



## **AWARENESS MODULE:**

**Food waste, environmental, economic and social impacts and implication.**



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## General information. Module 1

**Title:**

*Food waste, environmental, economic and social impacts and implications*

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**Duration:**

6 hours – The duration of this module is four hours of the lesson and two hours the practice of the exercises.

**Objective:**

Raise consumer awareness of the environmental, economic and social impact of food waste.

**Introduction:**

This module describes the different stages in the food chain and their relationship with food loss and waste. Then, the concepts of food loss and waste are defined, alongside the presentation of the main figures worldwide. Additionally, the two main indexes to quantify the progress towards SDG 12 are shown. Likewise, the main causes of food waste are explained as well as the most important socio-economic and environmental impacts. Finally, the module closes with the justification of the fight against food waste.

**Learning outcomes**

On successful completion of Learning Unit one participants should be able to...

Knowledge

- Know the different stages of the food chain and its implications in food waste.
- Know the concepts of food loss and food waste.
- Identify the main drivers behind food waste.

Technical skills

- Understand the differences between food loss and food waste.
- Interpret the food waste index and the way towards SDG 12.

Soft skills

- Appreciate the economic, social and environmental impacts of food waste.
- Raise awareness on the global dimension of food waste.

# Main contents



### 1. | Motivation / General framework

A famous saying says: “*we are what we eat*”

Food can be defined as any substance – whether processed, semi processed or raw – that is intended for human consumption. Food includes drink and also material that has spoiled and is therefore no longer fit for human consumption.

Food is the essential resource for the life of any living being. If there is no food, there is no life. Food provides us with the necessary materials and energy to develop our basic activities, moving, working, thinking... But unfortunately, in a big part of the world people care very little about where food came from and consider it as an inexhaustible resource that it is not necessary to worry about.

Every year thousands and thousands of tons of food are lost or wasted due to the lack of awareness of its value. “Food loss and waste” refers to the edible parts of plants and animals produced or harvested for human consumption, but not ultimately consumed by people. To put it in big numbers, in 2013, one out of every four food calories intended for people was not ultimately consumed by them (Lipinski et al., 2013), and the problem grew in the last years.

This issue is reaching such importance that it is essential to reflect on it trying to stop it. For this purpose, it is essential to know in depth how to measure it, its scale, its main causes, as well as its direct and indirect social and environmental effects. Knowing the problem well is the way to begin to remedy it.

#### 1.1 | The food supply chain

In urban societies, it is quite usual to forget where the food comes from. Knowing the process of food from the field to the plate is essential to value the importance of food. The whole process is known as “food supply chain” and is divided into four main parts:

- 1) Production;
- 2) Storage and distribution;
- 3) Processing and packaging;
- 4) Retail and markets.

These stages are interconnected, as the decisions and actions in one stage can influence the others. Besides, altogether they impact the food production process and the kind of food available for consumption (HLPE, 2017). Consumers are the agents at the end of the supply chain. They consume all the kinds of fresh or processed food in households or restaurants.

## The stages of the food supply chain and the actors involved



Source: own elaboration from HLPE (2017)

**1) Production.** It affects the availability, affordability, quality and diversity of food. Production includes the processes of sowing, growing and harvesting cereals, fruits and vegetables, and also all the stages of animal production prior to slaughter as for example, cattle and poultry raising as well as dairy and egg production (HLPE, 2017). Agricultural production can be traditional (small farms managed by peasants) or industrialized (bigger farms highly mechanized). Production can be local when the food is produced near the consumer or global when it travels hundreds or even thousands kilometres before it reaches the final consumer. Many actors as farmers, indigenous peoples, agribusiness, land and plantation owners and fisheries are involved in this step of the food chain (HLPE, 2017).

**2) Storage and distribution.** As a first step, the food that the producers do not consume themselves must be stored. Then, it can be consumed or distributed, that is, transported to the retailers and the different phases of load and unload products. This stage has a great impact on food waste. If the facilities for the conservation of food (for example cold storage and distribution) are not available, food will be wasted. This would be the case of nutrient dense food that cannot be consumed shortly in time or close to the production area. Among the actors involved in this stage, we could highlight transporters, agribusiness and distributors.

**3) Processing and packaging.** It includes milling, cooling, freezing, smoking, heating, canning, fermentation and extrusion cooking. This stage is important to prevent food waste as it extends the life of products, increases the availability of nutrients and improves the properties of food. Some of the agents involved in this step of the food chain are packing plants, the food and beverage industry and small and medium enterprises (HLPE, 2017).



