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# Sustainable Food Systems and Nutrition: Food Post-Harvest Losses

25 March 2020

Recording Link: <https://youtu.be/Tl45J3LrUf0>

## Questions and Answers

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**1. What are your tools to gather and analyse data of food waste? Is it only surveys or do you use something else, if so, what is it?**

According to SDG 12.3 formulation, food waste occurs at the retail and consumption level. It is measured and monitored by the Food Waste Index that has been developed by UN Environment, while FAO is in charge of monitoring Food Losses under the Food Loss Index.

In general terms, food waste can be measured with sector surveys (retail, food services, households) and estimated with a number of indirect methods or indicators. UN Environment recommends estimating food waste from Solid Municipal Waste using a food waste percentage to be derived from a waste composition analysis. An alternative method is using a mass balance approach, which was used in the 2011 study on the prevention and causes of Food Losses and Waste. These alternative methods however have limitations. For more insight, you may need to contact UN Environment.

**2. Do you think that it is necessary to include a percentage of reduction in the target of food losses as it is the case of food waste according to the SDG?**

SDG target 12.3 has been carefully formulated during a long inclusive process led by the countries. This target distinguishes the supply side of the food chain from the retail and consumption stages, and sets different objectives: an unspecified reduction of food losses and a 50 percent reduction of food waste.


There are several reasons for not having set a precise target for loss reduction. Among these, is the agreement that it is not advisable to pursue zero losses and that an optimal level of losses is not known. From a different angle one can say that loss reduction can be cost-effective where losses are high and the value of losses is higher than the investment cost. Once the cost-effective measures have been adopted, the cost of further reductions increases and the expected benefit shrinks with quantities.

Losses in low-income countries are more prevalent in the early stages of the value chain. The agriculture sector is generally characterized by a slower rate of adoption of new technologies, and the persistence of the major causes of food losses in developing countries (dysfunctional markets, difficult access to technologies). At the same time, the absence of progress in the presence of technical improvements of production processes, speaks potentially for the persistence of an external cost issue: it may be the case that even where the technology frontier is reached, the price structure does not create incentives to reduce losses, as the marginal cost of abatement is higher than the marginal benefit.

For the above reasons and more, setting a loss reduction target work-wide was not considered advisable.

**3. There are 6 other Food Categories in the world, I was wondering why the focus always is on Freshly harvested produce, what about meat, dairy, tubers, pulses, etc...?**

Food products have been grouped in six wide categories that include products of similar perishability and that broadly speaking represent a diversified diet.



The emphasis on fresh product stems is because of their perishability. These is where most losses in weight occur and where there are the largest opportunities for reduction. At the same time, one reason why cereals, fruits and vegetables, tubers (mainly potatoes) and milk are more often quoted is because there is more information on these products. The first case studies and surveys focused on where the problem and the opportunities were greater.

At the same time, the basket covers all categories (five internationally and up to six at country level) allowing countries to decide on what commodities to monitor and to develop a monitoring system for the less known products and commodity groups (meat, fish, sugar crops, cash crops). Evidence for those products is very scarce, which is why they are hardly quoted in large studies.

#### **4. Do the detail study have happened about FLI and FWI of Seafood category?**

The guidelines for the measurement include an annex (for publication soon) on the measurement of fish losses.

A pilot study on fish was conducted in Guyana in 2019 and the report will be published on the SDG 12.3.1 website (<http://www.fao.org/sustainable-development-goals/indicators/1231/en/>) soon.

FAO's Fisheries department worked on the reduction of fish losses for many years. Guidelines to carry out "Post-harvest fish loss assessment in small-scale fisheries" or case studies are available online ([link](#)). More resources can be found at <http://www.fao.org/flw-in-fish-value-chains/en/>.

#### **5. Why is qualitative losses different from food losses? if these would be a direct reason due to the consideration that these food (with some qualitative losses) will be losses?**

FAO's conceptual definition of losses includes quantitative and qualitative losses. The latter are more difficult to measure, hence the measurement framework directly measures quantitative losses only.

Qualitative losses are not easy to measure because perception of food quality is subjective. Different communities value different aspects of a commodity therefore it is not possible to have a uniform measurement for qualitative losses as it is for quantitative losses. Also, since the commodities may remain in the food supply chain with a lower prices it becomes even more difficult to separate these quantities and label them as lost.

