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Background

Food loss and waste are a massive global problem: one-third of all the food produced in the world is either lost or wasted every year between leaving the farm and reaching our plates, which equals a staggering amount of 1.3 billion tons of perfectly good and edible food or 216 kg for each of us. Not only does this wastage create immense economic costs, food loss and waste also comes at a high environmental and social price\(^1\).

Food losses and waste (FL&W) in the Near East & North Africa (NENA) region are high and contribute to reduced food availability, aggravated water scarcity, adverse environmental impacts and increased food imports in a region that already depends highly on imported food. It is estimated that 14 to 19% of grains, 26% of roots and tubers, 16% of oilseeds and pulses, 45% of fruits and vegetables, 13% of meats, 28% of fish and seafood, and 18% of dairy products are lost or wasted in the NENA region\(^2\).

These educational materials were prepared under the Egypt component of the regional project “Food Loss and Waste and Value Chain Development for Food Security in Egypt and Tunisia” which is implemented by FAO in collaboration with the Ministry of Agriculture and Land Reclamation and funded by the Italian Agency for Development and Cooperation. They aim to provide students aged 12 - 15 with a broad introduction to value chains, FL&W, the current status in the region, and the role of students in reducing FL&W and improving nutrition, while allowing teachers to meet curricular objectives effectively. The teaching guide is designed to guide teachers to implement the sessions. It is meant to be directly applicable for work in class, with a practical but not overly didactic approach.

The overall objective of this activity is to raise awareness among schoolchildren, teachers and staff about the problem of FL&W and introduce good practices to encourage food waste reduction. These efforts contribute to the achievement of the sustainable development goals (SDGs), particularly to target 12.3 that aims to halve food waste and reduce food loss globally by 2030.

\(^1\)FAO. 2018.
\(^2\)FAO. 2015.
An active and effective pedagogical approach

The teaching guide is student-driven, rich in active sessions using activities and discussions, and draws inspiration from internationally-recognized approaches such as the enquiry method. Discussing value chains and the reasons and consequences for FL&W with students encourages them to think about their relationship with the environment, their own important place in the social, political and ecological world. Students’ role as disseminators of food waste knowledge and as experts within their families, local and school communities can raise their level of self-assurance and self-esteem.

How to use this teaching guide

The material has been designed for first and second preparatory students aged 12 to 15. Our main aim in designing this material has been to make it as flexible as possible. The teaching material includes three main modules: the first defines food value chains, the second defines and identifies FL&W, its environmental impact and the role of students in reducing FL&W, and the third module discusses nutrition and the negative impacts of unhealthy eating habits. Each module includes objectives, a teaching plan, background information for the teachers’ understanding, suggested sequence of actions for each lesson, vocabulary learned, and the list of activities that are taking place in each module.

Students will find documentation to back up the learning activities in a dedicated learning guide, which complements the teacher’s manual. These teaching and learning materials are designed to be an introduction. Not all relevant value chain, FL&W, and nutrition related topics have been included. Important aspects may be added in future editions. The material caters to diverse target audiences, and teaching can be adapted to children in rural or urban schools. This awareness session including all modules is planned to last for 100 minutes (two classes and 10 minute break). Teachers are encouraged to make this document theirs and add/remove activities to suit their needs.
Acknowledgements

The project to develop this publication and series of supporting materials was led by Mariam Ghamrawy, FAO FAORNE, in the context of the project “Food Losses and Waste Reduction and Value Chain Development for Food Security in Egypt and Tunisia” implemented with the generous support of the Italian Agency for Development Cooperation and implemented in Egypt in collaboration with the Ministry of Agriculture and Land Reclamation.

This publication benefitted greatly from the contributions of many people. First and foremost, special thanks goes to the FAO team who supported the development of the publication throughout its entire process: Jennifer Smolak, Nutrition and Food Security Officer, FAO Egypt, and Jozimo Santos Rocha, Agro-Industry, FAO/RNE. Special thanks also goes to Phoebe Lewis, Junior Professional Officer and Agronomist at FAO for contributing to the Climate change section, and Mahmoud Bendary, FAO Consultant who provided advice and support to field-test the material in local schools.
Lesson 1

Food value chains

Summary

This lesson is about the lifecycle of food and how it reaches us. It explains each stage of the food supply chain, putting great importance on all the resources used at each stage. This lesson includes class activities, discussions, as well as a video showing the different value chain stages of a strawberry’s life.

Objectives

The objective of this section is to engage students in identifying the main source of food, as well as explaining each stage of a value chain and the resources utilized in each stage.

Teaching plan

<table>
<thead>
<tr>
<th>Plan</th>
<th>Approx. timing / min</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Ice breaker</td>
</tr>
<tr>
<td>B</td>
<td>Discussion: where does your food come from?</td>
</tr>
<tr>
<td>C</td>
<td>Introduction to the value chain of food - 3D model, poster or slideshow</td>
</tr>
<tr>
<td>D</td>
<td>Video: life of a strawberry</td>
</tr>
<tr>
<td>E</td>
<td>Value chain stages and resources used</td>
</tr>
<tr>
<td>F</td>
<td>Vocabulary learned</td>
</tr>
</tbody>
</table>

* Summary of class activities and discussions
A – Ice Breaker

The first encounter with your students on a new topic is critical; it is important that your students be interested in the lesson in order to give their full attention.

Start with an “ice breaker” activity to engage your students all together and create a sense of challenge between them:

Group several products (bread, milk, fruit, vegetable, pulses) and place them together on your desk, or simply show them in a presentation with the group of products in one slide. Ask your students to analyze the products carefully for 2 minutes. Then, ask them what the products have in common. All answers during any activity should be written on a board or flipchart to make sure that the information is in front of the students at all times.

The objective of this discussion is to engage students in identifying what the items have in common, the common answers would include similarities in function (e.g. we can eat them), color, size and source (e.g. grown on farm land or on trees).

B – Discussion: where does your food come from?

Now that your students have identified some common characteristics between all products, it is time to get your students thinking even more.

