

LEFTOVER CHALLENGE

Best Practices

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www.leftoverchallenge.eu



Co-funded by
the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union can be held responsible for them. Project 2023-1-NL01-KA220-SCH-000157905

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Introduction

When addressing leftover food, it is essential to research the causes, current status, and best practices. In this report, we will present the results of our investigation and describe existing best practices, as well as suggest ways to further improve these practices in European households.

Leftover food is a subset of food waste, created when food is prepared but not consumed. In this context, it is important to mention that we are referring to food that was left unserved, rather than food that has been partially eaten after serving. The second category of leftover food includes food that has been brought into a household but never prepared for consumption, or food that requires no preparation but is nonetheless not consumed. Therefore, when discussing leftover food, we are referring to food that was suitable for consumption in every way up until the point when it was discarded.

Leftovers can indicate suboptimal organization of household eating habits. However, in real-life scenarios, it is important to consider that life is often unpredictable, and realistically, the goal should be minimizing leftovers rather than completely eliminating them.

Results of questionnaires and Interviews with parents and children

To assess the current state of leftover management in households and identify existing good practices, we conducted an online survey targeting parents and children. The questionnaire was available in the native languages of the participating

countries: the Netherlands, Italy, Romania, Greece, and Slovenia. The survey was open from the beginning of May until the end of June, during which time we gathered 80 responses. Due to the low response rate and uneven distribution of responses among countries, we will present our results collectively, encompassing all countries together.

Socioeconomical status

None of the participants identified as being from the lower socioeconomic class. Among the respondents, 11.25% classified themselves as lower middle class, 63.75% as middle class, 21.25% as upper middle class, and 3.75% as upper class.

Questions for parents

In this segment, we investigated the current status of household leftovers, existing good practices, and general awareness regarding leftover food.

The first part of the survey focused on discarded food, its quantity, and the types of food typically discarded. About 29.5% of participants reported that they rarely throw away food, 48.7% do so sometimes, and 21.7% often. When estimating the amount of discarded food on a weekly basis, 56.4% of participants indicated they discard less than 1 kg of food, 37.2% reported discarding between 1 and 3 kg, and 6.4% reported discarding more than 3 kg. The most commonly discarded foods were bread, fruit, vegetables, and cooked foods such as stews and other dishes.

The main source of food waste in households is food left on the plate, accounting for 64.5% of the waste, while food that has been bought but not used accounts for 35.5% of the waste. Leftover food is most commonly donated or used as animal feed. In some households, leftovers are stored for later use. Nevertheless, leftovers are still too frequently discarded

