IMPROVING AGRICULTURAL & RURAL STATISTICS
Global Strategy

Harvest and Post-Harvest Loss statistics

Improving the availability and quality of data for better design, monitoring and evaluation of loss reduction and prevention programs

What are harvest and Post-Harvest Losses (PHL)?

- **Harvest losses** are losses that occur during the harvesting process, for example during the reaping of cereals, picking of fruit, lifting of fish from water, etc.
- **Post-Harvest Losses** are losses that occur on or off the farm, after separation of the production from the site of immediate growth to the moment it reaches consumers, for example during post-harvest operations such as threshing or shelling, cleaning or winnowing, drying, storage, transportation, distribution, processing, packaging, etc.

What is the difference between food loss and food waste?

- **Food loss** refers to the decrease in the weight of edible products available for consumption which occur during activities from harvest until reaching the wholesale market. Losses are assumed to be unintentional and resulting from producers' and intermediaries' inadequate practices.
- **Food waste** refers to food that is fit for human consumption but that is discarded either before or after it spoils. It is mostly associated with the final consumption of produce (public and household) and considered to result from negligence or a conscious decision to throw food away.

Why measure harvest and Post-Harvest Losses?

1. The reduction of food losses falls under several policy objectives, which require reliable data for decision-making. Examples are policies aiming to:

- Increase food availability to combat hunger and improve food security
- Improve the competitiveness of and value added by agricultural producers and value chain actors
- Increase the efficiency of supply chains through logistics, infrastructure, and equipment
- Address risks arising from changes in climate and economic conditions
- All while improving the welfare of the population, particularly those categories facing extreme poverty or severe food shortage

2. The measurement of harvest and Post-Harvest Losses also supports the implementation and monitoring of international and regional commitments for the reduction of food loss and waste, such as:

SDG 2030 Agenda	SAVE FOOD	CAADP Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihood
By 2030, reduce food loss along production and supply chain, including Post-Harvest Losses	Global Initiative on Food Loss Waste reduction	Halve the current (2014) levels of Post-Harvest Losses by 2025

3. Better data on Post-Harvest Losses also enhances the accuracy of broader analytical frameworks

For example, better food loss statistics also contribute to the accuracy of Supply-Utilization Accounts (SUAs) and Food Balance Sheets (FBSs), which are useful analytical frameworks for the monitoring of food security and nutrition in countries.

Before starting a PHL measurement: selection of commodities and value chain analysis

The assessment of harvest and Post-Harvest Losses can be time-consuming and expensive if the scope is not well defined.

As a result, national stakeholders must first select the basket of commodities on which to concentrate data collection efforts. The selection depends on the country's policy agenda, the commodities' economic relevance and their contribution to food security.

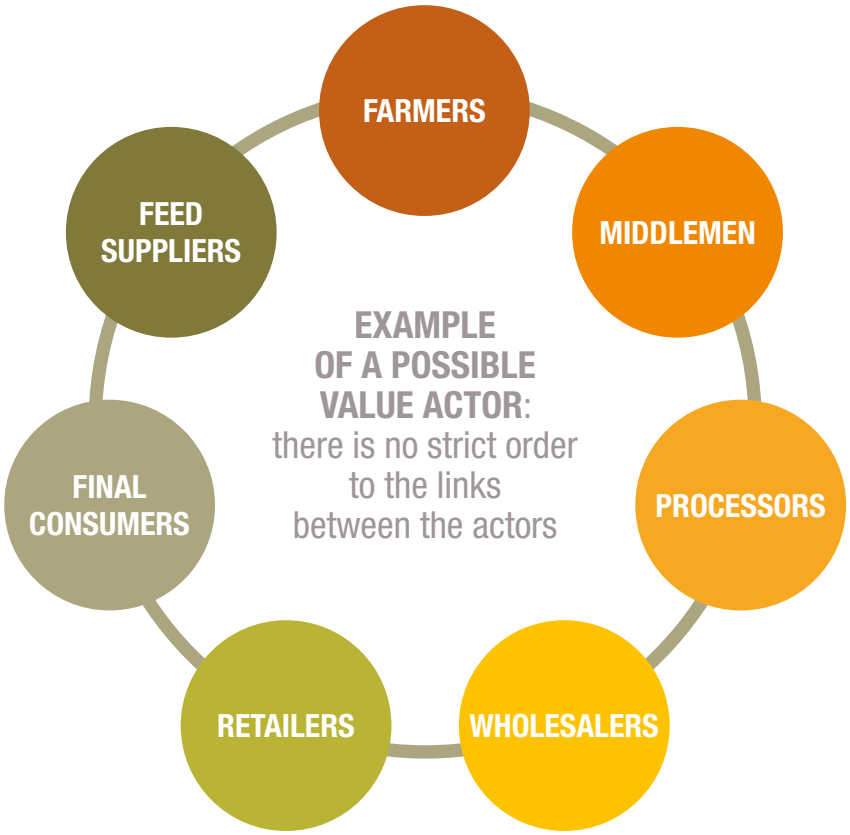
Once the commodities are known, a value chain analysis must be performed to identify the critical loss points at which accurate methodologies will be applied to measure the PHL study properly.