Ask your students the following set of questions:

- Where does your food come from?
- How is your food made?
- How does your food get to you?
- Who is involved in the process of getting food to you?

Teachers should wait for their students to reply, complementing each student alone on their answer. In the case that one or more students seem lost, ask them to focus on only one food product and answer the four questions based on the product chosen. Once again, the objective of this discussion is to understand the lengths of their knowledge on the topic before starting the lesson.
Every person has his or her own life, the first step is being in your mother’s womb, and then you are born and start growing year by year. The same goes for any kind of food, food have their own life cycle. A food value chain shows the movement of a food product along the supply chain and identifies the actors and their value-added activities. The process of how food ends up on our plate is called the food supply chain. It encompasses all the different stages that food is going through along this path.

The food supply chain starts with the farmer. Fruits, grain and vegetables are grown in a field or a greenhouse. Animals are raised on farms or in fisheries.

In this case, our delicious tomatoes are grown and harvested in a field.

Fruits and vegetables are then packed into trucks (post-harvest).

And transported (transportation) to wholesale markets or processing facilities where they are sold to smaller retailers.

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3 IFPRI. 2012.
Most fruits, vegetables, grains, and meat become parts of different products; so from the farm or wholesale market they are taken into a processing facilities where they are processed and made into different products.

Packaged for export, or processed into different food products to extend their life-shelf and enhance their quality.

At this stage, retailers purchase from wholesale markets or processed food is distributed to retail shops.

The next step takes the food either to a restaurant or cafeteria or to our home for consumption. Ideally, the food supply chain would end here, but as you already know, a lot of food is in fact not eaten but gets spoiled or thrown away and fed into the system of food waste disposal\(^4\).

\(^4\)FAO. 2018.
The objective of this is to teach students what a food supply chain is through storytelling, supported by visual aids such as a 3D model displaying a tomato supply chain, an infographic, or a slideshow of pictures and text.

**D - Video: life of a strawberry**

Different tools should be used to demonstrate and make sure the concept has been fully received by the students. After explaining the different stages of the value chain, showing a brief video with the journey itself will help students visualize the process in their head. If a projector is not available, and therefore video viewing is not possible, you can tell the story found in Annex 1, Activity 1D. After the story has been shown or read out, it is important to ask your students if they would like to view or hear it again.

**E – Value chain stages and resources used**

An efficient way to make sure that the information you are sharing has been received is to make the students become the teachers. At this stage of Lesson 1,

Ask for 5 volunteers and give each an A4 card with a different value chain stage. Ask the students to work together to arrange themselves in a line based on the correct process of a value chain. Ask each student holding a card to explain their stage as seen in the video / story, beginning with production and harvest.
It is time to add a new word to their dictionary: Resources

**Resources** represent an asset or wealth that can be used by countries, organizations or people to produce benefits. It is a broad concept and many definitions exist, but in general we can classify resources as the following:

- **Natural resources**: Land, forest and water, including the assets coming from the land, like plants and animals.
- **Human resources**: People who work, and their knowledge and experience.
- **Capital resources**: Money, infrastructure, and equipment.

Resources can be used by a person or organization in order to function effectively. In the value chain of food, resources are used to grow, harvest, process, handle, and distribute food so that it functions effectively: to deliver safe and nutritious food to people.

You have now introduced the word resources to your students; the next step is to link the word to reality. In an activity, your students should now be able to list all the resources used at each stage of the value chain.

The best way to handle this activity is to start repeating the story of the video (either by viewing the video and pausing after each stage, or by retelling the story adding the resources in them discretely). You may want to add a few elements in the story that represent the resources used at each stage. Stop at the end of each stage and ask your students to list the resources used. Having drawn each stage (the whole chain) on the board or flipchart, list their answers on the resources used under each stage.

**Stage 1**: Answers should include land, water, labor, air, energy
**Stage 2**: Answers should include labor, energy, and plastic/carton
**Stage 3**: Answers should include labor, gas, money, air, energy
**Stage 4**: Answers should include air, energy, electricity, labor, money
**Stage 5**: Answers should include labor, money, gas, air, energy
**Stage 6**: Answers should include labor, money, and energy
**Stage 7**: Answers should include water, electricity, and energy

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5WebFinance Inc., 2019  
6Federal Reserve Bank of St. Louis, 2018
In the case that teachers would be retelling the story, find an example of the story in found in Annex 1, Activity 1E.

**F – Vocabulary learned**

**Food value chain:**
The movement of a food product along the supply chain and identification of the actors and their value added activities.

**Food supply chain:**
The process of how food ends up on your plate, which includes all the different stages that food goes through along this path.

**Resources:**
Represent an asset or wealth that can be used by countries, organizations or people to produce benefits.

### Summary of class activities and discussions

<table>
<thead>
<tr>
<th>Activity</th>
<th>Section</th>
<th>Common answers</th>
<th>Length</th>
</tr>
</thead>
</table>
| Place five local food products on your desk*, and ask your students to observe for two minutes then ask what these five products have in common. | A       | Similarities in :
- function (e.g. we can eat them, we can drink them, we can cook them);
- Color
- Size
- Source (e.g. farm, plant, factory, etc.)                                | 5       |
| Place five local food products on your desk*, and ask your students to observe for two minutes then ask what these five products have in common. | B       | - Farm, supermarket, street market, kiosk;
- God, it grows;
- From the market, by car, from factories; my parents get it;
- Farmers, traders, truck drivers, retailers.                          | 5       |

