Opening the Black Box of Losses in the potato Value Chains

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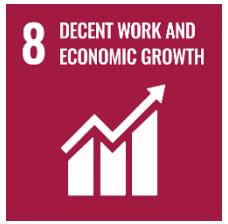
12 December 2023

REDUCING FOOD LOSS AND WASTE BENEFITS SOCIETY

But interventions need to be tailored to countries' contexts and objectives

Improved food security and nutrition

Improved productivity and economic growth



Reduced natural resource use and GHG emissions

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NEW ESTIMATES FOR FOOD LOSS ARE A BIG STEP TOWARDS ACTION

1/3 of food is lost or wasted (14% lost and 17% waste)
FAO raised awareness on food loss and waste with a global estimate in 2011

SDG 12.3 reflects growing attention to the issue

Creation of two indices to measure progress towards this target

FOOD LOSS INDEX

UN environment FOOD WASTE INDEX

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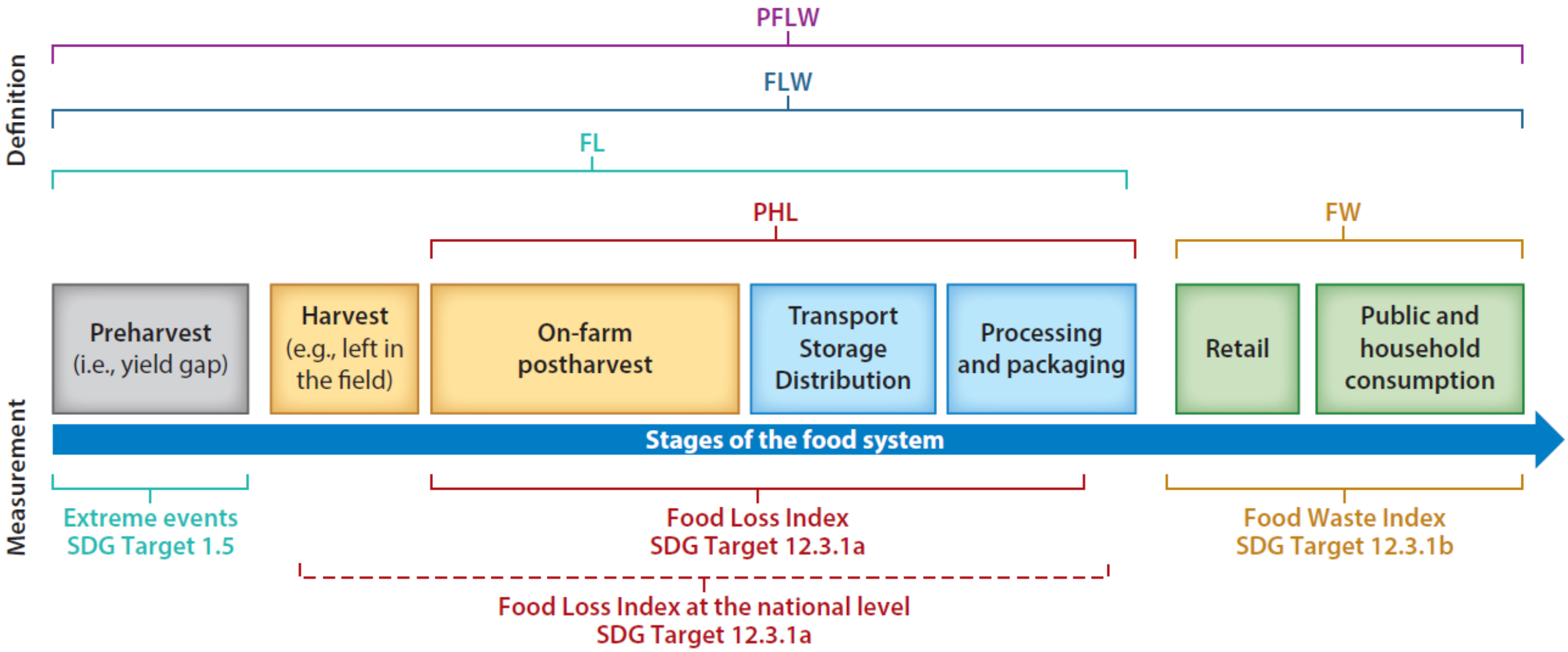
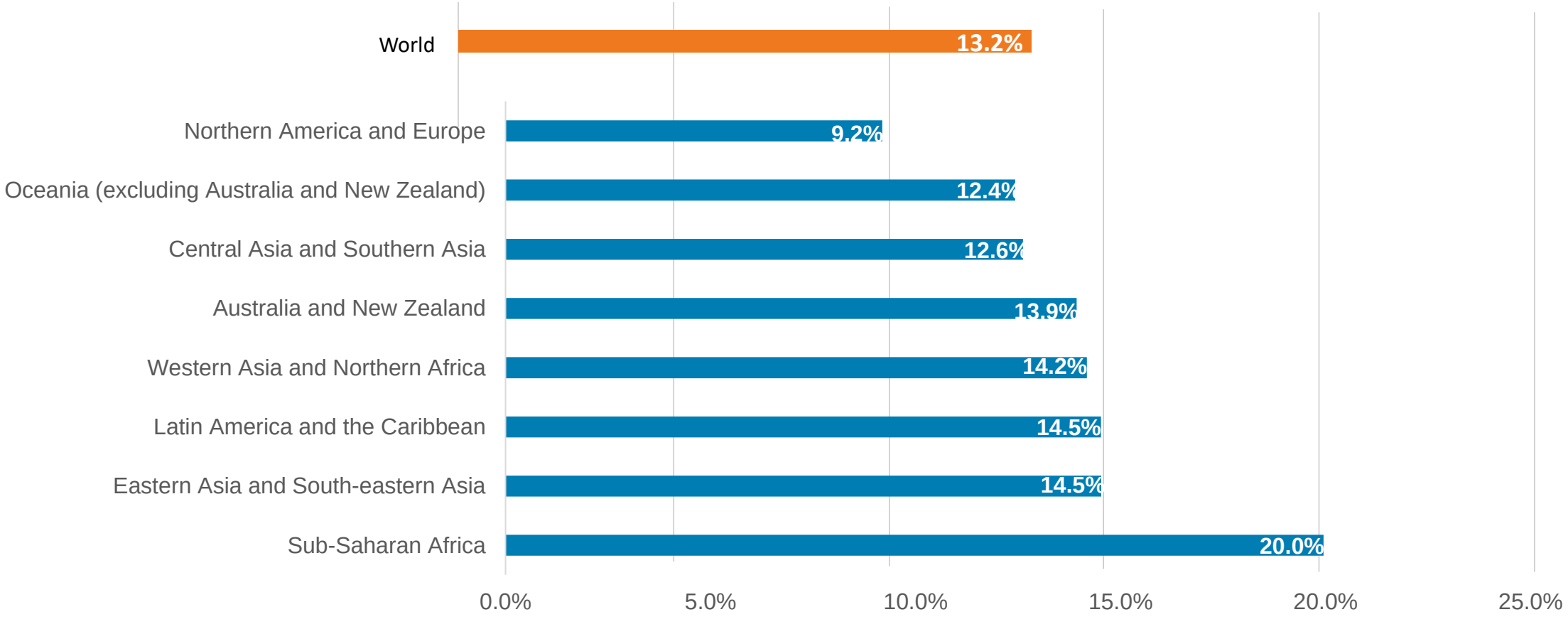
DEFINITION AND SCOPE OF FOOD LOSS INDEX



