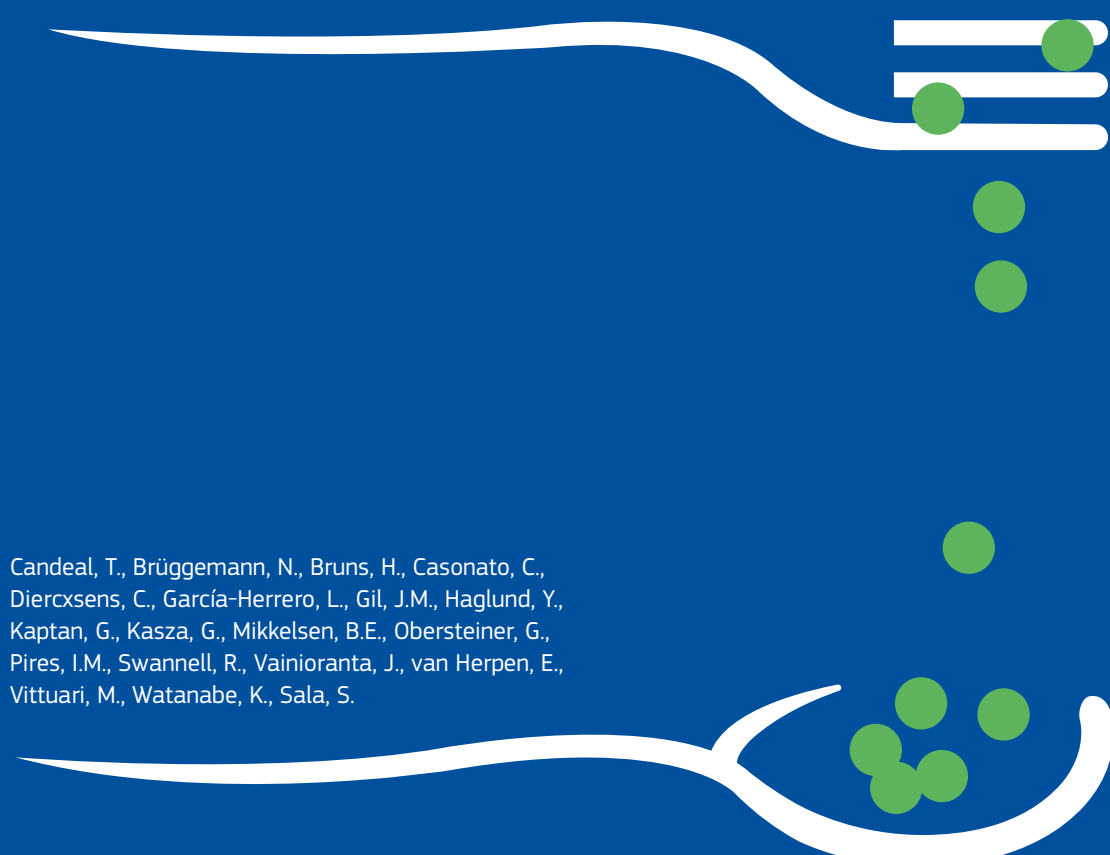




JRC TECHNICAL REPORT

Tools, best practices, and recommendations to reduce consumer food waste – **A compendium**

A stylized white graphic of a fork and a spoon. The fork is at the top, and the spoon is at the bottom. Several green dots of varying sizes are scattered around the utensils, representing food particles. The dots are concentrated more around the spoon and the tines of the fork.

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2023

Joint
Research
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JRC133004

EUR 31572 EN

Print	ISBN 978-92-68-05555-7	ISSN 1018-5593	doi:10.2760/404597	KJ-NA-31-572-EN-C
PDF	ISBN 978-92-68-05055-2	ISSN 1831-9424	doi:10.2760/967005	KJ-NA-31-572-EN-N

Luxembourg: Publications Office of the European Union, 2023

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How to cite this report: Candeal, T., Brüggemann, N., Bruns, H., Casonato, C., Diercxsens, C., García-Herrero, L., Gil, J.M., Haglund, Y., Kaptan, G., Kasza, G., Mikkelsen, B.E., Obersteiner, G., Pires, I.M., Swannell, R., Vainioranta, J., van Herpen, E., Vittuari, M., Watanabe, K., Sala, S., *Tools, best practices, and recommendations to reduce consumer food waste – A compendium*, Publications Office of the European Union, Luxembourg, 2023, doi: 10.2760/967005, JRC133004.

JRC TECHNICAL REPORT

Tools, best practices,
and recommendations to reduce
consumer food waste
A compendium

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Abstract

Food waste is a pressing issue that has significant environmental, social, and economic consequences. In line with its commitment to the global Sustainable Development Goal Target 12.3 of halving food waste by 2030, the European Union (EU) has implemented an extensive action plan to tackle this problem. In the EU, and many other parts of the world, most food waste occurs at the consumption stage. In order to tackle this hotspot of food waste generation, the European Consumer Food Waste Forum (ECFWF) - a pilot project involving experts from diverse backgrounds - has identified six intervention types to reduce consumer food waste, as well as recommendations for policymakers and other key players. The document, presented as a compendium, shows the main findings of this work, emphasising the importance of taking a systemic approach that considers the key drivers and levers of change when targeting food waste reduction at the consumer level. It brings together tools, best practices and recommendations which policymakers, researchers, businesses, and practitioners can draw on to take action to reduce consumer food waste, in cooperation with other stakeholders. The compendium encourages collaboration and concrete actions to address food waste and promote the establishment of sustainable food systems.

Acknowledgements

This document is a deliverable of the Administrative Agreement between DG Health and Food Safety (DG SANTE) Contract n° /2021/ SI2.851759 and the Joint Research Centre (JRC) n° 36041 focusing on 'Provision of technical and scientific support to DG SANTE in relation to Pilot project –European Consumer Food Waste Forum'.

The authors of this compendium would like to thank:

Anne-Laure Gassin (EC-SANTE) and Cristina Lisetchi (EC-SANTE) for guidance in defining the scope, elaborating the framework, and for their contributions throughout the project. Thanks also to Rikke Karlsson (EC-SANTE) for the support in finalising the compendium and to Alexis Mathioudakis (EC-SANTE) for the support in the organisation of the meeting between members of the Forum and of the EU Platform on Food Losses and Food Waste.

Zsuzsa Turoczy (EC-JRC), Maria Teresa Borzacchiello (EC-JRC), Marios Avraamides (EC-JRC), and Andrea Camia (EC-JRC) for the support in the organisation of the ECFWF.

Toine Timmermans from Food Waste Free United Foundation (Samen Tegen Voedselverspilling) and Leah Wistrand from WRAP (Waste & Resources Action Programme) for providing their knowledge to better capture the functioning of national food waste prevention programmes.

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Executive Summary

1. Context

Food waste is a cross-cutting issue that needs to be addressed urgently to reduce the environmental and climate impacts of food systems and support the **transition towards sustainable food systems**, which can ensure food security for a growing world population. In 2020, in the EU, nearly 59 million tonnes of food waste (around 131 kg per person) were generated, with an associated market value of EUR 132 billion (Eurostat, 2023). It is estimated that 53 % of total food waste occurred in households, amounting to 70 kg per capita on average (Eurostat, 2023), leading to significant environmental and social consequences. Notably, food waste that occurs at the last stages of the supply chain, i.e. at home or in food services, has a higher environmental impact per kg than unprocessed food products wasted at farm level. Food waste generated in the EU in 2020 is estimated to be responsible for 252 Mt of CO₂ (Sala et al., 2023) accounting for about 16 % of the total greenhouse gas emissions from the EU food system (Sanyè-Mengual & Sala, 2023).


Food waste also has **important economic and social consequences** and can threaten the resilience of food systems. Due to the cost of food production and waste treatment, wasting food leads to loss of resources that could be allocated more efficiently. For consumers, food waste leads to unnecessary spending in a context where food affordability is of growing concern: in the EU, some 32.6 million people cannot afford a nutritious meal every second day (Eurostat, 2021). Discarding food that is fit for human consumption, rather than making it available to people in need, also represents a missed opportunity in the light of growing challenges to food security. Finally, for many consumers, wasting food is morally wrong, thereby encapsulating an important ethical dimension as well (Bretter et al., 2023).

The EU and its Member States are committed to meeting the [Sustainable Development Goal \(SDG\) Target 12.3¹](#) to halve, per capita, global food waste at the retail and consumer level by 2030. The EU has implemented a **dedicated action plan to reduce food loss and waste**, including regulatory and non-regulatory actions, initially as part of the Circular Economy Action Plan (2015) and since 2020, under the European Green Deal's Farm to Fork Strategy. The establishment of a common

monitoring methodology in the EU² and the adoption of EU guidelines on food donation (European Commission, 2017) represent some key milestones in the European Commission's endeavours to harmonise legislation and clarify how relevant measures in EU legislation apply to food waste prevention. The Commission aims not only to lay down clear obligations for Member States concerning the reduction of food waste, supported by a clear legislative framework empowering them to take effective action, but also to propose the setting of legally binding food waste reduction targets for Member States in order to accelerate the EU's progress towards SDG Target 12.3. The Commission also supports the development and sharing of best practices and solutions to reduce food waste across the EU, and mobilisation of all key players in the field. This is done through the [EU Platform on Food Losses and Food Waste³](#) (FLW), [the EU Food Loss and Waste Prevention Hub⁴](#) or through specific projects such as the [European Consumer Food Waste Forum](#) (ECFWF)⁵.



131 kg
of food waste
per person in the EU
data from 2020



252 Mt
emissions of CO₂
per year in the EU
data from 2020

1 <https://sdgs.un.org/goals/goal12>

2 Delegated Decision establishing a common EU methodology to measure food waste adopted on 3 May 2019. Guidance on reporting of data on food waste and food waste prevention: <https://ec.europa.eu/eurostat/documents/342366/351811/Guidance+on+food+waste+reporting/5581b0a2-b09e-adc0-4e0a-b20062dfe564>

3 https://food.ec.europa.eu/safety/food-waste/eu-actions-against-food-waste/eu-platform-food-losses-and-food-waste_en

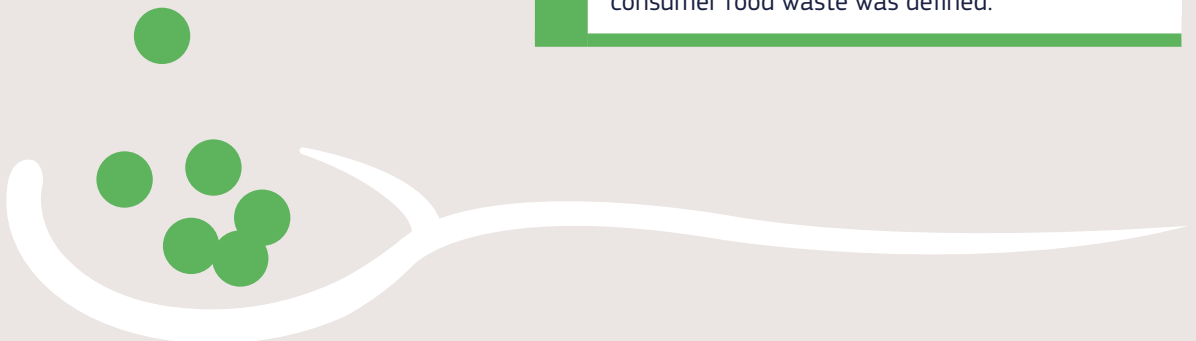
4 https://ec.europa.eu/food/safety/food_waste/eu-food-loss-waste-prevention-hub/

5 https://knowledge4policy.ec.europa.eu/projects-activities/european-consumer-food-waste-forum_en

2. Our approach

The ECFWF is a pilot project, funded by the European Parliament and coordinated by the European Commission (DG Health and Food Safety and Joint Research Centre). It follows on from the 'Key recommendations for action in food waste prevention', developed by the EU Platform on FLW, and in particular the recommendation calling for *improved action design, monitoring, evaluation and knowledge sharing regarding food waste prevention interventions*. Considering that most food waste occurs at the consumption level, this project aims to create tools and share best practices to inform future food waste reduction interventions that target consumers, while promoting replicability across Member States at all levels and for all relevant stakeholders. The ECFWF mobilised a network of food waste prevention researchers and practitioners in order to gather data and identify a variety of practical, evidence-based solutions to reduce food waste at the consumer level, including households and food services. The work was carried out between October 2021 and May 2023 in five main steps:

1	<p>Experts with diverse backgrounds and coming from various geographical locations were selected to be part of the ECFWF;</p>
2	<p>The ECFWF supported the identification of drivers and levers of behavioural change by reviewing scientific and grey literature (Vittuari et al., 2023). These drivers and levers were classified using the motivation-opportunity-ability (MOA) behavioural change model (van Geffen et al., 2020);</p>
3	<p>An evaluation framework to assess food waste prevention actions was defined, including quantitative and qualitative criteria. The ECFWF also specified which interventions should be collected and analysed;</p>
4	<p>The evaluation framework was tested by assessing 78 consumer food waste reduction interventions (Swannell et al., 2023). Of the evaluated interventions, those showing promising results were identified and outlined in consultation between the ECFWF experts and members of the EU Platform on FLW;</p>
5	<p>A set of tools and recommendations to help reduce consumer food waste was defined.</p>



3. Main conclusions

Reducing consumer food waste is possible. Stimulating behavioural change can contribute to this aim. However, identifying the right construct – an idea to be accepted by the target audience – to reach that desired effect requires a systemic approach, involving relevant food system stakeholders. The systemic approach refers here to the importance of considering that individual behaviours result from individual decisions influenced by external factors of different kinds (cultural, social, political, economic); hence interventions/approaches to reduce consumer food waste must consider both individual and systemic drivers and levers.

The Forum developed **a compendium of six different types of interventions** that a wide range of stakeholders can apply to support consumers in reducing food waste both in- and out-of-home. These types of interventions are:

1. Prompts and tools for households
2. Coaching for households
3. Local awareness campaigns
4. Classroom education programmes and actions in school canteens
5. Nudges out-of-home (food services)
6. National food waste prevention programmes

The relevance of each intervention, its most promising target group, and the key stakeholders that can make use of it, are described in the main document. Additionally, several examples of best practice are included. This information can be used to inspire similar and improved versions of these interventions.

The compendium also outlines **key tools and recommendations** that are transversal to selected types of interventions within the scope of the ECFWF, but also to other types of interventions not covered by the Forum's work. These include:

- An **evaluation framework** and a standardised data collection protocol to facilitate data gathering.
- A simple **introduction for practitioners** on how to use experiments to rigorously evaluate consumer food waste interventions.
- A basic introduction to the potential benefits and challenges of **consumer segmentation studies and techniques for targeting/tailoring interventions**.
- A set of **methods to quantify food waste**, including a food waste prevention calculator that helps quantify the environmental impacts and potential trade-offs of food waste prevention by applying life cycle assessment.