*If the physical products are not available, use a slideshow or the material for printing found in Annex 1, under Activity 1A.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Section</th>
<th>Common answers</th>
<th>Length</th>
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<tbody>
<tr>
<td>not available, use a slideshow or the material for printing found in Annex 1, under Activity 1A.</td>
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<td></td>
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</tr>
<tr>
<td>Show this video. In the case that a video is not available, read the story found in Annex, under Activity 1D</td>
<td>D</td>
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<td>2</td>
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<tr>
<td>Ask for 5 volunteers and give each an A4 card with a different value chain stage. Ask the students to work together to arrange themselves in a line based on the correct process of a value chain. Ask each student holding a card to explain their stage as seen in the video / story, beginning with production and harvest. Find the stages separately and combined in Annex 1, Activity 1E</td>
<td>D</td>
<td>Stages are the following: Production and harvest → Packed into trucks (post-harvest) → Distribution / Transportation → Storage facility / wholesale market / processing facility → Distribution → Retailer → supermarkets/markets/ / Restaurant -Consumer</td>
<td>5</td>
</tr>
<tr>
<td>Ask your students to list all the resources used at each stage of the value chain. Either replay the video or retell the story (found in Annex 1, Activity 1E2), making sure you pause after each stage. Write the resources utilized at each stage together on the board.</td>
<td></td>
<td>Stage 1: Answers should include land, water, labor, air, energy Stage 2: Answers should include labor, energy, and plastic/carton Stage 3: Answers should include labor, gas, money, air, energy Stage 4: Answers should include air, energy, electricity, labor, money</td>
<td>5</td>
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<tr>
<td>Activity</td>
<td>Section</td>
<td>Common answers</td>
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</table>
|          |         | Stage 5: Answers should include labor, money, gas, air, energy  
|          |         | Stage 6: Answers should include labor, money, and energy  
|          |         | Stage 7: Answers should include water, electricity, and energy |

**Bibliography**


Lesson 2

Food loss and waste

Summary

Now that the students understand where their food comes from, how it gets to their house and what resources are used at each stage, this section helps students understand what food loss and waste is and how it may occur at each stage. It also discusses the negative environmental footprint when food is lost or wasted. When stating a problem, it is important to explain the possible solutions; therefore, the role of students to reduce waste will be discussed in this section as well. This section includes class activities, as well as video highlighting the negative effects food loss and waste have on the environment.

Objectives

The objective of this section is to engage students in identifying how and when food is lost or wasted and the negative environmental impact of such actions.

Teaching plan

<table>
<thead>
<tr>
<th>Plan</th>
<th>Approx. timing / min</th>
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</thead>
<tbody>
<tr>
<td>A About food loss and waste</td>
<td>7</td>
</tr>
<tr>
<td>B Environmental impact of food loss and waste</td>
<td>10</td>
</tr>
<tr>
<td>C Role of students in reducing FL&amp;W</td>
<td>10</td>
</tr>
<tr>
<td>D Storage places activity</td>
<td>5</td>
</tr>
<tr>
<td>E A glance on appropriate storage methods</td>
<td>5</td>
</tr>
<tr>
<td>F Vocabulary learned</td>
<td>2</td>
</tr>
</tbody>
</table>
A – About food loss and waste

**Food loss** is food that is spilled or spoiled before it reaches the final product or retail stage. Losses occur during the production, handling, processing and distribution of food due to poor harvesting techniques (e.g. harvesting tomatoes late in season, using an old less maintained mechanical harvester for wheat etc.); poor handling practices; exposure to heat and sunlight; inefficient marketing systems (therefore the produce is stuck at wholesale); lack of processing equipment and factories; and weakness in policy and regulatory frameworks.

How about the food that is thrown away to birds, left in desk drawer to rot, or thrown out at home or restaurants? This is considered **food waste**. Any food that is fit for human consumption, but is not consumed because it is left to spoil or is discarded by retailers or consumers is considered food waste. Food waste is a behavioral problem. It derives from habits, customs and traditions, and behavior. Significant amounts of waste take place during religious holidays, wedding ceremonies and family gatherings, and in restaurants and hotels.

It is important to highlight at which stages losses and waste occur. This could be through circling the stages in different colors on the board or showing it in the presentation.

Studies suggest that roughly one-third of all food produced is lost or wasted, which amounts to 1.3 billion tons of food. FL&W in the region are high, it is estimated that 14 to 19% of grains, 26% of roots and tubers, 16% of oilseeds and pulses, 45% of fruits and vegetables, 13% of meats, 28% of fish and seafood, and 18% of dairy products are lost or wasted in the NENA region.  

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7FAO. 2018. Do Good: Save Food! Education material package on food waste reduction in primary and secondary schools. For age group 3 (ten to thirteen years old). Rome, Italy. License: CC BY-NC-SA 3.0 IGO.

8Harvard
It is important to grab students’ attention at this age with the big shocking numbers. The more they can relate to the problem the better chance there is to change behavior and start doing actions.

The huge amount of FL&W is terrible... but why else does it matter?

It comes at a cost to everyone in the value chain, especially consumers!

Remember, in the food supply chain, food moves from producer to consumer via the process of production, processing, distribution, retailing and consumption; like dominoes it hits one stage after the other. Each of these processes have costs (like energy, labor, and fees) that they pass on to the next stage, until the accumulated cost and profit becomes the price consumers pay. In other words, consumers’ prices covers the cost of good food and lost food. This is seen in the figure below where money consumers pay for food moves from consumers to producers in the reverse process, like a domino from consumer to retailer to distributor to processor to farmer⁹.

Figure 1. Movements of food and money in a simple food supply chain

⁹Harvard
B – Environmental impact of food loss and waste

During Lesson 1, your students have identified the resources used at each stage. The next step is to emphasize on the fact that by wasting food, the resources that have accompanied each stage are wasted as well. To be more clear, if one was to waste/lose one tomato, this does not only mean wasting the food product itself, but also all the natural resources that went into its production: water, land, labor, energy, biodiversity and the negative greenhouse gas emissions that have been produced. In addition, labor waste as well for producing, harvesting, processing, transporting until it reached consumers.

The next section will emphasize the fact that if food is lost or wasted at any stage, all the resources used at this stage and the stage before are lost or wasted.

We will now explain some of the environmental footprints that occur due to food loss and wastage:

**Carbon footprint - greenhouse gas emissions**

Producing, distributing and preparing food uses up fuel and energy, and produces greenhouses gases such as CO2, methane and nitrogen. A huge amount (3.6 gigatons) of greenhouses gases are emitted each year in the production, processing, storage and transportation of food that gets thrown away and then more greenhouse gases are emitted as wasted food decomposes in landfills.

