



Gaining Efficiencies by reducing Food Loss and Waste

Motivation

In 2011, a ground-breaking study¹ rose the world's awareness that one third of all the food annually produced is never consumed. Parallel to that, UN member-States committed in September 2015 to the Sustainable Development Goals including target 12.3 that states "By 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses."

Reducing food loss and waste is seen as a way to **lower production costs, improve food security and nutrition, and contribute towards environmental sustainability**, notably by easing the pressure on natural resources and decreasing greenhouse gas (GHG) emissions. In this respect, the availability of sound information on food loss and waste across the chain allows monitoring the efficiency of production processes and the overall sustainability of the system.

While the economic and environmental impacts of food loss and waste are well known, the connection between losses and food safety on a wider scale has received comparatively less attention. Crops are affected by a range of pests (including weeds and diseases) throughout the production (pre-harvest) and post-production processes (storage for example), leading to quantitative and qualitative losses. These pests may cause contaminations to crops, which may imply risks for human health, such as contamination by mycotoxins, in particular aflatoxins. Inappropriate applications of phytosanitary products may also pose food safety issues if the residues of pesticides in crops are beyond acceptable thresholds. While this project will not address in detail the food loss-food safety connection, some of the commodities to be selected will be those of relevance in the context which are known to pose certain food safety risks.

The Covid-19 pandemic and the war in Ukraine emphasized how quickly food systems disruptions can put food security, agricultural livelihoods and incomes at risks. The restrictions affecting the transport of goods and persons and the marketing of products are sources of increased inefficiencies in the post-production stages, such as reduced access to markets, higher transport times and costs or longer storage durations. Less efficient food chains directly translate into higher food losses, especially for commodities with the lowest shelf life, such as fruits and vegetables. These products are amongst the most important cash-crops in many lower and middle income countries, a significant source of income and foreign currency. The pandemic is also causing or exacerbating shifts in the composition of food demand that make the difficulties more acute in matching the demand and supply of food, in terms of volumes, time and space. Some commodities are more affected than others are, and higher losses can be foreseen (and are experienced) for non-storable goods that are destined to the food service industry (restaurants, hotels, etc.) or to export. The speed of adjustment of the supply to the demand shifts will be uneven across countries and commodities, as it

¹ FAO (2011), "Global Food Losses and Food Waste, extent, causes and prevention", <http://www.fao.org/3/a-i2697e.pdf>

depends on the degree of responsiveness of food chains, which is likely to increase with their level of sophistication and integration.

While the reduction of food loss and waste appears as a clear and desirable objective, actual implementation is not simple. When considering actions and policy options, food loss and waste reduction should be seen as a way to achieve other objectives, notably improved efficiency in the food system, improved food security and nutrition, and improved environmental sustainability. How policymakers prioritize these different dimensions and the information available on how food loss and waste affects them, will shape the most appropriate mix of interventions and policies to reduce food loss and waste.

The FAO 2019 SOFA² report produced the first new set of global food loss estimates after the 2011 study. Although not entirely covering the scope of the 2011 study because new global numbers on waste under the purview of UNEP are not yet available, the new estimates are that around 14% of global food production is lost on the farm but after harvest and up but not including the retail level. The new result is only apparently low, as it corresponds to at least 400 billion USD lost world-wide (at current 2016 prices).

A large set of new scientific and policy-related literature was recently produced on the technical and policy aspects of food losses and waste reduction. In particular, the 2019 SOFA publication delves into the three main impact areas of types of potential societal gains which justify interventions to reduce food loss and waste, namely: (i) increased productivity and economic growth, referred to in this report as the economic case; (ii) improved food security and nutrition; and (iii) mitigation of environmental impacts of losing and wasting food, in particular in terms of reducing greenhouse gas (GHG) emissions as well as lowering pressure on land and water resources. There are trade-offs between these benefits, and when deciding what action to take to address food loss and waste, a number of questions arise, including the reasons why is food lost or wasted, how much food is lost or wasted, why is it important to reduce food loss and waste, how that can be achieved to contribute to achieving food and nutrition security, and who are the ultimate beneficiaries.

This project has therefore the overarching objective to create the evidence base using the methodology developed by the FAO for measuring and monitoring progress against SDG target 12.3 and formulate recommendations for policy- and decision-making in line with the SOFA 2019 guiding principle to find solutions for reducing food loss and waste.