Qualitative losses however, can be inferred from the additional data considered in the guidelines on the measurement. Price data and information on the utilizations of destinations (feed, industrial uses, food processing, etc.) help estimating qualitative and economic losses.

#### **6. How we can differentiate the supply and value chains?**

There is no unique definition of these terms and they overlap to some extent. The food supply chain for example goes from the production site to consumption, which sounds



contrary. The value chain in principle includes the activities that add value to a product or service and exclude consumption.

In the SDG 12.3 methodological documents, we use the terms food supply chain, food chain or food systems interchangeably. However, the documents clarify that the SDG target considers that losses occur on the supply-side of the food systems while waste occurs on the demand-side or consumption-side.

The term value chain can also be used in case studies where it means the value chain that is the focus of the study, e.g. a region of the country or a set of businesses that are actually linked but that cover only on part of the economic sector.

**7. Do Central and South Asia have the highest post-harvest loss, more than 20%? What it can be related to?**

One of the reasons why Central and South Asia report higher losses than other regions is due to the importance of pulses in the region and the relative abundance of loss data on pulses and tubers. Tubers especially are more perishable than cereals and are hardly monitored in the rest of the world.

As we continue to collect more data and improve the model the estimates are expected to change over time.

**8. Amazing to see that the post-harvest rate is among the highest in America and Europe. Do you have any idea of the reason? Perhaps price (fruits destroyed on purpose to create demand)? Food standard regulations in Europe? Food safety (MRLs), Phyto sanitary regulations?**

New estimates by FAO indicate that 13.8 percent of total food produced in the world is lost between farm up to, but excluding, retail. These estimates measure loss in physical quantities for different commodities and then apply an economic weight to aggregate them. Commodities that are more valuable thus carry a larger weight in the total loss estimation than low value commodities.

In North America and Europe where higher value crops are more prevalent, the loss in economic terms is higher than would attribute by just measuring physical quantities or calories. It is also worth noting that more countries in Europe and America have more data as compared to other regions. Results may change once more data will be available in the rest of the world.

**9. Why there is not enough data for Vietnam? In first part, there are five foods including fish but your map is no mentioned?**

The FLW database reports data based on the literature that has been reviewed and data points validated. Data from three studies for Viet Nam were validated. More data will become available in the future; this is an on-going process as more literature is being reviewed. However, we will be happy to review and incorporate data from any source you may wish to share with us and that is not reflected in the database.

**10. Why are harvest losses not always included in the FLI?**



Indeed in some characterizations of the value chains, harvest losses are merged with on-farm post-harvest losses. The two types of losses are in fact distinguished, as harvest is a critical activity affected by its own set of causal factors and is extensively treated in the literature.

It is known that the harvest can be a critical loss point for many countries and commodities but the difficulty in including harvest losses in the international indicator comes from the definition of agricultural production used by most countries and by FAO. To include of harvest losses in the FLI we would need to harmonize the concept and data on agriculture production in all. This means that FAO would request that most countries change they survey method and introduce a break in the production data, including those countries for which the harvest is not a critical loss point. However, harvest losses can be integrated in the Food Loss Index scope if the reference quantities (i.e. production) are adjusted to include harvest losses, at the country level.

**11. Was FLI included in the UNO's Country-wide development index?**

No it is not included.

**12. Heat-map related question: Would you be so kind to explain, what is an observation exactly - official statistics, and article, a paper?**

An observation is a data point either from official statistics or from reviewed literature (articles, documents etc). One research can result in to one or several observations (data points) depending on what was being measured.

**13. In the typology you presented (for supply chain) - where is gastronomy? is it under processing? retail?**

Gastronomy, or the food service sector, falls under consumption that is under the Food Waste Index.

**14. Is there any tool/metrics to measure the food losses/waste for vegetables/fruits at wet markets in developing countries?**

The tools and data collection methods are very similar for wholesale and wet markets in developing countries.

**15. For the slide #15 is there any multiple regression models for each area related to weight loss including T and %Rh?**

Slide 15 did not report modelled estimates but descriptive statistics of available data. The loss imputation model developed is a mixed effect model that estimates losses by country and commodity where there is enough data. Where the data is insufficient, the model estimates a global loss factor by commodity.