**So, what are greenhouse gases?** The earth is wrapped in different layers of what we call greenhouse gases. Together these make up the atmosphere. The earth’s atmosphere stops it from cooling off in space: It lets some rays of the sun in but stops some of the heat from leaving the earth again. Greenhouse gases occur naturally, and without them, there would be no life on Earth. However, humans have been producing more and more greenhouse gases, e.g. in industry, agriculture, and waste management activities, and by burning fossil fuel in cars, or coal-fired power stations. The greenhouse gases we produce have unbalanced the natural atmosphere and contributed to climate change: too much of these gases are in the atmosphere and not all of the heat that should leave the earth can escape into space.

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10FAO. 2018.
Climate change:

**Climate change** refers to the long-term changes in the Earth’s air and land. Now, the climate is warming up faster than any time in the Earth’s history known to scientists. Climate change makes our planet warmer than it should be. If we continue producing such high amounts of greenhouse gases, a lot of the ice on Earth will melt, the sea level will rise and there will be less land for people and animals to live on. The weather will become extreme. Some animals and plants will not survive the new temperatures, and it will become more difficult for many people to grow food and to find places to live. Most likely, conflicts will break out over the distribution of land, water and food.

**So, how does FL&W impact climate change?**

Agriculture is a major producer of greenhouse gases. When people lose or waste food, this results in unnecessary greenhouse gas emissions going into the atmosphere each year. As we mentioned earlier, the amount of greenhouse gas emissions caused by FL&W is huge\(^ {11}\). If FL&W were a country, it would be the third largest emitter of greenhouse gases that cause climate change. Only the USA and China would emit more greenhouse gases\(^ {12}\).

These emissions come throughout the life of food. First, they come from the digestive systems of cows on farms. Second, emissions come from the energy to produce, transport, store and cook food that is ultimately lost or wasted. Lastly, when food is spoilt, it goes into your rubbish bins and then gets taken to landfills, which are big piles of rubbish. The food that rots on these landfills release emissions into the air\(^ {13}\).

**Water footprint:**

Amongst other things, climate change, can lead to water shortages, droughts and desertification in many places on Earth. Countries like Egypt are already suffering from water scarcity.

At the same time, food production is the largest user of water in the world. However, when we waste food, we also waste the water used to produce that food. One quarter of all the water used for agriculture is used to grow food that later ends up as waste. The “water footprint” of food waste is roughly the same amount of water as all the households in the world use per year, and as much as almost half of what the Nile river\(^ *\) discharges over the course of a whole year\(^ {14}\).

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\(^{11}\)FAO. 2015.

\(^{12}\)World Resources Institute

\(^{13}\)FAO. 2015. Food wastage footprint and Climate Change.

\(^*\)Original source was Volga River, which is 3,530 km long. Nile River is 6,853, therefore almost half. The Nile river was used instead as it is localized to the region.

\(^{14}\)FAO. 2018.
Show your students an empty one-liter bottle of water. Link the bottle of water you are holding to the food products around us; this will shock your students on the amount of bottles needed to produce one of the food products. One tomato needs around 13 liters of water to produce, one potato needs 25 liters and one egg needs 135 liters. The unhealthy pack of chips you eat uses 185 liters of water for its production... imagine needing 185 one liter bottles to create only one bag of chips! Clarify that the water used for each final product is the water used from the beginning of the lifecycle until it is being consumer by the consumer (from potato grown in the field to chips packet in your hand).

**Land occupation footprint:**

Another concern is the land occupation footprint of food waste, i.e. the amount of land that is used to grow food that is later wasted. Food that is later wasted is grown on about 1.4 billion hectares of land. If we compare this area to the surface of the largest countries on earth, it is the second largest after the Russian Federation. The land used to produce food later wasted is thus bigger than China or Canada.

**Biodiversity:**

Biodiversity refers to the variety of life on Earth at all levels, from genes to microbes, animals to ecosystems. All species and organisms contribute something to their common environment so it is very important to interfere as little as possible with functioning ecosystems.

The way we grow food can also be a major threat to biodiversity. For example, forests are cut down to make space for crop fields. Through this process, which is called deforestation, a lot of animals lose their habitat and are ultimately threatened by extinction. Moreover, the plants in these forest are lost, which intensifies the problems associated with CO2 and other greenhouse gas emissions. FL&W can lead to unnecessary loss of biodiversity if we put pressure on ecosystems to produce food that ultimately goes to waste\(^\text{15}\).

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\(^{15}\)FAO. 2018.
C. Role of students in reducing FL&W

If we do not change the way we treat our food, the problems associated with FL&W will increase significantly in the future. The global population is rising continuously and we will have to make significant improvements in how we grow and use food to be able to feed everyone in the future in sustainable manner. Avoiding food waste has a direct impact on world hunger.

Students can do a lot to avoid food waste. Food waste in our everyday lives happens when we put too much food on our plates; we buy too many food and do not eat it before it expired; we serve excessive portions of food, or we simply throw away half the food from our plates. It is now time to engage your students again.

Ask for smaller portions. The easiest way to reduce food waste is to put less on your plate. Serve yourself a smaller plate and go back for seconds if you still feel hungry after finishing it. That way, you only eat as much as you need, and no leftover food is thrown away. Furthermore, do not force big portions on a guest’s plate. The right way to do it is offer smaller portions more frequently.