The expected impact is that countries take informed decisions on loss and waste reduction interventions to structurally reduce the level of food losses and waste of key commodities and ultimately improve the efficiency of their main supply chains as well as the food security of selected population groups, and to create new jobs opportunities while resolving this problem.

Rationale

² FAO (2019), "The State of Food and Agriculture. Moving forward on food loss and waste reduction", <http://www.fao.org/state-of-food-agriculture/en/>

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Food loss and waste (FLW) has potential effects on food security and nutrition through changes in the four dimensions of food security: food availability, access, utilization and stability. However, the links between food loss and waste reduction and food security are complex, and positive outcomes are not always certain. Reaching acceptable levels of food security and nutrition inevitably implies certain levels of food loss and waste. Maintaining buffers to ensure food stability requires a certain amount of food to be lost or wasted. At the same time, ensuring food safety involves discarding unsafe food, which then gets counted as lost or wasted, while higher quality diets tend to include more highly perishable foods. From a nutritional point of view, this loss is equivalent to an estimated 13% of the calories produced globally, that will never make it to the mouth of consumers, while many remain food insecure. FLW also has significant effects over productivity and on environment. In terms of GHG emissions, the food lost is associated with around 1.5 gigatonnes of CO₂ equivalent. Food loss and waste represents a waste of significant and scarce resources used to produce food, including water, soil, energy, labor and time.

Location and point in the food supply chain matter for the food security and nutrition impact of reducing food loss and waste. How the impacts on the different dimensions of food security play out and affect the food security of different population groups depends on where in the food supply chain the reduction in losses or waste takes place as well as on where nutritionally vulnerable and food-insecure people are located geographically. Importantly, not everybody stands to gain.

The technical units of FAO in partnership with the main stakeholders have addressed all these issues in the SOFA 2019 report and produced a comprehensive overview of the policy objectives, interventions and their trade-offs.

This project will address policy- and intervention-related issues in one of its component. The project will help identify the critical loss points and main drivers, understand the data needs for policy and decision-making, and identify the appropriate interventions in the target countries as a way to build back better from COVID-19 and increase efficiency to increase resilience to shock and situations like the war in Ukraine. The new interventions will also aim to create new job opportunities while achieving the three main goals of reducing food loss and waste.

Proposed work program

The proposed work program is based on three main outputs: a first output on capacity development and data collection, a second one focusing analyzing the information for better policy making on FLW, and a third one on identifying the critical loss and waste points and bringing solutions for implementation.

OUTPUT 1: Capacity development and data collection

Objective. The objective of this Output is to produce relevant data and indicators on food losses and waste for the set of commodities that are part of the initiative. This objective will be reached by providing technical support on data collection and analysis to the national institutions that collect information on the agriculture and food sector. This technical assistance will be designed to establish the capacities, tools and know-how in these institutions on the production of relevant data and indicators on food losses.

Activities. The activities under Output 1 will be implemented according to three activities:

- **Activity 1.1:** the scoping phase, that will define the countries of intervention, adjust the set of commodities, sectors and overall approach to the specific needs and priorities of each country;
- **Activity 1.2:** the data collection phase, which will include the definition, development, testing and full implementation of the data collection instruments;
- **Activity 1.3:** the data analysis phase, which will generate relevant loss indicators from the data collected in activity 1.2.

Activity 1.1

Scoping

The scoping phase will establish with the country partners involved in the project the objectives and priorities of the loss and waste assessments, in terms of sectors (segments of the value chain) and commodities. In this phase, the project team will also identify with the national institutions the expected level of depth, accuracy and representativeness of the results as these characteristics will determine largely the type of data collection instrument and procedures to be tested and implemented.

In the scoping phase, the existing information, experiences and structures on food losses and waste (such as intergovernmental platforms, regional public or private initiatives etc.) will need to be clearly identified and assessed to ensure that the project draws on the appropriate infrastructure and avoids duplicating efforts and generating confusion. The information gathered during this preliminary phase will also serve to identify the data gaps on food losses and to better target and calibrate the data collection work.

Activity 1.2

Data collection

The work to be carried out under this activity will consist in defining and implementing data collection protocols with the objective to generate relevant and representative information at sub national level for the relevant segments of the food chain. The data collection instruments will be adjusted to fit the specific needs and characteristics of each country.

