



Optimizing the Formulation of Questions on Food Losses in National Agricultural Surveys

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Abstract

Food losses¹ represent a critical challenge that negatively affects food security, household nutrition, the economy, environmental sustainability and the agri-food system in general. According to the FAO, 13.3% of global food production, equivalent to 1.3 billion tons or 120 kilograms per capita, was lost in 2023 between harvest and retail (1), highlighting the urgency of generating accurate information on these losses to guide effective public policies and reduction strategies. The issue of food loss and waste has been globally recognized in SDG Target 12.3 which states “By 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along the production and supply chain including post-harvest losses”. In response, countries in Latin America and Africa incorporated specific questions on farm-level food losses in their National Agricultural Surveys and complemented with stand-alone off-farm surveys. However, evidence from field tests comparing declarative and physical measurement methods (2), as well as studies contrasting single-question and detailed survey approaches (3), show that survey responses based on farmers' declarations tend to underestimate the extent of losses, leading to unreliable data for decision-making. This article focuses on *identifying efficient and cost-effective strategies to formulate questions that allow more accurate capturing of food losses along the supply chain, seeking to improve the quality and usefulness of the data collected in surveys*. The analysis will include an assessment of the strengths and weaknesses of the different survey formats and strategies, as well as practical recommendations for their implementation in *food loss surveys of Latin America and Africa*, considering the cultural, economic and operational differences in these regions. The results of this study will guide relevant stakeholders in designing food loss modules that capture relevant information in a format and standard that can generate good quality data that can inform food loss reduction policies and strategies.

Key words: Food losses, agricultural survey, agricultural statistics, food security

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1. Introduction

Food losses represent a critical challenge that negatively affects food security, household nutrition, the economy, environmental sustainability and the overall Agri food system. FAO estimated that approximately 120 kilograms (kg) per capita was lost in 2023 between harvest and before reaching the retail market (1), this was an equivalent of 13.3% of all food produced. The situation was more prevalent in Africa, Asia and Latin America and the Caribbean. It was estimated that Sub-Saharan Africa (SSA) had losses of 20.5 percent in 2023 making it the region with the highest losses globally while Latin America and Caribbean lost 13.4 percent of food produced (1). These levels of loss are unacceptable considering the state of food insecurity globally. According to SOFI 2025 report (4), between 638 and 720 million people, corresponding to 7.8 and 8.8 percent of the global population, respectively, faced hunger in 2024 and about 2.3 billion people in the world are estimated to have been moderately or severely food insecure.

Food losses which are a result of structural inefficiencies and lack of proper policies to reduce the severity are best tackled by putting in place policies that are country and context specific, targeting specific value chains and stages of the supply chain where losses are the highest. However, there is not enough data on food losses that can be used to inform targeted policies and guide food loss reduction strategies. Accurate and timely estimation of losses and identification of the stages of the value chain where they occur is essential to design effective public policies that reduce food losses along the food supply chains and improve the efficiency of production and distribution systems to achieve food security, reduce malnutrition and increase household incomes.

Governments in the global south have attempted to reduce the data gap by including food loss modules in existing surveys. In Latin America, countries like Mexico, Costa Rica, Peru, have included specific questions on food losses at the farm level within their National Agricultural Surveys (ENAs). In Africa, the Global Strategy for Agricultural and Rural Statistics (GSARS) supported several countries to include a food loss module in their farm surveys. These loss modules, however, only cover losses during harvest and post-harvest on the farm. For off-farm losses, Colombia and Mexico included loss questions in existing off-farm surveys. In Colombia, they used the National Trade Survey to collect food losses during distribution and the National Manufacturer's survey to collect food loss data during processing and in Mexico the National Supply Chain survey was used to collect data for all off-farm stages. In SSA, FAO supported national institutions from Ethiopia, Mali, Ghana, Zimbabwe, Kenya, Burkina Faso and Botswana to design and implement pilot surveys to collect food loss data for various value chains off the farm.