FL: Food Loss; FLW: Food Loss and waste; FW: Food Waste; PFLW: Potential Food Loss and Waste, PHL: Post harvest loss, SDG: Sustainable Development Goals

Source: Delgado et al. 2023

Globally, 13.2% of food is being lost



Source: ***SDG Indicators Data Portal***

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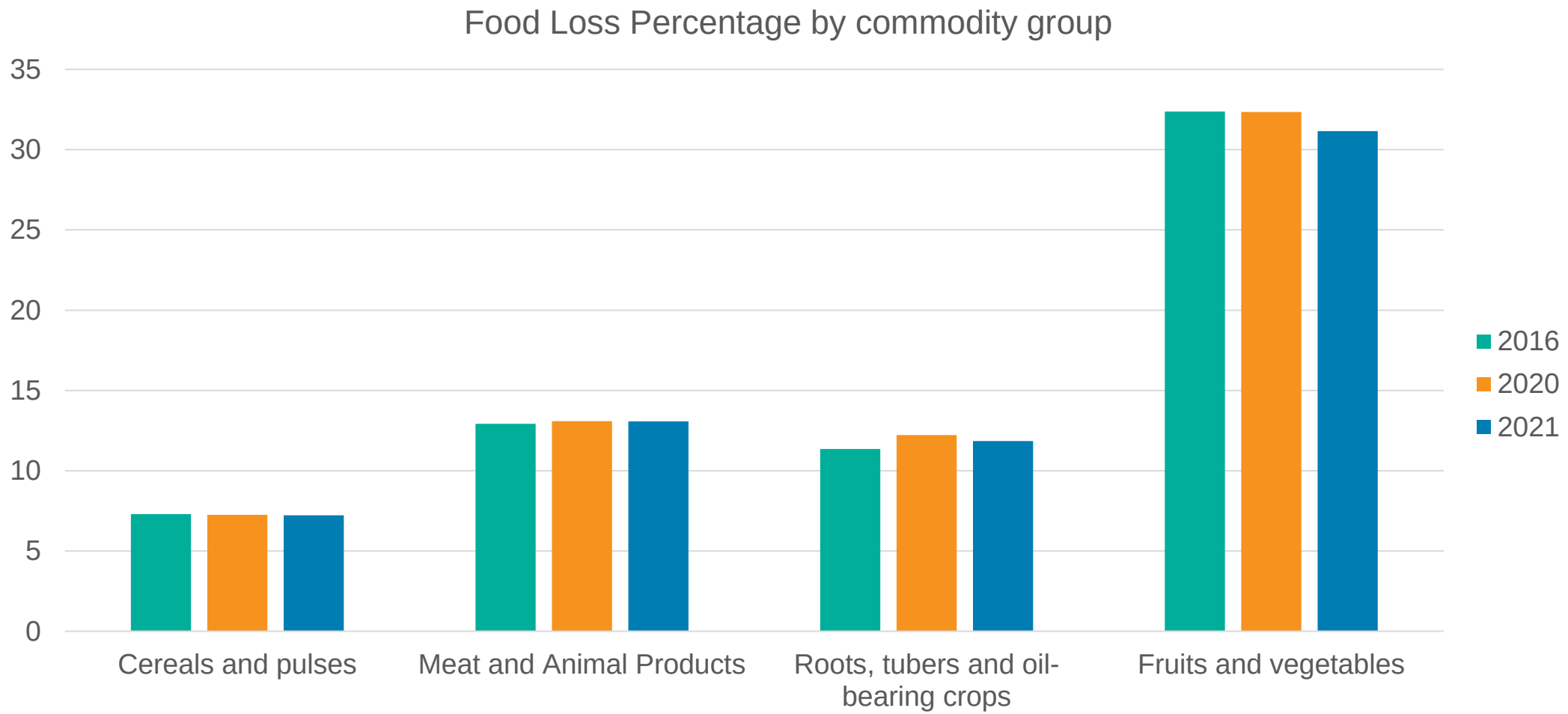
Food Loss Percentage by commodity group



FAO, 2023

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What are we measuring?

Confusion in the definition

quantity *versus* quality

Weight, caloric, nutritional and/ or economic loss

Inclusion/ exclusion of different loss dimensions

In percentage of total, harvested or potential production

natural *versus* unnatural

edible *versus* inedible

real loss *versus* re-use

Avoidable, possibily avoidable and unavoidable

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How are we measuring: estimation methodologies

	DATA & METHODS	PROS	CONS
Macro approach	**Data:** National or regional aggregated statistics **Methods:** • Mass- and energy balances: comparison of raw material input and produced output	• Cheap and straightforward implementation • Representative for large region and good comparability	• High requirements on data quantity, quality and standardized collection methodologies • Not representative for specific regional units • No distinction between: ○ VC stages where loss occurs ○ Natural and unnatural loss ○ Edible and non-edible loss

Literature using these methods: Gustavsson et al. (FAO, 2011), Kummu et al (2012) and Lipinski et al. (2013), Beretta et al. 2013, Buzby et al. 2014, and Stuart, 2009 looks at major disadvantages).