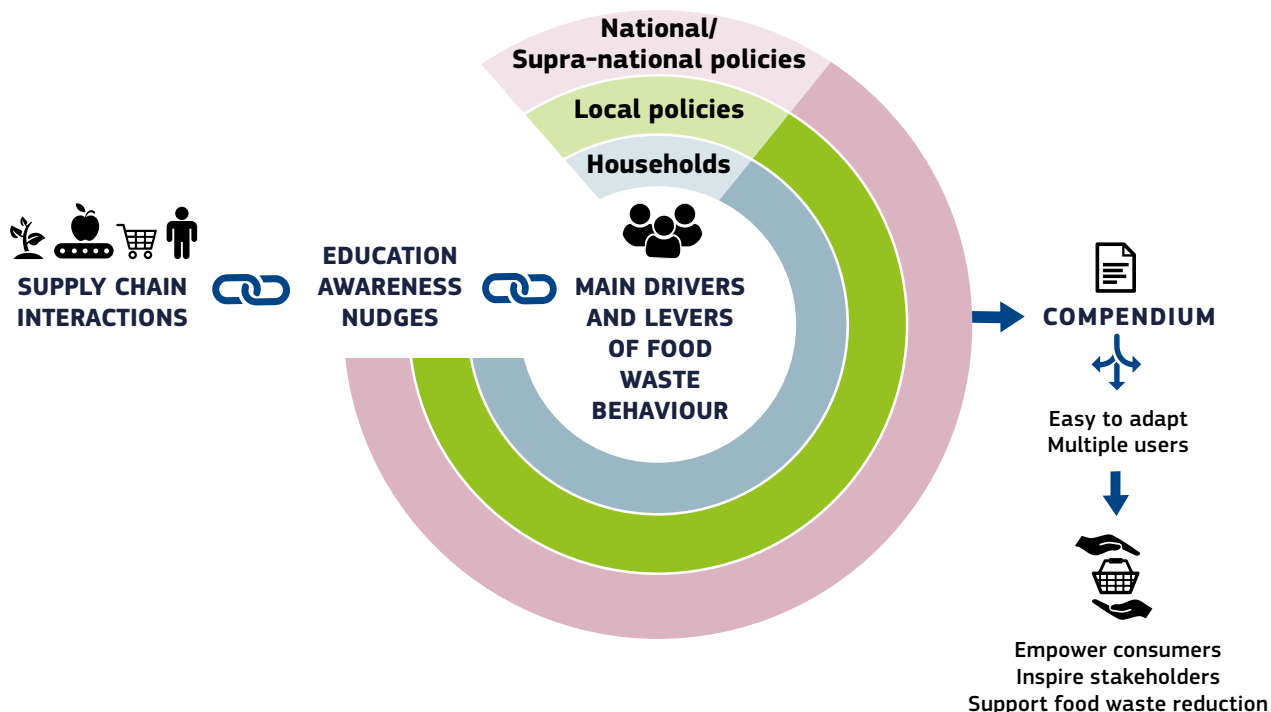
Tackling consumer food waste is a complex challenge that requires active engagement of multiple players and levels of institutional governance. Therefore, this work also presents specific **recommendations for policymakers, researchers and practitioners**, informed by best practices identified by the ECFWF. Insights generated through the Forum's work can benefit a wide range of stakeholders aiming to address consumer food waste (and possibly also food waste occurring at other stages of the food supply chain).

The figure on next page shows the key factors considered by experts in developing the compendium. The tools and solutions proposed take into account interactions in the food supply chain and how interventions like education, awareness raising, and nudges can address food waste drivers and change consumer behaviour. These interventions can be implemented at various levels, from policymaking to households. The compendium empowers users by providing knowledge and learning to design interventions that inspire consumers to make informed decisions.

The Forum acknowledges some limitations in its work. For example, the scope of the Forum's work was limited in terms of the type of interventions explored, data gathered (mainly in terms of cost of interventions), and the segments of the food supply chain covered. Interventions considered in this project mostly focus on individual behaviour and on consumer food waste prevention actions for which empirical evidence exists, while other potential interventions such as the use of economic incentives, legislative measures or environmental initiatives connected to food waste reduction (e.g. some fresh-produce items might not have a longer life with plastic packaging) (WRAP, 2022), have not been investigated (Michie et al., 2013).



Figure 1. Overview of the European Consumer Food Waste Forum's methodological framework and related outcomes.



Source: Own elaboration.

4. Looking ahead

The results of this work can support Member States in taking action and engaging with stakeholders to achieve the future food waste reduction targets⁶ by:

- Focusing interventions on hotspots for food waste generation;
- Encouraging institutional actors to think systemically;
- Making better use of available resources to support consumer behavioural change.

The compendium was created to be easily adapted to the needs of Member States and other stakeholders, based on their cultural specificities (e.g. dietary habits), market, and geographical contexts. The recommendations for policymakers include concrete and realistic examples, providing evidence that food waste reduction is achievable when all key players and levels of governance are

involved. Lastly, research gaps in consumer food waste prevention were identified and coupled with approaches to address these, which can be used to prompt research institutions and other stakeholders to further develop knowledge and learning in the field.

The journey has just started and the uptake and continuation of this work can and should be pursued by other networks, such as the [EU Platform on Food Losses and Food Waste](#)⁷, and carried forward through concrete action on-the-ground in Member States.

⁶ The Commission aims to introduce these targets through a new legislative proposal, to be adopted in 2023, which will be followed by a co-decision process with the European Parliament and the Council before its final entry into force.

⁷ https://food.ec.europa.eu/safety/food-waste/eu-actions-against-food-waste/eu-platform-food-losses-and-food-waste_en

1. Introduction

Reducing consumer food waste, along with a dietary shift towards a plant-based diet, is one of the priority actions for a sustainable food system transformation and a powerful action to protect the environment (Rosenzweig et al., 2020; SAPEA, 2020). Food waste creates significant social, economic and environmental burden, increasing the pressure on limited natural resources, such as land and water (FAO, 2019) and further endangering biodiversity and food security. Addressing consumer food waste could therefore deliver multiple wins.

Globally, households accounted for 61 % of food waste in 2019, corresponding to 79 kg per capita per year (UNEP, 2021). In the EU, it is estimated that, in 2020, 53 % of total waste occurred in households, amounting to an average 70 kg per capita (Eurostat, 2023). Around 10 % of all food supplied to retail, restaurants, food services and households is wasted. The consumption stage refers to food wasted both in and out-of-home. Out-of-home settings include a variety of food service businesses, such as restaurants, bars, mass catering, hotels, and events, where consumers are served or offered food. Food waste at the consumption stage represents a big challenge as it is the result of the interaction between individual and collective behaviours, against the backdrop of the dynamics of the other segments of the food supply chain, the food environment, and other external factors (e.g. food prices). Understanding the often-complex actions and patterns, and the drivers of behaviours leading to the discarding of food is necessary for a comprehensive, evidence-based reduction of food waste. Consumers can directly change many behaviours leading to food waste (e.g. cooking too much, forgetting food about to spoil or expire), but their capacity to prevent food waste is also influenced by other actors (e.g. policy makers, producers, food manufacturers, retailers, food services, NGOs) and issues (e.g. related policies, lifestyles, sustainability, welfare, health). **Therefore, reducing consumer food waste requires a multi-level and multi-dimensional approach.**

Multi-level refers to the much-needed **collaboration between all actors** of the food system: producers, food manufacturers,

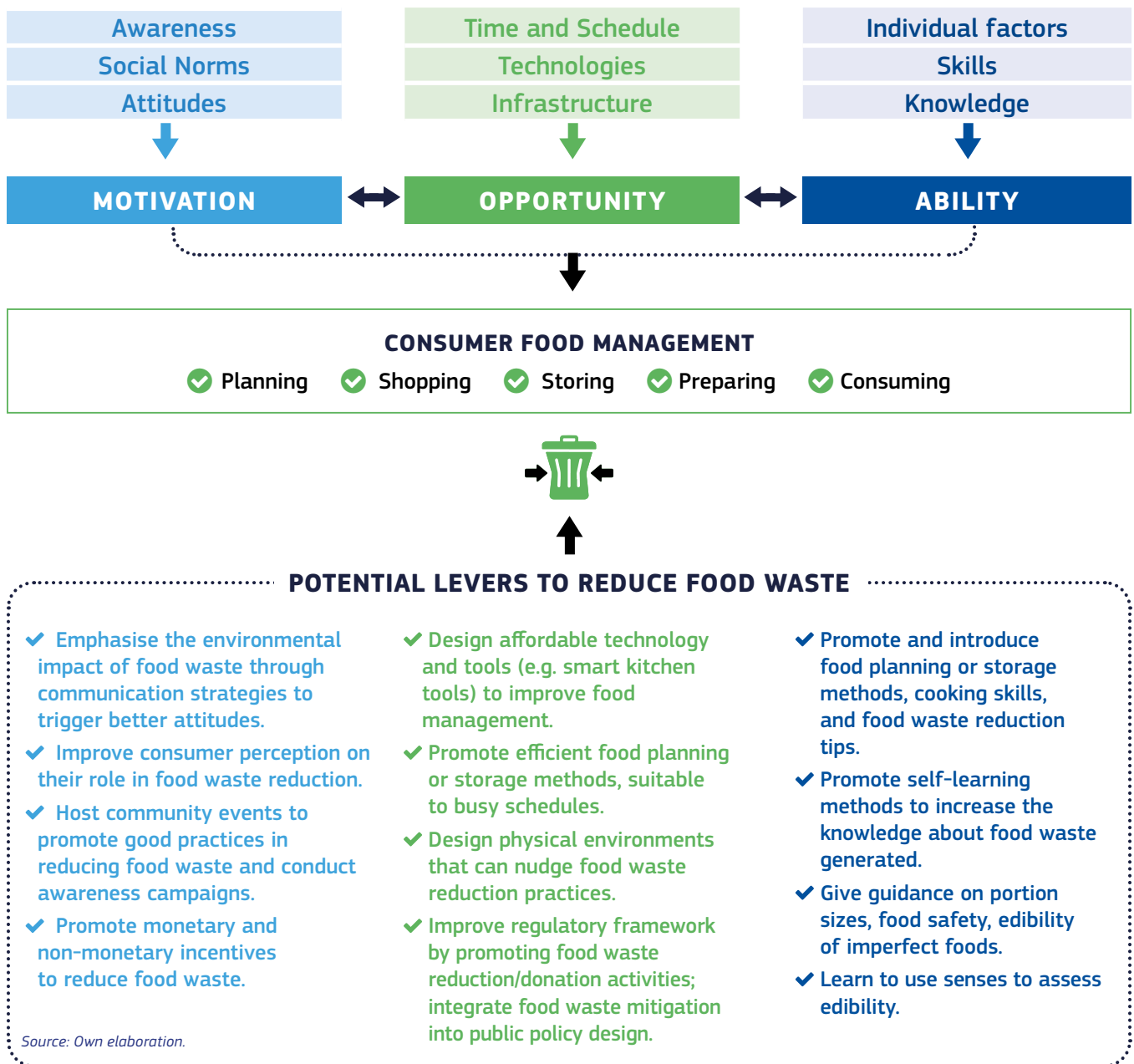
retailers, food services as well as policy-makers, NGOs, academics and other players (e.g. financial institutions and others). **Multi-dimensional** indicates an **approach that ensures consumer food waste** is addressed – not as a stand-alone issue – but one that **is embedded in a broader context** (for instance, as part of actions aiming to promote adoption of healthy, sustainable diets). Moreover, applying a behavioural science lens – from design to evaluation – will help ensure the effectiveness of actions put in place to tackle consumer food waste.

To untangle the behavioural component of food waste, one must understand that food waste occurs throughout the food management cycle and in different settings (De Laurentiis et al., 2021). Food waste is linked to decisions made by people when they plan, purchase, store, prepare, and consume food (see Figure 2). An increasingly popular approach in examining consumer food waste is the **Motivation Opportunity Ability (MOA) framework** (Ölander & Thøgersen, 1995). This behavioural model shows that food waste arises mostly as an unintended consequence of many iterative decisions and actions related to in- and out-of-home food management practices, driven both by internal (individual) and external (social and societal) factors and connected with consumer Motivation-Opportunity-Ability. This complex interplay between both the internal and external (including systemic) factors influencing consumer food waste explains why it is essential to understand the potential synergies between actions taken by different players in the food system and related issues, such as adopting healthier diets.

Addressing and modifying behaviours that lead to food waste reduction can be challenging since individuals often make multiple choices, some of which might appear as irrational, resulting in food waste (Vittuari et al., 2023). It is crucial to **understand the underlying causes** of such behaviours to develop effective interventions for reducing consumer food waste.

Along with the understanding of drivers and levers of food waste behaviour, it is essential to identify **hotspots** (e.g. groups of high

Figure 2. Relation between MOA framework (light blue - motivation; green - opportunity; dark blue – ability), food waste behaviours and potential levers (compiled from Blondin & Attwood, 2022 and Vittuari et al., 2023).



wasters, where food waste mostly occurs, food products most wasted), economically vulnerable groups, and 'low-hanging fruit' (e.g. consumer groups that are most receptive to behaviour change intervention).

Extensive research into the behavioural drivers and levers of food waste (Vittuari et al., 2023) together with a thorough evaluation of consumer food waste reduction interventions (Swannell et al., 2023), are the starting points for building this compendium, which summarises the outcomes of a behavioural science analysis and compiles

tools, best practices and recommendations.

The compendium is the outcome of the European Consumer Food Waste Forum (ECFWF), a pilot project that aimed to collect data and identify evidence-based, practical solutions to reduce food waste at the consumer level. The ECFWF brought together experts from diverse backgrounds to collaborate on addressing food waste in households and food services. The primary objective was to gather valuable insights that can support the implementation of effective strategies for reducing consumer food waste.

This document addresses some of the needs identified by the EU Platform on Food Losses and Food Waste, particularly in enhancing the design, monitoring, evaluation, and knowledge sharing of food waste prevention interventions (European Platform on Food Losses and Food Waste, 2019).

The compendium outlines **three priority actions** emerged from the work of the ECFWF to maximise impact of food waste reduction efforts:



1. Better identify the target population:

that is, those individuals who are wasting the most, who are most in need of intervention and/or more receptive to change.



2. Improve the design of interventions

to reduce consumer food waste, based on evidence, and make monitoring and evaluation the norm.



3. Integrate insights from behavioural science in interventions,

including the use of nudges, to change behaviours also in the long term.

Triggering consumer behavioural change – irrespective of the type of consumer or setting that is targeted – is challenging. Behavioural interventions successfully tested in experimental settings might not work in real-life. Interventions applied by practitioners in real settings might not have been properly evaluated due to resource constraints – thus leaving it unclear if the intervention should be continued. More empirical evidence on effective interventions is necessary from both experimental and applied settings. Currently, reliable and uniform data to evaluate interventions are scarce – a gap that this compendium both reveals and aims to fill.

This document highlights how the implementation of interventions could move from a 'one-size-fits-all' to a more 'tailored' approach. It acknowledges the complexities of behaviours and habits that are context-dependent and hard to generalise. By utilising this compendium, stakeholders can improve their actions and contribute to more effective and sustainable food waste prevention efforts.

Collaboration between the various food system stakeholders is key to designing and implementing effective interventions. So far, NGOs and universities have taken the lead in testing and implementing interventions. Still, there is an opportunity to share this responsibility with other food systems actors, like retailers and local or national governments.

The outputs of the ECFWF enrich the constantly increasing evidence base on food waste prevention by indicating six generic types of interventions and providing tools that can be applied in improving the design, monitoring and evaluation of interventions.

Practitioners, policymakers and researchers can use this compendium as inspiration to design, implement and evaluate interventions to reduce consumer food waste.

2. Scope of the ECFWF and evaluation of interventions

This section provides an overview of the procedure followed to identify the best practices, tools, and recommendations.

The ECFWF conducted a review of drivers and levers of consumer food waste, as outlined in the report by Vittuari et al. (2023). Additionally, the ECFWF adapted an existing evaluation framework to suit food waste prevention interventions at the consumer level, as described in García-Herrero et al. (2023). The latest work incorporated key findings from the review of drivers and levers and framed a scope of interventions to analyse exhaustively within the ECFWF. The scope prioritised the data gathering and evaluation of some types of interventions,

namely awareness-raising, nudges and social norms, and education and training. In this report, we refer to nudge as *'any aspect of the environment in which people make decisions (i.e. the choice architecture) that predictably alters people's behaviour without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must not need several resources to be conducted'* (Thaler & Sunstein, 2008). Figure 3 lists a few examples of nudges.

Figure 3. Examples of nudges.