**4) Retail and markets.** After processing and packaging, food goes to markets (both formal and informal) and the retail sector (HLPE, 2017). Thus, this stage of the supply chain involves the process of shelling fresh or processed food to consumers at different scales. The exchanges can happen in markets, supermarkets and different kinds of restaurants or catering firms. In some cases, retail can involve a second round of packaging or processing, including pre-cooking or cooking food. In sum, we can say that this step comprises retailers, vendors, food outlet owners, traders, restaurateurs and wholesalers, among others.

The European Green Deal has put into the forefront the Farm to Fork Strategy, which seeks to transform the food supply chain into a healthy, fair and environmentally friendly system. Within this general goal, the Farm to Fork Strategy has specific aims closely related to the food chain as the production, processing, distribution and consumption of food in a sustainable way and the prevention of food loss and food waste. Encouraging sustainable food systems not only promotes the health of natural ecosystems, but could also have significant advantages for all the agents that participate in the food chain.

## **1.2 | Food loss and food waste**

Food can be wasted in different ways in each step of the food chain. Usually, a differentiation is made between food loss and food waste.

“Food loss” refers to food that spills, spoils, incurs an abnormal reduction in quality or otherwise gets lost before it reaches the consumer. It typically occurs at the production, storage, processing and distribution stages of the food value chain, and is the unintended result of agricultural processes or technical limitations in storage, infrastructure, packaging, and/or marketing. Losses that occur during storage, transport and processing, also of imported quantities, are therefore all included. Losses consider the commodity as a whole with its non-edible parts.

## The differences of food loss and food waste



Source: FAO (2016)

“Food waste” refers to food that is of good quality and fit for human consumption but that is not consumed because it is discarded before or after it spoils. Thus, food goes to one of the following end destinations: landfill, controlled combustion, sewer, litter/discards/refuse, co/anaerobic digestion, compost/aerobic digestion or land application. Food waste typically, but not exclusively, occurs at the retail and consumption stages and is the result of negligence or a conscious decision to throw food away.

Both food loss and waste could be reduced if producers, manufacturers, distributors, retailers and consumers became aware of the problem, and each of us took the necessary measures to avoid it.

As we will see, efforts made to measure food waste are bigger than those to measure food lost.

### 1.3 | Food waste and the SDG

An important step forward in raising awareness on this issue was the setting of food loss and waste as a defined target within the internationally agreed Sustainable Development Goals (SDG). The problem is directly reflected in objective 12, about sustainable consumption and production (SCP), and more specifically in targets 12.3. (shift towards SCP in the food system) and 12.5. (Environmental impacts such as waste management).



Reducing food loss and waste can also help to achieve progress on SDGs 2 and 4 related to Zero Hunger and Poverty Reduction.



## 2. | Scale of the problem. Why is it important?

### Facts and figures:

- It is estimated that by 2050 the world's population will reach 9.1 billion, 34% higher than today (FAO, 2009). In order to feed this population, global food production should increase by 70%.
- According to UNEP (2021), around 931 million tonnes of food waste was generated in 2019. Households contributed 61% to this figure, food service 26% and retail 13%. These figures suggest that more than 17% of the global food production is wasted.
- If we consider both food losses and food waste, around one third of all food produced worldwide for human consumption in the world is lost or wasted (FAO, 2013).

*“The weight of unused food would be equivalent to that of approximately 23 million fully loaded 40-tonne lorries, which, when lined up, would circle the earth seven times.”*

- On a global per capita-level, 121 kilograms of consumer level food are wasted each year, 74 kilograms in households.

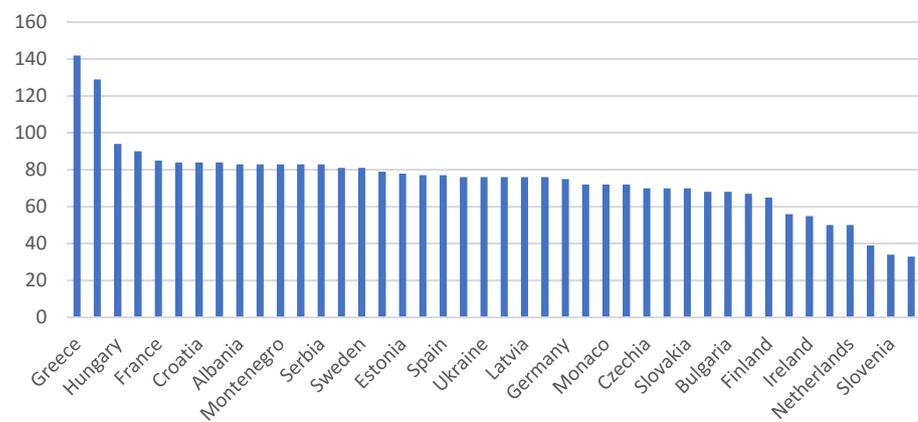
To put these alarming figures in context, FAO et al. (2020) estimated **that 690 million people in the world suffer from hunger in 2019**, and around 3 billion people cannot afford a healthy diet. According to FAO et al. (2015), **if one quarter of the food currently lost or wasted could be saved, it would be enough to feed 870 million hungry people.**