A value chain analysis consists of identifying, at each level of chain, the actors involved and estimating the value added to the product through the inputs and outputs obtained as well as the constraints that result in losses.

In 2016, one third of all food produced for people was not eaten. Food loss and waste gave rise to USD 940 billion in economic losses and 8 percent of greenhouse gas emissions annually.

A value chain analysis will help to:

- Identify major participants in the supply chain
- Fully decompose the system and its current status (subsystem, cost structure, spatial and seasonal dimension, etc.)
- Better identify actors and processes in the chain where most losses are likely to occur



ON-FARM MEASUREMENT

What are the main measurement approaches for PHL?

Rapid assessment

- Data collected using a pilot or baseline survey relying on farmer declarations, focus groups or stakeholder workshops
- Expose the most serious loss points
- Provide quick information on the PHL system and the causes of losses

Probability sample surveys

- Produce statistically representative data on loss for relevant groupings, such as administrative and agro-ecological units (village, region, nation, etc.)
- Three data collection approaches:
  1. Objective measurement: crop-cutting in the field, post-harvest operation using farmer practices, laboratory analysis of the grain collected from farmer storage.
  2. Subjective approaches (farmer declarations): ask farmer directly for an estimate of the losses relating to the various on-farm operations.
  3. Visual scales: combination of the two approaches that requires prior work in laboratories to prepare the scales to be discussed with the farmer.

Experimental design

- Quantify losses across different environmental conditions and farming practices
- Used when new equipment or practices are to be tested for a given farm operation
- Can be conducted in research stations or in the field with farmers

Modelling

- Mostly uses data that has been already collected to estimate losses
- Helps to identify and quantify the major determinants of commodity loss at different levels (farm size, inputs, infrastructures available, etc.)
- Advantages are the lower costs and the ability to predict losses