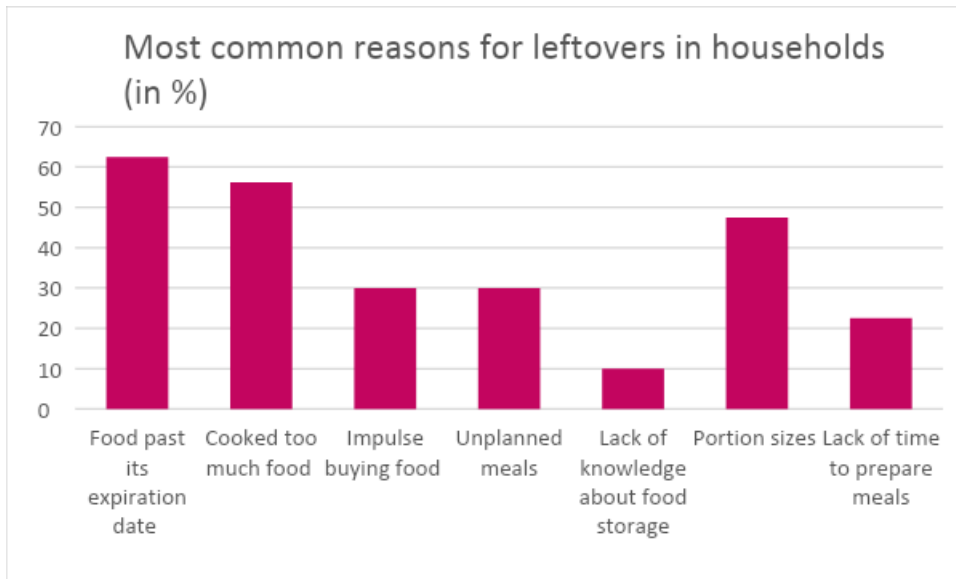


Figure 1: Most common reasons for leftovers

Leftovers that are stored are usually kept for a short period, typically one or two days. Storage times can vary depending on the type of food. Some participants reported longer storage periods when using the freezer, if the food is suitable for this type of storage. Food that is not eaten or stored ends up being discarded. The main reasons for discarding food are spoilage or the food having passed its expiration date. Additionally, some participants mentioned forgetfulness as a factor, either forgetting to use the food in time or forgetting that it was stored, leading to spoilage. A small proportion of people discard food due to dislike, especially when trying new foods where the quantity purchased was more than needed for an initial taste. Interestingly, the biggest motivation to minimize food waste is to save money. This, along with other reasons, is illustrated in Figure 2.



Figure 2: Common motives to reduce food waste.

The most common practices for storing food and extending the shelf life of food or leftovers are presented in Figure 3.

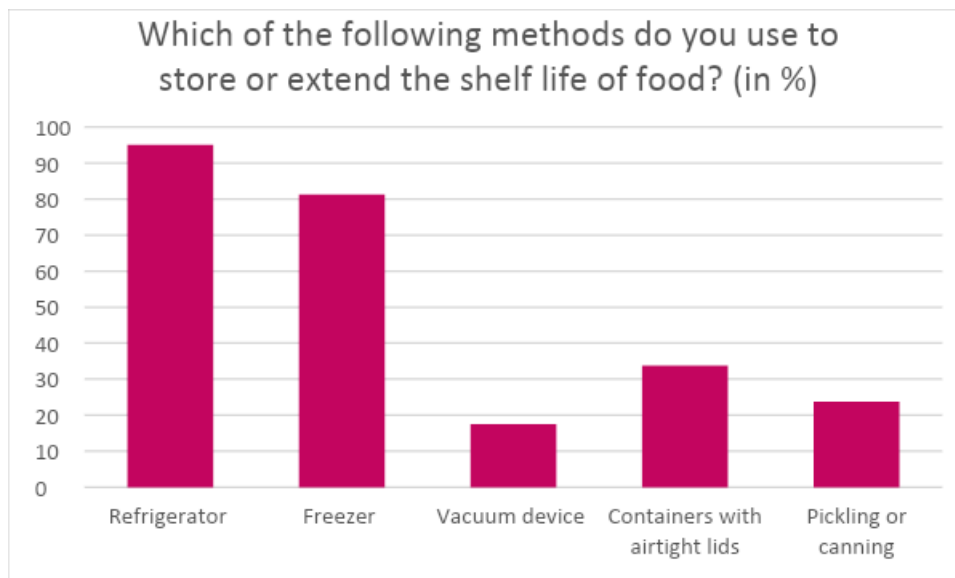


Figure 3: Practices of storing leftovers or food.

In the second part of the questionnaire, we focused on good practices within households and explored what could improve leftover management. According to literature, the best practice for minimizing food waste is meal planning. Among participants, 17.5% always plan their meals in advance, 46% do so most of the time, 21% sometimes, and 15% rarely plan meals ahead.

When asked about the adequacy of their meal planning skills, 58.8% of participants rated their skills as adequate. Using leftovers that are spoil-free and prepared but uneaten as ingredients for new dishes is a common practice: 23% of participants use leftovers often, 40.5% sometimes, 26.6% rarely, and 10% never use leftovers for new meals. Responses to an open-ended question about the use of leftovers confirmed and expanded on these answers, indicating that leftovers are often used either as ingredients or as part of meals adapted to include them.

The last part of the questionnaire focused on ways to enhance existing good practices, as well as motivations and limitations. The main factors influencing decisions to buy food are presented in Figure 4.