Thus, reducing food waste offers significant gains for the entire population. In addition to improving food security, and contributing to the reduction of social inequalities through food savings and food security, it has important effects on the environment and biodiversity. If food waste were a country, it would be the third largest emitter in the world, behind only China and the USA (FAO, 2013).

- Contrary to the previous belief that food waste was mainly concentrated on developed countries, UNEP (2021) concluded that the **generation of food waste is a global problem**, very similar between countries with different income levels. Thus, in high-income countries, the average food waste in households was 79 kg/capita/year, in upper middle-income countries 76 and in lower-middle income countries it was 91 kg/capita/year.
- Thus, action to combat food waste is equally relevant in countries at different income levels. There is also a consensus that previous

estimates of food waste were clearly underestimated. This also contrasts with the previous narrative of a world where food waste was concentrated in developed countries, while losses were concentrated in developing countries due to inefficiencies in the production, storage and distribution. It is estimated that EU food waste was around 88 million tonnes (Stenmarck et al., 2016). This food waste leads to 170 million tonnes of CO<sub>2</sub> emissions and 261 million tonnes of resources. The associated costs are estimated by Stenmarck et al. (2016).

### Household food waste estimate (kg/capita/year) in European countries



Source: UNEP (2021)

- In a case study for Spain (MAPA, 2019), 79.1% of households admit to wasting food. Of these, 79% throw away food as they have bought it, and up to 30% admit to throwing it away after cooking, either from the fridge or from the plate. By products, the highest wastage rates are 40-50% for root crops, fruit and vegetables; 35% for fish; 30% for cereals; and 20% for oilseeds, meat and dairy products.

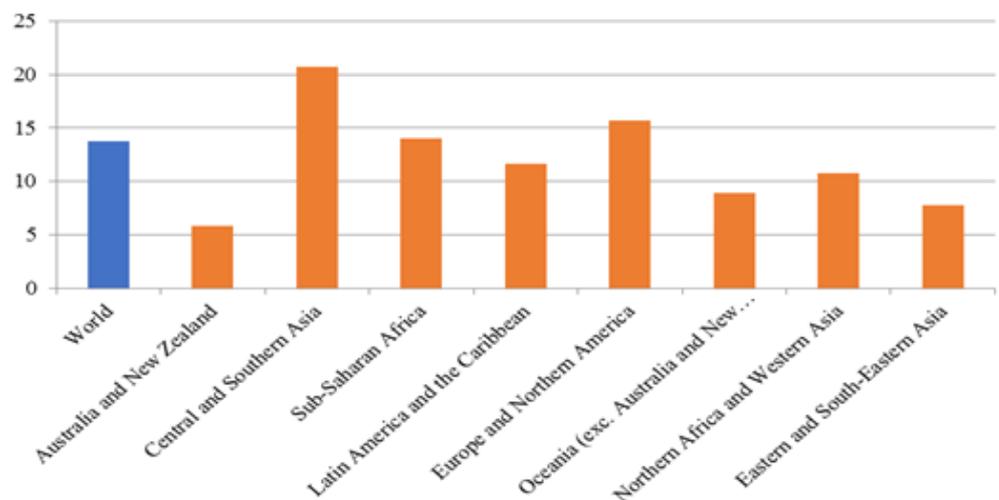
## 3. | Indexes and measuring tools

### 3.1 | How to measure Food Waste?

In order to achieve Target 12.3. of the Sustainable Development Goals (reduce by 50% per capita global food waste at retail and consumer levels by 2030, as well as reducing food losses along the production and supply chains) and to **measure the progress towards the SDG target**, two main indices were developed: Food Loss Index (FLI) and the Food Waste Index (FWI).

**Food Loss Index:** FLI was developed by the Food and Agriculture Organization of the United Nations (FAO) and provides evidence on food losses from production just up to the retail level (not including it). This index measures the changes in percentage losses for a basket of 10 main commodities by country in comparison with a base period.