Do not throw your leftovers. If you do not like your sandwich, either take it back home and eat another time or give it to someone else. However, do not leave it in your desk, throw it in the bin or give it to the birds.
| Family | **Recycle your leftovers.** If you do end up with leftovers, keep them for another day. Using leftovers to make new meals is a smart way to ensure you eat everything you buy. Instead of scraping them into the bin, why not use them as tomorrow’s ingredients? For example, a tablespoon of cooked vegetables can be the base for a soup. If you cannot eat them tomorrow, freeze and save them for a later day. Remember that it is very important to store leftovers in the fridge or freezer within two hours after they were prepared and in closed clean and dry containers. In the summer months when it is warm, cut this time down to one hour. Remember when reheating the frozen leftovers, ensure that the amount you can actually able to consume.

| Family | **Shop smart and do not buy in bulk.** Ask your parents to plan meals, use grocery lists, and avoid impulse buys. This way, you are less likely to buy things you do not need and that you are unlikely to consume within expiry “use by” dates.

| Family | **Do not throw away “ugly” irregular shaped fruits and vegetables.** Fruits and vegetables come in all sorts of shapes and sizes, and each one is just as tasty and good to eat as the next. An apple can have rough spots, a carrot can be a little bent, and a potato can be crooked, none of this affects their taste, nutritional value or other quality in any way. As long as the outside is intact, the inside of fruits and vegetables is always sterile, and therefore safe to eat. Use them in stocks, salads, dishes and sauces.

| Family | **Always check your fridge.** Make sure your fridge is set at the right temperature (between 1-5o Celsius) and get to know where in the fridge different types of food are kept best. Also, do not pack your fridge too full! An overloaded fridge uses more energy and it is likely that you forget to use something shoved into its furthest corner.

| Family | **Practice FIFO: First In, First Out.** This is very simple, but requires a little bit of organization. When you put your shopping away, rotate the food in your fridge and cupboard so that the older food comes forward and the most recent shopping, which will live the longest goes to the back. However, some new food may need to be eaten quickly so keep an eye on the use-by date (or use your judgement). |
| Family and student | **Learn to understand the date on your food:** Not everyone reads the expiry date or use-by date before purchasing, and in some cases (like with honey and sugar) there is no need to abide by the expiry date. However understanding dates is crucial. Best-before dates are manufacturers’ suggestions for peak quality: They indicate until which time the food is at its best in terms of smell, texture, and taste. That information says very little about when the food actually loses quality or goes off altogether and is not safe to use anymore. If the packaging is intact and the food has been stored correctly, food is generally still safe to eat after the “best-by”-date. You can normally tell by having a good look at your food or telling an adult to do so. If the food looks, smells, and tastes good, it is normally good to eat.

“Use by” dates are strict expiration dates: Some foods, such as raw meat, can make you very ill if you eat it after the expiration date. If you find that you will not be able to eat food before the date on its “use by”-label, you can freeze it, and defrost and eat it later. Once the use by-date has passed and you have not frozen the food, you will have to throw it out.

So do not go around throwing away food just because the sell by- or best by-dates are up! If it has been stored properly, food is often still edible after these dates. |
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Family and student</td>
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<tr>
<td>Family</td>
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</table>
D. Storage places - activity

Food is sometimes wasted because it has gone bad. If we store our food properly, we will waste less of it. The main objective of this activity is to identify the extent to which students know how to properly store food.

Ask your students what they know about storing food correctly, why it is important to know where, and how to store food? The typical answer should revolve around the following: Improper storage of food leads to decay or spoilage thus leading to waste. In this case not only did we waste the food itself, however we have wasted all the resources used to produce the food, leading to excess greenhouse gas emissions and more risk for biodiversity footprint.

After they have completed their discussion,

Hand out copies of both activity worksheets found in Annex 1: Activity 2D and explain the activity. On the first worksheet, you will find three storage methods: fridge, cupboard and worktop. On the second worksheet, you will find different foods available every day in our kitchen. The task is to cut the food or peel the sticker and stick it in the correct storage location.

This activity tests the knowledge of each student on the appropriate storage methods before proceeding with the next section.

E. A glance on appropriate storage methods

Depending on the type of food, you will need to store it in the fridge, freezer or in containers you keep in cupboards or on shelves. Storage is important as it keeps the food safe so that it is still good to eat or cook later. Proper storage is key to longer shelf life, as for example certain fruits and vegetables produce gases during ripening that can quicken the process of ripening of other items in the fruit bowl or vegetable drawer.

Some food needs to be kept in the refrigerator to help stop bacteria from growing on it whether it is cooked food, half-used food, or raw food. If you are having guests over for food, do not leave the food out of the fridge for more than 4 hours.
The order you arrange your food in the refrigerator is also important, as the refrigerator airflows in a specific manner. Minimize opening the refrigerator door too often to ensure the right temperature. Show the proper method of food arrangement on a poster or slideshow.

- **Ready to eat food**
  - such as dairy products, yoghurts & cream

- **Ready to eat food**
  - such as cream cakes, butter, cooked meats, leftovers & other packaged food

- **Raw meat, poultry & fish**
  - always cover & keep in sealed containers

- **Salad, fruit & vegetables**
  - keep ready to eat fruit and vegetables in sealed bags or containers, always wash before use
You can freeze pretty much everything, including yoghurt, cheese, milk, meat/fish, eggs, bananas, baked goods, rice, bread etc. Anything with a high water content like strawberries and tomatoes will go squishy but are still fine to cook with or turn into juice.

You can safely store food in the freezer for years, as long as it stays frozen the whole time. However, the taste and texture of food changes if it is frozen for too long. Freezing is an important storage method, as it stops/slows the wastage of food. Re-heating frozen food should be done wisely, as it could end up contaminated. Special-ly, meat and meat products (including fish) cannot be refreeze again.

Many types of food do not require refrigeration to be kept safe for consumption. Dry food such as rice, pasta, flour, many types of drinks, tinned food and unopened jars can be stored outside the refrigerator or freezer in a dry area and not under direct sunlight. However, it is still crucial to take care how your dry food is stored.

**In order to store dry food in a proper and safe manner, precautions have to be considered:**

- Keep food in sealed bags or containers as this helps keep food fresh and stops anything falling into the food by accident.
• Do not store food or drinks near cleaning products or other chemicals.
• Ensure that no humidity, the storing containers are sterile and safe for storing.
• Do not use old food containers to store household chemicals, and do not store food in containers that have been used for other purposes.
• Only reuse undamaged plastic water bottles that you can clean\textsuperscript{17}.

**F - Vocabulary learned:**

**Food loss:**
any food that is spilled or spoiled before it reaches the final product or retail stage.

**Food waste:**
any food that is not consumed because it is left to spoil or is discarded by retailers or consumers.

**Climate change:**
climate is the long-term changes in the Earth’s air and land, climate change is the change in climate as seen today.