They will, nevertheless, follow a consistent set of principles:

- Statistical and scientific soundness: the methods used will seek to generate representative data at country-level and, hence, will draw on proper sampling and extrapolation procedures. The scientific

relevance of the assessment methods used, especially those involving complex and lengthy physical measurements (such as selecting and analysing grain samples in storage facilities), will follow the recommended practices from the scientific literature.³

- **Cost-efficiency:** the instruments will be designed to collect the required data at the minimum cost. To this end, secondary information on losses along the food chain will be used to prioritise the sectors and actors that require more in-depth and statistically robust techniques. For example, information from case-studies or quick loss assessments may be used in a first stage to identify the hotspots on which data collection efforts may be focused, for example through a combined use of sample surveys and objective measurements. Less critical sectors or actors may be assessed through lighter and less costly instruments. Partnerships with sectoral organizations, especially in the processing sector, may be useful in generating or making available high quality data at a relatively low cost.
- **Innovation and digital technologies:** the project will foster digital best practices and innovative technologies related to post-harvest operations, such as CAPI data collection and partnerships for example with the Information Network on Post-harvest Operations (INPhO) as part of FAO Digital Services Portfolio Mobile App; smartphone App, web services and feature phone (SMS/IVR). Innovative data collection and alternative data sources can provide local information e.g. on Weather and Crop calendar, local market prices (FPMA), all using web services, thus strengthening PHL estimates and contributing to the evidence base.
- **Tablets** will be used for data collection with questionnaires developed with a CAPI software to assure higher data quality while shortening data processing and analysis time and allowing for logical checks and on-the fly validation. A proposed CAPI software is Survey Solution, developed by the World Bank and used in FAO projects for carrying out agricultural censuses and surveys.
- **Broad spectrum of methods:** evidence has shown that each assessment method has its own set of biases and that focusing on a unique approach may not yield satisfactory results.⁴ The project team will therefore seek to identify the most relevant tools and methods for the commodity, sector or actor to be assessed, from a comprehensive set of approaches that ranges from full-scale sample surveys (to cover small and medium-scale farming, for example), to field experiments and qualitative techniques (to understand better the causes of losses, for example). The measurement methods will include both objective approaches (physical measurements) and declarative ones (interview-based) where possible, as recommended by the literature⁵.

The data collection activities are expected to cover at least 3 years over the 5-year project period. Within these 3 years, the following major deliverables are expected: a complete methodology for the data collection and construction of indicators; a pilot-test of the data collection tools; a full-scale implementation of the data collection for the priority commodities, sectors and actors of the supply-chain.

Activity 1.3

Data analysis and indicators

³ See *GSARS, 2017, Gaps Analysis and Improved Methods for Assessing Post-Harvest Losses, FAO, Rome* for a summary and analysis of the most common measurement approaches.

⁴ For example, *GSARS, 2017, Field Test Report on the Estimation of Crop Yields and Post-Harvest Losses in Ghana, FAO, Rome*, provided quantitative evidence on the systematic difference in loss estimates from declarative and objective approaches

⁵ See *GSARS, 2018, Guidelines on the measurement of harvest and post-harvest losses, FAO, Rome*

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The last activity under this Output is the construction of indicators on food losses and waste from the data collected. After the data is collected, the basic indicators will need to be computed using a methodology adapted to the type of data collection instruments used. These indicators will reflect the requirements imposed at the inception of the project, especially in terms of statistical representativeness (national or lower) and expected accuracy. The work carried-out in the past by different organizations has shown that the construction of total loss and waste estimates, in percentage or absolute terms, is not a trivial aspect of a loss assessment study. The aggregation of relative losses over the supply-chain, for example, may not be straightforward as the quantity used as reference (harvest, quantities in storage, handled, etc.) typically changes depending on the segment of the chain. The type of indicators to be produced and their properties will also be a function of the needs of the country and the subnational governments. For those that need accurate and timely quantitative loss estimates for food security purposes (to anticipate import and export quotas, for example), the focus will be placed on the measurement of absolute losses over the entire chain through an appropriate aggregation procedure. If the priority lies in the optimization of each segment of the chain, more attention should be paid to the estimation of relative losses - more or less independently - for each segment.