**16. How one can measure farm loss in fragmented production units?**

One of the main recommendations of the methodology is to use sample-based agricultural surveys to accurately estimate losses in the traditional food value chain



characterized by small informal operations, where farmers operate in isolation and are small-scale.

**17. Is the FLI based on CPI?**

No, the two indices are completely independent. There is a similarity in their formulae because they are both fixed base (Laspeyres-type) indices, and we have chosen value of production for the weights.

**18. Do you have any methodology to calculate the food loss for one agricultural company (or one total sector) for example the average productivity/yield (tons/ha) and actual prod/yield?**

The methodology has been developed to fill in a gap and that is to provide stakeholders with a method and tool to accurately measure losses up to the national level and along many stages of the food supply chain.

The tools for data collection are different between sectors or stages. In the case of sample surveys, the questionnaires for data collection apply at the business or farm level. The methodology was not created with the specific objective to help single firms measure their losses and assess their efficiency against a benchmark. It was primarily developed for governments. However, FAO is currently developing a set of tools for the private sector, to help single operations measure their performance on SDG indicators and take action, which will be available in the near future. You may refer to the FLW protocol, another tool developed by a coalition of stakeholders, aiming specifically at individual entities.

The method you suggest, to compare actual yields to average yields goes into the direction of helping farms assessing their performance. There are however many factors others than losses that can cause lower productivity of a farm (local climatic conditions, agricultural practices and soil fertility, etc.).

**19. Where do we find the questionnaires for the report of the 5 food groups? Colombia has an agenda to start measurement this year... But we need to know if these questionnaires exist.**

The questionnaires are progressively being uploaded on FAO's page on SDG 12.3. If not published yet, we will be happy to share the questionnaires upon request via email.

**20. Based on the FLI, how do you translate this information into a calculation of GHG emissions for those commodities or value chains?**

GHG emissions from food losses can be estimated by applying emission factors for the various products at the various stages of the supply chain.

GHG emissions occur during the primary production phase; this is where agricultural inputs are used, livestock is reared and soils are cultivated. GHG emissions further accumulates along the supply chain during processing, transportation, distribution, preparation and disposal. For this reason, the carbon footprint of food that is lost or wasted towards the end of the supply chain may incorporate significantly larger embedded levels of GHG emissions than food lost earlier on in the chain.



The effect of a reduction in food losses or waste on land and water use and GHG emissions is determined by how the price changes caused by that reduction are transmitted throughout the supply chain and the wider economic system. As the food moves along the supply chain the level of GHG increases.

You may refer to Chapter 5 of the SOFA 2019 report on food losses and waste ([link](#)) and to the 2013 report on “Food wastage footprint. Impacts on natural resources “ ([link](#)).

**21. Is it reliable to build the index based on farmer declaration? I have a sensitive that there is possibility to have unbiased estimation.**

There is a growing consensus in the literature that farmers underestimate losses. A systematic difference between physical measurement and declaration-based estimates has been measured in a field-test of the two assessments in Ghana ([link](#)).

This is a concern that we are aware of but physical or objective measurements are costly and complicated. At the same time, the difference between the two data collection methods is small for some on-farm operations. For this reason, we recommend using physical measurement in a sub-sample only to correct the bias of declaration-based estimates but keep the survey costs under control.

**22. If the academy (or others) performs measurements at different scales and different value chains, can this data be reported? If possible, should it be done through national channels or can it be done directly to FAO Statistics?**

For official loss data, it should be reported through the official Statistical Office or the relevant ministry in the country. But for un-official loss data the academy can share the publications with us to form part of our extensive literature review and for it to be included in the Food Loss and Waste Database.

**23. When choosing commodities, if a country has a very small production of one of the baskets, for example a very small fish production, could instead other commodities be chosen to be measured from any of the other baskets?**

There is a difference between the minimum requirements for international reporting on the FLI and country information needs. The FLI must be compiled on two products per group for international reporting, but the basket selection of goods to be measured ultimately depends on the country's priorities. Countries can go above and beyond the two main products per category and compile a national FLI.

**24. Concerning the weights used in the Food Loss Index: Are the weights supposed to stay stable over survey rounds? (If losses for a product reduce, the supply will increase and the price fall (ceteris paribus). So, the impact of that improvement will be lower than if the weight stayed stable.)**

Yes, the FLI weights are supposed to stay stable over several Food Loss survey rounds. The FLI is a fixed-base index using the total value of agricultural production in the base period as weights. This value remains fixed if the same base year is being used and only loss percentages will change over time (hopefully based several loss surveys). This circumvents the problem mentioned in the question.