**Biodiversity:**
the variety of life on Earth at all levels, from genes to microbes, animals to ecosystems.

**Summary of class activities and discussions**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Section</th>
<th>Common answers</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask your students what they can do to reduce food waste at home and in school.</td>
<td>C</td>
<td>Serve less portions. Do not throw away food or leftover. (Here the tips should be discussed)</td>
<td>5</td>
</tr>
<tr>
<td>Ask your students what they know about storing food properly and where and how to store food.</td>
<td>D</td>
<td>Improper storage of food leads to spoilage and decay.</td>
<td>5</td>
</tr>
</tbody>
</table>

\textsuperscript{17}FAO. 2018. Say NO to Food Waste. A guide to reduce household food waste. Cairo, Egypt.
Hand out copies of the two activity worksheets found in Annex 1: Activity 2D and ask your students to stick each food product in its appropriate storage location.

Hand out copies of the two activity worksheets found in Annex 1: Activity 2E and ask your students to stick each food product in the proper storage place in the fridge.

**Extra resources and information**

**Question:** Why are greenhouse gas emissions so high in food production?

**Answer:** A lot of CO2 is produced in agricultural operations such as ploughing and harvesting, and of course in the transportation of food around the world. Treating crops with nitrogen fertilizers releases nitrogen into the soil and the air - a greenhouse gas 300 times more powerful than CO2 and a major ozone-depleting chemical. Large amounts of electricity are needed in the storage and processing of food, and a lot of greenhouse gases are emitted at that stage. Furthermore, decomposing food produces methane, another greenhouse gas, as does cattle farming.

**Bibliography**

FAO. 2015. Food wastage footprint and Climate Change. License: bb144e/1/1115

FAO. 2018. Do Good: Save Food! Education material package on food waste reduction in primary and secondary schools. For age group 3 (ten to thirteen years old). Rome, Italy. License: CC BY-NC-SA 3.0 IGO.


Lesson 3

Nutrition

Summary

This section helps students understand the five food groups that should be present in every healthy eating plate. It also discusses saturated fat, salt and sugar, and its negative effects, as well as the recommended maximum dosage per day. This section includes class activities and discussions.

Objectives

The objective of this section is to emphasize on the importance of a nutritious meal and the five food groups, the main components of a nutritious meal, as well as understanding saturated fats, sugar and salt intake.

Teaching plan

<table>
<thead>
<tr>
<th>Plan</th>
<th>Approx. timing / min</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Nutrition and The five food groups 10</td>
</tr>
<tr>
<td>B</td>
<td>The five food groups - activity 5</td>
</tr>
<tr>
<td>C</td>
<td>Your healthy eating plate 10</td>
</tr>
<tr>
<td>D</td>
<td>Create a healthy meal - activity 5</td>
</tr>
<tr>
<td>E</td>
<td>Negative effects of saturated fat, salt and sugar 10</td>
</tr>
<tr>
<td>F</td>
<td>Vocabulary learned 2</td>
</tr>
<tr>
<td>*</td>
<td>Summary of class activities and discussions</td>
</tr>
</tbody>
</table>
Nutrition is about eating a healthy and balanced diet\textsuperscript{18}. The key to eating healthy is to enjoy a variety of nutritious foods from each of the Five Food groups. Every food group is important as it provides essential nutrients and energy that supports normal growth and good health.

The five food groups are:

1. Vegetables and legumes
2. Fruits
3. Grains
4. Proteins (vegetable and animal based)
5. Dairy

Vegetables and legumes/beans:
Vegetables come from the different parts of the plant, including leaves, roots, tubers, flowers, stems, seeds and shoots. Legumes on the other hand, are the seeds of the plant and are eaten in their immature form as green peas and beans, and their mature form as beans, lentils and chickpeas. Vegetables should make up a large part of your daily food intake and should be encouraged at every meal (including snack times). They provide vitamins, minerals, dietary fiber and phytonutrients (nutrients naturally present in plants) to help your body stay healthy.
Fruits:
Adding different fruits to your daily diet enhances your health. However, be careful, fruits can be high in sugar and calories, and low in dietary fiber, and can even damage your teeth, so avoid drinking too much fruit juice. Fruits are important as they provide vitamins, minerals, dietary fiber and many phytonutrients that help your body stay healthy.
**Grains:**
This food group is mostly made from wheat, oats, rice, rye, barley, quinoa and corn. The different grains can be cooked and eaten whole, ground into flour to make a variety of cereal foods like bread, pasta and noodles, or made into ready-to-eat breakfast cereals. Be careful, refined grain products (such as cakes or biscuits) can be high in added sugar, fat and sodium.

**Other products**
- Pasta
- Noodles
- Muffins
- Rice cakes
- Couscous
- Bulgur
- Popcorn
- Flour

**Breakfast cereals**
- Ready to eat cereals
- Oats
- Muesli
- Wholewheat biscuits

**Grains**
- Rice
- Barley
- Corn
- Polenta
- Semolina
- Rye
- Spelt
- Quinoa

**Breads**
- Wholemeal
- Wholegrain
- White
- Rye
- Pita
- Crispbread

**Proteins:**
This food group includes all kinds of lean meat and poultry, fish, eggs, nuts and seeds and legumes/beans. This food group is characterized by not only being “protein rich”, but also providing a wide variety of other nutrients such as: iodine, iron, zinc, vitamins, especially B12, and essential fatty acids. Our bodies use the protein we eat to make specialized chemicals such as hemoglobin and adrenalin. Protein also builds, maintains, and repairs the tissues in our body. Muscles and organs (such as your heart) are primarily made of protein.