Food loss index (%) in 2016



Source: UNEP (2021)

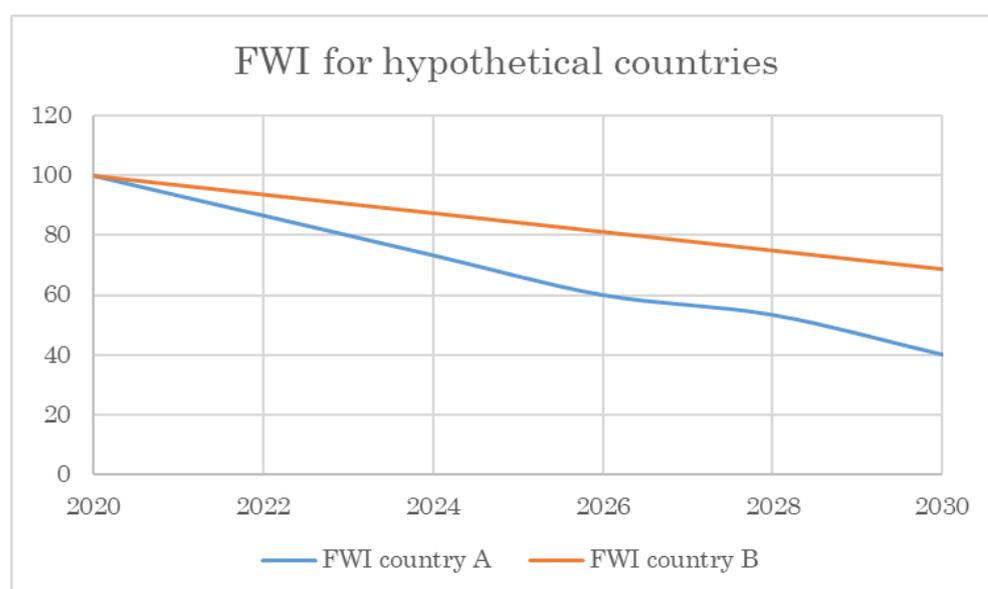
According to FAO, in 2016 **Central and Southern Asian countries exhibited the highest values for the FLI**, accounting for more than 20%, while for Australia and New Zealand the index barely reached 5%.

## Food Waste Index

In a complementary way to FLI, the **Food Waste Index**, developed by the United Nations (UN), covers the later stages of the food supply chain – food waste – occurring at the household, food service and retail level.

This FWI index is conceived as an indicator of the **progress in the reduction** of household food waste estimates. For instance, for two hypothetical countries A and B, and considering 2020 as base year, the corresponding FWI index could be as follows:

Household food waste estimate (kg/capita/year)				
Year	Country A	Country B	FWI country A	FWI country B
2020	150	80	100	100
2022	130	75	87	94
2024	110	70	73	88
2026	90	65	60	81
2028	80	60	53	75
2030	60	55	40	69





Although country B reports lower values of per capita food waste over the whole period, its FWI is higher than for country A, as the progress towards the objective of halving household food waste is more intense in country A (reaching the SDG by 2028) than in country B.

In order to obtain data for the construction of the FWI for different countries and sectors, a three-level methodology is implemented:

- Level 1: Modelling and extrapolation is used to generate food waste data for those countries that do not have their own measurement.
- Level 2: (The recommended level to measure the progress towards SDG). It involves the measurement of food waste in countries and sectors, generating primary data on current food waste. In this level, household and retail sector studies are used to provide comparable national data.
- Level 3: Additional information on specific sectors and data disaggregation by destination and other socioeconomic variables is provided, obtaining the most comprehensive picture.

## 4. | Food waste impacts

Food waste generates burdens that affect the environment, the economy, and also, human well-being. We can analyse these impacts on the basis of different scientific studies.

### The environment.

The production, packaging and distribution of food generates important environmental impacts. By wasting food all the environmental resources to produce it are wasted too.