Despite these efforts, empirical evidence indicates that survey responses based on farmers declarations tend to underestimate the magnitude of losses, generating unreliable data for decision-making (2, 3), comparing the nationally representative Integrated Household Survey (IHS) in Malawi — which relied on a single question — with a detailed module that differentiated by activity and type of loss, found substantial discrepancies in the reported incidence of losses. In the IHS, only 6%, 4%, and 4% of households reported losses for maize, groundnuts and soya, respectively, whereas the detailed module identified losses in 36%, 47%, and 42% of households for the same crops (2, p. 14). The authors attribute this gap to the fact that single questions tend to omit partial crop damage and fail to differentiate between

stages such as harvest, processing, and storage. Similarly, field tests conducted in Ghana, Malawi, Zimbabwe and Namibia under the GSARS framework (2), also documented in the 50x2030 technical note (5), confirm significant discrepancies between farmers declarations and objective physical measurements, particularly during harvest and storage. A study (6) on Minimum losses by commodity and region, gives an estimated level of minimum losses ranging from 2 – 20.7% depending on the commodity group, results from recent surveys however indicate much lower levels of losses. This underestimation can be due to several factors, including the design of the questions that induce response bias or lack of understanding, the position of the questions within the questionnaire, and the reference period used that may limit the ability to remember or quantify losses accurately, among others. The impact of this situation is that the data obtained does not correctly reflect the magnitude of food losses, which complicates the analysis, planning, and implementation of interventions for the reduction of food loss.

In this scenario, the efficiency and cost-effectiveness of the process of formulating and applying these questions are especially relevant, given that farm surveys usually involve substantial human and financial resources and should result in good quality data. Finding the optimal design involves maximizing the accuracy and usefulness of the information collected, while minimizing logistical costs and loss of reports. This study focuses on identifying efficient and cost-effective strategies to formulate questions to capture food losses on the farm more accurately, seeking to improve the quality and usefulness of the data collected in the farm surveys. To this end, an exhaustive analysis of past food loss surveys in Africa and Latin America has been done to compare the different methodological perspectives and agricultural contexts and to establish the optimal strategy. The analysis will include an assessment of the strengths and weaknesses of the different survey formats and strategies, as well as practical recommendations for their implementation in Latin American and African farm surveys, considering the cultural, economic and operational differences in these region.

2. Experiences in Africa and Latin America

FAO collaborated with various national governments in Africa and Latin America on capacity building, information gathering, and technical support for estimating indicator 12.3.1.a. (Food Loss Index). Below are brief examples of the work carried out in recent years.

2.1. Africa

Reduction of food losses is an important component in the Comprehensive African Agriculture Development Program (CAADP) where all African Union (AU) countries committed to halving post-harvest losses by 2025. The AU target coupled with the SDG 12.3 target, led countries that had existing farm surveys to strive to collect food loss data that could be used in policy formulation and measuring progress towards the two indicators. FAO through the GSARS and the 50x2030 Initiative, supported countries that already had existing farm surveys to add food loss modules on a sub-sample of the surveyed households to collect data for pre-harvest, harvest and post-harvest operations. The countries supported through this initiative were, Benin, Burkina Faso, Burundi, Ghana, Guinea, Mali, Mauritania and United Republic of Tanzania. The food loss surveys in the different countries were similar in terms of survey design, types of questions asked and the indicators obtained.

To supplement these efforts, FAO statistics division under the SDG 12.3.1a mandate, supported some of these countries in designing pilot surveys off the farm. This was to build the capacity of national stakeholders in collecting data both on-farm and off-farm to be able to monitor losses for the entire Food Supply Chain (FSC).

This paper will only highlight two cases in Mali and Burkina Faso where two unique strategies were used to complement each other and increase the coverage of the farm surveys.

2.1.1. Mali

The Planning and Statistics Unit of the Ministry of Agriculture of Mali (CPS Agriculture) received support from GSARS to add a food loss module on their annual farm survey (EAC) in the 2021/22 survey and in the 2022/23 survey. This survey had national coverage with only two districts (Bamako and Kidal) being excluded due to lack of agricultural activities and security concerns respectively. Loss data was collected through producer declarations, targeting millet, sorghum, rice, maize, fonio millet, cowpea and groundnut value chain producers. Losses were measured for each of the on-farm activities separately (harvesting, winnowing/cleaning, threshing/shelling, drying and packaging) and then later aggregation was done for the post-harvest activities to be able to get pre-harvest, harvest and post-harvest losses. Considering the farm survey already has several questions, only a few questions could be added to estimate food losses without increasing the respondent burden. Figure 1 illustrates the example of questions that can be asked in an appended food loss module:

Figure 1: Example questions to be appended to an existing survey

Appended Food Loss Module: Harvest losses	
<i>Harvest losses are defined as the produce that is ready for harvest but that was left in the field/on the tree/on the plant/on the ground during harvesting for any reason</i>	
01. What was the total quantity harvested during the reference period?	<input type="text"/> kg
02. On the harvested plots/orchards, what was the total quantity of produce left on the field/tree/ground during harvest/picking during the reference period?	<input type="text"/> kg
<i>Refer only to produce that is ready to be harvested. Please include all pickings if there are multiple pickings; If the crop is grown in greenhouses, include cleaning and withdraws during and between pickings. Please do not include plots/orchards/trees that have not been harvested (i.e. due to weather or pests), only refer to those harvested.</i>	
03. This is equivalent to _____ percent (%) of produce lost during harvesting , do you agree?	<input type="text"/> %
<i>If the producer does not agree, please go back to confirm the harvested quantities and the quantities left on the field/plot.</i>	

Source: Author’s own elaboration

To complement the data collected during the agricultural survey, a stand-alone pilot survey was conducted in Mali supported by FAO statistics division through 50x2030 Initiative to collect more detailed data on food losses for maize, millet and sorghum during storage. The focus was on storage losses because it has been identified as one of the critical loss points² (CLP) for grains in SSA but measurement of losses at this stage is very complex. The survey in Mali was done in 4 districts, covering 288 households. Data collection was through declaration using detailed CAPI questionnaires and physical measurement where the samples were taken to a lab and results availed after two days, estimated time for each CAPI questionnaire was 45 – 60mins.

² A stage in the Food supply chain where losses are highest

other distributors to be able to have an overview of losses for the whole supply chain. The model of asking the questions is similar to what we have in figure 1 above.

Taking advantage of the improved capacity in the country in terms of food loss measurement, a stand-alone pilot survey covering off-farm stages was designed to complement the data collected during the farm survey. The value chains under study remained the same in order to have an overview of the entire supply chain. Data was collected for Producer cooperatives/producers, collectors, wholesalers and processors. Producers and producer cooperatives were included in order to collect any marketing information that had not been collected in the farm survey. Data collection was through declaration only using CAPI questionnaires, estimated time for each questionnaire was 45 – 60mins.

Figure 3: More detailed questions in the stand-alone survey

Stand Alone Survey: Transportation

1.01. What was the **total quantity of the produce transported** during the reference period? kg

1.02. What are the **destinations** of the produce after transportation that did not move to the next stage?

Sold kg
 Re-used internally (i.e. for own processing) kg
 Sent to animal feeding kg

Landfilled kg
 Reincorporated to the soil kg
 Composted kg
 Incinerated kg
 Anaerobic digestion kg
 Lost (spilled) or disposed of (losses) kg

05. What are the **quantities send to each destination?**

1.03. Out of the transported quantity, how **much produce was damaged** during transportation, but still handed over to the client? kg

1.04. What **type of transportation facility** was used?

Animals Truck
 Bike Open van or pick-up
 Motorbike Covered truck
 Car Refrigerated truck
 Other (specify) _____

1.05. How was the product **packed for transportation?**

Loose Cardboard boxes
 Wooden boxes Bags
 Plastic crates Other (specify) _____
 Baskets

1.06. What was the **stacking method** you used?

Pallets Other (specify)
 Racks None

1.07. **Where** was the produce being transported?

Rural collection centres Wholesale markets
 Packaging company Retail markets
 Processing Exportation
 Other (specify)

1.08. What was the **average time of transportation?** hours

1.09. What was the **average distance** of transportation? km

1.10. What were the **main destination regions** of the transport?

Region 1 ...
 Region 2
 Region 3

1.11. What are the **causes of losses** during transportation?

Spillage Kgs
 Poor packaging Kgs
 Poor handling of produce Kgs
 Poor weather conditions at the time of transport
 Poor road network Kgs
 Over-stacking Kgs
 Produce fallen and left on the ground Kgs
 Other _____

1.12. From the reported quantities lost, how much was **due to the reasons** mentioned?

Kgs
 Kgs
 Kgs
 Kgs
 Kgs

Source: Author's own elaboration

This survey, which had more detailed questions, as seen in figure 3 above, did not only focus on the loss quantities but also included questions on the other destinations/utilizations of the produce that exits the food supply chain to establish the sub-optimal utilizations of the

produce. This strategy complemented the data collected at the farm level through the farm survey for the country to have an overview of the losses along the whole supply chain.