1. Social influence or other types of social norm information provide people with information on what is done by their peers to reduce food waste (descriptive norms) or of what other people think should be done regarding food waste (injunctive norms). Recent research highlights that targeting social norms is a promising approach to reducing consumer food waste (Blondin & Attwood, 2022).
2. Interventions that simplify consumer choices and/or change how convenient food-related decisions are can make food waste reduction easier (or, vice versa, food waste more difficult). Reduced plate size can be considered a means to make food waste slightly more difficult because it makes it less easy for people to put large quantities of food (which might get wasted afterwards) on their plate while still allowing them to decide how much to eat (i.e. not limiting their freedom to eat as much as they want).
3. Salient and catchy prompts such as warnings against the negative impacts of food waste that direct attention to the issue.
4. Providing salient and actionable information on the relevance of food waste and potential actions to reduce food waste can get people to act according to their motivations (and remind them to do so).
5. Feedback instruments provide people with information on the consequences of their actions. For example, feedback can inform consumers about the amounts of food they wasted in a specific time frame. Ideally, feedback should include actionable information for people to change their behaviour.
6. Commitment devices acknowledge the common struggle people face in following through with their plans. These devices allow individuals to intentionally make certain decisions more challenging or costly for themselves, thereby increasing the likelihood of engaging in their preferred behaviour (Bryan et al., 2010). As an example, people can sign up to a food waste reduction community or pledge publicly to reduce food waste (Stöckli et al., 2018).
7. Defaults are pre-selected options that are automatically chosen if no other choice is made. Although usually they can be easily changed, people frequently stick with the default. In the context of consumer food waste, pre-selected attributes of subscription meal boxes or the setting of a specific dining setting that both minimise the potential for leftovers are examples of defaults in the food waste domain.

Considering the scope, from April 2022 until January 2023, the ECFWF collected and evaluated interventions with the help of two tools developed or improved specifically for the ECFWF: 1) the evaluation framework for food waste prevention actions, and 2) the food waste prevention calculator (García-Herrero et al., 2023). The ECFWF has not only screened the scientific literature for evidence of interventions that were implemented in experimental settings but has also considered food waste reduction interventions implemented by practitioners in real settings. A total of 78 interventions were screened and

74 were thoroughly evaluated (all evaluated interventions are available in Swannell et al., 2023). In addition, to investigate specifically the design and implementation of national food waste prevention programmes, ad-hoc interviews and exchanges were conducted with the programme directors during spring 2023. These interviews were instrumental for identifying the success factors and for issuing recommendations which may be transferred to other national contexts.

The criteria used for the evaluation of each intervention are as follows in Figure 4:

Figure 4. Criteria used to evaluate the interventions and a brief description of each criterion.

Criteria	Description
 Quality of the intervention design	Objectives and aims are defined, appropriate targets and related KPIs are established both in terms of impacts (food waste reduction quantities) and/or outcomes (behaviour change or outreach), presence of a consistent monitoring plan, identification of food waste drivers and levers in the design of the intervention.
 Effectiveness	Whether the intervention reached the objectives set out in the design phase, preferably providing quantitative evidence of food waste reduction or consumer behaviour change.
 Efficiency	A ratio measuring the performance of an intervention (results achieved/resources spent).
 Perceived wider systemic effects of the intervention	Assessing the possible connection between the food waste prevention intervention and other impacts on the food system (positive or negative). For example, the intervention could result in a more healthy diet or may lead to increased use of packaging.
 Sustainability over time	The longevity of the intervention (how long the effect of the intervention was maintained), if known, and the availability of resources needed to maintain the effect (funds, dissemination efforts).
 Transferability and scalability	Whether an intervention can be transferred to a different context or geographical area and if it can be scaled up.

Source: Own elaboration.

A first selection of the interventions singled out those that reported their effectiveness (i.e. those achieving their objectives) and clear information on their design and implementation. This helped to classify the interventions according to their main features. The preliminary results were presented in a workshop conducted with members of

the Consumer food waste prevention sub-group⁸ of the EU Platform on Food Losses and Food Waste and ECFWF experts. Table 1 shows the different classifications presented in the workshop, based on which six types of effective evidence-based interventions to reduce consumer food waste were defined (presented in [Section 3](#) of this document).

⁸ Consumer food waste prevention sub-group:
https://food.ec.europa.eu/safety/food-waste/eu-actions-against-food-waste/eu-platform-food-losses-and-food-waste/thematic-sub-groups/consumer-food-waste-prevention_en

Table 1. Group of interventions, main target groups and key characteristics.

Group type & main target(s)		Key features
1	Prompts and tools for households   Home, households of all kinds	<ul style="list-style-type: none"> • Medium impact • High scalability • Low costs
	Physical or visual prompts are administered at the household level. Main characteristics include simple use, affordable production, low tech and possibly 'do-it-yourself' solutions; work as a daily reminder or 'nudge' to encourage/motivate food waste reduction behaviours (especially linked to storing, preparing and consuming leftovers).	
2	Coaching for households   Home, households of all kinds	<ul style="list-style-type: none"> • High impact • Low scalability • High costs
	Consumers receive information on food waste and how to avoid it through practical skills and knowledge. The coaching can be tailored to the specific drivers of food waste for a particular household and the solutions can be fitted to their lifestyle and habits.	
3	Classroom education programmes and actions in school canteens   Primary and secondary schools	<ul style="list-style-type: none"> • Medium impact • Medium scalability • High costs
	Educational materials and action plans are provided to schools to educate children through pedagogical approaches, and specific actions to reduce food waste in canteens.	
4	Local awareness raising campaigns   Home, households of all kinds	<ul style="list-style-type: none"> • Medium outreach • Low scalability • Medium costs
	Awareness raising campaigns embedded at local level. They can be multi-component interventions, and extend beyond simple information provision by integrating different types of behavioural interventions such as nudges, and should leverage knowledge related to the specific context and engage local stakeholders.	
5	Nudges out-of-home (food services)   Out-of-home, any type of customer	<ul style="list-style-type: none"> • Medium impact • High scalability • Costs may depend on the novelty of the technology employed
	Nudges used to reduce consumer food waste in out-of-home settings, such as restaurants, canteens or retailers.	
6	National food waste prevention programmes   Home, households of all kinds	<ul style="list-style-type: none"> • Medium outreach • Launched at a large scale • Medium costs
	Dedicated organisations run comprehensive national programmes targeting consumer food waste through recurring awareness campaigns, education, and behavioural interventions (such as nudges) to shift collective behaviour and establish new social norms.	

The ECFWF structured this document based on the type of group of interventions identified.

The analysis and resources provided in this compendium reflect a **multi-dimensional approach**, which takes into account:

- the action design, monitoring, evaluation, and knowledge-sharing steps;
- the behavioural constructs impacted: motivation, opportunity, and ability to influence food waste-related behaviour; and
- the extended effectiveness of the actions: influence and synergies with other initiatives not intentionally targeting food waste reduction but affecting it.

This compendium provides:

-
- **Six generic types of interventions** showing effective results in addressing food waste, and how to conduct them ([Section 3](#))
 - Recommendations and actions for policy makers ([Section 4](#))
 - Specific tools and recommendations to monitor and evaluate interventions ([Section 5](#))
 - Recommendations for action design of interventions ([Section 6](#))
 - Knowledge gaps in regards to reduction of consumer food waste and research needs to address them ([Section 7](#))
-



3. Six generic types of evidence-based interventions to reduce consumer food waste

This section presents **six generic types of interventions the Forum selected as the most effective in reducing consumer food waste based on the 74 evaluated interventions (see Section 2). Practitioners can consult this section and find all the relevant information to implement effective interventions to reduce consumer food waste in their respective settings.**










The six generic types of interventions, either aiming to reduce food waste at home (1-3) or out-of-home (4-5), or both (6) are:

1		Prompts and tools for households
2		Coaching for households
3		Local awareness campaigns
4		Classroom education programmes and actions in school canteens
5		Nudges out-of-home (food services)
6		National food waste prevention programmes

Each intervention is presented according to a common structure to facilitate the use of the compendium, as described below in Table 2. The description of the interventions is based on the information retrieved from

the evaluated interventions and additional feedback received from the ECFWF. Therefore, all examples are provided, and their detailed analysis is presented in the report by Swannell et al. (2023).

Table 2. *Intervention profile characteristics and description.*

Intervention characteristics		Description
Profile	 Location	Shows the place where food waste is prevented. Differentiation between in-home and out-of-home.
	 Targeted consumers	Indicates those consumers who can benefit from this type of intervention.
	 Implementers	Provides the main stakeholders implementing this type of intervention.
	 Duration	Specifies how long the intervention should last to achieve positive effects.
	 Observed reduction	Shows how much food waste has been prevented in terms of mass or change in consumer behaviour.
 What this type of intervention is about?	Explains the aim of the intervention described under the 'Aim' subsection, the mechanisms/methods used to achieve it (under 'How does it work?') and the specific contexts or consumer groups for which it is particularly adapted (under 'Consumer groups or contexts for which this intervention type works best'). 'Possible synergies', includes the other interventions and other topics which, when combined with this type of intervention, might potentiate its effect or impact.	
 Monitoring aspects	Indicates different monitoring techniques identified for the type of intervention. Differentiates between monitoring impacts and outcomes with provision of the KPI and methodology used.	
 Implementation tips	A box brings specific tips to help practitioners identify key aspects to optimise the effectiveness and facilitate the implementation of the intervention.	
 Examples	At the end of each intervention, a table is included, showcasing examples of the described intervention. The table provides additional information under the 'Further Information' column, such as external links, when available, to access more details about the intervention. It also references the intervention evaluated under Swannell et al. (2023) using a specific code (e.g. NT1). This code facilitates the retrieval of information pertaining to that intervention from the evaluation report. By utilising the provided code, readers can access specific information and findings related to the evaluated intervention.	

3.1 Interventions to reduce food waste in-home

These three types of interventions focus on **different drivers of food waste**. Prompts and tools for households primarily (but not exclusively) aim at making food waste reduction more convenient. Thus, they affect opportunity factors (see MOA framework in van Geffen et al., 2020). Coaching for households aims to increase consumers' ability to reduce food waste. In contrast, awareness campaigns (both local and national) are primarily aimed at increasing problem awareness and, thus, consumers' motivation to reduce their food waste.






These interventions also differ as to where they are most appropriate for implementation. For example, both prompts and tools and coaching for households will be more applicable to situations where it is possible to reach out directly to households. In addition, different actors can implement local awareness campaigns with outreach at the local level, while national awareness campaigns and programmes require coordination by national authorities.

3.1.1 Prompts and tools for households

They encompass all interventions that provide a physical, textual or digital prompt to encourage consumers to reduce food waste at home and adopt new habits and routines.



Table 3. Overview of prompts and tools for households.

Intervention characteristics		Description
Profile	 Location	Households of all kinds
	 Targeted consumers	Any type of consumers, especially those who are in charge of purchasing and preparing meals.
	 Implementers	All actors (researchers, NGOs, retail, other food businesses, public authorities, food producers). In particular, designers could potentially have a role in the development of tools for the kitchen and app developers in the design of digital tools.
	 Duration	Minimum one week to test and evaluate the tool, no upper limit as prompts and tools can be adopted permanently. Developing a new tool or adapting an existing tool to a specific context might be a longer process and is not accounted here.
	 Observed reduction	Some examples of tools evaluated by the ECFWF showed a food waste reduction by up to 40 % compared to the baseline. No evidence is available as to the duration of these effects.

What are prompts and tools for households?

Aim

The aim of using nudges as tools and prompts is to enhance consumers' food-management skills and support them in adopting new habits and routines to reduce food waste at home. These tools and prompts serve as reminders and raise awareness about behaviours that can be incorporated into daily life. Overall, these tools and prompts aim to empower consumers by providing practical support and guidance to reduce food waste in their day-to-day activities.

How does it work?

These tools and prompts are designed to assist consumers in food management, including planning, shopping, storing, preparing, and managing leftovers. They are often designed to target multiple stages of the food management process. By utilising physical, textual, or digital prompts and providing specific tools, they help consumers establish new routines and behaviours.

Examples of tools include digital or physical shopping lists and menu planners, guidance on proper food storage, recipes for utilising leftover ingredients, food waste diaries to track and analyse waste, and tools for measuring portion sizes.

Prompts, conversely, can take the form of reminders or specific actions to encourage behavioural change. For instance, a 'Use-it-up' day can be designated, or a sticker can be placed on items that are nearing their expiration date, reminding consumers to prioritise their consumption. Taking pictures of wasted food can create visual reminders of the impact of waste, and instructions for freezing surplus food can guide consumers on how to prevent waste in the first place.

Table 4. Examples of specific prompts and tools for households.

Example	Further information
Stickers to place on kitchen appliances (refrigerator and freezer) to remind routinely about the best storing habits.	Ja-Nee Koelkaststicker Fridge stickers and Koele stickers Freezer stickers ⁹ ; in Swannell et al. (2023) intervention evaluated under code NT1 .
Portion-based measuring cup.	Wat is het Eetmaatje? Measuring cup ¹⁰ ; in Swannell et al. (2023) intervention evaluated under code NT1 .
Visual prompt to put in the fridge to highlight products that need to be used.	'Use-it-up' tape, ¹¹ Clamp for fridge; in Swannell et al. (2023) intervention evaluated under code NT15 and NT8 .
Sharing recipes designed specifically to include more flexibility in the ingredients and to encourage the use of leftover food.	Flexipes - 3-Step Recipes ¹² ; in Swannell et al. (2023) intervention evaluated under code NT3 .
Shopping lists to improve meal planning.	Cozzo supply manager app ¹³ ; in Swannell et al. (2023) intervention evaluated under codes NT5, NT2, NT6 .
Combination of the tools.	First Aid box for food waste; in Swannell et al. (2023) intervention evaluated under code NT4 .

Consumer groups or contexts for which this intervention type works best

Especially relevant for households with:

- unpredictable consumption patterns,
- lack of time and skills,
- problem awareness and motivation to take action.

Compared to other types of intervention, prompts and tools for households can be used by a large number of households without exponential costs due to economies of scale.



Possible synergies

- Integration of multiple tools (fridge tabs, shopping lists, recipes, etc.), that target various stages of household food management.
- Combination with awareness-raising elements. There are different ways to raise awareness in individuals. Some examples found by the Forum included the use of more creative approaches such as 'induced hypocrisy' – which is when someone preaches one thing but does something different.
- Coaching programmes for households are relevant channels to disseminate tools and prompts for households.

9 <https://www.voedingscentrum.nl/nl/thema/kopen-koken-bewaren/eten-bewaren/ja-nee-koelkaststicker.aspx> and <https://www.voedingscentrum.nl/nl/thema/kopen-koken-bewaren/eten-bewaren/koele-stickers.aspx>

10 <https://www.voedingscentrum.nl/nl/thema/kopen-koken-bewaren/eten-bereiden/eten-voorbereiden/wat-is-het-eetmaatje.aspx>

11 <https://www.ozharvest.org/use-it-up/tape/>

12 <https://www.hellmanns.com/us/en/flexipes.html>

13 <https://cozzo.app/>

Monitoring impacts and outcomes

Table 5. Monitoring KPI and methods used in prompts and tools for households.

	KPI	Methodology
Impacts	Grams of food waste per person or household over a period.	Direct measurement: waste compositional analysis; food waste diary. Pre-post intervention measurements and ideally with a control group.
Outcomes	Behaviour: the frequency of using tools can be assessed, along with changes in knowledge, attitudes, and behaviour. This includes evaluating the frequency of implementing waste-prevention actions in daily food management. Examples of such actions include making shopping lists, checking inventory, and cooking with leftovers. Outreach: number of people that have purchased/ are using the tool.	Surveys.



Implementation tips for prompts and tools for households

- Carefully understand what behaviour should be changed (to understand what can make the difference between the actual wasting behaviour and what can make the difference in preventing food waste).
- Identify which tools and prompts can stimulate behavioural change; which type of awareness-raising elements can make a difference.
- Identify what channel(s) can provide the targeted households with the tools/prompts.
- Include a baseline measurement and control group.
- Assessment of the impact of the intervention; ideally not only shortly after the tools and prompts have been delivered, but also long-term assessment.








3.1.2 Coaching for households

Coaching for households aims to break consumer routines in planning, shopping, cooking and storing by applying an integrated approach and addressing food waste

behaviour comprehensively. Coaching increases knowledge and boosts skills in the kitchen, helping consumers and households to learn, often through more 'hands-on' interactions.