**Poultry**
- Chicken
- Turkey
- Duck
- Goosh

**Eggs**
- Chicken eggs
- Duck eggs

**Fish and seafood**
- Fish
- Prawns
- Crab
- Mussels/clams

**Legumes/beans**
- All beans
- Lentils
- Chickpeas
- Split peas
Lean meats
- Beef
- Lamb
- Veal
- Low salt sausages

Nuts and seeds
- Almonds
- Pinenuts
- Cashew
- Pumpkin seeds
- Sesame seeds
- Sunflower seeds
- Walnut
- Hazelnut

Dairy:
Milk, yoghurt and cheese are dairy products that are recommended for most people over the age of two years. A wide range of milk and yoghurt products are available with varying levels of fat. Milk can be fresh, dried, evaporated, or UHT (long life). The foods in this group are excellent sources of calcium, which is essential for strong and healthy bones. Not many other foods in our diet contain as much calcium as these foods.
If you eat a variety of foods from each of these groups, your body will receive all the nutrients and vitamins it needs to function. \(^\text{19}\)

B. The five food groups - activity
It is important after concluding any lesson, to make sure that every student has had their chance to prove that they have fully understood the idea behind it. The best way to do so is through an interactive activity.

On the board/flipchart draw a circle, divide into 5 sections and name each section as one of the five food groups. Lay out different foods or food ingredients and ask each student to choose one and stick it into the appropriate food group. All the students should get the chance to play this game, so print extra food products. Among those different foods, there will be cards of processed food such as cakes, biscuits, and chips. Students should then be guided that these items should not be placed in any of the food groups, but grouped alone, to be discussed later.

\(^{19}\)FAO. 2018.
C. Your healthy eating plate

The perfect meal should consist of ingredients from the five food groups. Half of your plate should be vegetables, aim for color and variety. Fruits should also be included in this half. A quarter of your plate should be whole grains and the remaining quarter should be proteins, keeping in mind that you should limit processed meat such as luncheon, sausage and bacon. Healthy plant oils should be used in moderation and it is important to skip sugary drinks and limit fruit juice.

Let us look at the perfect healthy eating plate:

Healthy oils
Use healthy oils like (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.

Vegetables
The more veggies - and the greater the variety - the better. Potatoes and french fries don’t count.

FAO. 2019.
Fruits
Eat plenty of fruits of all colors.

Water
Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

Whole grains
Eat a variety of whole grains (like whole-wheat bread, whole-grain pasta, and brown rice). Limit refined grains (like white rice and white bread).

Healthy protein
Choose fish, poultry, beans, and nuts; limit red meat and cheese; avoid bacon, cold cuts, and other processed meats.

D. Create a healthy meal - activity

Always answer your students’ questions at once, to ensure that all students have understood lesson before moving to another one.

Now that the students have understood what a healthy eating plate consists of, engaging them in an activity on the topic will ensure that they start applying the healthy eating plate in their homes.

E. Negative effects of saturated fat, salt and sugar

Now your students are aware of the five food groups and what a healthy eating plate should include and how it should be formed. It is time to discuss what foods should not be part of their daily diet and the negative impacts of these foods.
**Fats** - We all know too much fat is bad for us, but we do not always know how much or what type of fat we are eating. The problem is eating too much unhealthy fat. There are two types of fats: “good” unsaturated and “bad” saturated. Unsaturated fats are good for the heart, and mainly come from nuts and seeds, certain fish, and good quality vegetable oils like olive, canola and peanut oil. Saturated fat can lead to a harmful build-up of fat in our bodies, which can cause serious diseases in the future, weight gain and some cancers. There can be a surprising amount of saturated fat in everyday food and drink. A lot of saturated fat comes from meat and poultry, eggs, butter, cheese, cakes, pastries, chocolate, biscuits, sausages, and pizza.

At this point, it is important to start showing your students some of the most common local products that have a lot of saturated fat and are consumed regularly (show some products either as physical products or on the presentation).

How about salt and sugar? Ask your students if they know how much sugar, they should be consuming and in reality, how much they consume.

**Salt** - Most of us are eating more salt than we should, even without realizing it. It is not only the salt that we add to our cooking or in our meals, but also the salt that is already in the food that we buy. Food such as sausage, pastries, pizza, chips, mustard, ketchup and cold cuts contain a lot of salt, even if they do not taste salty! Too much salt can put you at risk of high blood pressure and heart diseases later on in life. Adults should have less than a teaspoon of salt a day, imagine how many teaspoons your family is consuming daily!

<table>
<thead>
<tr>
<th>Age</th>
<th>Maximum daily intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 6 years</td>
<td>0.25 tsp (3gm)</td>
</tr>
<tr>
<td>7 - 10 years</td>
<td>0.75 tsp (5gm)</td>
</tr>
<tr>
<td>11+ years</td>
<td>1 tsp (6gm)</td>
</tr>
</tbody>
</table>
Sugar - People especially young people like your students are having nearly 3 times more sugar than they should be. These sugars are obtained from fizzy drinks, juice drinks, cakes, pastries, chips, biscuits, yoghurts, sweets, chocolate and ice cream. Consuming too much sugar can lead to the build-up of harmful fat on the inside that we cannot see, which can cause weight gain and serious diseases in the future such as heart disease, type 2 diabetes and some cancers. Another result of sugar is that it could lead to tooth decay.

Like salt, sugar consumption does not only mean sugar that is added to your tea, but also the sugar that has already been added to your food and drinks to sweeten it (added sugar), this includes honey, syrups and fruit juice nectars²¹.

<table>
<thead>
<tr>
<th>Age</th>
<th>Maximum daily intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 6 years</td>
<td>3.75 tsp (19gm)</td>
</tr>
<tr>
<td>7 - 10 years</td>
<td>4.5 tsp (26gm)</td>
</tr>
<tr>
<td>11+ years</td>
<td>5.25 tsp (30gm)</td>
</tr>
</tbody>
</table>

Vocabulary learned:

Nutrition: is eating a health and balanced diet. The key to eating healthy is to enjoy a variety of nutritious foods from each of the Five Food groups.

The five food groups: Vegetables and legumes, fruits, protein, grain, and dairy. Every food group is important as it provides essential nutrients and energy that supports normal growth and good health.