This strategy is proposed for countries that are interested in having an overview of the entire food supply chain while building on already existing efforts. The main advantage of this strategy is that the inclusion of questions on the different utilizations of the produce improves understanding on the type of data that is required and increases response rate while at the same time capturing data that can be used to analyze sub-optimal uses of the produce. The other advantage is that collecting complementary information on causes of losses, the linkages between the different actors, the qualitative and economic losses widens the scope of the analysis and forms the basis for targeted intervention and food loss reduction strategies.

3.2. Latin America

Given the thematic relevance in the Latin American region, in recent years several countries have been incorporating specific questions on food losses into their national agricultural surveys. Such as in the case of Africa in Latin America, since 2021, FAO has worked hand in hand with regional counterparts to advance in the estimation of indicator 12.3.1.a.

It should be noted that the progress is differential by country, where, in the case of Mexico and Uruguay, preliminary estimates of the food loss index (FLI) were made, while Peru and Costa Rica validated their off-farm questionnaires (9). In the case of El Salvador and Chile, although the support was mainly aimed at the estimation of indicators 2.3.1, 2.3.2 and 2.4.1 of the SDGs, it also collaborated in the incorporation of questions that identify losses within the farm. Currently, work is being done with Paraguay and collaboration with Argentina and Brazil is planned for the coming years, which shows that the region is making continuous and firm progress in the training and estimation the food losses.

For this study, the work carried out in El Salvador and Paraguay will be highlighted.

3.2.1 El Salvador

During the 2024/2025 period, FAO provided technical assistance to El Salvador aimed at strengthening the national agricultural statistical system and generating reliable data that enable the formulation of evidence-based public policies, as well as the effective monitoring of progress towards the Sustainable Development Goals. s.

In this context, FAO worked with the General Directorate of Agricultural Statistics (DGEA) of the Ministry of Agriculture and Livestock (MAG) of El Salvador, the entity responsible for agricultural statistics. The main objective of the support was to add questions for the estimation of SDG indicators within the execution of the National Multipurpose Agricultural Survey (ENAPM), the main statistical instrument aimed at generating information on indicators of the agricultural sector. This survey facilitates informed decision-making, the formulation of public policies and the preparation of sectoral development plans. The sample design considers the agricultural producers of the national territory as the universe of study, establishing departmental representation for basic grains (corn, beans, sorghum and rice) and national representation for the other productive items.

Specifically, technical assistance was developed in two stages. In the first phase, a pilot survey was carried out to validate the data collection instrument, the field methodology, and the associated operational processes. This pilot test covered a sample of 300 productive units

distributed nationwide, covering 14 value chains – including basic grains, vegetables, fruits, coffee, cattle and beekeeping – in 9 departments of the country. The operation was carried out by a team of 20 technicians organized into 6 brigades, with the support of regional technical headquarters, during a period of 7 days of field work. In the second phase, the questions that would be integrated into the questionnaire (ENAPM-2025) were identified, and the training process of the surveying personnel was collaborated, as well as in the procedures for estimating results.

Figure 4: Example of the predictions about losses in the ENAPM, El Salvador 2025

¿Experimentó pérdidas de producción durante la cosecha de arroz, en el ciclo agrícola %fechaagricola%?	SINGLE-SELECT 01 <input type="radio"/> Sí 00 <input type="radio"/> No	Detalle las tres principales causas por las cuales experimentó pérdidas post cosecha en el ciclo agrícola %fechaagricola% en arroz.	MULTI-SELECT: OSSEED causas_postarrozpr1
¿Cuál es la cantidad aproximada, en quintales de arroz granza, que considera que se perdió durante la cosecha en el ciclo agrícola %fechaagricola%?	NUMERIC: DECIMAL -----	@optioncode.InRange(6,10) Perdida_postarrozpr1.InList(1)	01 <input type="checkbox"/> Secado inadecuado 02 <input type="checkbox"/> Almacenamiento deficiente 03 <input type="checkbox"/> Contaminación por agua o exposición a la intemperie 04 <input type="checkbox"/> Manejo inadecuado durante la limpieza o selección 05 <input type="checkbox"/> Transporte inadecuado 09 <input type="checkbox"/> Se perdió parte del fruto o grano durante el transporte al almacenamiento o lugar de acopio 10 <input type="checkbox"/> Otro motivo de pérdida de fruto o grano, especifique
Rebrote_primera.InList(1) self<=0 self<=150 Verifique la producción en quintales granza reportada			
¿Experimentó pérdidas de producción en actividades post-cosecha de arroz (selección, limpieza, empaquetado, etc), durante el ciclo agrícola %fechaagricola%?	SINGLE-SELECT 01 <input type="radio"/> Sí 00 <input type="radio"/> No		
¿Cuál es la cantidad aproximada, en quintales de arroz granza, que considera que se perdió durante el manejo postcosecha en el ciclo agrícola %fechaagricola%?	NUMERIC: DECIMAL -----	Detalle otra causa adicional que le haya ocasionado pérdidas durante la postcosecha en arroz de primera en distrito de riego.	TEXT otraPostarrozpr1 -----