Source: Delgado et al. 2021

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How are we measuring: estimation methodologies

Micro approach

DATA & METHODS	PROS	CONS
Data: data on a sample of value chain actors, often collected ad-hoc **Methods:** • Questionnaires and interviews • Food loss and waste diary • Direct measurement, through weighing or volume assessment • Scanning	• Commodity, climatic zone and context specific • Detailed, fully relevant and VC stage specific data • Insights into causes and prevention possibilities	• Costly and time consuming • Representativeness highly sensitive to sampling choices • Sensitive to the estimation timing • Estimates are often not comparable, and cannot be generalized • Same estimation method can often not be applied to all VC stages

Literature using these methods: APHLIS, 2014, Monier et al. (2010), WRAP (2009, and 2010), Kaminski and Christiansen, 2014; Minten et al., 2016a; Minten et al., 2016b, Delgado et al. 2021

Source: Delgado et al. 2021

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What we do?

Value chain concept

- FL occurs at different stages of the food VC: production, post-production procedures, processing, distribution (FAO, 2011; HLPE, 2014; Lipinski et al., 2013)
- We collect information through representative surveys among farmers, middlemen, and processors (identify specific nodes).

What we measure

- We measure physical quantities and quality losses.

Compare Alternative Methodologies

- Robustness check using 4 alternative methods: 1 traditional method and 3 new methods

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Three micro approach methods in addition to traditional method

Self-reported method (traditional)

- For example, used by Ambler et al. 2018; Kaminski and Christiansen, 2014; Minten et al., 2016a; Minten et al., 2016b

Category method

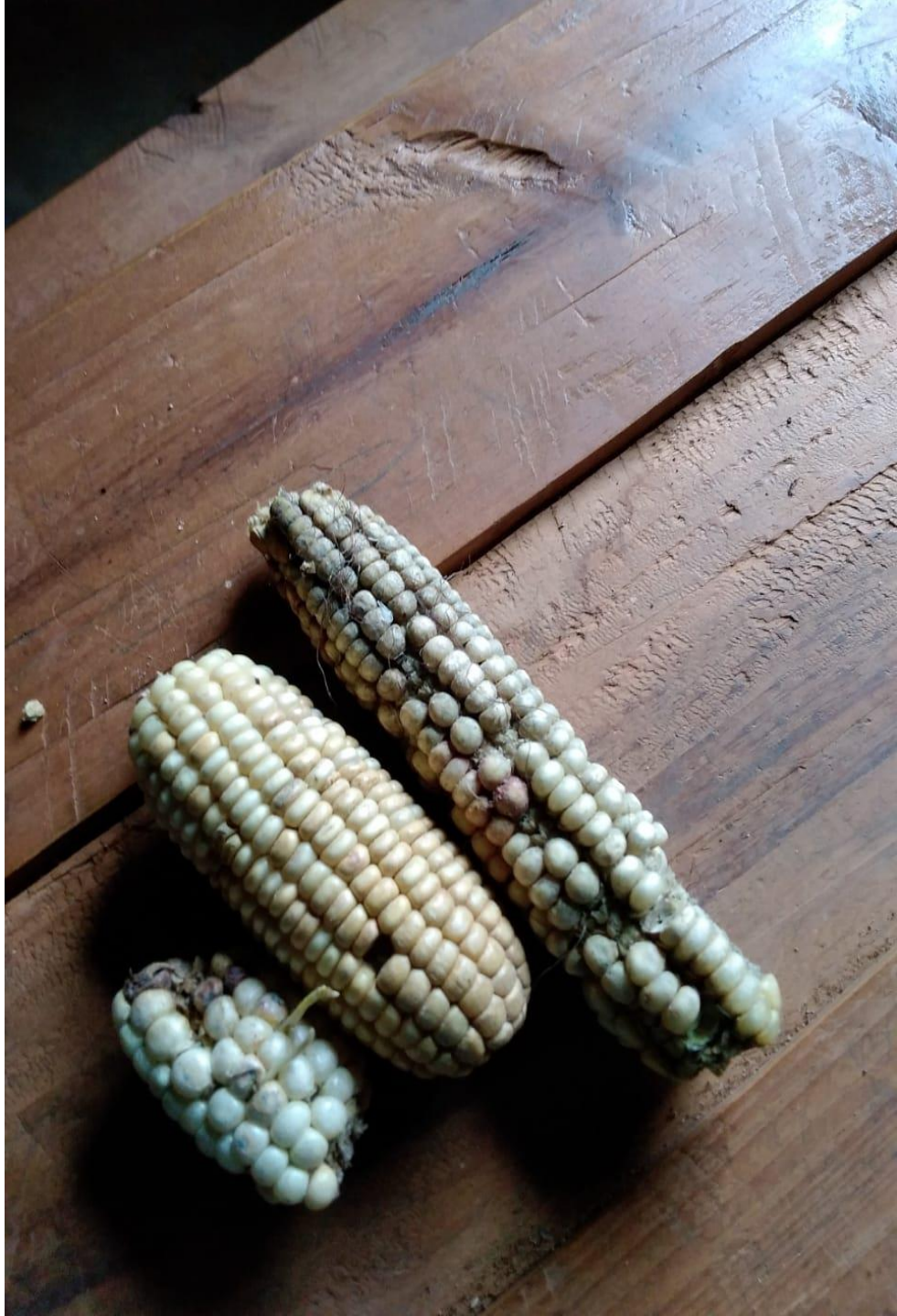
- Based on the evaluation of a crop and the classification of that crop into quality categories.

