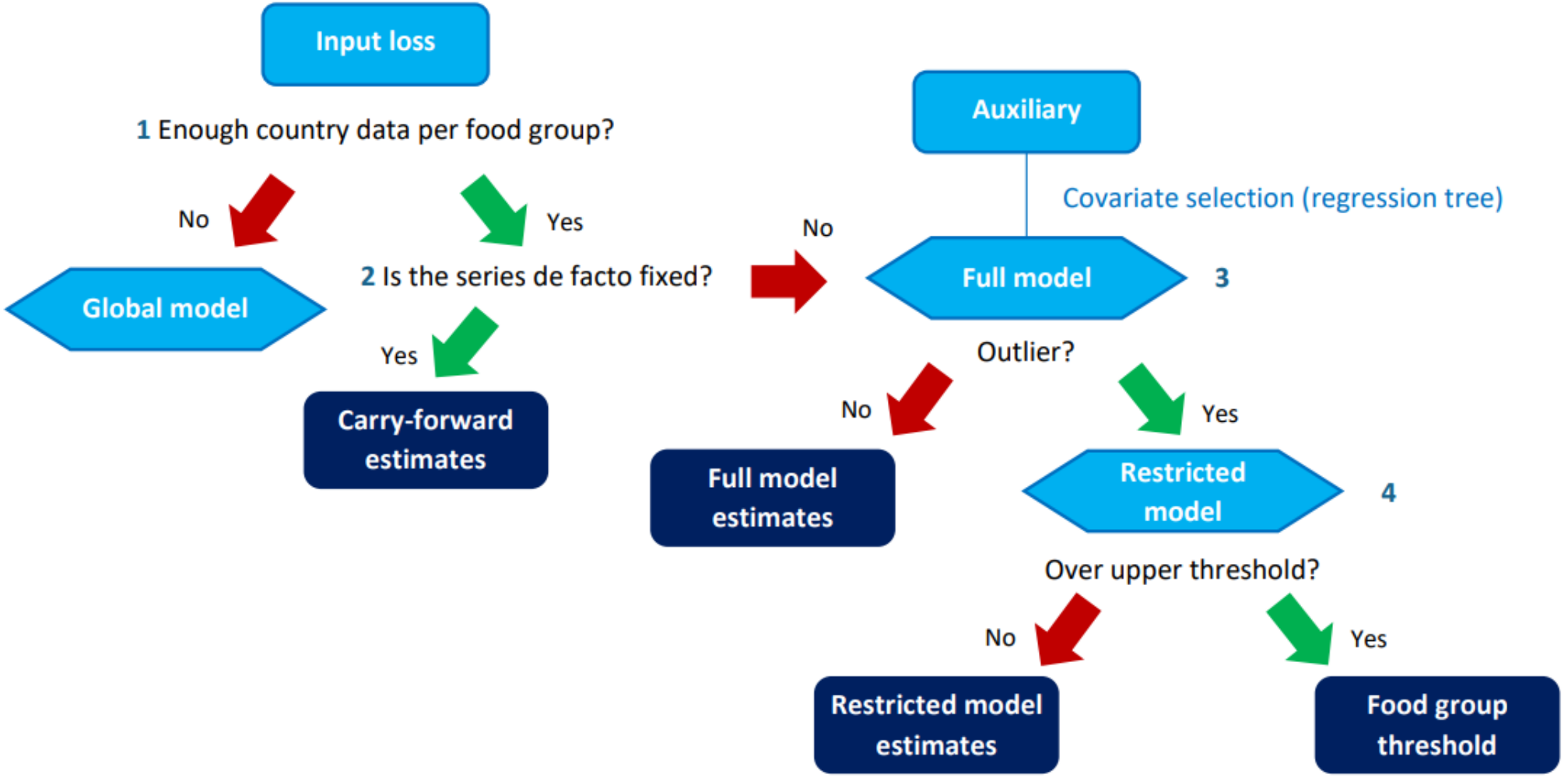
A model estimates the impact of the independent factors on a depended variable.

- Is there a relationship?
- How strong is the relationship?
- Does it make a positive or negative impact?
- Is it linear/What is the appropriate functional form?