²¹FAO. 2019
## Summary of class activities and discussions

<table>
<thead>
<tr>
<th>Activity</th>
<th>Section</th>
<th>Common answers</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the board or flipchart, draw a pie chart dividing it into five sections (same as the five food groups). Name each section as one of the five food groups (Fruits, Vegetables, Protein, Dairy, Grains). Lay out different cards with different food products and ask each student to choose one and stick in the right food group. Make sure you have extra food cards to ensure everyone gets a chance to answer. Cards can be found in Annex 1 - Activity 3B. In the case that food cards are not available, ask your students to think of one food item and write it in the food group.</td>
<td>B</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Divide the class into teams of 3 to 4 students. Each team is required to create one healthy meal (breakfast, lunch or dinner) according to the previously taught healthy eating plate. The worksheet will be found in Annex 1: Activity 3D. Students are required to draw the food in each section of the plate or write the components of the meal down.</td>
<td>D</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

### Bibliography

- MedlinePlus – U.S National Library of Medicine
Final activity

Distribute A3 posters among all students along with crayons. Students will be asked to draw what they feel about food waste or how they see it from what they learned during class. Examples will be previewed on the presentation of previous work drawn by students, found in Annex 3. Creativity is important as well as making sure that the information gained is drawn or written on paper. As soon as students are done with their drawings, students should briefly present their drawing and we will start hanging them around the school in different floors and corridors as an awareness tool as well as to beautify their schools.
Annex 1
Activity
1A
In a big field, where hard workers are working, lays a land full of strawberries. The story starts with a tiny plant, turning into a bud then flower and by time developing into a beautiful red strawberry. The strawberry is then harvested gently by one of the farm laborers and placed in a small plastic box that is well ventilated to avoid spoilage. The plastic boxes are all layered evenly in a big carton box and placed on a truck.

The truck then starts moving out of the farm and through the city until it reaches a storage facility. At the storage facility, a worker on a loading car picks up the strawberry boxes and places them in a secured location. The strawberries are then mechanically moved on a belt and secured in room that has the right temperature and proper ventilation. Strawberries are then labeled manually and packed properly, loaded and are ready for export. The strawberries are then loaded on a plane and exported to another country. As soon as the plane lands, the strawberries are transferred to retail stores and placed gently on the fruit stand.

A mother and daughter are shopping in the retail market, when the girl spots the delicious looking strawberries in the box and asks her mother to buy a box. At first, her mother refuses, but after the girl insists, her mother approves. The girl then reaches for the strawberry box and add it to their shopping cart. They then proceed to the cashier, and pay for their strawberries and the remaining groceries.

The scene changes to their home, where they start unloading their groceries. The mother places the strawberries in the refrigerator. The next day, she takes the box out and rinses them under tap water, eats a strawberry, closes the box and returns them to the refrigerator. Days pass by and the mother and daughter forget about the strawberries that are in their refrigerator. Slowly, the strawberries shrivel up and starting growing mold. After a couple of days, the mother takes out the strawberry box, which went bad, and dumps them in the garbage bin. The daughter then opens the bin to find the strawberries thrown out. At this point, the girl becomes sad.
Activity 1C

Production & harvest
Activity 1C

Post-harvest
Transportation
5

Activity 1C

Packaging
Activity 1C

Retail
Activity 1C

Consumption
Activity
1C

Processing
Activity
1C

Export
Stage 1: At the beginning of the story, we can see a big farm where farmers are working in the farm. The story then magnifies on a specific plant, which grows into a strawberry. A man then carefully harvests the strawberry. We all know of course that we grow our plants in soil and we use a lot of water and fertilizer.

Pause

Stage 2: After the man harvests the strawberry, he gently places it into a small plastic box, which is packed into a bigger carton box with the other strawberry boxes.

Pause

Stage 3: The strawberries are then transported on a truck through the field and the city.

Pause

Stage 4: A worker on a mini truck then picks up the strawberry crates and places them in a good ventilated storage space and then go through a machine where they are labeled, packed properly and ready for export.

Pause

Stage 5: The strawberries are then exported to another country by plane.

Pause

Stage 6: The strawberries are now in a supermarket being loaded by a worker onto a fruit stand.

Pause

Stage 7: A girl then points to the strawberries and asks her mother if she can buy them, and her mom said no. However, the girl insisted so her mother eventually said yes. Therefore, they take the strawberries an pay for them, then take them home, put them in the fridge and take them out rinse them. Unfortunately, the strawberries were forgotten until they turned moldy and were thrown out.
Activity 2E
Fridge Frenzy

©Shutterstock
Activity 2E
Fridge Frenzy
Activity 3A
Annex 2
Activity
answers
2D

Fridge
- Raw meat
- Cooked rice
- Cooked chicken
- Cooked pasta
- Cheese

Cupboard
- Flour
- Pasta

Worktop
- Banana
Final Activity poster samples
**Crossword puzzle**

**Down**

2. ……………………… makes our planet warmer than it should be.
4. An important tip to reduce food waste at home is to ……………….. by not buying in bulk and avoiding over shopping.
6. If food gets spoiled in your refrigerator because you did not eat it in time and had to throw it out instead, this is called …………………
8. Any food that is spilled or spoiled before it reaches the final product or retail stage is ………………….
10. One of the tips of reducing food waste at home is practicing proper ………………… methods.
12. A food ………………… shows the movement of a food product along the supply chain and identifies the actors and their value added activities.
13. A healthy plate consists of three components. A quarter of your plate should be …………………, which includes lean meat, poultry, fish, eggs and nuts.

**Across**

1. Food waste occurs at the …………………… stage of the value chain.
3. A huge amount of ……………………… gases (such as CO2, methane and nitrogen) are emitted each year in the production, processing, storage and transportation of food that ends up thrown away and then decomposes in landfills.
5. When food is lost or wasted, all the …………………… used for production is wasted as well.
7. The maximum intake for …………….. is one teaspoon daily.
9. ………………… is eating a healthy and balanced diet.
11. A healthy plate consists of three components. ………………….. should make up half your plate. Aim for color and variety, and make sure you add fruits to your plate as well.
14. A healthy plate consists of three components. A quarter of your plate should be …………………, which includes wheat, oats, rice, quinoa, and corn.
Food loss and waste
and value chains