Attribute method

- Based on the evaluation of a crop according to inferior visual, tactile, and olfactory product characteristics.

Price method

- Based on the reasoning that higher (lower) values of a commodity reflect higher (lower) quality.



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Data collection

- For selected commodities we map the specific commodity value chain and collect random samples of three different agents in the VC: producer, middleman and processor.
- We developed specialized digital questionnaires for the three different agents of the value chain and with the specificities of the commodities.
- Methodology consistent and comparable across commodities and countries
- The questionnaires enable us to characterize the nature of food loss, specifically the production stages and the particular processes at which loss is incurred.

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Examples where the methodology has been validated

Data sample

	Sample					
	Ecuador Potatoes	**Peru** Potatoes	**Honduras** Beans and maize	**Guatemala** Beans and maize	**Ethiopia** Teff	**China** Wheat
Producer	302	411	1209	1155	1203	1114
Middlemen	182	85	325	365	---	140
Processor	147	139	224	245	---	53
Total	631	594	1758	1765	1203	1307

Note: In the case of teff in Ethiopia, we only survey producers because most of the producers will bring their teff to millers who work on a fee-for-service basis, returning milled teff flour to the producers without any major intermediation of middlemen.

Source: Delgado et al. 2021

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Examples of results of implementing the four methodologies in different countries

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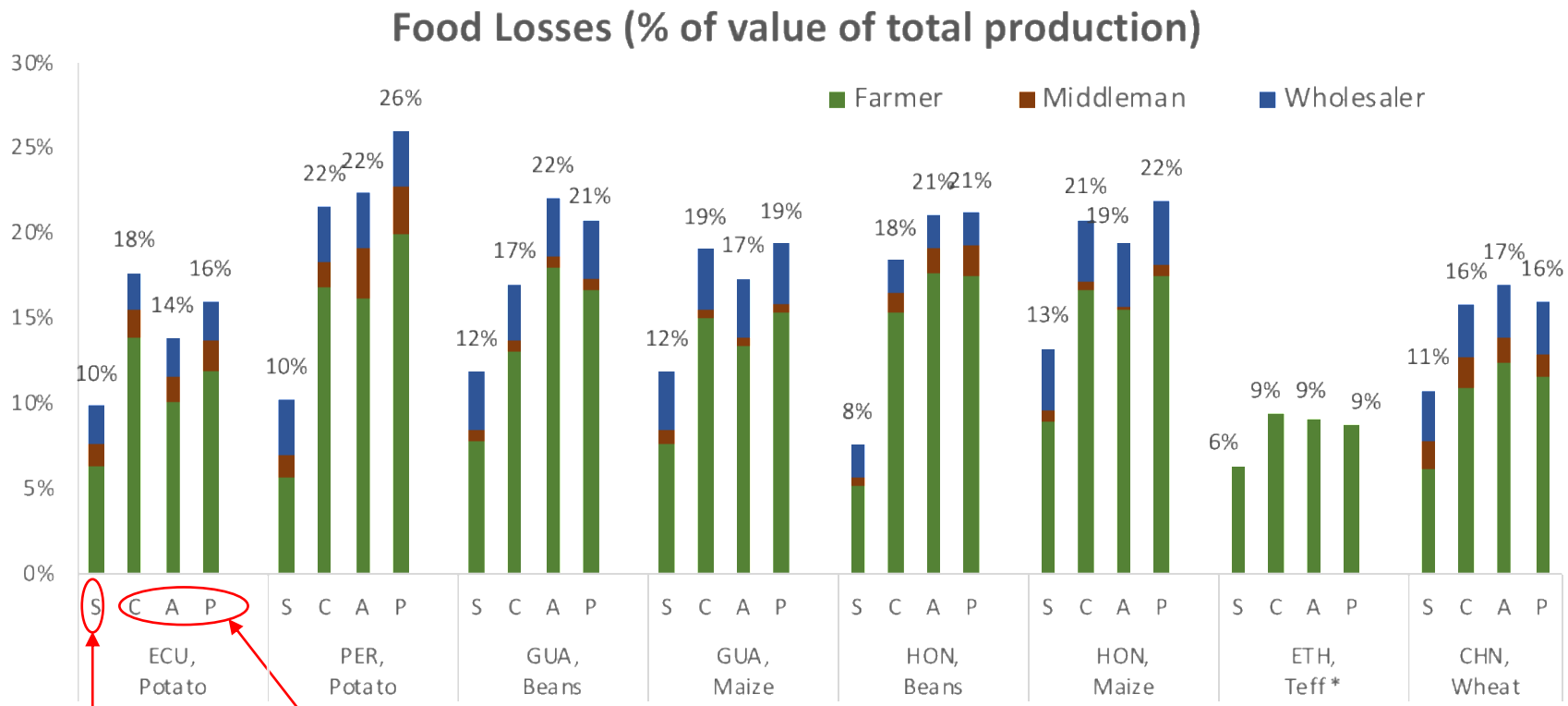
IMPROVING MEASUREMENT OF FOOD LOSSES



Self-reported (S) losses -Traditional method

Category classification (C), Attribute measurement (A) and price (P) methods

* Ethiopia: Losses assessed at the farmer level only

- Significant losses, but they vary based on methods
- The aggregate "self-reported method" yields less losses systematically
- Losses are larger at the farmer level

Source: Delgado, Luciana; Schuster, Monica; and Torero, Maximo. 2021. Quantity and quality food losses across the value Chain: A Comparative analysis, Food Policy,101958,ISSN 0306-9192,

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IMPROVING MEASUREMENT OF FOOD LOSSES