- Food requires energy for its production, transportation and disposal. To give you some numbers:

***“38% of the energy globally used to produce food is lost or wasted” (FAO, 2014).***

- Food consumes and pollutes (groundwater and surface) water resources. To give you some numbers:

***“Global food waste represents 24% of water resources used in food production” (Kummu et al., 2012).***

***“In the EU, 12% of the nitrogen emitted to water bodies in food production is due to food waste, with meat being responsible for around 50% of the emissions” (Grizzetti et al., 2013).***

- Food generates emissions from agricultural machinery and transport vehicles. To give you some numbers:

***“8-10 % of global greenhouse gas emissions are associated with food that is not consumed” (Mbow et al., 2019).***

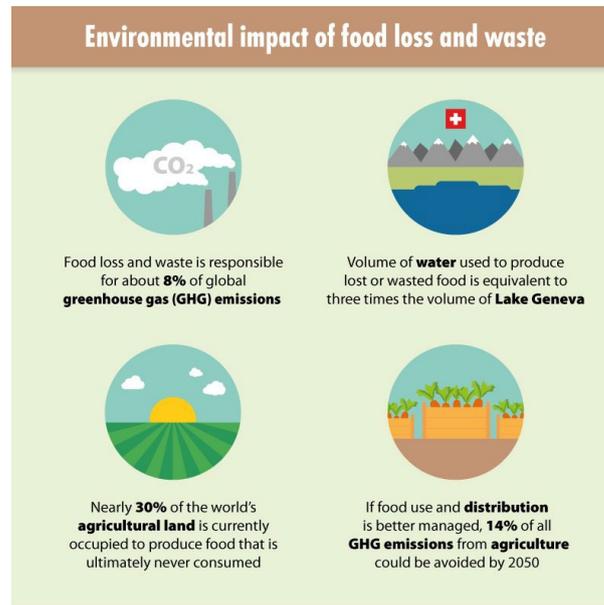
- Food production degrades land through desertification and deforestation. To give you some numbers:

***“Food waste accounts for 23% of cropland utilised in food production globally” (Kummu et al., 2012).***

- Food contributes to biodiversity loss due to agricultural changes and sea food waste. To give you some numbers:

***“Agriculture is responsible for a majority of threats to at-risk plant and animal species tracked by the International Union for Conservation of Nature” (FAO, 2013).***

## Environmental impacts of food loss and waste



Source: UN environment program

### The economy.

Food waste generates important financial losses.

- Globally, it involves a decrease in economic value. To give you some numbers:

*“Food wastage of agricultural products in 2007 amounted to around 750 billion dollars, which is equivalent to the total GDP of Switzerland or Turkey in 2011” (FAO, 2013).*

- At the individual level, it reduces the purchasing power of households. To give you some numbers:

*“In the United States, food waste represents about 10% of the total food expenditure and around 1% of the individual disposable income” (Buzby and Hyman, 2012).*

- Food waste induces inequality between developed and developing areas. To give you some numbers:

*“Food waste amounts to similar volumes in high and low income areas. However, consumers in industrialized areas waste almost as much food as the entire net food production of sub-Saharan Africa” (FAO, 2011).*



## Human well-being.

Food waste involves high negative impacts on people's lives:

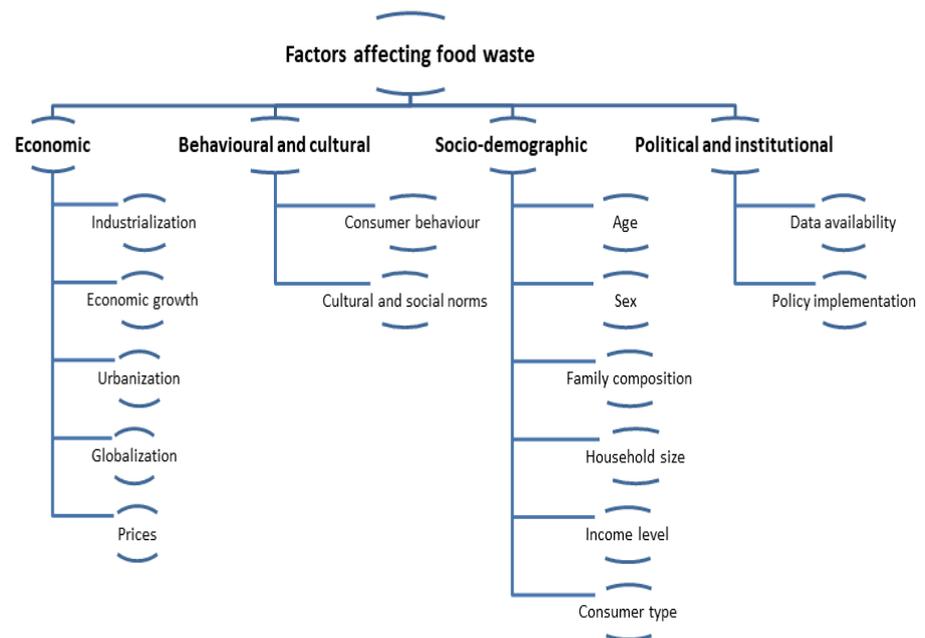
- Despite having enough food available for all the people in the world, many citizens suffer from food insecurity. To give you some numbers:

*“The volume of food wasted globally would be enough to feed 4 times all the hungry in the world” (FAO, 2011).*

*“Even if 25% of the food wasted globally could be saved, it would be enough to feed 870 million hungry people in the world” (UN, 2020).*

## 5. | Drivers of food wastage

According to Thyberg & Tonjes (2016) “food waste is a function of cultural, personal, political, geographic and economic drivers.”. Thus, food waste is affected by a combination of determinants as:



Source: own elaboration

### Economic factors

- **The industrialization of food supply chains:** it influences the types and quantity of food waste. Food processing increases packaging (boxes, cans, trays, etc.) and the components of the animals and plants to be disposed (bones, husks, fats, pods, etc.).
- **Economic growth:** it boosts dietary changes towards larger shares of meat, fish and dairy products that involve larger food wastes. Besides, as household's income increases, food loses weight in the total expenditure and people tend to waste more food. Likewise, the increase in income entails a larger expenditure in leisure and restaurants which increases the likelihood of food waste.
- **Urbanization:** it disconnects citizens from the origin of food, as people are far from the place where it is produced. Thus, the knowledge about the on-site production processes of food is lost. In urban areas food is

diverse and mostly not local, increasing food waste in comparison to rural areas.

- **Globalization:** it widens the distance between the geography of production and the geography of consumption. The globalization of food supply chains induces an increase in the range of available foods and the import of non-local products (mainly farming goods) associated with the new dietary patterns. This growing disconnection between production and consumption triggers food waste.
- **Prices:** Excessively low prices perceived by farmers could hurt food producers and farm workers, generating an increase in food waste.

### Behavioural and cultural drivers

- **Consumer behaviour:** the way that consumers behave depends on issues that affect them individually. First, one of the most important determinants modelling consumer's behaviour and food waste is awareness. Knowing how much food we waste is key to carrying out the right changes. Second, attitudes towards food waste also induce the reduction of wasteful behaviour. These attitudes are influenced by the information that consumers have (think for example about the difference on the expiry and the durability date). Third, habits also influence food waste. Past behaviours as food waste are likely to be repeated (Russell et al., 2017). Finally, emotions also influence wasteful behaviour. For example, consumers tend to feel guilty when they waste food (Watson and Meah, 2012). Emotions as anticipated guilt can help to avoid food waste.
- **Cultural and social norms:** Cultural values influence the individual behaviour and attitudes. Perceptions of edibility are different among cultures. Besides, some societies have strong historical traditions regarding food, which makes them less vulnerable to the modernization of food systems and to food waste. In developing economies, there is a tendency towards buying small portions of food each time, which reduces the probability of wasting food. Furthermore, in some regions, cultural values such as hospitality induce to cook more than the necessary for guests, involving large food waste (Zhang et al., 2018). In other places, food is used as a way to celebrate. This is the case of "La Tomatina" in Spain (where people throw tomatoes away) or similar festivities around the world.

### Socio-demographic determinants

Although there is no consensus about the socio-demographic issues boosting food waste, the existing evidence points at:

- **Age:** Young people seem to waste more than old people. In developed areas, the oldest cohorts lived periods of austerity in the past.

- 
- **Sex:** women tend to waste less.
  - **Family composition:** households tend to waste more if there are children in the family.
  - **Household size:** Large households waste more than small ones in per capita terms. People that live alone tend to generate more waste.
  - **Income level:** food waste seems to increase with the household income.
  - **Consumer type:** price-oriented consumers tend to waste less food.

#### **Political and institutional issues**

- **Limited data availability:** it makes it difficult to quantify the level and trajectory of food waste. There are problems in distinguishing the magnitude of food wastage in developed versus developing areas. It is not possible to differentiate the waste of edible versus inedible parts, mainly in low income countries.
- **Policy implementation:** some policies that were implemented to achieve food safety or enhanced nutrition can also induce food wastage. This could be the case of certain laws as the data label laws that restrict donations.

## 6.1 Justification of the fight against food waste.

As we have seen in this module, food waste is a big problem that needs to be shown in order to shed light on the ways to contribute to its reduction and to increase people's awareness. We have seen that many efforts are made to measure the true scale of the problem. The methods to quantify food waste are varied, however all of them point to it as an important problem. We have also found that the impacts of food waste are wide and imply economic, social and environmental aspects. Therefore, fighting against food waste can result in positive outcomes in different directions.