Source: Authors' own elaboration

Regarding the variables on food losses, the evaluation of the pilot test determined that, due to space restrictions in the questionnaire and the need to optimize operating costs, the questions on losses during the harvest were incorporated exclusively for the prioritized cereals (maize, beans, sorghum and rice), collecting quantitative information on these losses. On the other hand, variables on post-harvest losses were included for all the groups of products covered by the survey (cereals, vegetables, fruits and industrial crops); in this case, in addition to quantifying the losses, the underlying causes of the losses were identified. During the pilot test, questions about losses were well received by producers, who showed interest in making visible the specific causes that affect their production, which confirms the usefulness and viability of the module.

This experience constitutes a methodological proposal for the incorporation of specific modules that balances operating costs and information collection times, generating data of strategic relevance for the country. The process also left key lessons learned: continuous training of operational personnel is essential for the correct interpretation of the questions, and it is necessary to establish mechanisms for periodic review of the instrument as international methodologies evolve.

3.2.2 Paraguay

In Paraguay, the National Institute of Statistics (INE) is the entity responsible for exercising the stewardship and coordination of the National Statistical System (SISEN), as well as chairing the Commission for the Monitoring of the Sustainable Development Goals (SDGs),

as established by Executive Decree No. 3851/2020, which institutes the "SDG Paraguay Commission" including member institutions and their respective roles. In this context, FAO provided technical assistance to the INE for the design and implementation of a data collection strategy on food losses in the country. To this end, a working group was formed with the technical support of the Ministry of Agriculture and Livestock (MAG), the governing body of the agricultural sector responsible for leading, designing and implementing public policies aimed at the efficient, competitive and sustainable development of the country.

Technical assistance was structured in three phases. In the first phase, an analysis of the state of food losses in the country was conducted, identifying an existing legal framework but an absence of statistical references. A Multi-Criteria Analysis (MCA) was carried out integrating indicators across multiple dimensions: production volumes, prices, trade balance (imports/exports), nutrition (macronutrient contribution: energy, protein and fats), socio-cultural relevance, and perishability. For the final selection of products, an inter-institutional workshop was organized in which 42 representatives from diverse sectors participated, prioritized a basic basket composed of 13 food chains across five categories: fruits and vegetables (tomato and banana), roots and tubers (cassava and onion), cereals and oilseeds (maize and soybean), animal products (beef, chicken, pork, tilapia and raw bovine milk), and other products (yerba mate and sugarcane).

Figure 5: Questions developed in the pilot test of the Loss Survey, Paraguay 2025.