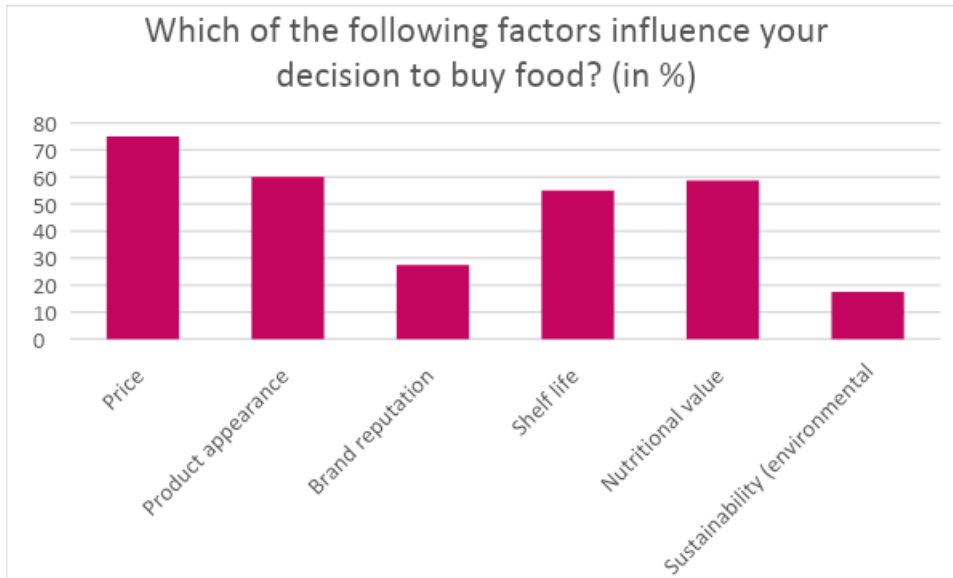


Figure 4: Factors of decision making when buying food.

In Figure 5, we present the main skills that the participants reported would help them reduce food waste.

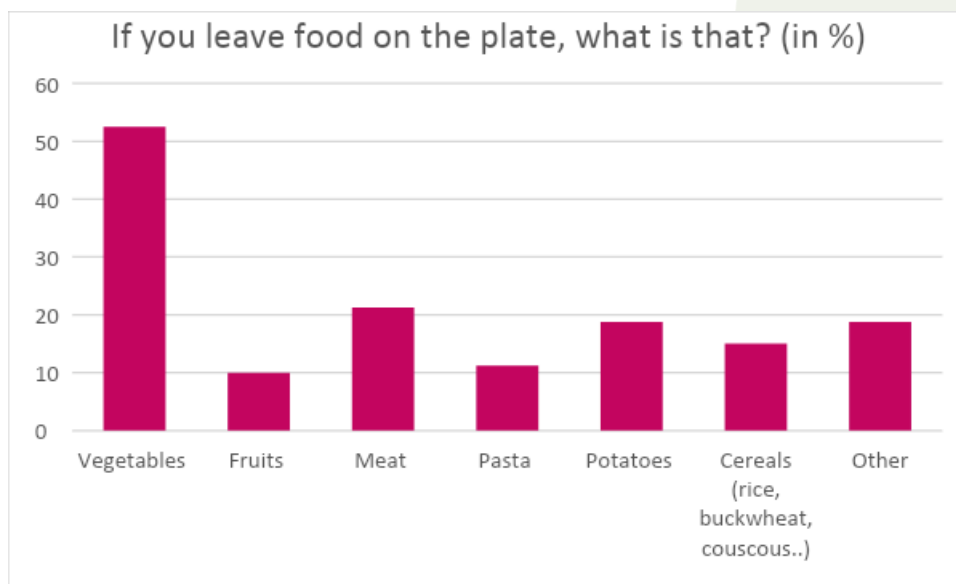


Figure 5: Skills to help reduce food waste.

The biggest challenges reported by participants included meal and shopping planning, a lack of knowledge about food storage and food safety, differences in food preferences within the same household, and a lack of time to properly manage food shopping and cooking. These challenges are also the most frequently reported areas for potential improvement in leftover management.