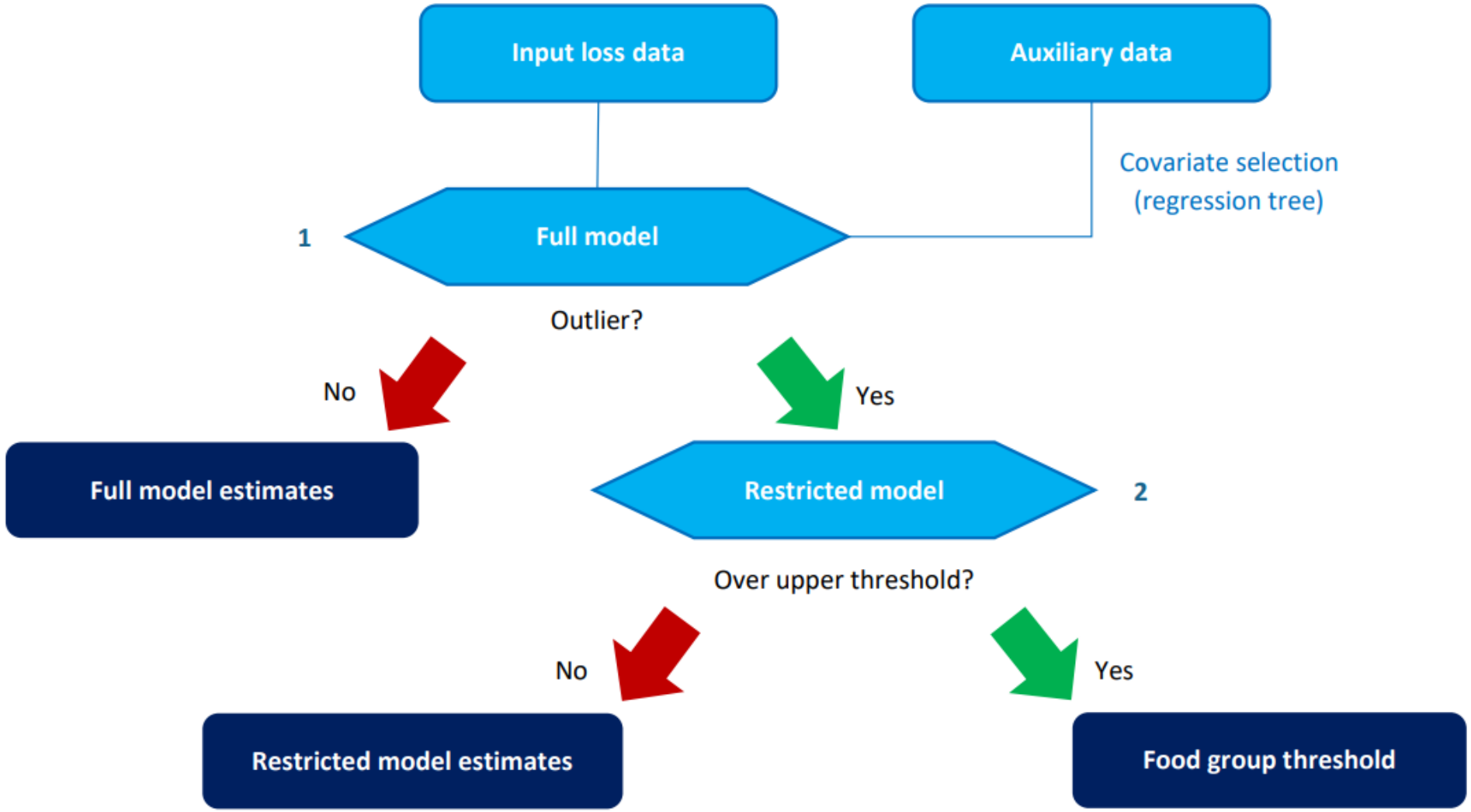
Visualization of the input data used for global and country food loss estimation model



Visualization of the input data used for country food loss estimation model



Visualization of the input data used for global food loss estimation model



The limitations of the global food loss estimation model

- The food loss estimates can **serve as a placeholder** and provide a **first benchmark** estimate in the absence of estimates or data provided by the countries

- **The information is not detailed enough** to support investment decision or policy design to reduce food losses (no estimates by stage, no possible impact analysis of interventions for the moment)

- More and improved food loss data, in turn, will help to improving the model and the estimates
  - FAO is continuing to extract data from the literature in the FLW database
  - Efforts are continuing and FAO to improve the model

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Thank you very much!

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