OFF-FARM MEASUREMENT

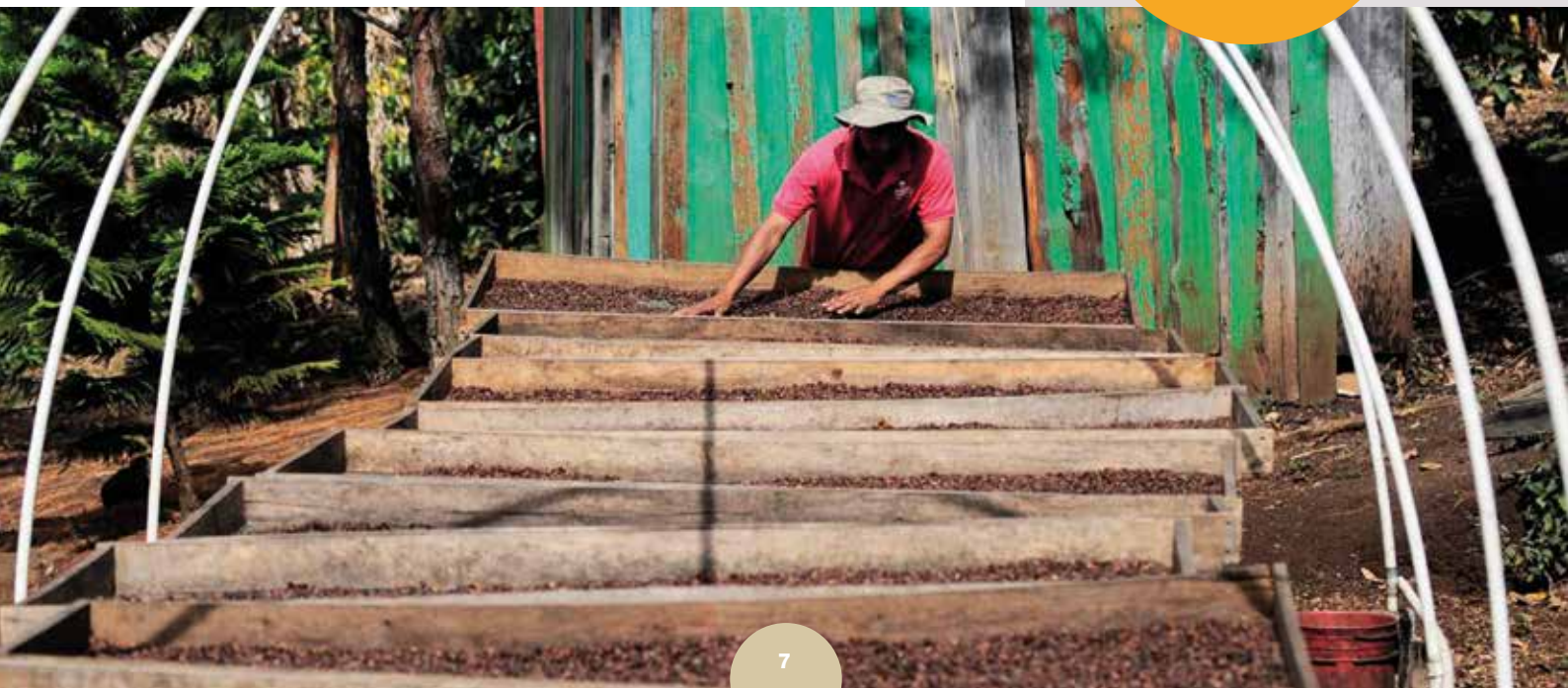
For off-farm actors (wholesalers, warehouses, processors, millers etc.), the assessment can be done through a direct survey, as they are more likely to be aware of the losses generated by their operations.

The data collection approach consist mainly in inquiry, as the traders, processors and other actors of the supply chain tend to keep better track of their activities.

For processors or millers, loss refers to the period starting from the commodity's entrance into the facility until immediately before processing.

The periodicity of the data collection varies depending on the type of actor surveyed and the average period during which the grain is stored. One visit per month is generally sufficient. It is recommended to survey these actors during the periods when they handle the largest amounts of commodities.

In terms of sampling, it may be necessary to build strata (stratum of wholesalers, stratum of intermediates, stratum of processors/millers, etc.) of actors and to perform a simple random selection in each stratum.



Compiling the key indicators of harvest and Post-Harvest Losses

Key indicators

The following core loss indicators should be presented by commodity and at different levels of aggregation (geographical, type of operations, actors or other) depending on the data collection scheme, sampling design and data needs.

Quantitative (or weight) losses: Losses, generally expressed in kg, are either collected from the farmer (enquiry approach) or generated by physical (or objective) measurements.

- Provide an indication of the amounts lost, which can be directly subtracted from food production to assess a country's food supply situation
- Can be used for food security analyses or to estimate import demand and export potential.