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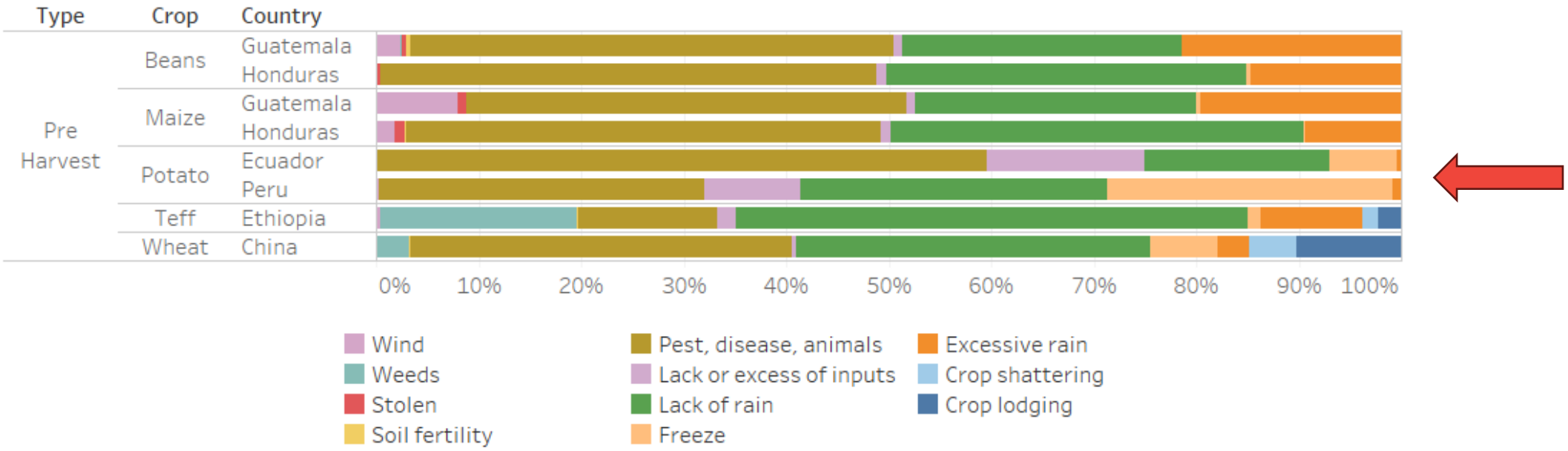
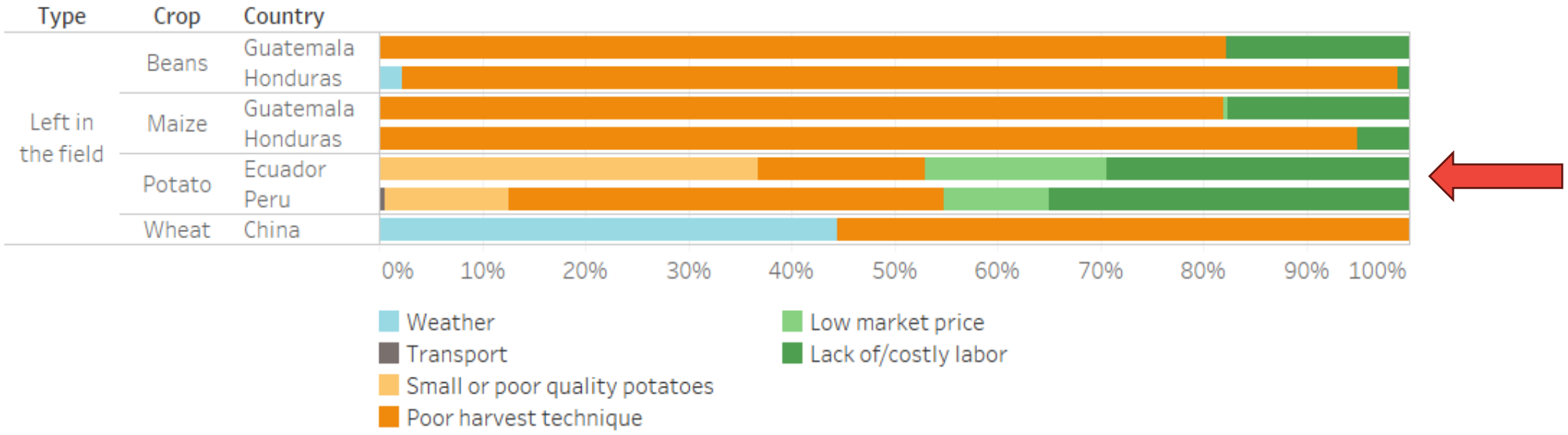
IDENTIFY REASONS (PRE-HARVEST)



Source: Delgado, Luciana; Schuster, Monica; and Torero, Maximo. 2021. Quantity and quality food losses across the value Chain: A Comparative analysis, Food Policy,101958,ISSN 0306-9192,

IDENTIFY REASONS (LEFT IN THE FIELD)



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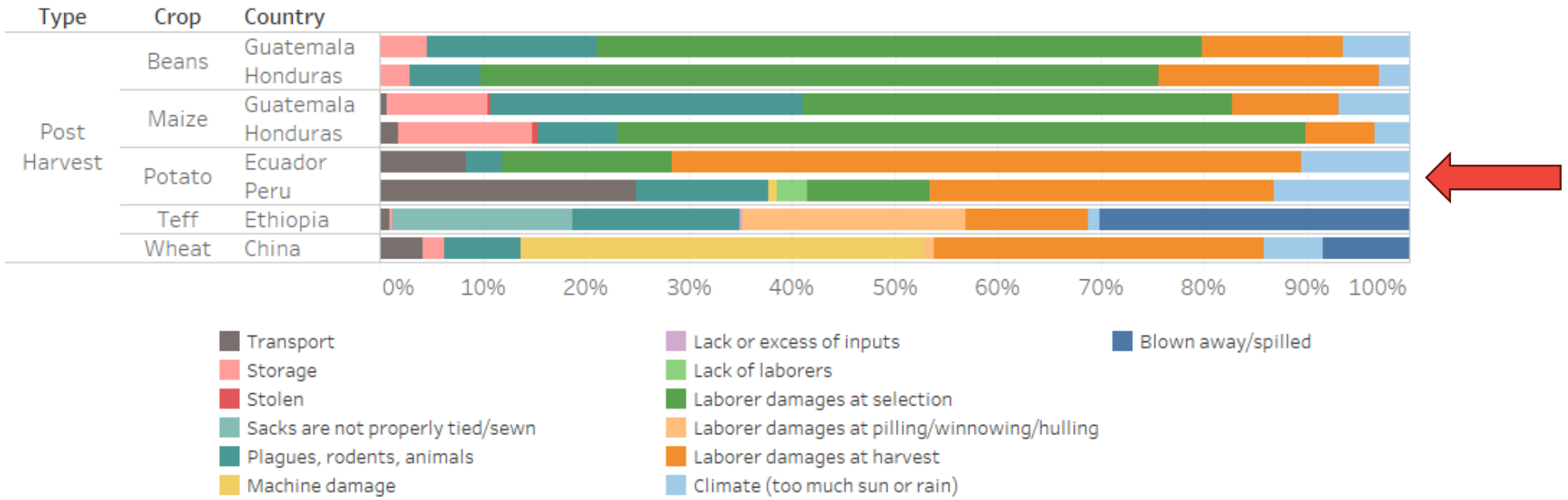
IDENTIFY REASONS (POST-HARVEST)