SECTION III. FARM PRODUCTION LOSSES (during the agricultural period: July 1/2024 to June 30/25) (only if in Section I-Q6. Role was marked as Producer)						
Harvest losses. Complete only if affirmative.						
Crop product Complete in the corresponding ROW	3.1 During harvest, do you consider that you had losses or crop shrinkage? (Do not include pre-harvest losses due to droughts, floods, frosts, etc.) If you answered that you had losses, ask for the amount in kilos, otherwise go to Product Selection.		3.2 What are the causes of losses during harvest? 1. Lack or deficient labor 2. Adverse weather 3. Poor harvest handling 4. Over-ripening 5. Logistics problems 6. Other (specify) If the option does not appear in the list, select 6. Other and describe the cause in the next cell.			
	3.1.a 1. Yes / 6. No	3.1.b Amount in Kg				
1 Tomato						
2 Onion (head)						
3 Cassava						
4 Banana						
SECTION III. FARM PRODUCTION LOSSES (during the agricultural period: July 1/2024 to June 30/25) (only if in Section I-Q6. Role was marked as Producer)						
Post-harvest losses. Complete only if the producer carries out the activity. If the activity is not performed, fill in [0] zero for the quantity and do not answer the loss question.						
Crop product Complete in the corresponding ROW	3.3 Product Selection		3.4 Product Cleaning		3.5 Product Packaging	
	1. What was the quantity of product selected for sale? Record the amount in kilograms	2. How much product was lost during selection? Record the amount in kilograms	1. What was the quantity of product cleaned for sale? Record the amount in kilograms	2. How much product was lost during cleaning? Record the amount in kilograms	1. What was the quantity of product packaged for sale? Record the amount in kilograms	2. How much product was lost during packaging? Record the amount in kilograms
1 Tomato						
2 Onion (head)						
3 Cassava						
4 Banana						
SECTION III. FARM PRODUCTION LOSSES (during the agricultural period: July 1/2024 to June 30/25) (only if in Section I-Q6. Role was marked as Producer)						
Post-harvest losses. Complete only if the producer carries out the activity. If the activity is not performed, fill in [0] zero for the quantity and do not answer the loss question.						
Crop product Complete in the corresponding ROW	3.6 Product Storage		3.7 Product Refrigeration		3.8 What do you consider to be the cause of post-harvest loss? 1. Bruising/impact damage 2. Poor hygiene or handling 3. Lack of temperature and humidity control 4. Power outage 5. Lot mixing 6. Prolonged storage 7. Lack of standardization (size, shape, color, etc.) 8. Other (specify) If the option does not appear in the list, select 6. Other and describe the cause in the next cell.	
	1. What was the quantity of product stored for sale? Record the amount in kilograms	2. How much product was lost during storage? Record the amount in kilograms	1. What was the quantity of product refrigerated for sale? Record the amount in kilograms	2. How much product was lost during refrigeration? Record the amount in kilograms		
1 Tomato						
2 Onion (head)						
3 Cassava						
4 Banana						

Source: Author's own elaboration

In the second phase, given the budget, the decision was made to select four products (tomato, onion, banana, and cassava) considered relevant for the country's food security and the segment of Peasant Family Farming. The measurement was limited to three critical stages: farm, transport, and wholesale. The data collection instrument was designed after a process of technical refinement between the INE and FAO, The questionnaire was organized into nine sections: geographic location and producer identification; data on the production and destination of the product during the agricultural reference period (from 1 July 2024 to 30 June 2025); losses during harvest (quantities and causes); post-harvest losses, with comprehensive mapping of all activities at farm level including selection/sorting, cleaning, packaging, storage and cooling, identification of processed quantities, quantities lost and causes at each stage; Socioeconomic impact and prevention measures.

A pre-test was carried out to assess both the practical usability of the forms and the cognitive understanding of the respondents. A group evaluation session identified strengths and weaknesses. The field operation constituted the largest logistical component of technical assistance, forming three multidisciplinary work teams. Each team included INE technicians, FAO specialists, and MAG extension technicians. The operation focused on two departments selected for their relevance in terms of fruit production volume – Caaguazú and Central – covering eight districts. At the end of the operation, a total of 363 effective surveys were obtained. The questionnaire was administered in person, requiring approximately 45 to 60 minutes to complete an interview. Among the methodological findings, it was identified that most of the losses reported by respondents were "pre-harvest" losses — which are not methodologically quantified in the percent food loss indicator (SDG 12.3.1a). However, these represent significant losses (between 50 and 100% of the production that farmers leave unharvested in a given cycle, mainly due to market factors such as prices, oversupply, brokering and smuggling) and should be considered for the design of public support policies and the estimation of related indicators such as productive yield (tons/ha/year).