Table 6. Overview of coaching for households.

Intervention characteristics		Description
Profile	 Location	Households of all kinds
	 Targeted consumers	<p>Any type of consumers, especially those who are in charge of purchasing and preparing meals.</p> <ul style="list-style-type: none"> • Person in a household with the role of primary food purchaser. • Waste reduction ambassadors: i.e. a selection of highly motivated participants who will further be active in their communities to inspire their peers to reduce food waste. • Community groups (neighbourhoods or small towns) that can leverage an already existing network to impact food waste-related behaviours further. • Economically vulnerable people.
	 Implementers	All actors (e.g. researchers, NGOs, local authorities, community groups).
	 Duration	It is generally implemented as a one-time intervention, running for a couple of months, for each cohort of participants.
	 Observed reduction	Coaching programmes evaluated through the ECFWF have shown reductions exceeding 50 % for restricted samples. These are promising results but should be adequately contextualised to the experimental setting to which they refer.

What are interventions based on coaching for households?

Aim

Actively support households to reduce food waste through specific training and coaching programmes where households gain knowledge and skills for all aspects of food management at home (planning, shopping, storing, preparing, and using leftovers). Coaching also provides ongoing support over a specific period.

How does it work?

Activities can include information workshops and sharing of material through various media channels, coupled with training or kitchen laboratories to learn new food management practices in a facilitating environment. They provide knowledge and improve skills (e.g. on leftover use or proper

usage of the refrigerator), enhance motivation (e.g. by showcasing monetary savings, inspiration from peers or personal interactions with trainers) and also offer instruction on how to integrate tools (such as shopping list templates, portion measurers or fridge thermometers) in the kitchen. These also employ more creative approaches, such as thematic challenges related to cooking with leftovers or repurposing scraps, thus developing important skills in the kitchen. The most effective coaching programme included individual sessions for personalised feedback and training.

Trainers can support participants in the programme through direct exchange, which can benefit from monitoring progress over time.

Table 7. *Examples of specific coaching programmes.*

Example	Further information
Laboratories and coaching run by Slow Food Germany to increase participants' skills.	Slow Food Kitchen Labs ¹⁴ ; in Swannell et al. (2023) interventions evaluated under code EC3 .
City-wide programme using a combination of approaches (workshops, challenges).	FoodWIN Brugge ¹⁵ ; in Swannell et al. (2023) interventions evaluated under code EC4 .
Information sessions aimed directly at engaging the most vulnerable population.	Alimentar Sem Desperdicar; in Swannell et al. (2023) interventions evaluated under code EC1 .
Programmes initiated by Zero Waste Scotland leveraging existing community networks.	Volunteer and Community Advocate Programme and Love Food Hate Waste Scotland cascade training ¹⁶ , in Swannell et al. (2023) interventions evaluated under codes EC7 and EC8 .

Possible synergies

- Coaching programmes can be embedded into broader food management and literacy schemes, e.g. knowledge of financial savings, sustainable eating, local food messages and food safety.
- This type of programme can benefit from being integrated into local action plans, including awareness campaigns and events, to gain interest in the topic from households.

Monitoring impacts and outcomes

Table 8. *Monitoring KPI and methods used in coaching and training for households.*

	KPI	Methodology
Impacts	Grams of food waste per person or household over a period.	Direct measurement: waste compositional analysis; food waste diary. Pre-post intervention measurements and ideally with a control group.
Outcomes	Behaviour: perceived changes in skills; increase in knowledge/attitudes/behaviour. Frequency of performing waste-prevention actions in daily food management (e.g. making shopping lists, checking inventory, cooking with leftovers). Outreach: number of people participating in the coaching sessions.	Surveys.

14 <https://www.slowfood.de/was-wir-tun/projekte-aktionen-und-kampagnen/dialogforum-private-haushalte-reduzierung-von-lebensmittelverschwendung>

15 <https://foodwinnersbrugge.be/over.html>

16 <https://www.lovefoodhatewaste.com/love-food-hate-waste-scotland> and <https://wrap.org.uk/resources/report/evaluating-impact-wraps-cascade-training-programme>



Implementation tips for coaching for households

Ensure relevance

1) Identify the consumer group(s) within the community that could benefit from a coaching programme. Consider segmentation to target households with higher waste levels or specific groups that are more motivated to participate. 2) Identify relevant food waste drivers to address with the coaching programme. A key recommendation is to focus on time and money-saving smart behaviour.

Decide on the most suitable format and prepare material

- Good news - the specific coaching format is less important. Online guidance, workshops, and door-to-door visits can be equally effective. The choice depends mainly on the available resources, as costs increase with the level of personal contacts.
- Focus on the identified drivers when creating messages. Providing information from three perspectives (social, financial, and environmental impacts) and adapting to the local food context and culture can be powerful.
- Consider the integration of creative approaches such as individual, personalised stories as motivational support, 'MasterChef' moments as icebreakers, or challenges as triggers for change or for developing new habits without using an authoritarian tone.
- Offer tools (e.g. shopping list templates, portion measures, and thermometers).
- Ensure coaches are appropriately trained to accomplish the goals of the coaching.

Conduct the coaching

- To recruit households, it is important to spread the call for participation through various media platforms, message boards, leaflets, and regional newspapers, tailored to the target group. Utilising existing networks and community initiatives can help generate faster traction and engagement.
- Deliver information sequentially and use a combination of communication and engagement tools (e.g. uploaded to a specific website). For example, podcasts and videos are highly effective, in addition to cutting costs in some cases.
- Consider using a step-wise scaling of the coaching in phases,
 - 1) start from a smaller group of ambassadors (n<50 households) with more intensive training and challenges,
 - 2) scale up to a larger group (n=500 households) with standardised materials through e-mail,
 - 3) involve aggregate groups such as schools, companies (n=1000 households) with personalised group materials.
- The use of kitchen diaries can significantly contribute to the reduction of food waste.
- Focus groups and exit interviews should also be applied to gather qualitative data and improve the intervention material or application by pinpointing challenges encountered by participants and opportunities to improve the programme.
- Increase visibility through social media, traditional media, podcasts, and videos.

Foster sustainability of the action

- 1) Seek additional funding and adapt materials: Explore options for financial support to engage more communities and tailor educational materials to local contexts.
- 2) Include sustainability in the design phase: Develop an action plan with evaluation elements and aim for the project to continue as an integral part of the organisation after completion.
- 3) Foster collaboration: Work with universities, local authorities, NGOs, schools, and social institutions to reach more participants and involve vulnerable consumers. By leveraging partnerships with social institutions and charities, vulnerable consumers can be actively involved, extending the project's impact to those who need it most.








3.1.3 Local awareness campaigns

Local awareness campaigns consist of actions to improve the visibility of the impact of food waste and elicit consumer behaviour change by providing information, prevention practices, and general tips. They take place on

a community, municipal or regional level. They can leverage more locally targeted strategies, ensuring they are relevant to the community and households in their respective contexts.

Table 9. Overview of a local awareness campaign.

Intervention characteristics		Description
Profile	 Location	An awareness campaign can take place anywhere, but the aim is to prevent food waste from happening in households. This type of intervention is implemented specifically in a restricted geographical area.
	 Targeted consumers	Any type of consumers. Examples are: <ul style="list-style-type: none"> • Cities and neighbourhoods which commit to supporting their inhabitants to act against food waste and would like to address international and national issues in concrete local action plans. • Community groups with existing networks to further impact food waste-related behaviours.
	 Implementers	All actors, however, typically NGOs, local authorities, and waste management companies.
	 Duration	Multiple formats exist from one week to a few months as one-time interventions or repeated every year.
	 Observed reduction	From the data collection, the intervention that was most thoroughly evaluated showed a 9 % reduction in food waste on a large scale.

What are local awareness campaigns?

Aim

Local awareness campaigns set out to raise awareness of food waste among consumers, influencing their attitudes, beliefs and ultimately, behaviours to reduce food waste in households. They can nudge behaviours that help minimise food waste in-home, such as meal planning, proper food storage, understanding date labels and using leftovers.

How does it work?

These campaigns can build their messaging strategy on the local context by integrating relevant information, such as specific waste management practices or food waste costs relevant to the area where the campaign

takes place. Media for outreach might also differ from case to case. Campaigns provide information targeted to specific local needs to increase consumers' knowledge of the quantity of food waste and associated impacts and how to reduce it, including specific behaviours (e.g. meal planning, effective storage, freezing, understanding of date labels, using up leftovers) resulting in more motivation for consumers to change their behaviour. Often, community networks to activate new social norms and practices to reduce food waste are coupled with the campaigns.

Table 10. *Examples of specific local awareness campaigns.*

Example	Further information
Comprehensive local awareness campaign in specific London neighbourhoods aimed at food waste reduction, together with improved recycling and improved diets.	Life Trifocal project ¹⁷ ; intervention evaluated in Swannell et al. (2023) under code AL6 .
Example from Canada of an awareness campaign using locally sourced information on food waste costs.	Reduce Food Waste Save Money ; intervention evaluated in Swannell et al. (2023) under code AL5 .
Trial of Love Food Hate Waste campaign.	West London Campaign ¹⁸ ; intervention evaluated in Swannell et al. (2023) under code AL7 .

Possible synergies

- Local awareness campaigns can be combined with or prepare the ground for interventions such as training and skills development, economic and material incentives, and changes to consumers' choice architecture, known as nudges.
- They can relay national and international communication campaigns (e.g. International Day of Awareness on FLW, World Food Day).
- They can include the promotion of specific tools and prompts households could use to support their food waste reduction efforts.

Monitoring impacts and outcomes

Table 11. *Monitoring KPI and methods used in local awareness campaigns.*

	KPI	Methodology
Impacts	Grams of food waste, per person or household over a period.	Direct measurement: waste compositional analysis; food waste diary. Pre-post and/or control group.
Outcomes	Behaviour: perceived changes in skills; increase in knowledge/attitudes/behaviour; Frequency of performing waste-prevention actions in daily food management (e.g. making shopping lists, checking inventory, cooking with leftovers). Outreach: number of people reached by the campaign, participating in events, engagement.	Surveys; media analytics.

¹⁷ <https://resources.trifocal.eu.com/resources/>

¹⁸ <https://wrap.org.uk/resources/case-study/west-london-food-waste-campaign#:~:text=It%20works%20in%20partnership%20with,to%20help%20consumers%20waste%20less>



Implementation tips for local awareness campaigns

Understand the audience and the context for the campaign

What is the current level of awareness and behaviours among target consumers? Once you know this, you can tailor your activity to the specific audience and context.

Consider co-designing with others or connecting to a bigger initiative to promote synergies

Working in partnership with local organisations and initiatives that share your goals, such as local authorities or waste management organisations, could be beneficial to your campaign effectiveness, and boost awareness of wider sustainability issues. In Maizuru, Japan, for example, a local programme was co-designed with waste management officers, more information can be found in Swannell et al. (2023) by the intervention [code AL4](#). The practitioner could also consider linking up with a national or global food waste awareness campaign to boost the visibility of the campaign and promote shared goals.

Set appropriate objectives, such as:

- To increase knowledge of the impact of food waste and how to reduce it, including specific behaviours, i.e. meal planning, effective storage, freezing, understanding of date labels, and using up leftovers.
- To empower consumers to change their behaviour.
- To improve food literacy and cooking skills.

Combine delivery methods to maximise reach and engagement

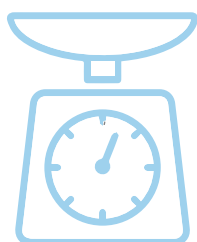
The [Trifocal programme](#) successfully reached different audiences through multiple activities including cookery workshops, pop-up events, experiential learning at schools and toolkit provision to food businesses. The Fish scale project (Swannell et al., 2023, intervention [code AL1](#)) reached key stakeholders by combining a media campaign with events and interviews.

Pre-test your intervention

Testing your designed intervention with a small sample of people can help highlight any problems before implementation. In '[Reduce Food Waste, Save Money](#)', a subset of 160 volunteer households were randomly selected for the pre-intervention baseline audit. Pre-testing particular elements of the campaign, such as surveys or communication material with a sample of the target audience can help ensure successful implementation.

Use a control group

Observing a group of participants that are not receiving any kind of intervention is important for determining the effect of your action. In '[Reduce Food Waste, Save Money](#)', the long-term effectiveness of the intervention was evaluated by comparing the amount of food waste disposed from participating households with data from households in a control group.





3.2 Interventions to reduce food waste out-of-home

Two types of intervention address food waste generated out-of-home:

- 1. Classroom education programmes and actions in school canteens** refer to materials and action plans which are provided to schools to educate children and reduce food waste in canteens.
- 2. Nudges out-of-home** refer to nudges that specifically target consumer food waste in contexts such as collective catering for companies, school canteens (if they do not include a pedagogical or educational component), festivals, and restaurants.






These two types of interventions mainly focus on two levers of food waste. Education programmes and actions in school canteens primarily aim at increasing children's abilities to reduce food waste. Nudges out-of-home

primarily (but not exclusively) aim at making food waste reduction more convenient. Thus, they can affect opportunity factors.

3.2.1 Classroom education programmes and actions in school canteens

School environments are recognised as crucial in developing awareness and knowledge of food among young generations. The introduction of food waste in specific curricula has a longer horizon for reaping the effects and can be coupled with other food-related topics. Actions in school canteens also target younger generations but might have a more localised effect to that specific eating setting and not transfer to household behaviour.

Table 12. Overview of classroom education programmes and actions in school canteens

Intervention characteristics		Description
Profile	 Location	In-home (pupils are educated about why and how to reduce food waste in their daily life). Out-of-home (pupils participate in actions to reduce their plate waste at the school canteen).
	 Targeted consumers	Pupils of primary and secondary schools.
	 Implementers	National authorities, municipalities, researchers, NGOs, schools boards, teachers, canteen staff.
	 Duration	From one lesson in class to the entire school year.
	 Observed reduction	A 15 % reduction in waste quantities in canteen sites was registered from a multi-school project ¹⁹ .

¹⁹ See Swannell et al. (2023) – intervention evaluated under [code ES6](#)

What are interventions based on education programmes and action canteens?

Aim

The aim is twofold; 1) educate children through classroom activities, and 2) reduce food waste occurring during school meals. Education interventions can be organised by offering specific module(s) on food waste, showing its causes and impacts, and how children can counter its generation. Educational material on food waste can also be included in wider curricula addressing food literacy, sustainability, home economics. Alterations to the school eating environment through nudges can be implemented in parallel to classroom education or as a stand-alone intervention.

How does the intervention work?

Teaching about how to value and save food can be mandatory (where included in school curricula under home economics/education for sustainable development) or done voluntarily

when school boards and teachers decide to address the topic on their own initiative.

National education administrations, NGOs or specialised organisations can provide teaching materials for teachers. Teaching materials on food waste ideally allow teachers to identify core elements to be taught and extra components that can be customised to their pedagogical objectives and resource constraints.

Multiple actions in the canteen can be implemented (and combined). For example, nudges to adapt portions, food waste reduction challenge, co-creation of menus with children, and new lunch settings, such as a longer seating time or new food serving methods. In the canteen setting, it is also crucial to acknowledge and ideally engage with canteen staff and catering facilities so that they become an integral part of the delivery of the intervention.

Table 13. *Examples of interventions based on education programmes and action canteens.*

Example	Further information
Comprehensive school programme, tested and transferred to different contexts.	Do good save food ²⁰ ; intervention evaluated in Swannell et al. (2023) under code ES5 .
Food literacy programme running in Dutch schools, including a module on food waste.	Smaaklessen - smaakmissie ²¹ ; intervention evaluated in Swannell et al. (2023) under code ES2 .
Educational campaigns in French Schools run in collaboration with digital provider.	Mon Ecole Anti Gaspj ²² ; intervention evaluated in Swannell et al. (2023) under code ES8 .
An example of a food literacy project in high schools run in collaboration with a consumer interest group.	Green chef ²³ ; intervention evaluated in Swannell et al. (2023) under code ES4 .
A challenge for high schoolers through engagement on social media.	Havikki battle ²⁴ ; intervention evaluated in Swannell et al. (2023) under code ES3 .