OUTPUT 2: Data collected is accessible and used as evidence for policy-making and evaluation.

Activity 2.1

Access and long-term preservation of data collected through the project

This activity groups all the sub-activities linked with the release of the data collected by the project to data users as part of national institutional processes. Support will be provided on the evaluation of existing policies of data access and dissemination with a view to better integrate open data principles and standards as well as micro-dissemination practices. Support will be specifically provided on i) the preparation of data, metadata and documentation files for dissemination, ii) on Statistical Disclosure Control (i.e. Data Anonymization), disclosure risk and information loss assessment; iii) on the development of DDI-compliant metadata and iv) if necessary, on the installation/maintenance of dissemination platforms such as IHSN NADA repositories.

Activity 2.2

Data is used for analysis and decision making at the country level

The project will support the countries with trainings on analysing, interpreting and communicating results.

OUTPUT 3: Identifying the critical loss and waste points and bringing solutions

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FLW is a complex area and loss and waste reduction is not a policy objective per se but rather a conducive factor to other policy objectives (economic, social, and environmental). Moreover, the SOFA report highlighted the trade-offs in the policy impact and the need to evaluate the cost-benefits of any interventions. The COVID-19 pandemic, and the response of governments to the challenge, will inevitably lead to substantial disruptions in the logistics of the food supply chains, impeding the shipment of food and agricultural inputs, threatening food security and nutrition, particularly for the most vulnerable population segments. In this context, keeping food losses in check in the face of these disruptions can have a considerable positive impact in terms of improving food security and nutrition in Sub-Saharan Africa.

The project will formulate recommendations on policies and investments around two activities.

Activity 3.1

Value chain and existing policy are assessed to identify priority areas for interventions

In order to understand where most losses and waste occur and interventions are likely to make the biggest impact, the project will carry out food loss and waste assessments to identify the critical loss and waste points, the main causes and drivers for losses and waste, and the possible technical solutions.

Special attention will be dedicated to post-production losses in perishables due to limited storage capacity and logistic challenges. Market closures prevent transactions between producers, traders, wholesalers, retailers and consumers. With no place for transactions, supply is reduced, prices increase and livelihoods and incomes suffer, creating a major stress on food security. These analyses will help to understand the data needs and the priorities in terms of data collection. The project will advise on how to target interventions that focus on ensuring food security and nutrition. The project will also analyse existing policies to understand the priority objectives and analyse how to ensure policy coherence across different policies when proposing a course of action to reduce losses.

Activity 3.2

Country action plans to reduce food losses are formulated

Public interventions – in terms of policies and infrastructure investments – may create an enabling environment that allows private actors to invest in the reduction of food losses or waste; such interventions should be chosen in line with policymakers' ultimate objective, whether related to economic efficiency, food security and nutrition, or environmental sustainability. Focusing on initiatives that are well-targeted to the objective pursued will be the key to success. Based on the data to be collected, the project will propose immediate actions to limit losses and waste. In the longer term, providing or improving public goods, such as roads and other infrastructure, governments can help farmers gain market access and reduce on-farm losses. In the context of the evolving COVID-19 pandemic and the war in Ukraine, it will be important to present both short-term options for reducing losses and waste, as well as longer-term solutions. An important dimension, to improve food security and nutrition, is that interventions for food loss interventions must target vulnerable populations. In addition, we aim at interventions that will advise restaurants, caterers, and other food services to implement better practices in the management of organic waste.

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The project will support in the design of country action plans and interventions that will consider the overarching policy objectives and dimensions (economic, social, and environmental) beyond the reduction of food losses as well as their respective trade-offs. The results from these assessments will help carrying out a cost-benefit analysis of the possible solutions and prepare investment plans that will bring solutions.

Geographic focus:

All 52 Hand in Hand countries with 11 countries in Asia and the Pacific, 29 in Africa, 8 in Latin America and the Caribbean, 3 in the Near East and North Africa, and 1 in Europe and Central Asia. In addition, developed countries will benefit through the FLW reduction initiatives on cities and through collaboration with the Food is Never Waste Coalition.

What is the time frame of the impact area?

2022–2024 (3 years)

What is the budget envelope of the impact area?

USD 39 million (i.e. USD 0.25 million per country/year)