On when the base year of the index changes, the weights will change appropriately.

**25. How similar or different is the approach being used in FLI from the methodology being used by ESN and FI? Will FAO conduct regional or national workshops to train government enumerators?**

The Food Loss Assessment (FLA) methodology developed by ESN (and implemented also by FI) is different from the SDG methodology for data collection, however the two approaches are linked and complement one another.

FLA's are a crucial to analyse the value chain structure, identify the critical loss points and causes of losses, and identify the possible solutions. The estimates produced however are valid only within the scope of the study and are based on a very small number of observations so they cannot use to monitor losses at the country level.

FLA's or value chains analysis are part of the preparatory work of food loss measurements along the supply chain because they help setting a cost-effective data collection strategy. The data collection strategy will concentrate efforts and resources in the critical loss points, where most losses occur, interventions are mostly needed and the impact is expected to be highest, and use lighter cheaper methods in less relevant points of the value chain (loss-wise).

As for the second part of the question, technical assistance to countries was already rolled out and various regions and countries received training last year. Several more trainings were scheduled this year, unfortunately, were cancelled for the pandemic, but will be re-scheduled as normalcy is restored. An online course on the methodology and calculating the FLI will also be available soon and countries can already start using it to learn on their own. Countries in need of technical assistance on specific areas can contact us directly.

**26. Who exactly is in charge of reporting FLI to FAO, is there any procedure already established who should deliver the data? Is there a timeline for reporting FLI to FAO?**

Official country reporting on food losses via the FAO is taking place as for other SDG indicators.

Each country has a focal point either from the statistical office or from the relevant ministry that reports official country data to FAO. When questionnaires are sent out to countries, they normally have timelines. The next batch of questionnaires will be sent out in 2021.

**27. Do you have experiences of countries where the food loss index has been done by different entities and how the results differ? understanding that people can do it based on their interests, how could the results be reliable? understanding that people can do it based on their interests, how could the results be reliable?**

In fact, not many countries are calculating the food loss index yet and no country has calculations from different entities, at least not on the national level. One of the main recommendations in the FLI methodology, is that food loss measurement be undertaken within the national statistics system (by the statistics office, the line





ministries or other government institutions – the same institutions that compile the consumer price index, or agriculture statistics). This, to guarantee the adherence to official statistics principles of objectiveness and transparency.

**28. Is there any level of validation of such exercises that can allow publication? I'm asking this because in countries when it comes to PHL quantities, everyone tends to refer to what FAO has done but apparently FAO has provided tools for people to do their own assessments.**

To date, there is still a dire lack of national loss data. Very few countries carry out postharvest loss surveys, and even fewer estimate losses along the whole supply chain. For this reason FAO followed a two-pronged approach. The first prong aimed and filling in the data gaps. Losses were estimated with a model. The second prong was to develop the methods and tools to collect loss data within countries. Implementing the loss surveys requires time and resources, so there is still no visible result to date.

So FAO PHL estimates are still the benchmark that is commonly used by the FLW community.

**29. Did you mention that food losses measurement of supply chain also include the wholesale (but not retail)? In Vietnam, some markets play a role of both wholesale and retail so whether we consider it is inside food loss or food waste.**

This is an important point. The SDG set a boundary at the retail stage between what is considered a loss and what is considered waste. This boundary is reflected in the indicators that monitor losses and waste respectively. Of course, like any rule that is set for the whole world, it does not reflect all the situations.

The boundaries between the various supply chain actors are sometimes not very distinct in some countries. These cases require some decisions and discretions on the part of the countries as to how to best measure losses. The method for estimating losses at the wholesale market level can be applied to wet markets that serve as both wholesale and retail.

For an accurate compilation of the FLI, a breakdown between the wholesale component and the retail component should be made either in the survey design itself (wholesalers and retailers tend to operate at different times of the day in the same market) or with other disaggregation techniques.

**30. How are we doing with a unified methodology so far between countries? The problem is that we KNOW that different countries are measuring food losses differently, meaning results and charts are not reliable to a certain percentage. Are there clear guidelines regarding methodology of measuring food losses including here the line where data from countries should be discarded due to low data, low consistence or other reasons?**

Addressing differences across countries was one of the challenges in developing the methodology. While the index is the same (like the consumer price index that is similar in all countries), the data collection methods and tools, or the estimation methods, can vary across countries.