20 <https://internationalfoodwastecoalition.org/do-good-save-food/#:~:text=Helping%20schools%20to%20cut%20food,Nations%20Food%20and%20Agriculture%20Organisation>

21 <https://www.smaaklessen.nl/nl/smaaklessen.htm>

22 <https://www.toogoodtogo.com/fr/initiative/ecole-antigaspi-toogoodtogo/programme-mon-ecole-antigaspi>

23 <https://decojovem.pt/pt/noticias/o-green-chef-esta-de-volta-e-com-novidades-vamos-colocar-a-mao-no-pao>

24 <https://emblafoodaward.com/winners/finland-havikki-battle-food-waste-battle-motiva-oy/>

Consumer groups or contexts for which this intervention type works best

- Primary and secondary schools where food waste is identified as a theme as part of food literacy and/or sustainability/ Sustainable Development Goals lessons.

Possible synergies

- Improvements of school food quality and palatability along with upgrades in the organisation of school meals can also affect food waste.
- Schools, compared to households, are a more controlled environment where data collection is easier. Systematic data collection in schools can be associated with food waste mitigation programmes also through technologically-assisted measurement devices. This type of monitoring can also directly involve students and be incorporated in educational efforts in math or technological literacy.

- Education programmes on promoting healthy habits and raising awareness about global sustainability challenges can integrate concrete actions on food waste.
- These programmes can have a positive spill-over to household food-related behaviours: children can transfer awareness and behaviours to their families and influence household food saving-behaviour. Well-designed educational interventions targeting younger generations can have multilevel effects.
- Schools might be especially constrained by resource availability (time, knowledge, funds), the implementation of classroom programmes hinges on these resources and wider institutional constraints. This can be understood as a synergy to be taken into account or possible barrier.

Monitoring impacts and outcomes

Table 14. *Monitoring KPI and methods used in prompts and tools for households.*

	KPI	Methodology
Impacts	Mass (e.g. grams) of food waste per person and either per plate or total amount of food waste in a period (in the case of school canteens, it is important to report also the number of meals served or the amount of waste as a percentage of the food served).	Direct measurement: waste compositional analysis; perform pre and post (or during activities) measurement campaigns.
Outcomes	Knowledge, attitudes, and practices (KAP) surveys can be performed before and after the programme to assess the change. A dedicated food waste literacy score tool could be developed.	Focus groups and interviews to gather qualitative data and get children’s feedback. Quantitative methods to measure food (waste) literacy.
Other indicators	Tracking of participation in classes and activities; engagement from students.	Focus groups and interviews to gather qualitative data and improve the specific interventions and components of consumer food waste reduction belonging to the school.



Implementation tips for education programmes and actions in school canteens

Teaching how to save food

- Identify the teaching materials you want to use: check if official academic materials are available in your country via the Ministry of Education or associated public agencies. If you need to, you can identify NGOs at the national or international level who have developed materials for your age group.
- Determine how much time you want to dedicate to the topic and refer to the teaching guide (usually designed to accompany teachers) to select and organise the teaching session(s).
- Coordination with other teachers in your school can feed a collective momentum in the school and facilitate the programme's organisation. This can boost the commitment of children excited to be involved in a school-wide programme.
- Validate with the school board or the headmaster the resources available to help you achieve your teaching objectives.
- Inform parents about the programme to get their support in reinforcing food waste efforts at home (through a letter to parents, for example).
- Activities at home such as keeping a food waste diary for a couple of days and considering food waste at home are beneficial (children rely on changing habits at home to adopt new long-lasting behaviours).

Reducing food waste in school canteens

- Involve the canteen staff as they can play a key role in measuring food waste, identifying solutions to reduce food waste, and supporting children in changing behaviours to save food.
- Define a simple measurement methodology to separately weigh children's plate waste. Consider taking advantage of some of available digital measurement methodologies.
- Measure a baseline before the launch of activities (to reduce plate waste in the canteen). Repeat after the action (follow up) to be able to evaluate.
- Providing information and support to children at the canteen is essential to get their commitment to change their behaviour.
- Games, challenges, Smart EdTech and other discovery activities, such as listening to chefs' or local food suppliers' stories on how these actors provide and cook the best food, are ideal for getting children interested.








3.2.2 Nudges out-of-home (food services)

Nudges out-of-home refer to nudges that specifically target consumer food waste in contexts such as collective catering for

companies, school or university canteens (if they do not include a pedagogical or educational component), festivals, and restaurants.

Table 15. Overview of nudges out-of the home (food services).

Intervention characteristics		Description
Profile	 Location	Out-of-home, any food service establishment both for leisure (restaurants, tourism, festivals) and daily food provisioning (retailers, canteens, mass catering).
	 Targeted consumers	Any type of consumers.
	 Implementers	Restaurant staff, catering companies, researchers, and NGOs.
	 Duration	From one week to permanent.
	 Observed reduction	Reduction of food waste quantities varies based on the nudge implemented and the type of environment where they are implemented, but some example show a potential reduction of up to 40 %.

What are interventions based on nudges out-of-home?

Aim

Nudges can be used to stimulate and encourage consumers to reduce food waste by smartly influencing their behaviour.

How does it work?

Nudges can address specific drivers of food waste and use different mechanisms to change consumers' behaviour (see [Section 2](#) or further details). They can be used individually or as a bundle of nudging techniques.

Table 16. Examples of specific nudges to reduce consumer food waste.

Example	Further information
Demonstration of optimal food preparation from school canteen staff	Pilot project in Catalan schools ²⁵ , intervention evaluated in Swannell et al. (2023) under code NOOH3 .
Prompts encouraging correct portion consumption	Dose Certa Project ²⁶ , intervention evaluated in Swannell et al. (2023) under code NOOH6 .
Take away doggy bags	Embrulha! Project ²⁷ , intervention evaluated in Swannell et al. (2023) under code NOOH9 .
Providing the opportunity for guests to express portion preference	Implementation of Dose Certa in a music and arts festival, intervention evaluated in Swannell et al. (2023) under code NOOH1 .

25 <https://escolescontraelmalbaratament.blogspot.com/>

26 https://ec.europa.eu/environment/pdf/waste/prevention/MenuDoseCerta_Factsheet.pdf

27 <https://www.lipor.pt/en/news/with-the-embrulha-project-you-can-help-end-the-scourge-of-food-waste-don-t-sit-around-waiting/>

Consumer groups or contexts for which this intervention type works best

- Restaurants and canteens that want to build a culture of 'food waste reduction' in their organisation can easily stimulate consumers through nudges. Examples of such easily implementable nudges include encouraging consumers to take only the food they need - the right portion, or *Dose Certa*.
- Situations in which consumers make less deliberate decisions, i.e. when they make decisions involving less reflection and are more habitual. In these situations, nudges can be especially effective. However, (many) nudges can also be effective in decisions involving much reflection and deliberation.

Possible synergies

- Leverage technological advancements in food waste measurement to ease monitoring and introduce automated feedback messages at the moment of waste to increase the awareness in customers when they discard their leftovers.
- Engage with different stakeholders to implement and disseminate the intervention, such as local restaurant organisations or waste management companies. This was particularly effective in the implementation of a doggy-bag initiative (*Embrulha! Project*) encouraging restaurant customers to bring home their leftovers.
- Involve canteen or restaurant workers in the design phase and testing of the nudging strategies to understand what is feasible and adoptable in each specific context. Cultural and organisational changes in kitchens and serving style might be necessary to implement a nudge.

Table 17. Monitoring KPI and methods used for nudges out-of-home.

	KPI	Methodology
Impacts	Grams of food waste per person or household over a period.	Direct measurement: waste compositional analysis; diary.
Outcomes	Self-reported behavioural changes by guests. Outreach: Number of consumers taking advantage of the doggy bag.	Surveys. Outreach: Tracking or scanning.



Implementation tips for nudges out-of-home

Know your consumers

Nudges can be very context-dependent, making their effectiveness difficult to predict. For example, one evaluated intervention contained posters urging people to take the 'right' amount of food at a buffet. This message, however, was just one of many messages (e.g. menu highlights, COVID-19 prevention warnings) that consumers were exposed to potentially diffusing the signal they received. In another case, however, corporate restaurants displayed informational cards on the tables and managed to drive discussion among guests, resulting in reduced plate waste.

Partnerships between actors

- Waste management operators could support your initiative: The project *Embrulha!* which distributed and promoted doggy-bags in restaurants is an example of a partnership between commercial restaurants and the waste management company in charge of collecting organic waste in the region.
- Partnerships with researchers will help you set up your intervention(s): Actions to reduce consumer food waste out-of-home are often experimental and rely on collaborations between restaurants and research organisations such as universities.






3.3 National food waste prevention programmes



Under this generic type of intervention, the ECFWF recognises the importance of programmes that are organised at a national level and include large-scale awareness campaigns and other sub-initiatives (such

as those described in the other generic types), but which are coordinated centrally by national authorities or by a recognised organisation in the field of food waste prevention.

Table 18. Overview of national food waste prevention programmes.

Intervention characteristics		Description
Profile	 Location	At a national level.
	 Targeted	<ul style="list-style-type: none"> • Entire population • Stakeholders of the food supply chain and organisations representing them • Local and regional policymakers and other relevant public authorities • Schools • Media with national outreach
	 Implementers	National governments and agencies, researchers, NGOs, local authorities, and media, ideally through a multi-stakeholder platform. Financial institutions such as banks or philanthropic foundation can also play a role.
	 Duration	Usually set up to run over several years and/or permanently. National programmes set targets, and action plans and monitor progress over 1-to-5-year periods.
	 Observed reduction	A 27 % reduction in avoidable household food waste was achieved in Hungary over a period of 6 years (2016-2022). A 30 % reduction of total household food waste was reported in the Netherlands (2010-2022). The UK has reported a 31 % reduction in edible household food waste between 2007 and 2018. It is difficult to establish a direct correlation between national food waste prevention programmes and food waste reduction when it occurs without appropriate monitoring and evaluation.

What are national food waste prevention programmes ?

Aim

National food waste prevention programmes are umbrella initiatives that can include many different sub-programmes. Their main goal is to coordinate and organise a **comprehensive national strategy** to reduce food waste in the whole supply chain, in line with the requirements of the Waste Framework Directive or other key national commitments. To target consumers specifically, these programmes may include awareness raising campaigns, help shape social norms, and/or implement large scale educational interventions aiming at food waste reduction. **National strategies or programmes are pivotal to creating an enabling environment which will coordinate actions of multiple players and facilitate individuals' behavioural change.** Food waste reduction efforts need to be a shared responsibility and national governments have the capacity and reach to achieve meaningful results. These programmes can also collect and disseminate good practices for local governments or smaller scale organisations and communicate experience and results with international networks dedicated to food waste prevention (such as the EU Platform on Food Losses and Food Waste) or make these available on resource platforms (such as the EU Food Loss and Waste Prevention Hub).



How do such programmes work?

By **fostering cross-sectoral** collaboration and adoption of a more systemic approach, such national programmes can trigger actions from multiple stakeholders to increase impact and reduce consumer food waste, for example, by involving retailers in interventions to reduce consumer food waste at home. These partners can act as amplifiers of the initiative as they find a value added for their own business and/or activities. Countries such as Hungary, The Netherlands, and the United Kingdom, which report significant reduction in consumer food waste have put in place an **organisation** dedicated to the coordination of national food waste prevention action plans, engaging multiple actors through public-private partnerships or voluntary agreements. **Coordination of efforts** can be done by an independent third party or a governmental body working in collaboration with relevant food system actors. An important feature is also establishing a common roadmap for food waste reduction, based on an overall **strategy**, with clear targets and continuous monitoring and evaluation. Input from universities and research institutes is also extremely relevant to ensure an appropriate evidence base for these programmes and adapt actions accordingly (e.g. addressing hotspots, low-hanging fruits, behavioural change patterns).

The specific actions implemented within national programmes can vary. Any of the generic types of interventions presented in the previous sections can operate simultaneously and create synergies to target a large part of the population. These programmes can have a standardised image (e.g. a logo or a name), which makes public outreach through different communication media more consistent and recognisable. Such an approach also helps in building **trust** amongst the stakeholders and the general public.

Collaboration is key. Actors across the supply chain need to collaborate to contribute to reducing consumer food waste. Being part of the wider network and community focusing on food waste prevention can also strengthen outreach.

Table 19. Examples of consumer food waste reduction actions from national programmes.

Examples and further information	Governance	Funding	Success factors
Project Wasteless (Maradék nélkül) ²⁸ ; more information on the specific interventions can be found in Swannell et al. (2023) under code G1	Stemmed from governmental bodies (Food Safety Agency; Ministry of Agriculture)	Started with a Life+ project, now mostly covered by government budget, fundraising through projects and private partners to diversify revenue	The organisation is a recognized source of information from the media; teachers amplify the food waste prevention message at a low cost, as this requires no extra budget; employees of the organisation are often linked to higher education institutions.
Samen Tegen Voedselverspilling ²⁹ ; more information on the specific interventions can be found in Swannell et al. (2023) under codes NT1, NL4, AS3	Organisation based on a public-private initiative entrusted with the task to deliver the ambitious food waste reduction targets set by the Dutch government	Both private (subscription from members of the voluntary agreement) and public	Analyse the hotspots, test interventions targeting those hotspots, monitor and evaluate routinely. Collaboration with retailers (amplify the message), with university (evaluate), creative agencies and communication strategies (design interventions).
WRAP ³⁰ ; more information on the specific interventions can be found in Swannell et al. (2023) under codes AL6, AL7, O2, NT5, NT10	Started as quasi-governmental agency, now an independent charity	Both private and public; and moved to a more hybrid source of funding. Yearly funding is based on reported impact	Data-driven approach, collaboration across the board, build reputation and trust, work towards changing the food environments (retailer relations have proved especially effective).
Resources	Building partnerships driving change - A voluntary approach to cutting food waste ³¹ ; Voluntary agreements blueprint ³²		

Possible synergies

- Participate in EU-wide debate on food waste prevention and act as a point of contact to disseminate good practices or challenges with an international network.
- Organise awareness raising campaigns leveraging the global movement on food waste prevention, such as the International Day of Awareness on FLW (September 29th), World food day (October 16th).
- Relevant evidence on food waste's impact and prevention efforts can also be coupled with other important public policy challenges, such as healthy and sustainable diets, plastic packaging reduction and recycling, climate action.

28 <https://maradeknelkul.hu/en/about-wasteless/>

29 <https://samentegenvoedselverspilling.nl/>

30 <https://wrap.org.uk/>

31 <https://wrap.org.uk/sites/default/files/2021-05/Building-partnerships-driving-change-A-voluntary-approach-to-cutting-food-waste.pdf>

32 <https://eu-refresh.org/voluntary-agreements-food-waste.html>

Monitoring impacts and outcomes

Table 20. Monitoring KPI and methods used in national awareness programmes.

	KPI	Methodology
Impacts	Grams of food waste per person or household over a period; Evolution of food waste in households in kg per capita per year.	Direct measurement: waste compositional analysis. Food waste measurement following Commission Delegated Decision (EU) (2019/1597). Target-Measure-Act approach ³³ .
Outcomes	Self-reported intentions to change behaviours; Perceived abilities and skills to manage food in the household (self-reported behavioural changes); Frequency of performing waste-prevention actions in daily food management (e.g. making shopping lists, checking inventory, cooking with leftovers), audience reached (e.g. media/social media monitoring data). Number of stakeholders participating in collaborative processes.	Surveys; media analytics.



Implementation tips for national programmes

Build knowledge

- Establish a baseline and identify waste hotspots in the population to prioritise actions.
- Ensure application of an evidence-based and data-driven approach throughout the programme (e.g. the amount of food waste in a country or region, its cost and environmental impact, and the causes of food waste).
- Comprehensive national programmes can serve as national knowledge hubs, collecting data of nationally representative samples on causes of consumer food waste and identify suitable strategies for action.