Economic losses: Value of quantities lost at the market-selling price or producer price.

- Provide a measure for gross economic loss or loss expressed in value terms
- Can be used to assess the cost-efficiency of potential loss reduction measures

Relative (or percentage) losses: Percentage or relative indicators measure the intensity of losses for the different harvest and post-harvest operations considered. They are calculated by dividing the estimated quantities lost at each stage by the estimated quantities handled at that stage.

- Facilitate comparisons of losses over time, or loss intensity between different stages and processes

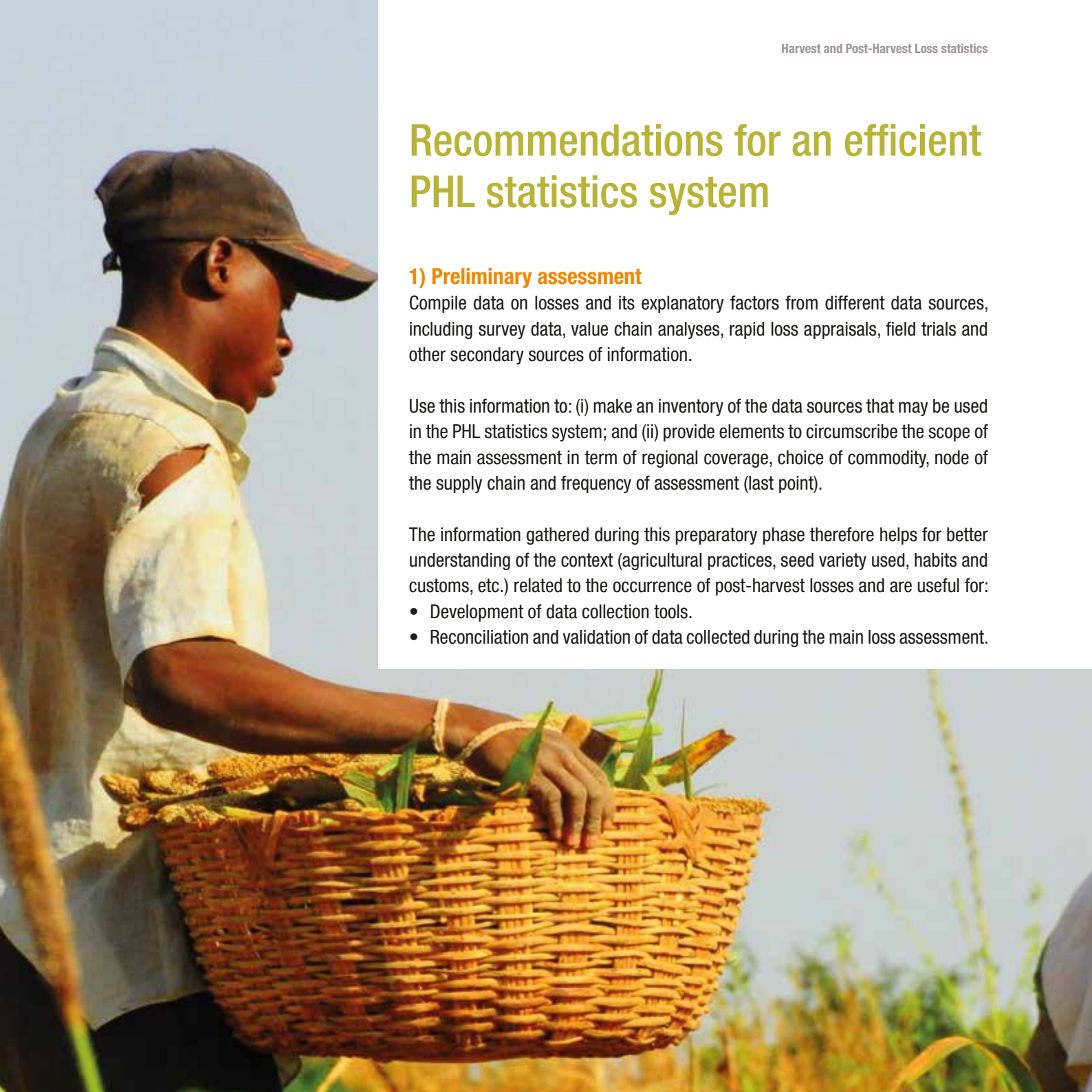
Tabulation plans and reports should include actionable cross-tabulations for food decision-makers concerned with the practical issues of food loss prevention and reduction programs.