It is not realistic nor advisable to impose the same type of surveys and methods in all countries. One does not survey smallholders like large commercial farms. What matters is that the definition of losses is the same, that data are representative and that accuracy is known.

The Guidelines on the measurement of harvest and postharvest losses propose a range of data collection and estimation methods, with recommendations and caveats on their limitations.

However some level of inconsistency or non comparability must be expected. Even inside the European Union, the EU directive on the measurement of food waste allows member-States to select what they consider the most appropriate measurement method at each stage of the supply chain.

### **31. Is the current methodology of measuring clear, simple and available to us countries?**

A great effort has been put in developing a consistent and comprehensive framework, and in making all material openly available ([link](#)).

The material was written to make the message as simple and clear as possible.

We have also organized the material by type.

- a paper on the methodology and calculating the FLI with an online course (available soon) which tries to simplify the methodology
- The guidelines for data collection by main group of products (grains, fruits and vegetables, animal products, fish)
- Field tests and pilot survey reports, to share the field experience and give concrete examples
- Questionnaires for data collection that can be adapted in each country.

FAO Regional Offices and the technical divisions at Headquarters (Nutrition, Statistics) are available for further clarification and support.

### **32. How could we collect data correctly to use for indexing FLI and FSI?**

Materials are available that countries can use in order to learn how to correctly calculate the FLI. They are available here: <http://www.fao.org/sustainable-development-goals/indicators/1231/en/>

FAO Regional Offices and the technical divisions at Head-Quarters (Nutrition, Statistics) are available for further clarification and support.

### **33. What is the risk that you see emanating from several people doing the assessments that may not be proper and basing on those for decision making?**

Assessments provide a description of the supply chain, they identify the critical loss points, the causes of losses and the possible interventions. They produce some loss estimates that can be used for benchmarking purposes. One risk is to use the results from an assessment carried out for example in one region on a certain value chain to draw conclusions on the whole country or on a different region.



Policy decision making should be based on official loss data, which should be properly collected based on laid down guidelines and methodology. Policy makers should be made aware of the limitations of the data used for the evidence base.

**34. Who exactly will be in charge of reporting FWI to UNEP, is there any procedure already available and a timeline until when the data should be provided to whom, in which format etc.?**

UNEP will give guidance on this once they have the methodology ready. Countries can engage with any custodian agency through the national SDG focal points and reporting channels.

**35. Is there any tools available to study about the PHL in poor countries like Nepal.? If not, the concerned organizations need to develop those so that people from poor countries can use that. We might not have enough resources to build those tools.**

The guidelines were developed with a concern for countries with a limited statistical resources and capacity. The guidelines were implemented in Malawi and Zimbabwe that are two low- income countries. These reports will soon be made available online for reference.

Another resource is the reviewed literature on PHL in Nepal and other countries with similar characteristics. If you visit the Food Loss and Waste database you will be able to see what is available : <http://www.fao.org/food-loss-and-food-waste/flw-data/en/>

**36. How could we collect data to use for indexing FLI and FSI?**

Guidelines for the measurement of PHL have been developed by FAO. Guideline for measurement of grains and pulses has been published while others are still being revised and will be available soon. Countries can use these guidelines together with the methodological paper on SDG indicator 12.3.1a to collect data and to calculate the FLI correctly. These documents are available at: <http://www.fao.org/sustainable-development-goals/indicators/1231/en/>

**37. Do you think that a mobile-based approach for food waste assessment at consumer level would be beneficial?**

This question is rather for the UN Environment. However, if consumers have a tool of measuring stock of food purchased and wasted at the household level it will be beneficial in the calculation of the food waste percentages because the figures will more accurate as compared to the use of re-call method.

Also, a mobile app can help raise people's awareness on their own level of food waste. Awareness raising is one of the effective policy measures for reducing food waste at the consumer level.

**38. Can edible mushroom losses be measured? Is there some information about edible mushrooms in the database?**

Mushroom losses can be measured, and there is some data in the FLW database.



**39. Fruits which get damaged and are discarded after a few days at traditional retail markets, such as Rosa presented, is that food loss or food waste?**

Any discarded food products in the retail markets and beyond is categorized as food waste.

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