If we start with the economic side of the problem, reducing food waste can help all the agents involved in the different steps of the food chain to save money, from the producers to the consumer. The food wasted needs a previous investment to be produced, processed, transported and retailed. Therefore, if we throw it in the landfill, we are also wasting money. And this happens both at the macroeconomic and at the household level.

The food wasted each year is remarkably similar in low-middle income and high-income countries, suggesting that most countries have room to reduce food waste. Nevertheless, savings could be more important for low-income countries. This is true also at the household level. Families with lower purchasing power spend a higher proportion of their income on food. Therefore, they could benefit if they became aware of the problem and wasted less food.

Reducing food waste has also an important social side. Food saved from being wasted increases the amount of available food, and it can benefit the weakest part of the society. If a similar quantity of food were destined to feed the poorest, the fight against hunger could largely improve, using the same resources. Reducing food waste can also help to achieve food security, contributing to avoiding famine.

Finally, the environmental perspective of food waste is quite astonishing. If food loss and waste were a country, it would be the third biggest source of greenhouse gas emissions. Food waste also burdens waste management systems, making it a major contributor to the three planetary crises of climate change, nature and biodiversity loss, and pollution and waste. Similarly, the food wasted has been produced using land, water, fertilizers and pesticides. Amounts of oil, electricity and materials have been used to process, package and transport it. Indirectly, we can also imagine that a part of the food wasted can have contributed to deforestation or land erosion. Therefore, reducing food waste can avoid all those resources being wasted.

To sum up, food waste reduction offers multi-faceted wins for people and the planet as saving money, improving food security, addressing climate change,



as well as reducing the pressures on land, water, biodiversity and waste management systems. Yet, this potential has until now been woefully under-exploited.

# Evaluation section



## 1. | Multiple choice questions

**1. The economic factors that drive food waste are:**

- a) Globalization, urbanization, culture and sex.
- b) Globalization, culture, age and sex.
- c) Economic development, industrialization of supply chains, globalization and urbanization.
- d) Economic development, industrialization of supply chains, culture and the household size.

**2. The globalization of food supply chains:**

- a) It is related to hospitality and the effect of social norms on food waste.
- b) It disconnects the production and consumption of food, boosting food wastage.
- c) It is related to consumer's sex.
- d) None of the above.

**3. The limited data availability about food waste:**

- a) Makes it difficult to quantify food waste and evaluate its trend
- b) Makes it difficult to compare food waste in high income and low income countries.
- c) In developing areas, it is not possible to differentiate the waste of edible and inedible parts.
- d) All of the above.

**4. Food wastage generates negative impacts on:**

- a) The environment.
- b) The economy.
- c) Human well-being.
- d) All of the above.

**5. Regarding the financial effects of food wastage, we could say:**

- a) It contributes to the increase in household's purchasing power.
- b) It generates notable losses on the global economic value.
- c) It does not affect to the disposable income of citizens
- d) None of the above.

**6. Considering the environmental connections of food wastage, it is possible to say that:**

- a) It increases the use of water resources.
- b) It makes greenhouse emissions grow.
- c) It degrades land quality.
- d) All of the above.

**7. Food wastage affects human well-being because:**

- a) It contributes to improving the health of citizens.
- b) It reduces inequalities among people.
- c) It generates food insecurity.
- d) None of the above.

**8. According to UNEP (2021),**

- a) Households are the main contributor to food waste in the supply chain.
- b) Food service is the main contributor to food waste in the supply chain.
- c) Retail sector is the main contributor to food waste in the supply chain.
- d) None of the above.

**9. Recent studies show that:**

- a) The generation of food waste is a global problem, very similar between countries with different income levels.
- b) Developed countries produce significantly higher levels of per capita food waste than developing countries.
- c) Developing produce significantly higher levels of per capita food waste than developed countries.
- d) All of the above.

**10. In order to measure the progress towards the SDG Target 12.3., the main indexes are:**

- a) Food Loss Index (FLI) and Food Waste Index (FWI).
- b) Food improvement index along the global value chains.
- c) It is not possible to measure this progress.
- d) None of the above.

**11. “Most households in Spain admit to wasting food both, as they have bought it, and after cooking”. This sentence is:**

- a) True.
- b) False.

**12. Complete the missing links of the food chain:**

- a) Production
- b) Storage and distribution
- c) Processing and packaging
- d) ..... (Retail and markets)

**13. “Food loss” refers to food that spills, spoils, incurs an abnormal reduction in quality or otherwise gets lost before it reaches the consumer.**

- a) True.
- b) False.

**14. “Food waste” typically does not occur at the retail and consumption stages.**

- a) True.



b) False.