Strategise

The Dutch campaign organises its activities around four pillars: 1) transparency, monitoring and impact, 2) business innovation across the food sector, 3) consumer activation and behaviour change, and 4) changing the rules and removing (legal) barriers. While the specific implementation of the programme might be adapted to the cultural context or governance structure, having specific target and objectives to guide action over a medium-long term period is necessary.

Project Wastless (Maradék nélkül) aims to halve avoidable household food waste by 2030 compared to the baseline of 2016. It is composed of 4 strategic elements: 1) mass communication (mass media and social media) for short-term impact through; 2) school programme for long-term impact; 3) monitoring of efficiency (annual food waste direct measurement and surveys); 4) stakeholder involvement and networking to amplify efficiency.

All programmes reviewed began with funding that was secured for several years.

³³ Target-Measure-Act is now a consolidated principle in the action against food waste: <https://champions123.org/publication/call-global-action-food-loss-and-waste>

Build networks of actors

The organisation and governance of national food waste prevention programmes can take many forms: public-private partnership (Netherlands), multi-stakeholder dialogue³⁴ (Germany) or a government-led action (Hungary). However, one thing is common for all successful programmes evaluated under this work: collaboration and building trust are key and need to be integrated at different levels.

- Working groups for different food chain segments (e.g. agriculture, food processing, retail, food services) can be established to collect and disseminate good practices and amplify relevant messages.
- Collaborate with universities and research institutes as they can access the most recent scientific breakthroughs and leverage their knowledge, especially on evaluation practices.
- Facilitate the formation of a Community of Practice, pooling expert knowledge and bringing together interested individuals.
- Retailers, who (in addition to food services operators) are the supply chain actors with more direct contact with the final consumer, can amplify the message of food waste prevention and integrate it in their own marketing or CSR (Corporate Social Responsibility) strategy; NGOs or civil society organizations can also act as amplifiers for campaigns.
- Businesses participating in a voluntary agreement can be a source of funding.

Integrate different expertise

To implement a successful programme, knowledge and expertise from different fields is necessary: nutrition and health, food safety, food supply chains, behavioural sciences, environmental sciences, education, communication as well as monitoring and evaluation of public policy and fundraising. Attracting competent and motivated people dedicated to the running of the prevention plan can also make a difference in the impact achieved. The availability of permanent staff dedicated to these projects can ensure sustainability over the time.

Disseminate intervention:

- Comprehensive national programmes can include awareness campaigns that are recurring and recognised by the public, so that an established and trusted public image can be established.
- Analyse data and information to produce evidence-based communication materials that are easy to access for stakeholders and the general public alike.
- Chefs, artists, and influencers can be valuable contributors to national awareness campaigns to bring consumer food waste to the attention of the media and public. Recognisable public figures can be engaged as spokespeople for a consumer campaign.
- Good media relations are important for high reach and can create substantial Advertising Value Equivalency even with relatively low budgets (for example, see the Project Wasteless programme).
- School programmes are the most efficient components of comprehensive national programmes; in addition to the long-term effect on future generations, they also reach parents, delivering immediate impact.

34 <https://www.bmel.de/EN/topics/food-and-nutrition/food-waste/national-strategy-for-food-waste-reduction.html>

3.4 General considerations

Below, the ECFWF lists some considerations which apply to all the generic types of interventions contained in this section:

- Define what behavioural change you want to achieve: overall aim (e.g. reduce consumer food waste) and specific objectives (e.g. for nudges out-of-home, food waste could be avoided by choosing the right portion, or by providing foodie bags to bring home leftovers).
- Implementing a bundle of interventions carried out simultaneously or sequentially can positively boost the effectiveness and longevity of food waste prevention efforts. For example, a large-scale national awareness campaign could be used as the backdrop for more localised coaching interventions or to publicise the purchase and use of prompts and tools for households.
- It is advisable to establish the long-term effect of the intervention by monitoring it after its conclusion.
- Qualitative evaluation methods, such as focus groups and exit interviews, can also be applied to gather qualitative data, and improve the intervention material or implementation with insights that are hard to gather through a survey.
- As pointed out in the guide to quantification methods – further described in [Section 5.3](#), surveys are not the most reliable monitoring method.
- Keep track of the EU Food Loss and Waste Prevention Hub to find and implement innovative ideas and receive information to share.



4. Recommendations and actions for policymakers

This section provides many possibilities for action to support food waste reduction at a consumer level, targeting policymakers at the **local, national and EU levels**. The ECFWF acknowledges the advancements in food waste governance made in the past decade, such as the FAO Voluntary Code of Conduct (FAO, 2018) and the requirements contained in the Waste Framework Directive (European Commission, 2022), but also identifies shortcomings in the current regulatory landscape and concrete opportunities to take action. These recommendations are elaborated based on the gaps encountered during the analysis of interventions, expert knowledge, the outcome of the impact assessment supporting the proposed introduction of food waste reduction targets in the EU, and key literature addressing food waste prevention at a consumer level, such as the Champions 12.3 guidebook for consumer behavioural change 'A Guide: Changing Behavior to Help More People Waste Less Food'³⁵ or outputs of the Australian 'Fight Food Waste Cooperative Research Centre'³⁶. These last sources provide key information to reach different stakeholders – including policymakers – to support consumer behavioural change.

Policymakers have a role to play in highlighting future pathways to reduce food waste. Their role should go beyond setting reduction targets. Ideally, they would use their resources to create an **enabling policy environment** to accelerate food waste reduction as well as specifying and outlining pathways to address this key challenge. Governments are also essential in supporting and coordinating research (e.g. Bock et al., 2022 or Fritsche et al., 2021) and practical endeavours to reduce food waste.

Without prompt political action on food waste reduction efforts, reaching ambitious international targets such as SDG Target 12.3 and the broader climate policy objectives outlined in the EU Green Deal and Farm to Fork³⁷ strategy will not be possible. Food and waste are the subjects of many policy actions at the EU levels, from the CAP to the Waste Framework Directive, food safety regulations or the Unfair Trading Practices Directive³⁸. It is acknowledged that there is a need for an **integrated approach to food policy** in general, as highlighted by the Farm to Fork strategy, and addressing food waste generation alongside sustainable production and consumption patterns and food security.

In terms of specific actions, the Waste Framework Directive – as revised in 2018 – introduced specific obligations for Member States to reduce food waste at each stage of the food supply chain, monitor food waste levels and report on progress made. The first monitoring was executed in 2020, and subsequent exercises will be able to capture progress in terms of food waste reduction. **Measurement** is at the heart of food waste prevention, with monitoring and reporting on food waste being essential elements to assess the effectiveness of interventions and monitor progress.

35 <https://champions123.org/publication/guide-changing-behavior-help-more-people-waste-less-food>

36 <https://fightfoodwastecrc.com.au/>

37 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system COM/2020/381 final

38 EU Directive 2019/633 on unfair trading practices in the agricultural and food supply chain was adopted by the European Parliament and Council on 17 April 2019

The ECFWF indicates priority actions for national governments, especially in deploying coordinated actions that are adequately designed, including an evidence-based approach to running large-scale awareness campaigns, and educational programmes for schools. The ECFWF also acknowledges the crucial role of local governments, municipal and regional, which are increasingly recognised as active agents of sustainability transitions. They can be particularly effective in food waste reduction as many policy actions involving waste management and food are under their oversight. New governance structures, such as food policy councils and direct citizen participation, can also be implemented more swiftly at this level, and actions deployed more efficiently.



To illustrate the key findings for action derived from the work of the ECFWF, table 21 collates the specific **recommendations, examples of best practices, the type of action needed from policymakers, and the corresponding level of governance.**

Table 21. Recommendations for policymakers.

Recommendation	Why	Best Practice	Action needed	Level of governance
Establish local food policy councils ; put consumer food waste reduction as an objective integrated into a broader food strategy to implement specific/targeted interventions at the local level.	Integrated policymaking requires coordination of actions between local authorities (municipalities or regional government and their subsidiary agencies), food businesses, restaurants, public sector procurement and food provision actors, communities and NGOs (including charities) whose work often includes food waste prevention. Impactful synergies can be created, especially if coordinated with national or international actions.	See Section 3 in this compendium, where the action from municipal authorities is specifically called out; systemic benefits/integrated approach needed.	Stakeholder engagement and policy development	L
Establish local or regional food waste reduction action plans (or as part of sustainable food plans, with food waste reduction as a key pillar) with targets . Apply the Target-Measure-Act approach also at the local level to encourage reporting on waste quantities locally and by public bodies.	Integrated policymaking requires coordination of actions between local authorities (municipalities or regional government and their subsidiary agencies), food businesses, restaurants, public sector procurement and food provision actors, communities and NGOs (including charities) whose work often includes food waste prevention. Impactful synergies can be created, especially if coordinated with national or international actions.	<p>Milan Urban Food Policy Pact Indicator framework³⁹ as a resource to implement local strategies and monitoring plans;</p> <p>Example of local plans:</p> <ul style="list-style-type: none"> • City of Paris (Plan stratégique parisien de lutte contre le gaspillage alimentaire)⁴⁰. • Catalunya (Ley 3/2020)⁴¹. • Guidance for municipalities to reduce food waste within local food systems⁴². • Get inspired for action on the proposal for GHG emissions reporting for public buildings⁴³; catering services could report to the local authority on their food waste generation. • REFRESH⁴⁴ before National platforms. 	Target and measure / Monitoring and evaluation	L

39 <https://www.fao.org/3/cb4181en/cb4181en.pdf>40 <https://cdn.paris.fr/paris/2019/07/24/ab3a6b9a1cefcdceff008741cffcebb6.pdf>41 <https://cido.diba.cat/legislacio/9956541/ley-32020-de-11-de-marzo-de-prevencion-de-las-perdidas-y-el-despilfarro-alimentarios-comunidad-autonoma-de-cataluna>42 <https://www.slowfood.com/wp-content/uploads/2022/01/Guidance-on-food-waste-reduction-in-cities-EN.pdf>43 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0802>44 <https://eu-refresh.org/national-platforms.html>

Recommendation	Why	Best Practice	Action needed	Level of governance
Participate in international knowledge-sharing networks on sustainable urban planning.	The role of local governments to facilitate sustainable transition has been acknowledged for some time: leveraging existing knowledge and replicating successful and transferable interventions from other cities will lead to cost abatements for the design of new actions.	Examples of existing groups include: <ul style="list-style-type: none"> • ICLEI⁴⁵– Local Governments for Sustainability. • MUFPP⁴⁶– Milano Urban Food Policy Pact. • C40 Cities⁴⁷. • FAO food for Cities initiatives⁴⁸. • EUROCITIES⁴⁹. • URBACT⁵⁰. • UIA⁵¹ – Urban Innovative Actions. 	Knowledge sharing	L
Apply Sustainable Public Procurement criteria in tenders for public catering as a valuable tool to engage stakeholders in food waste prevention.	Criteria can include requirements for written procedures describing best practices for purchasing, storage, cooking, menu planning and serving in order to prevent food waste and the need for measuring food waste.	Examples of cities applying such sustainable public procurement criteria in public catering: Mouans-Sartoux ⁵² ; City of Paris ⁵³ . The European Commission has issued a set of guidelines and criteria for public procurement and establishing tenders for public food services: Green Public Procurement Criteria for catering services ⁵⁴ .	Policy	L, N

45 <https://iclei.org/>46 <https://www.milanurbanfoodpolicypact.org/>47 <https://www.c40.org/>48 <https://www.fao.org/fcit/fcit-home/en/>49 <https://eurocities.eu/>50 <https://urbact.eu/>51 <https://uia-initiative.eu/en>52 <http://mead-mouans-sartoux.fr/pour-un-projet-alimentaire-de-territoire-a-mouans-sartoux/>53 <https://cdn.paris.fr/paris/2023/02/16/plan-alimentation-durable-2022-2027-version-finale-7-fevrier-2023-bd96dpi-PPo0.pdf>54 <https://circabc.europa.eu/ui/group/44278090-3fae-4515-bcc2-44fd57c1d0d1/library/ee257835-8865-4b6c-959f-ef9c5f75239b>

Recommendation	Why	Best Practice	Action needed	Level of governance
Consider trialling economic incentives , such as Pay as you throw/ Polluter pays ⁵⁵ schemes.	A tariff system that relates to the price for a service – this can be waste management at the city level but also a fine system for food service customers to deter them from generating plate waste – for this recommendation. However, further research linking economic incentives to food waste generation is necessary.	There is only one recorded example from Luxembourg applying such policy ⁵⁶ .	Further research	All
Engage waste management companies in food waste prevention.	Include public awareness raising or nudges on food waste prevention with the promotion of waste sorting and the construction or provision of relevant collection and recycling infrastructure (specific compost bins for households). Waste management can be an entry point for action that is already anchored in the territory and that has a wide reach in the population.	In the UK it has been shown that separate food waste collection ⁵⁷ can lead to lower municipal food waste levels, this however cannot be generalised to all contexts.	Stakeholder engagement; Further research	L, N
Support transferability of successful FW programmes by sharing action design and details on monitoring efforts to support those who are just starting their food waste reduction plans.	Costs for the design of successful actions could be reduced or spread out if the same action is taken in a different context or a different city/country.	From the ECFWF data collection, the action Do Good Save Food ⁵⁸ states that 'a proper collaboration network of committed people including ambassadors at a city level and a project coordinator at the school level is needed. Lack of a proper network may limit transferability' (more details in Swannell et al. (2023), intervention code ES6). The Trifocal project established a transfer plan applicable to different cities ⁵⁹ .	Knowledge sharing	All

55 Principle that requires that polluters should bear the costs of their pollution including the cost of measures taken to prevent, control and remedy pollution and the costs it imposes on society, from: https://www.eca.europa.eu/Lists/ECADocuments/SR21_12/SR_polluter_pays_principle_EN.pdf

56 https://www.sias.lu/assets/files/SIAS_Faenk-vir-un-2021-Schuttrange-EN.pdf

57 <https://wrap.org.uk/resources/report/impact-food-waste-collections-household-food-waste-arising>

58 <https://www.fao.org/publications/card/en/c/CA1173EN>

59 <https://resources.trifocal.eu.com/>

Recommendation	Why	Best Practice	Action needed	Level of governance
Identify local/national ambassadors to promote programmes on consumer food waste reduction.	These ambassadors can inspire and set an example in their local network, amplifying the effect of single interventions. The interventions can include training, events like wasteless weeks, coaching for households.	See Section 3.1.2 in this compendium.	Stakeholder engagement	L, N
Identify contact point(s) to connect local programmes with the existing national programme on food waste reduction.	Having a single point of contact for food waste-related matters can lead to more efficient communication channels and the exchange of best practices.	In Italy, some food waste prevention actions are coordinated by the National municipality association ⁶⁰ . In The Netherlands, the organisation United against food waste ⁶¹ orchestrates national-level actions and facilitates stakeholder engagement.	Stakeholder engagement and knowledge sharing	L, N
Ensure implementation of National Food Waste Prevention programmes , as prescribed by the Waste Framework Directive, especially considering reduction needs at the intersections of sectors (i.e. primary production – food processing – retail and final consumption).	<p>For example, in addition to sectoral approaches, reduction measures must also focus more prominently on the interdependencies that exist in the food system. Actions at one stage of the food supply chain can trigger unintended consequences in another stage.</p> <p>By looking specifically at food waste prevention, this viewpoint could be easier to gain. So far, EU countries with specific national food waste prevention programmes in place are yet a minority (see Netherlands⁶², Germany⁶³, and Hungary⁶⁴ for concrete examples).</p>	<p>The ECFWF points to two large-scale national programmes from the data collection (Swannell et al., 2023) that show how establishing coordinated 'umbrella initiatives' bring benefits from activating multi-stakeholders' partnerships:</p> <ul style="list-style-type: none"> • Facilitate the reach of diverse consumer groups (e.g. primary schools, households) • Coordinate actions to test various interventions at scale (e.g. education, awareness) • Encourage a wider stakeholder group to amplify the messages to help change behaviour • Monitor the use of public funds <p>(See Section 3.3 for further details).</p>	Policy; Stakeholder engagement	N