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Results: Controlling by heterogeneous effects

- **Age, education and experience** negatively correlated with the probability and share of FL's/
- No clear **gender** differences – varies by commodity (positive for beans but not for maize)
- **Access to markets** is positively correlated with reduction of losses
- **Technology and improved seeds** access positively correlated with reduction of losses
- **Mechanization** no clear effect

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Results on magnitudes

- Our three new methodologies that aim to reduce measurement error are consistent across them
- Self-reported measures seem to consistently underestimate food loss.
- Loss figures across all value chains fluctuate between 6 and 25 percent of total production and of the total produced value.
- Across the different estimation methodologies, losses at the producer level represent between 60 and 80 percent of the total value chain losses
- The average loss at the middleman and processor levels lies around 7 and 19 percent of total value chain losses , respectively.
- The presence of pests, lack of rainfall, and lack of appropriate post-harvest technologies, and access to markets seem to be the major factors behind the losses identified in our study.

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IMPORTANCE OF LOSSES

- Food losses and Wasting food impacts the current and future availability of these increasingly scarce resources.

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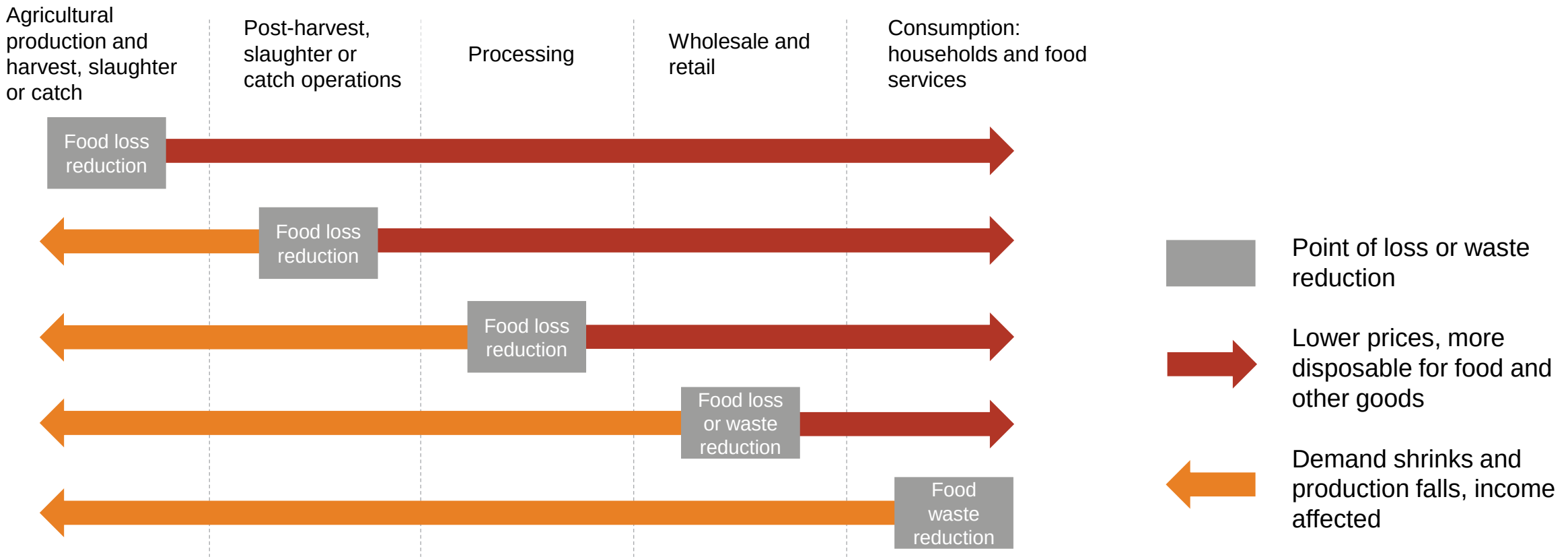
IMPACT OF REDUCTIONS ON FOOD SECURITY AND NUTRITION

Reductions should occur early on in the supply chain and in highly food-insecure countries

Price and income effects of food loss and waste reduction along the supply chain



Source: SOFA, 2019

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MAJOR GAPS

- As already shown, there is no accurate information on the extent of the problem, especially in low- and middle-income countries.
- Second, there is only scarce evidence regarding the source or cause of food loss and therefore how to resolve the specific problem.
- Third, there is little evidence of what practices had worked and are cost effective in reducing food losses effectively.
- Forth, there is little understanding on what incentives need to be in place for farmers to do the necessary investments to reduce FL

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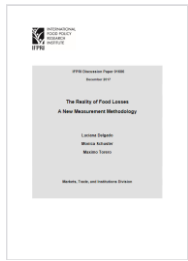
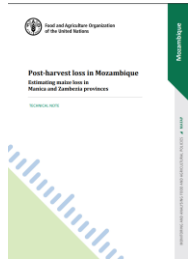
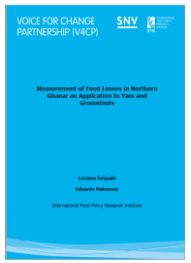
The FLAPP: evidence based