Additionally, 58% of parents reported that their children are picky eaters. Vegetables are the most problematic food group for children, followed by legumes. A smaller proportion of children refuse to eat fish and certain meats. There is also a trend showing that children often have a negative attitude towards leftover food. Generally, if people refuse to eat leftovers, it is due to a dislike of leftovers altogether, or because of the reduced variety in meals. Another important factor is the fear of food being spoiled or the perception of lower quality and safety.

When we asked children if they are willing to eat leftovers from lunch as supper, the responses were quite evenly distributed: 38.6% said yes, 31.6% said no, and 30% reported that they do not care. The main reasons children leave food on their plate are because they are full (48.5%) and because they dislike the food (40%), with the remaining children leaving food due to initially large portion sizes. What children



most

commonly leave on their plates is presented in Figure 6.

Figure 6: Food most commonly left on the plate by children.

Seventy-four percent of children are involved in family meal planning, which means their food preferences are considered to some extent. Sixty percent of children report that their preferences are heard sometimes, 29% always, and 11% say their food preferences are not considered.

In the final question, we asked children whether they had ever heard about the topics of food waste or leftovers. Sixty-six percent of children have heard about these topics either at school or at home.

To further investigate the issue of leftovers in households and to identify good practices, we also conducted interviews with parents. When interpreting the results of these interviews, it is important to consider that although the interviews were anonymous, the researcher and the interviewee were in the same room, allowing for the potential presence of observational bias. The first interview question asked parents to describe the management of leftovers in their households. Responses varied, with most parents reporting a satisfactory level of leftover management. This was achieved either by planning meal sizes or by storing leftovers properly. However, some parents admitted to discarding food, primarily due to poor planning skills, which led to preparing too much food for a single meal.

In this segment, several motivating factors for proper leftover management emerged;

the most significant factor was budget. Many families still devote a significant portion of their monthly budget to groceries and thus cannot afford to be wasteful. Good practices mentioned by parents included storing leftovers in closed containers, refrigerating them, and eating them later. The second most commonly reported good practice was proper meal planning, followed by composting.

The second interview question focused on handling leftovers. Responses confirmed previously reported practices, with the majority of people storing leftovers for future use. Interestingly, some people use leftover food as animal feed and select which leftovers are suitable for this purpose.

The third question explored shopping and meal planning. Most parents plan meals in advance and adjust their shopping accordingly. There is some variability in planning, with some parents planning for the entire week and others for just a few days. Additional shopping trips may be needed to obtain missing ingredients. In some cases, parents reported incorporating leftovers into their meal and shopping plans.

The fourth question investigated personal inclinations towards eating leftovers. Overall, there was a positive inclination, as parents found leftovers convenient since they are already prepared. Interestingly, some parents expressed satisfaction from not having to discard food. However, it was noted that eating the same food repeatedly can become boring for some, and a fear of spoilage can prevent leftovers from being consumed. In these cases, leftovers might be discarded.

In the second part of the parent interviews, we explored parents' interest in the topic of leftovers. First, when asked whether this topic is important to them, all parents agreed that it is. Some parents were more focused on the environmental aspect, while others emphasized the economic implications of food waste.

Secondly, when questioned about whether educating children might improve leftover

management within their households, parents unanimously agreed that it would be beneficial. The only variation was in the perceived methods of such education, which ranged from increasing awareness of the topic to teaching children about the processes of preparing and growing food. This approach aims to develop an eating culture and raise awareness of the effort involved in food production and preparation.

Lastly, when asked if they would be interested in learning more about preventing leftovers, parents expressed interest. They highlighted two main points: the need for practical learning, where they would appreciate practical, actionable information, and the desire for time-efficient learning methods that would not require too much of their already limited time.

Results of questionnaires and Interviews with teachers

The second group we investigated for insights into awareness about leftovers and existing good practices were primary school teachers. Our focus was on exploring how topics related to food waste are presented in the existing curriculum and identifying opportunities to expand education related to minimizing leftovers. To gather this information, we conducted an online survey with open-ended questions for teachers.