60 <http://sprecoalimentare.anci.it/>61 <https://samentegenvoedselverspilling.nl/>62 https://ec.europa.eu/food/safety/food_waste/eu-food-loss-waste-prevention-hub/eu-member-state-page/show/NL63 https://ec.europa.eu/food/safety/food_waste/eu-food-loss-waste-prevention-hub/eu-member-state-page/show/DE64 https://ec.europa.eu/food/safety/food_waste/eu-food-loss-waste-prevention-hub/eu-member-state-page/show/HU

Recommendation	Why	Best Practice	Action needed	Level of governance
<p>Provide insights on the effectiveness of national programmes by collecting food waste data. Guide uniform consumer food waste measurement and build a baseline of consumer food waste levels for home and out-of-home, with as much data granularity as possible.</p>	<p>Opens an opportunity for becoming a primary, credible information source for stakeholders, influencers, and journalists. This can amplify the impact of communication activities by providing information that is derived from the context. It will also help in implementing the right type of interventions by highlighting hotspots and drivers of food waste.</p>	<p>Leveraging primary data collected through national monitoring efforts can be effectively used.</p>	<p>Monitoring and evaluation</p>	<p>N</p>
<p>Facilitate the formation of participatory governance bodies, like citizen's panels and assemblies.</p>	<p>Give citizens a voice and the agency to participate in the policymaking process; gather insights in what are the priorities for citizens and develop policies that are accepted and supported by citizens.</p>	<p>The European Commission convened a citizens' panel on 'food waste'⁶⁵, which met over three sessions (between December 2022 to February 2023) to deliberate on actions required to step up the effort to reduce food waste. The panel was convened in the context of the upcoming legislative proposal for setting food waste reduction targets to be met by Member States by 2030. The recommendations which were issued from the panel give insights as to what are the priority actions from a citizen's perspective. Citizens called for a broad food systems approach with recommendations addressing: cooperation in the food value chain (from farm to fork); food business initiatives and supporting consumer behavioural change. The panel's recommendations will support the Commission's overall work programme related to food waste prevention and may also serve as a guide to help Member States in achieving the food waste reduction targets.</p>	<p>Stakeholder engagement</p>	<p>All</p>

65 https://citizens.ec.europa.eu/food-waste-panel_en

Recommendation	Why	Best Practice	Action needed	Level of governance
<p>Invest in home economics/education for sustainable development curricula, which include, among other topics, food waste reduction.</p>	<p>The younger generation is seen as a key target for developing appropriate behaviours regarding food in all its facets, including food waste behaviours. Education programmes can have a long-term effect. School programmes may also reach parents - which could have an immediate effect (parents are active members of the society: further systemic effects). Recommendation 18 from the European Citizens' Panel on food waste also supports this action.</p>	<p><u>Section 3.2.1</u> – school programmes and education, recently Austria has enshrined food waste prevention in new legislation on education⁶⁶.</p>	<p>Capacity building</p>	<p>N, L</p>
<p>Orchestrate yearly national food weeks as an umbrella initiative.</p>	<p>Increase the visibility of ongoing or future actions; establishes a recognisable branding of food waste reduction efforts at the national level; change the social norm by showcasing the movement against food waste and reaching as many consumers as possible and making the topic more pressing; can leverage the setting of the food waste prevention also for supermarkets, catering etc. Recommendation 21 from the European's Citizen Panel on food waste also supports this action.</p>	<p>Food waste Weeks: Germany⁶⁷, Netherlands⁶⁸, (September) and UK⁶⁹ (March), Ireland⁷⁰ (June).</p> <p>Food Waste Days: Globally, the International Day of Awareness of Food Loss and Waste (September 29th),⁷¹ is celebrated in many Member States. Also, in Italy⁷² (February 5th).</p>	<p>Stakeholder engagement and knowledge sharing</p>	<p>All</p>

66 https://www.bmbwf.gv.at/Themen/schule/schulrecht/erk/lp_neu_kund.html

67 <https://www.bmel.de/DE/themen/ernaehrung/lebensmittelverschwendung/aktionswoche-lebensmittelverschwendung.html>

68 <https://samentegenvoedselverspilling.nl/verspillingsvrijeweek/>

69 <https://wrap.org.uk/taking-action/citizen-behaviour-change/love-food-hate-waste/key-campaigns/food-waste-action-week>

70 <https://stopfoodwaste.ie/seasonal-events/its-stop-food-waste-week>

71 <https://www.fao.org/platform-food-loss-waste/flw-events/international-day-food-loss-and-waste/en>

72 <https://www.wwf.it/pandanews/societa/giornata-nazionale-di-prevenzione-dello-spreco-alimentare/#:~:text=Stop%20agli%20sprechi%20di%20cibo&text=Il%205%20febbraio%20si%20celebra,di%20prevenzione%20dello%20spreco%20alimentare.>

Recommendation	Why	Best Practice	Action needed	Level of governance
Awareness-raising campaigns on healthy eating should include other sustainability components , including food waste.	To be more cost-effective in public spending, governments and authorities should find suitable ways to include food waste prevention with wider policy goals (nutrition, sustainable diets, waste recycling) without creating a confusing narrative or overburdening citizens with information.	In Swannell et al. (2023), there are some examples of practices from the ECFWF data collection which integrated the topic of waste into a wider narrative ⁷³ , such as healthy diets.	Multi-dimensional/systemic action	All
Propose legal obligations for food business operators (especially retailers and food manufacturers) to include raising awareness in their operations and actions.	The creation of an enabling environment ⁷⁴ for food saving behaviour can be incentivised/implemented through regulation and bans when voluntary action from food businesses is not enough and/or lacks transparency.	There are calls from academics and civil society to include a more regulatory approach to engage food businesses to encourage food saving (see also Section 7 in this compendium). The ECFWF experts propose to take inspiration from a recent Voluntary Energy Efficiency Agreements in Finland (based on the Energy Efficiency Directive (EED)), which encourages energy providers to conduct voluntary awareness-raising activities for their customers. This initiative could be similarly applied in food policy, by advocating retail/food processing sectors to tackle household food waste, e.g. retailers could run evidence-based awareness raising through their channels.	Regulation	EU/N
Developing data-sharing platforms where different actors can autonomously share and compare relevant data on food waste interventions would allow the responsible persons to develop and maintain actions and interventions based on evidence-based decisions.	Facilitate knowledge sharing by improving already existing channels. Recommendations 4 and 5 of the European Citizens' Panel on food waste also highlight how knowledge and data sharing are a priority in food waste reduction.	Improve the scope and usability of the EU Prevention Hub to make it more user-friendly.	Multi-dimensional/systemic action	All

⁷³ The relevant evaluated examples can be found with the [codes: AL6, ES6, ES2, AL1, AL6, ET2](#)

⁷⁴ Food environments can be defined as the “physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food” – definitions for <https://epha.org/wp-content/uploads/2021/10/policy-briefing-i-discovering-the-role-of-food-environments-for-sustainable-food-systems-eufpc-october2021.pdf>

Recommendation	Why	Best Practice	Action needed	Level of governance
Consideration of alternative date labels in FIC regulation (Food Information to Consumers), including smart technologies.	These approaches were not considered in the impact assessment for the revision of the regulation ⁷⁵ , but consumer surveys expected that smart indicators would make it easier to see how long a fresh product can be used and help to determine how long a fresh product can safely be eaten (Lehn et al., 2023).	Examples gathered through the ECFWF (Swannell et al., 2023) – show the potential for novel developments in labelling to aid consumers in understanding expiration dates, but it is currently not allowed to use them as an alternative to a ‘use by’ or a ‘best before’ date according to the regulation. Information provided by smart technologies should be consistent with the information provided in accordance with the mandatory rules of the regulation and on voluntary food information.	Further Research; Regulation	EU

LEGEND

L: Local, **N:** National, **EU:** European Union, or all. The actions that can be adopted by policymakers do not have to solely require regulatory action, to highlight this, the type of actions is defined as follows:

Stakeholder engagement: organise, coordinate and facilitate platforms for different stakeholders to come together and identify common objectives and activities. As this does not occur spontaneously, this process can be initiated by policymakers at any level.

Monitoring & Evaluation: there is a lack of evidence to support implementation of effective food waste prevention initiatives. Evidence-based policymaking requires routine iterations of evaluation exercises.

Knowledge sharing: increase the reach of successful programmes by effectively communicating implementation details and results achieved.

Policy: devise and apply a set course of action with strategic goals and implementation through diverse policy instruments, and involving multiple actors. Policy should support decision-making by all players.

Capacity building: provide appropriate funding, training and tools.

Regulation: introduction of legally binding measures.

Multi-dimensional/systemic action: food waste is a complex subject, in many cases, it is regulated by legislation which deals with waste management, while its causes and determinants – as well as solutions – might be part of a different policy domain (agriculture, food, trade, marketing, education). We should encourage policymakers to adopt a more integrated view of food waste prevention.

Further research: support additional research to fill in knowledge gaps.

75 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12749-Food-labelling-revision-of-rules-on-information-provided-to-consumers_en

5. Recommendation and tools for evaluation for practitioners

5.1 Evaluation Framework and data collection protocol

An evaluation framework for consumer food waste prevention initiatives was developed by the ECFWF and detailed in García-Herrero et al. (2023).



The goal of the evaluation framework was to (1) identify effective and efficient interventions and, (2) understand the adequacy of the interventions in addressing specific food waste drivers and levers for prevention. There is a consensus in the literature on the lack of systematisation of knowledge regarding consumer-level food waste prevention, and this evaluation framework provides a set of criteria to assess the performance of a prevention intervention, both in terms of food waste reduction achieved and behavioural change. This framework aims at understanding the differences among consumers' food waste behaviours, encouraging data collection on behavioural change and on specific consumer segments targeted by the intervention. Some key elements that guided the development of the evaluation framework included modularity (being adaptable to the evaluation of many different typologies of interventions), adaptability, and accessibility from a variety of stakeholders (i.e. maintaining a balance between thorough data collection and usability). The ultimate objective of this framework is its application by a wide range of practitioners who need to assess whether their prevention intervention works or - just as importantly - does not work and requires redesign. An understanding of the evaluation framework can help practitioners to better design and implement their interventions.

5.2 Food waste prevention calculator

To evaluate the effectiveness of the identified interventions, the EU Commission's Joint Research Centre introduced a food waste prevention calculator (De Laurentiis et al., 2020).



The calculator helps practitioners (e.g. local, regional, or national administrations, food business operators and other actors within the food supply chain, NGOs) to identify potential trade-offs which can be encountered when implementing an intervention. Trade-offs might be encountered when the environmental and economic impacts of conducting an intervention are greater than the benefits reaped from saving food from being discarded and appropriately managed. Identifying these trade-offs in the food waste prevention calculator can lead to an improvement of the intervention design, but it can also facilitate evaluation and comparison between different intervention types.

Building on the recommendations provided by the ECFWF, this calculator was expanded to include the following elements:

- Simplification with generic items (general food) and new food items with an update on the environmental impacts;
- Addition of nutritional features;
- Addition of positive messages;
- Inclusion of a section with questions and answers (Q&A) to clarify the benefits and limits of this tool.

The environmental component of the calculator, assessing both benefits and burdens associated with a food waste prevention action (e.g. emissions saved by avoiding food waste and emissions generated by transporting food to a new location) is based on Life Cycle Assessment (LCA) – a pivotal method for addressing multiple environmental impacts and trade-offs. To evaluate the environmental

benefits and burdens associated with an action, the user is required to provide information on the types and quantities of food products saved by the intervention, the waste treatment technology that would have been used (had the food been discarded), and the resources used to implement the intervention. Further information on the tool can be found in García-Herrero et al. (2023).

5.3 Food waste quantification techniques and available protocols

Regarding food waste quantification at the consumer level, and especially in households, direct and precise measurement becomes particularly complicated due to the level of investment required. In addition, in some cases, it can also require effort and commitment from consumers themselves. Furthermore, most available methodologies provide figures for a specific moment in time corresponding to the moment the measurement takes place. Replication of monitoring is, therefore, necessary to indicate trends in food waste generation over time. Therefore, monitoring over time should be put in place, especially to gain insights into the long-term effects of an intervention, which constitutes another major knowledge gap regarding consumer food waste. Detailed information can be found in García-Herrero et al. (2023).

- In order to facilitate the monitoring of interventions and evaluate their effects, the JRC collected direct and indirect methods for quantifying food waste to facilitate measurement and evaluation. Direct methods for waste measurement can include weighing, waste compositional analysis, surveys, diaries, records, and observation.
- Indirect methods estimate food waste from various secondary data sources, including modelling, mass balances, proxy data and literature data.



6. Recommendation for action design and monitoring

6.1 Segmenting consumers and tailoring behavioural interventions

To inform effective and efficient intervention design, segmentation aims to investigate how context and individual characteristics impact people's responses to food waste reduction interventions. Knowing who will respond to which intervention and in what context – and the causes behind their response – can inform the choice, design, and delivery of interventions. Tailoring interventions uses the information collected through segmentation to find appropriate interventions for a specific group of people.

Behavioural interventions, especially nudges⁷⁶ have different effects on different groups of people. The characteristics of individuals and the contexts in which they make decisions can cause interventions to sometimes be more or less successful. In some contexts, or for some groups of people, interventions might be less or not effective at all (Grüne-Yanoff, 2021). Understanding which contexts

facilitate effective interventions more, and which groups of people are more responsive to specific calibrations or types of interventions, is important. It allows utilising these contextual and personal characteristics as a means to an end. More specifically, this knowledge can be used by scientists, practitioners, and policymakers to better target groups answering their specific needs.

The JRC designed 'The role of segmenting consumers and tailoring behavioural interventions to reduce consumer food waste' **tool** with a two-fold objective. The **first objective** is to introduce an approach to characterise the contexts and recipients of interventions, referred to as **segmentation**. Segmentation means dividing a group of individuals into homogeneous sub-groups based on one (or several) characteristics that individuals in that group have. Segmentation can serve to identify groups with specific characteristics that influence how well interventions work. The **second objective** is to outline an approach to using this information to 'fine-tune' interventions. Fine-tuning, here, refers to **targeting and tailoring**. Targeting describes the act of choosing and administering an intervention for a particular group or context. Tailoring describes the process of matching aspects of an intervention, or the type of intervention, to the characteristics of a group. Importantly, targeted, and tailored interventions can be more effective than un-targeted or un-tailored interventions.

To provide an accessible account of the main principles, potentials, challenges and examples of these techniques, the tool follows a certain structure. This structure builds on the main line of arguments used to elucidate these techniques:

1. Nudges can have variable outcomes: they are context-dependent and need to be designed carefully.
2. Individual and/or context characteristics explain why sometimes nudges work better or worse.

⁷⁶ Nudges are commonly defined as interventions affecting behaviour in a predictable way without forbidding any options and without significantly changing economic incentives (Thaler & Sunstein, 2008). See examples in Figure 3 from this report.

3. Individual and/or context characteristics can be the basis for segmenting people into groups.
4. Segmenting people into groups can be done to identify groups that are (most) likely to respond to specific interventions or that are most in need of intervention.
5. Identifying groups that are (most) likely to respond to specific interventions or that are most in need of intervention can inform the design and selection of interventions.
6. Interventions can be chosen and designed to be effective for specific groups.
7. There are important limitations identified in the literature and by experts.

More information on how consumer segmentation works and how to tailor behavioural interventions in the tool is available in Bruns & Nohlen (2023b). The tool also outlines case studies from the food waste domain to provide examples of segments and potential insights for targeting and tailoring food waste reduction interventions.

6.2 Introduction to using experiments to evaluate consumer food waste interventions

Experimental testing is a central method to evaluate consumer food waste reduction interventions. Experiments, when conducted rigorously and carefully, generate data on the effectiveness of food waste reduction interventions, which allow stakeholders to evaluate these interventions. Thus, they provide important input for the evaluation framework (García-Herrero et al., 2023), specifically.