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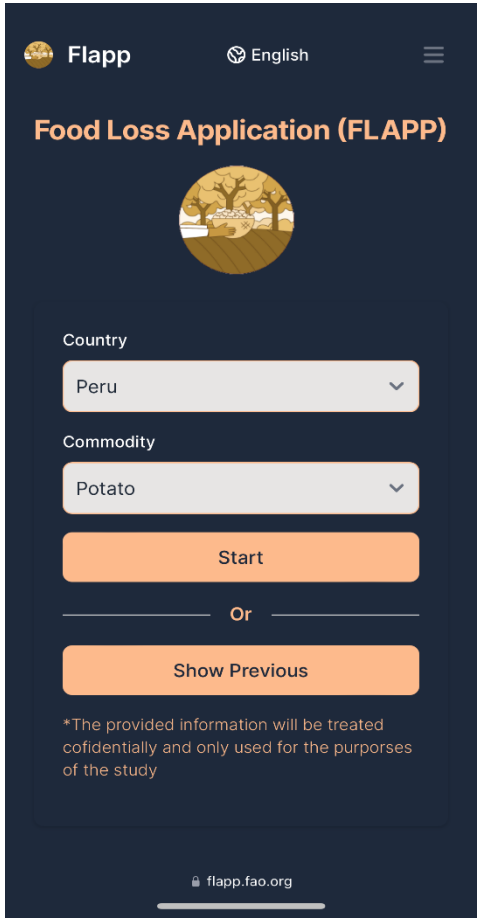
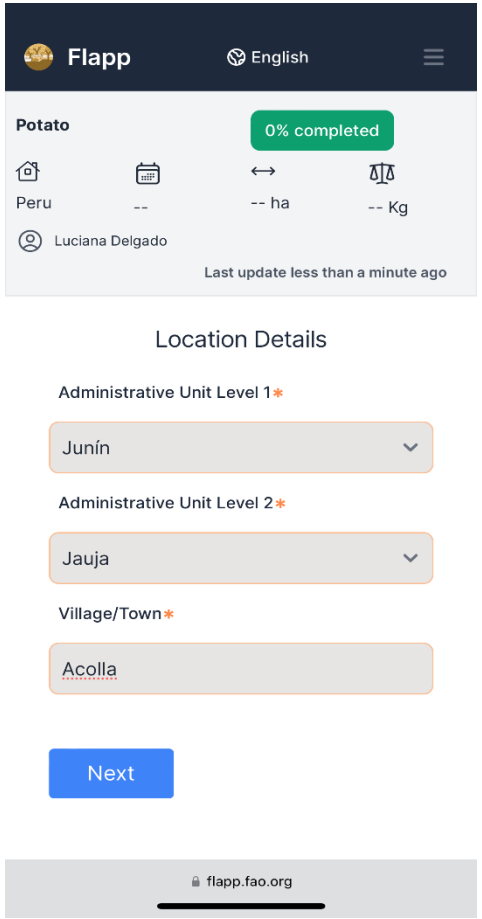
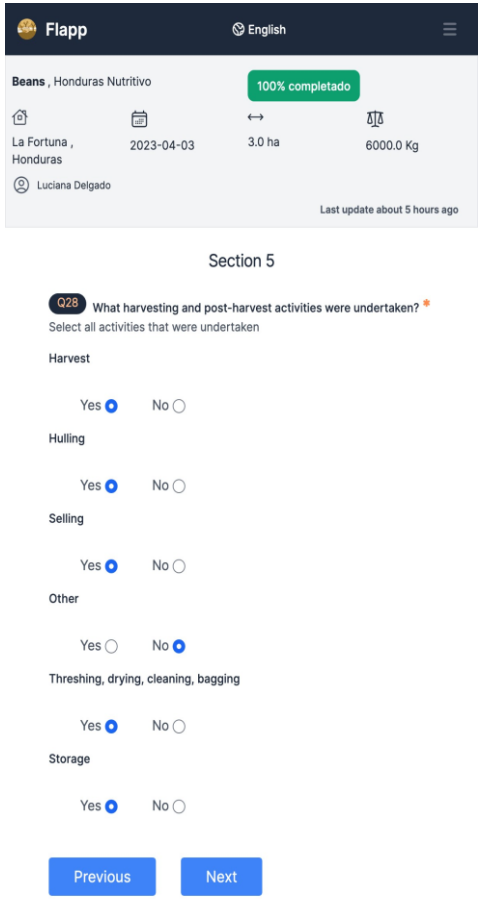
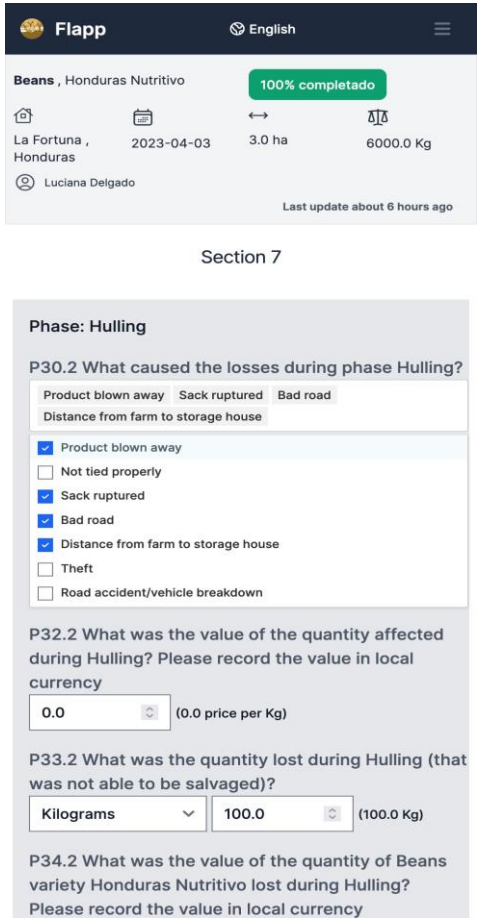
The FLAPP: adaptive context