To further explore how the topic of leftovers is presented in schools and identify potential areas for improvement, we also conducted interviews with smaller groups of teachers in each participating country. This approach allowed us to gain a deeper

understanding of the current educational landscape regarding food waste and the possibilities for integrating more comprehensive lessons on minimizing leftovers within the school curriculum.

Firstly, we investigated the extent to which the topic of food waste is covered and in which year it is most prominently featured in the school curriculum. The topic of food waste is present throughout all years of elementary schooling, integrated into various subjects through a multidisciplinary approach that aligns with each subject's curriculum. For instance, in science classes, the focus may be on the environmental impact and ecosystem implications of food waste, while in art classes, students might create projects to visualize the food cycle.

Common themes across subjects include proper food storage, efficient use of leftovers, raising awareness about the environmental impact of food waste, practical measures to reduce food waste such as portion control and meal planning, and the moral and social implications of wasting food. Through this integrated approach, students receive a well-rounded education on the importance of minimizing food waste and developing sustainable practices.

Secondly, we inquired about the strategies taught in schools or other settings to reduce food waste. Common strategies include portion control, such as serving proper sizes and taking appropriate amounts of food in self-service settings, and proper food storage, like checking expiry dates and extending the freshness of food through refrigeration or freezing.

Other strategies involve reusing leftovers, composting, mindful shopping, and fostering a cultural change by promoting a sustainable culture. Schools aim to impart knowledge on these approaches, although it is crucial that similar practices are applied at home to reinforce and supplement this learning with practical experience. This combination of school and home practices can help students develop a more

comprehensive understanding of how to effectively reduce food waste.

We then asked teachers which subjects they considered appropriate for including the topic of leftover food. A wide variety of subjects were identified as suitable for integrating this topic. Subjects focusing on environmental and social education were mentioned most frequently, followed by skills-based subjects that involve practical learning. Natural science subjects were also considered appropriate, as were civic education and technology subjects.

From these responses, we can conclude that there is no single optimal subject for including topics on leftover food or food waste. Due to the broad nature of the topic, integration should be multidisciplinary, addressing multiple aspects such as environmental impact, social implications, and practical solutions. The collected answers highlight the importance of raising awareness of food waste and leftovers, discussing multiple layers of the issue to ensure a comprehensive understanding across various educational contexts.

To gain more practical insights on the topic of leftovers, we explored how schools can encourage students to be mindful of and reduce food waste. While there was some overlap with previous discussions, our focus here was on the approach rather than the subject.

The responses highlighted the importance of practical education and strategic school initiatives. Effective methods identified included learning through experience, awareness-raising campaigns, reward systems, and the use of digital tools. The overarching idea is to incorporate the topic of food waste into students' everyday lives, helping them develop mindfulness and skills that go beyond the classroom. By creating engaging and interactive experiences, schools can instill habits and awareness that encourage students to actively participate in reducing food waste.

Teachers agree that there are numerous opportunities to incorporate the topic of leftover food into the curriculum. They suggest several strategies to effectively address this issue within the school environment:

Curriculum Integration: Integrating the topic of food waste across various subjects ensures that students gain a comprehensive understanding of its multifaceted impact.

Practical Activities: Involving students in hands-on activities, such as cooking, composting, and food preservation, helps them develop practical skills and awareness about reducing food waste.

Use of Technology: Leveraging digital tools and platforms can enhance learning and assist in tracking food waste reduction efforts.

Community and Family Engagement: Engaging the community and encouraging family involvement can extend the reach of school initiatives and promote consistent practices at home.

Awareness and Behavioral Change: Conducting campaigns and activities to raise awareness can cultivate a culture of mindfulness and inspire behavioral change regarding food waste.

By implementing these strategies, teachers believe the school environment can address the topic of leftover food more effectively, equipping students with the knowledge and skills necessary for adopting sustainable practices.

Teachers believe that several topics could be integrated into the curriculum to significantly enhance children's awareness of food waste and methods to reduce it.

These topics can be classified into several key groups:

Understanding Food Life Cycles: This includes teaching children about the journey of food from farm to table and educating them about the environmental impacts of food production and disposal.

Practical Skills: This group focuses on practical aspects such as meal planning, portion control, and cooking with leftovers, providing students with vital skills to minimize waste.