Complementary indicators

In addition to loss estimates, dissemination can also encompass quantitative information on the key factors contributing to losses at critical points of the chain, as well as qualitative or quantitative information on the prevention and mitigating strategies.

Examples of complementary indicators

- Meteorological information
- Adoption rate of certain pest-resistant varieties
- Use of modern storage facilities (metallic silos, etc.)
- Commodity prices along the supply chain (to estimate economic or value losses)
- Additional information that may help explain changes in loss patterns, such as loss causes, or add contextual information to the dissemination of the core indicators



Recommendations for an efficient PHL statistics system

1) Preliminary assessment

Compile data on losses and its explanatory factors from different data sources, including survey data, value chain analyses, rapid loss appraisals, field trials and other secondary sources of information.

Use this information to: (i) make an inventory of the data sources that may be used in the PHL statistics system; and (ii) provide elements to circumscribe the scope of the main assessment in term of regional coverage, choice of commodity, node of the supply chain and frequency of assessment (last point).

The information gathered during this preparatory phase therefore helps for better understanding of the context (agricultural practices, seed variety used, habits and customs, etc.) related to the occurrence of post-harvest losses and are useful for:

- Development of data collection tools.
- Reconciliation and validation of data collected during the main loss assessment.

2) Main loss assessment

Use sample surveys to collect data on PHL for the main loss assessment, irrespective of the level of the value chain investigated (on-farm and off-farm).

Measure losses using objective measurements or farmer declarations, considering the relative gains of each method.

Integrate the assessment of harvest and Post-Harvest Losses with existing surveys to maximize cost efficiency and leverage data sources (for example, it is recommended to use annual agricultural surveys as a vehicle to collect information on food losses at the farm level).

When establishing a baseline for food losses monitoring, collect data consecutively for three years using a sample survey to limit the effect of estimate variations due to external factors, such as climatic events or major pest outbreaks. Baseline indicators can be updated after each agricultural census, to reflect structural changes in the farming system that may affect loss factors.

Once the baseline is known, formal PHL assessments using sample surveys can be done every three or four years, because in the absence of cyclical shocks, the aggregate parameters on post-harvest losses remain relatively stable from year to year. Meanwhile lighter measurement approaches are used in between two survey rounds. However, seasonal factors, as well as the main agricultural variables that influence losses, must be collected for each crop year and can be used to adjust post-harvest loss parameters.

3) Data compilation and analysis

Calculate loss indicators for each targeted stage of the value chain in both absolute and relative terms.

Use relative indicators for time series comparisons as these indicators tend to be more stable and less likely to be affected by measurement biases and by annual yield availability.

If probability sample surveys are used to measure losses, compile indicators according to the survey design and accompany the average indicators with their respective standard deviations and confidence intervals.

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Guidelines on the measurement of Harvest and Post-Harvest Losses

Field Test Report on the Estimation of Crop Yields and Post-Harvest Losses in Ghana

A Review of Methods for Estimating Grain Post-Harvest Losses

Training Course on Post-Harvest Losses (EN-FR)

- **Food Loss Analysis E-learning course**
- **Guidelines on the measurement of harvest and Post-Harvest Losses of Fruits and Vegetables**
- **Guidelines on the measurement of harvest and Post-Harvest Losses of Livestock products**
- **Guidelines on the measurement of harvest and Post-Harvest Losses of Fish**
- **Sustainable Development Goals. SDG Indicator 12.3.1 - Global food losses**

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