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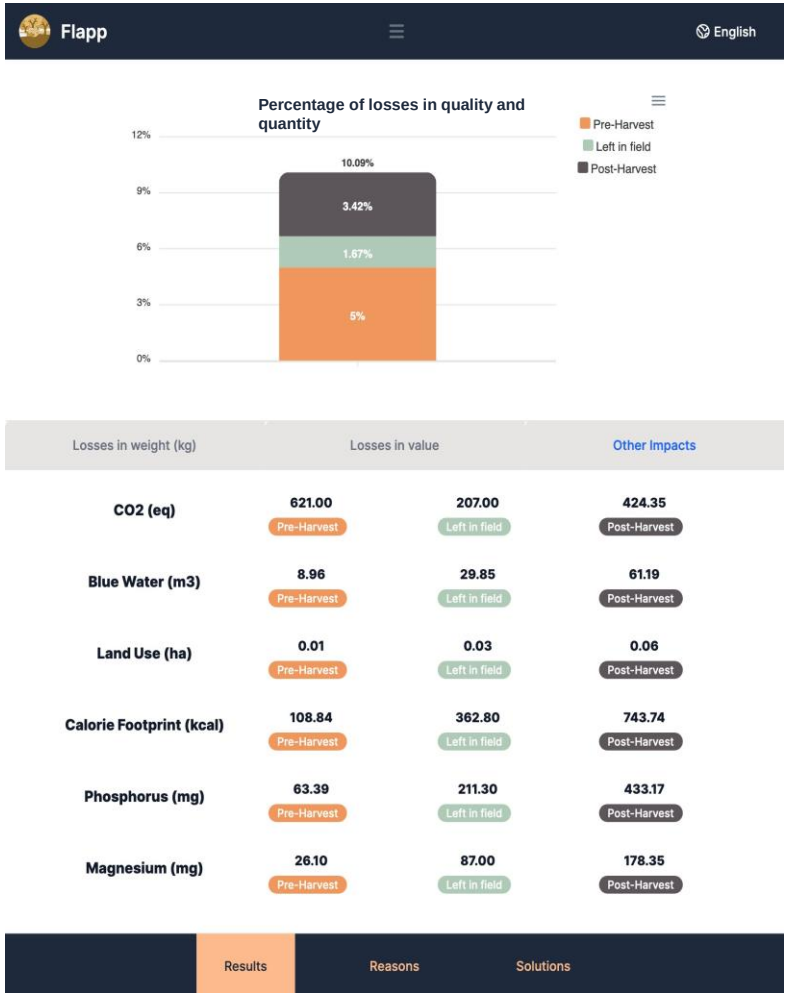
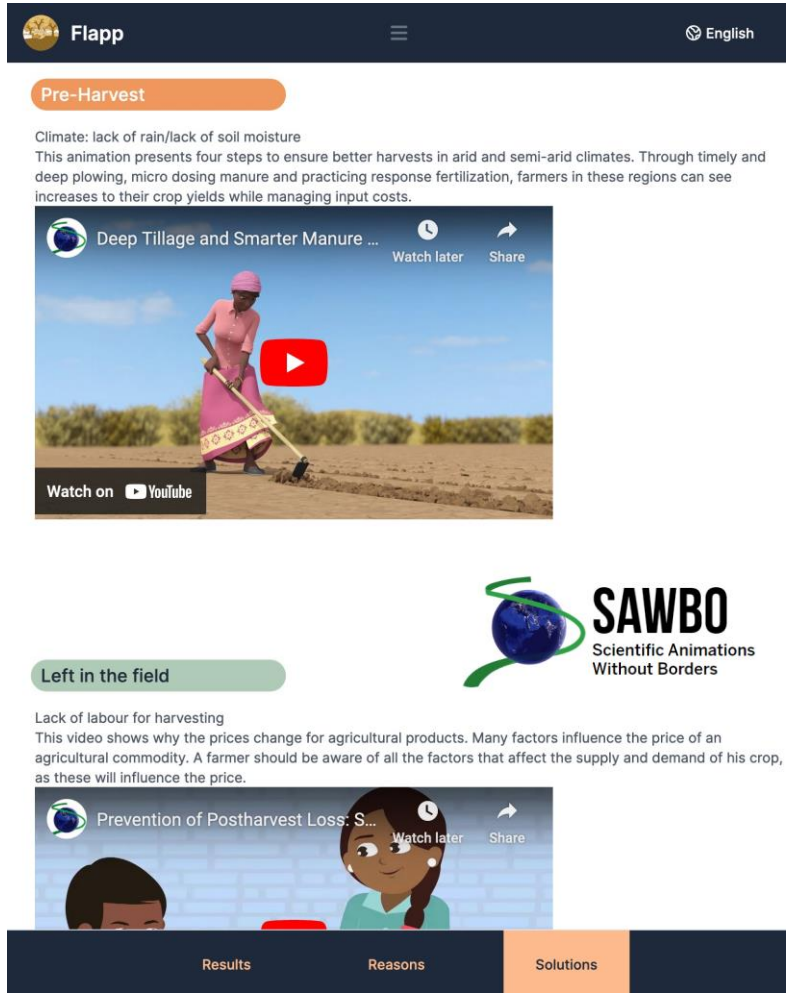
The FLAPP: actionable results





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Knowledge for action

- Increase access to information on losses for farmers, companies, producer associations, and cooperatives.
- Support farmers in identifying the major reasons for losses and provide solutions based on scientific evidence.
- It will enable the crowd-sourcing of information from farmers, enhancing FAO's ability to analyze where losses occur at the farm level.
- The app will become more specific in terms of countries and commodities as the user base grows, with users providing information about the attributes of their specific commodities in their respective countries.

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SUMMARY OF MAJOR CONCLUSIONS

Conclusion #1 Not all FL reductions are created equal in terms of impact

Conclusion #2 It is difficult to manage what you cannot measure and to find a solution if you don't know the cause of the problem.

Conclusion #3 Cost effective technical innovations are needed in low income economies to reduce losses upstream

Conclusion #4 Innovation important in nudging the business case for FL reduction: broader investment strategy & policy coherence & proper incentives

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Thank you

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