**15. Families with lower income levels spend a higher proportion of their income in food. Therefore, they can benefit if they become aware of the problem and waste less food.**

- a) True.
- b) False.

**16. If food loss and waste were a country, it would be a not significant source of greenhouse gas emissions.**

- a) True.
- b) False.

**17. Reducing food waste, we can**

- a) Save money.
- b) Improve food security.
- c) Reduce pressures on land, water and resources.
- d) All of the above.

## 2. | Activities/optional exercises

- Think about the food you have consumed in the last weeks. Note the quantity of the food you have wasted and the reasons for doing it.
- Following the infographic about the determinants of food waste, explain which ones (and why) affect you mostly.
- Trace a strategy to be able to achieve the SDG 12.3 individually, i.e., how could you as a consumer halve food waste by 2030?



### 3. | Multiple choice answers

1 a	6 d	11 a	16 b
2 b	7 c	12 d	17 d
3 d	8 a	13 a	
4 d	9 a	14 b	
5 b	10 a	15 a	

# Key concepts and vocabulary



## Key concepts and vocabulary

**Agricultural production:** farming process of sow, grow and harvest cereals, fruits and vegetables, and also cattle and poultry raising and dairy or egg production. Agricultural production can be traditional (small farms managed by peasants) or industrialized (bigger farms highly mechanized using big amounts of fertilizers, pesticides and phytosanitary products). Production can be local when food is produced near the consumer, or global when it travels hundreds or even thousands kilometres before it reaches the final consumer.

**Consumption:** final stage of the food chain and involves all the different kinds of fresh or processed food in households or restaurants.

**Distribution:** process of transport to the retailers and the different phases of load and unload products.

**Food:** any substance – whether processed, semi processed or raw – that is intended for human consumption. It includes drink and also material that has spoiled and is no longer fit for human consumption.

**Food loss:** Food that spills, spoils, incurs an abnormal reduction in quality or otherwise gets lost before it reaches the consumer. It typically occurs at the production, storage, processing and distribution stages of the food value chain, and is the unintended result of agricultural processes or technical limitations in storage, infrastructure, packaging, and/or marketing.

**Food Loss Index:** Indicator developed by the Food and Agriculture Organization of the United Nations (FAO) that provides evidence on food losses from production just up to the retail level (not including it). This index measures the changes in percentage losses for a basket of 10 main commodities by country in comparison with a base period.

**Food supply chain:** series of processes by which food is grown or produced, sold, and eventually consumed. It is divided in six main parts: 1) Agricultural production; 2) post-harvest handling and storage; 3) manufacturing; 4) distribution; 5) retailing; and 6) consumption.

**Food waste:** Food that is of good quality and fit for human consumption but that is not consumed because it is discarded before or after it spoils. Food waste typically, but not exclusively, occurs at the retail and consumption stages and is the result of negligence or a conscious decision to throw food away.

**Food Waste Index:** Indicator developed by the United Nations (UN) that covers the later stages of the food supply chain – food waste – occurring at



the household, food service and retail level. It is conceived as an indicator of the progress in the reduction of household food waste estimates

**Manufacturing:** stages of processing food (peeling, cutting, boiling, cauterizing, ...) and the bulk packaging of products

**Post-harvest handling and storage:** processes of drying, cleaning or milling products after harvest, slaughtering cattle or poultry and the storage of the net product.

**Retailing:** process of shelling fresh or processed food to consumers at different scales. It includes markets, supermarkets and different kinds of restaurants or catering firms. In some cases, retail can involve a second round of packaging or processing, including pre-cooking or cooking food.

# Useful resources



## Useful resources

[https://en.reset.org/knowledge/global-food-waste-and-its-environmental-impact-09122018#:~:text=Global%20food%20waste%20is%20a,financial%2C%20ethical%20and%20environmental%20costs.&text=An%20estimated%201.3%20billion%20tonnes,FAO\)%20of%20the%20United%20Nations](https://en.reset.org/knowledge/global-food-waste-and-its-environmental-impact-09122018#:~:text=Global%20food%20waste%20is%20a,financial%2C%20ethical%20and%20environmental%20costs.&text=An%20estimated%201.3%20billion%20tonnes,FAO)%20of%20the%20United%20Nations).

<http://www.fao.org/resources/infographics/infographics-details/en/c/414196/>

<https://menosdesperdicio.es/publicaciones-enlaces/documentos>

<http://www.fao.org/policy-support/policy-themes/food-loss-food-waste/en/>

<http://www.fao.org/3/ar429e/ar429e.pdf>

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