Economic and Financial Literacy: Teachers emphasize the importance of smart shopping and understanding the economic impact of food waste, promoting an awareness of the cost associated with waste.

Waste Management Techniques: This involves teaching techniques such as composting and reusing leftovers, equipping students with knowledge on how to manage waste effectively.

Ethical and Social Education: It covers the moral aspects of food waste, encouraging students to consider the ethical implications and promoting community involvement to foster more sustainable behaviors.

Environmental Sustainability Education: This includes examining the environmental consequences of food waste and encouraging initiatives and behaviors that support sustainability.

By incorporating these topics into the curriculum, teachers aim to equip students with a comprehensive understanding and practical skills needed to adopt more sustainable and responsible practices regarding food consumption and waste.

As we are planning to develop a serious game to help raise awareness of leftovers, we were interested to identify the topics that would benefit this game. All the identified topics were already discussed, but to summarize, these topics would be: storage and preservation, composting, smart shopping and meal planning, creative cooking, environmental impact, nutritional awareness, and financial literacy. A good proposition, however, hard to implement was virtual role-playing, where children would manage a controlled environment in order to develop skills and learn about leftover prevention.

Overall, teachers reported a wide variety of topics and suggestions that could benefit the development of the game. To further explore these topics of interest, identify subjects that already include topics related to leftovers, and, most importantly, understand teachers' disposition towards using our game, we conducted interviews. These interviews provided deeper insights into how the game could be integrated into existing curricula and how receptive teachers might be to implementing this educational tool in their classrooms.

In these interviews, teachers disclosed that some sustainability topics are already incorporated into the existing curriculum, although there are exceptions where such topics are absent. When describing these topics, teachers confirmed the findings of the online survey. During the interviews, teachers were asked to identify topics they consider crucial for reducing food waste. Teachers from all participating countries emphasized the importance of understanding the food life cycle and fostering a personal attitude towards food. Other crucial topics mentioned included practical skills, the consequences of food waste, meal and shopping planning, basic nutrition knowledge, and reusing or composting leftover food.

The last two important questions in the interview focused on using play for learning and teachers' willingness to incorporate a serious game into their teaching

processes. Teachers view learning through play as a highly motivating way to engage children, as it allows them to present information in a fun and innovative manner. This approach makes children more motivated and receptive to new information. Overall, teachers are open to using the educational game we are developing, seeing it as a valuable tool for teaching and enhancing students' understanding of food waste and sustainability.

Conclusions

Overall, there is a solid foundation of good practices for handling and preventing leftovers in European households. While there is room for improvement, the focus should be on expanding and enhancing these existing practices.

The most common good practices include meal and shopping planning, proper storage of food and leftovers, and reusing leftovers either as animal feed or for composting. Parents are aware of the importance of minimizing or eliminating leftovers, with household economy being the primary motivator.

When considering opportunities for improvement, parents express a desire to learn new practical skills in a time-efficient manner. They also acknowledge the critical role of educating their children about minimizing leftovers, understanding that instilling these values early can lead to more sustainable habits in the future.

The prevention or minimization of leftovers is well represented in a variety of school subjects. Teachers recognize the importance of this topic and are open to educating their students about it. Educators noted that the issue of food waste contains multiple layers that need to be addressed comprehensively. Similar to parents, educators emphasized the necessity of practical skills to tackle the issue of leftover food, alongside a strong theoretical foundation.

Educators are also receptive to incorporating an educational game into their lessons, seeing it as a valuable tool to motivate children to learn while offering a welcome break from traditional learning methods. This approach allows students to engage with the topic in an interactive and enjoyable way, potentially enhancing their understanding and retention of the information.

In this report, we established that our game should focus on enabling children to engage in meal and shopping planning, teach them simple storage practices, and present the food life cycle to develop awareness of the importance of food in society and the environment. Our aim is to enhance awareness among future consumers and ultimately reduce leftovers. By equipping children with the necessary skills and knowledge, the game seeks to foster more sustainable behaviors and attitudes toward food consumption and waste reduction.