Figure 6: More detailed questions in the Loss Survey, Paraguay 2025

SECTION IV. SOCIO-ECONOMIC IMPACT AND PREVENTION OF FARM PRODUCTION LOSSES (during the agricultural period: July 1/2024 to June 30/25) (only if in Section I-Q6. Role was marked as Producer)			
Impact and prevention of farm losses by the producer. Select the corresponding option.			
4.1	Have you had to reduce or change your production due to farm product losses?	(.....) 1. Yes	(.....) 6. No
4.2	How do these farm losses affect your economy?	(.....) 1. Little	(.....) 2. Moderate (.....) 3. A lot
4.3	Do these losses affect you in any other way?	(.....) 1. Yes	(.....) 6. No
	4.3.a If yes, indicate how:		
4.4	Do you carry out any practice to prevent and/or reduce these farm losses?	(.....) 1. Yes	(.....) 6. No
	4.4.a If yes, indicate how:		
4.5	What support do you consider necessary to reduce farm product losses?	(.....) 1. Technical training (.....) 2. Credit facilities (.....) 3. Access to marketing/sales channels (.....) 4. Storage and/or refrigeration infrastructure (.....) 5. Form or strengthen committees, associations, cooperatives (.....) 6. Transportation logistics (.....) 7. Other. Specify:	

Source: Author's own elaboration

Also, the need to adjust the questionnaire to consider the seasonality by crop cycles, complement the quantification of food losses with estimates of economic losses, and establish a formal governance framework to improve coordination, planning and decision-making for future statistical operations on food losses was identified. This procedure allowed Paraguay to establish the methodological foundations necessary to integrate these

measurements into permanent national statistical operations, such as the Agricultural Census or the National Agricultural Survey. It is also a validated tool for the incorporation of loss-specific modules in countries that aim to generate more specific data on Food losses.

3. Discussion

3.1. Summary of findings and conclusion

For the calculation of food loss indicators, the minimum set of questions are quantities handled and quantities lost, for an already existing survey, these would be the questions added to get minimum set of information on food losses. For informed decision making, however, it is important to include other complementary questions to establish the enabling environment for the losses and this way to be able to inform policy formulation and targeted intervention. This includes questions on the destinations of the produce leaving the FSC, technologies used, linkages with other actors and the causes of losses. Results from previous research have shown that the quality of responses improves when the questions are expounded upon and broken down into several questions. The main disadvantage however is that the cost of data collection increases with increase in the length of the questionnaire. Other studies to compare results from physical measurement and declarations have also indicated that the quality of responses is better with physical measurement but this can only be achieved at an increased cost.

The optimal strategy would therefore be the one that can strike a balance between the different approaches. The analysis of experiences in Africa and Latin America shows that the most cost-effective strategy for collecting data on food losses is the incorporation of minimum questions into existing agricultural surveys, modelling techniques could also be carried out when frequent surveys are not feasible, as was implemented in Mali. For countries that require a broader view of Food Losses, the addition of modules with complementary questions – such as Paraguay – offers greater depth, however, feasibility should be assessed as it depends on the absorption capacity of the baseline survey and the resources available, and no strategy should be discarded, as they all provide valuable information depending on the context.

Therefore, countries that wish to incorporate questions on loss are recommended to adopt a progressive approach, incorporating at least a minimum set of questions on losses as a baseline that can be expanded in future rounds; clearly define the conceptual boundaries between types of loss through training of enumerators and pilot tests; and consider the modelling approach to ensure the temporal sustainability of the measurement. In terms of results, likewise, it is a priority to develop harmonized conceptual frameworks that resolve ambiguity in the classification of losses, validate estimation methods based on variables from routine agricultural surveys, study the impact of different formulations of questions on response bias, and explore complementarity with mass measurements to compare the results, likewise, secondary sources could be identified as administrative data that help reduce collection costs.

3.2 Methodological challenges identified and recommendations

In general, the main methodological challenges identified was the conceptual ambiguity; since there is a recurring difficulty in clearly differentiating between concepts such as pre-harvest losses (claims), losses during harvest and post-harvest losses. This generates the need

to clearly define this limit. This challenge can be solved by asking for the quantities going to different utilizations (only applicable to detailed questionnaire), by including a clarifying sentence in the questionnaire on what is meant by losses and also by thoroughly training the enumerators on the concepts and boundaries of food losses

Another challenge arises with the use of terms such as "losses" or "waste" can generate rejection or bias in the answers, which causes producers to tend to confuse it with economic losses. Clear definition of losses should be included in the data collection instrument.

It was also identified that in order to reduce the underestimation of loss results, it is necessary to design detailed questionnaires to capture accurate information on the causes, destinations, and stages of losses, however, it can increase the burden for the interviewee and also equates to an increase in operational costs; so striking a balance between detail and simplicity is a key methodological challenge.

5. References

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