Frequently, experimental data are generated by research projects evaluating food waste reduction interventions. Meanwhile, practitioners who implement such interventions

do not generally use experimental designs to evaluate how effective interventions are in changing behaviour. Yet, these practitioners are at the core of such interventions, implementing them on large scales, which can provide excellent opportunities for experimental testing. By taking these opportunities, practitioners can a) evaluate the effectiveness of their intervention, and b) widen the scientific knowledge on food waste reduction interventions. To achieve both goals, using rigorous scientific methodologies is key. As with an incomplete or missing evaluation, using wrong or non-scientific methods can lead to the implementation of ineffective interventions.

The JRC has developed 'A simple introduction to using experiments to evaluate consumer food waste interventions' to equip readers with the basic concepts necessary to design experiments to evaluate consumer food waste reduction interventions. The tool can be easily coupled with the evaluation framework (García-Herrero et al., 2023), thus supporting the improvement of the quality of the intervention design phase. This tool is available in Bruns & Nohlen (2023a).

7. Gaps identified by ECFWF and recommendations to fill the research needs



7.1 Understanding where consumer food waste is mostly generated and why

7.1.1 Drivers and levers need to be considered and integrated more prominently

The reasons for consumer food waste can vary significantly among individuals, food products, and situations. Although research is starting to **uncover and better understand the factors that drive food waste and identify the relevant levers associated with those drivers** (Vittuari et al., 2023), further research is necessary to gain a deeper understanding.

Understanding the underlying causes of food waste can help determine the most effective interventions and inform their design, especially in relation to specific contexts

such as local environments. The effectiveness of interventions in reducing food waste caused by different drivers frequently remains unclear. Interventions that are most likely to yield positive outcomes while addressing the most common drivers of consumer food waste should be recommended, however it is difficult to pinpoint which ones these are. Scientific insights are needed to assist in tailoring and implementing interventions to specific contexts, such as food shopping, buffet food selection, or meal preparation at home while addressing the relevant drivers related to motivation, opportunity, and ability.

Table 22. Key gaps and research needs in drivers and levers to be considered.

Identified gaps	Recommended actions
There is insufficient understanding and consideration of the role played by drivers and levers of food waste across various consumer types, food products and contexts.	Further empirical research is needed to comprehensively understand the various drivers and levers associated with different consumer types, food products, and contexts.
Lack of understanding as to how to select the most effective interventions for reducing food waste based on the underlying relevant drivers and levers.	Further research and practical guidance are needed to facilitate selecting the most promising interventions for reducing food waste, taking into account the relevant drivers and levers.
Lack of knowledge as to how behavioural factors impact food waste and the effectiveness of reduction interventions, limiting their transferability to other countries, household profiles, or consumption contexts.	Further evidence is needed to explore the potential transferability of food waste reduction interventions to different countries, household profiles, or consumption contexts, along with strategies to enhance their transferability.



7.1.2 Improving intervention design is key

Segmentation can pave the way for better targeted and tailored interventions. It can be applied especially to identify 'hot spots', 'low-hanging fruits', or socially or economically vulnerable groups who can benefit the most from a specific intervention. These interventions could be more effective and efficient compared to generic 'one-size-fits-all' approaches. At the moment, evidence of

effectiveness of targeted and tailored interventions is lacking. Ideally, the generation of evidence should be guided by a theory or model, such as the Motivation Opportunity Ability model, and incorporate practical guidelines for segmentation and tailoring/targeting. An initial step in that direction can be found in [Section 6](#), and Bruns & Nohlen (2023b).

Table 23. Key gaps and research needs in identifying key actors.

Identified gaps	Recommended actions
There is limited understanding of behavioural 'hot spot', vulnerable groups, and 'low-hanging fruits' in relation to food waste.	Further research is needed that is focused and context-specific to better conceptualize, define, identify, and impact the most relevant target audiences, contexts, or behaviours that should be addressed by food waste prevention interventions. Practical guidelines should be developed to facilitate the process of conducting empirical testing and segmentation, as well as targeting and tailoring interventions aimed at reducing food waste.
There is a lack of clarity regarding the role and significance of behavioural factors, such as motivation, abilities, and opportunities, in characterising relevant consumer segments related to food waste.	Further research and practical guidance are needed to facilitate matching the most promising interventions for reducing food waste to specific segments of the population, taking into account the relevant drivers and levers.
There is a limited understanding of the effectiveness and efficiency of targeted and tailored interventions for reducing food waste.	More empirical evidence is needed to assess the effectiveness and efficiency of targeted and tailored food waste reduction interventions. This can be achieved through appropriate monitoring and evaluation of actions taken in these interventions.
There is currently no dedicated theory, model, or guidelines specifically focused on targeting or tailoring interventions for food waste reduction.	Efforts should be made to develop a theory or model that specifically addresses the targeting and tailoring of interventions for food waste reduction.

7.2 Sharing more evidence-based resources with practitioners

7.2.1 Evaluating interventions is a priority



The consistent and reliable evaluation of interventions for food waste reduction remains a challenge. In order to tackle this issue, the ECFWF has improved an evaluation framework building from Caldeira et al. (2019) as introduced in the report by García-Herrero et al. (2023), and in [Section 2](#) of the compendium. However, to effectively use this

evaluation tool, data gathering is crucial, including data on food quantities, costs, barriers, and opportunities for scaling and transferring interventions.

Consistent **measurement of food waste** relies on establishing common ground in terms of definitions and quantification

methods among scientists and practitioners. According to EU legislation⁷⁷, food waste refers to all food as defined in Article 2 of Regulation (EC) No 178/2002 of the European Parliament and of the Council that has become waste. This definition considers food in its entirety, including inedible parts that are not separated from edible parts during production. To further standardise reporting of food waste levels by Member States at the national level, the EU common measurement methodology, described under the Delegated Decision (EU) 2019/1597 of May 2019 should be employed.

Whilst the EU common measurement methodology can also help to standardise monitoring and reporting of food waste levels in the context of food waste prevention interventions, practitioners may also wish to **further develop quantification methods**, depending on the specific objectives pursued as well as related costs and efforts. For instance, more detailed measurement could be carried out to quantify the share of food

waste arising from the discarding of edible fractions of food or to identify specific food components (García-Herrero et al., 2023).

It is important for practitioners to have **information about the costs associated with interventions**, allowing them to consider cost-effectiveness when selecting interventions. There is a growing body of research highlighting the central importance of **considering scalability early in the intervention design process**. Yet, designing scalable interventions grounded in lower-scale scientific research is far from straightforward (Al-Ubaydli et al., 2017; DellaVigna & Linos, 2022).

There is a related **knowledge gap concerning the long-term effectiveness of behavioural interventions**. Additional evidence is needed to understand the effect of consumer food waste reduction interventions over time. Specifically, further scientific research is needed to determine whether

Table 24. Key gaps and research needs in evaluating interventions and sharing information.

Identified gaps	Recommended actions
There is a lack of shared definitions, standardised measurement methodologies, and indicators for food waste.	While the EU has a common definition and measurement methodology for monitoring food waste, at each stage of the food supply chain, by Member States, further guidance may be needed for their possible adaptation and application to the monitoring of consumer food waste, (see García-Herrero et al., 2023).
There is insufficient data regarding the costs of food waste reduction interventions at scale.	Efforts should be made to improve the reporting of cost information for interventions, including estimated costs for experimental interventions implemented at scale.
There is a lack of consideration for the necessity of and challenges associated with scaling up food waste reduction interventions and the long-term effectiveness of behavioural interventions for food waste reduction.	Evidence and experience shedding light on the challenges and consequences associated with scaling up, and on the long-term effectiveness of food waste reduction interventions should be gathered and incorporated.
There is a lack of understanding regarding the potential negative effect of food waste reduction interventions on various food value chain actors.	Systemic effects of food waste reduction interventions on other actors than consumers should be investigated and considered. This includes understanding the potential impacts on producers, retailers, and other stakeholders in the food value chain.

⁷⁷ Article 3(4), point (a), of the Waste Framework Directive

consumers adapt to the behavioural interventions they encounter in the long term, potentially diminishing their effectiveness. This research would provide reliable insights to inform practitioners in their approach to reducing food waste.

Lastly, there are few studies that **anticipate or investigate potential drawbacks of consumer food waste reduction** for certain actors within the food value chain. To comprehensively evaluate the effectiveness of food waste reduction interventions, these effects should be taken into consideration.

7.2.2 Sharing of knowledge and experiences motivates action

Practitioners dedicated to reducing food waste, including public authorities, often lack **access to evidence-based and actionable resources** such as tools, best practices, recommendations, and guidelines. National programmes, such as those described in [Section 3.3](#), can serve as umbrella initiatives that screen evidence-based best practices and facilitate resource sharing at the country level. Similarly, at a higher level, expert hubs and networks including scientists and practitioners can enhance collaboration and exchange between countries and provide an improved overview of effective strategies

across countries, ultimately enhancing the transferability of interventions. Existing initiatives such as the Commission's EU Food Loss and Waste Prevention Hub, the EU Platform on Food Losses and Food Waste, and European Consumer Food Waste Forum are already in place. However, there is room for improvement in terms of **accessibility and use** by practitioners at all levels.

In addition, the European Union should motivate Member States to improve their implementation of national programmes on food waste.



Table 25. Key gaps and research needs from enhanced sharing of knowledge and boost action.

Identified gaps	Recommended actions
Practitioners face challenges in accessing evidence-based and actionable resources on food waste reduction interventions and related insights, for example on drivers and levers.	Evidence-based food waste reduction interventions should be shared regularly through networks and for a including relevant stakeholders. Knowledge- and data-sharing hubs should be improved. Context-relevant evidence and knowledge should be openly accessible.
Future promising pathways to reduce consumer food waste and actions required from policymakers need to be identified.	Knowledge- and data-sharing hubs need to be enhanced and established as places where experts and policymakers can interact. Foresight exercises can be employed to identify future challenges and potential solutions related to food waste.
The involvement of governments as coordinators and facilitators of food waste reduction is too rare.	There should be a more pronounced role for governments in accelerating collaboration between stakeholders and in coordinating food waste reduction actions.

7.3 Further actions to reduce food waste

7.3.1 Combining different interventions



Many effective strategies to reduce food waste often **combine interventions that address various mechanisms underlying food waste to change consumer behaviour**. For example, these interventions can include raising awareness, providing knowledge-building materials, distributing practical tools, and creating a decision environment that encourages food waste reduction through nudges.

Further research is needed to determine which interventions or types of interventions can be more effective when combined. While some research has explored the effects of combining different types of pro-environmental policies (Alt et al., 2022ab), more dedicated research is needed for food waste reduction interventions. Additionally, it is important to investigate the potential

benefits of implementing interventions sequentially, such as following awareness-raising campaigns with interventions to develop food waste reduction skills.

There is potential to combine food waste reduction interventions with other interventions that target pro-environmental or health-related behaviour aligned with food waste reduction for example. Acknowledging the multi-dimensional nature of sustainable development and combining various sustainability interventions could more effectively facilitate behavioural change in the desired direction. Some recent literature (Qi et al., 2022; Trewern et al., 2022) has shown how to possibly investigate the interaction between different behavioural change interventions addressing simultaneously different food-related issues.

7.3.2 Consider spill-over effects of food waste prevention actions



It is important to recognise that efforts to reduce food waste at one step of the household food management process can sometimes lead to food waste at another step. Food waste can also occur at another step of the supply chain, such as when donated food or leftovers taken home in a doggie bag are later wasted. It can also occur when portions adapted through differently sized plates result in more waste in restaurant kitchens.

Interventions aimed at reducing food waste can also have positive spill-over effects by promoting behaviours that can also reduce individual climate impacts, lead to healthier and more sustainable dietary choices or serve other societal goals. Such positive

spill-over effects, meaning indirect or unintended, yet desirable benefits created by food waste prevention actions in other domains can be important and should be acknowledged. For example, educational campaigns on food waste reduction can also motivate people to lower their overall carbon footprint by taking action in another area, for example, driving less. When evaluating the effectiveness of food waste reduction interventions, such indirect effects should be considered. The evaluation framework proposed by the ECFWF recognises that synergies among interventions can be better identified within multi-actor networks and programmes addressing sustainability in a more comprehensive manner.

7.3.3 Some promising types of interventions are under-studied



Certain interventions, such as **financial incentives or communication of social norms**, are often overlooked as practical actions to reduce food waste. Consequently, less is known about their potential effectiveness. Obtaining more insights about such potentially effective interventions is important. Relying solely on intuitions about

their effectiveness can be misleading, and evidence from other behavioural domains such as energy usage might not directly apply to food waste reduction (Allcott, 2011). Alternatively, where it is clear why certain types of interventions should not be used in practice, this should be communicated and shared.

7.3.4 Quantifying the different impacts of food waste could help target priority actions

While focusing on reducing amounts of food waste it is common, this should be supplemented by evaluating reductions in terms of the loss of nutritional value or the related environmental impact. This approach would help to identify and address the specific food waste actions with the greatest negative social and environmental consequences and could improve the cost-benefit ratio of interventions.

Additionally, expressing **information about food waste reduction or targets** in terms of the related environmental benefits can motivate environmentally conscious

consumers to take action. For example, people that are concerned about the levels of food waste could value information on the quantitative reduction of food waste in kilograms, while people seeking to reduce their carbon footprint might be more interested in the respective impact of food waste reduction on carbon emissions. In García-Herrero et al. (2023), the food waste prevention calculator is described as a tool that aids in quantifying the impacts of food waste. This calculator can be used to assess and measure the extent of food waste in the described terms or context.



7.3.5 Defining the roles of the consumer and systemic drivers

Consumer food waste is the product of a complex interplay between contextual and individual factors (Aschemann-Witzel et al. 2022). Research on **how individual factors can induce food waste at different stages of the supply chain is key to adopting a systemic approach to reducing food waste**. It is equally important to understand and acknowledge the role of contextual factors, especially the legal and policy landscape, as well as the market environment in which consumers make food waste-related decisions. These factors are relevant drivers of food waste as well and interact with psychological and social drivers.

Even if consumers are motivated and equipped to reduce food waste, they might not act accordingly if laws, regulations, and market incentives did not align with their intentions.

Behavioural interventions like nudges have their place, they should not overshadow the need for systemic change (see Boulet et al., (2021), or Chater & Loewenstein (2022)) for a related discussion in the behavioural sciences.



Price also plays a central role, as provision of sustainable and affordable food is crucial for food security. Research on better understanding the dynamics of food prices and their effects on food waste reduction interventions is therefore needed.

Food culture and lifestyles are also important aspects to consider in combatting consumer food waste. Further research on food quality, consumers' relationship with food and the perceived value of food can inform the development of policies and interventions needed to address the issue effectively.

Table 26. Key gaps and research needed in tackling food waste should take spillovers into account.

Identified gaps	Recommended actions
The relative roles of individual and systemic factors in consumer food waste are not well understood.	There is a need for a better understanding of the respective role of individual and systemic factors, their interactions, and the implications for identifying the most effective interventions to reduce consumer food waste.
There is a lack of sufficient understanding regarding the effectiveness of interventions in the context of fluctuating food prices and other external stressors. Additionally, the impact of food-related culture and lifestyle on food waste remains unclear.	Further research is needed to evaluate the performance of food waste reduction interventions in the context of varying food prices and other external stressors. Additionally, there is a need to explore topics such as food quality, individuals' relationships with food, and consumers' perceived value of food.

7.4 Activating actors

The research conducted by the ECFWF has identified specific actors in the food supply chain, namely commercial restaurants, the leisure and tourism sectors, the healthcare sector, retailers, and NGO, who are reportedly less active in preventing consumer food waste or sharing the results of their efforts. While some of these actors may already be taking action, it is important to further encourage their participation in the wider food waste community. Stakeholder platforms coordinated at a national level, for example, the [Dialogue Forums in Germany](#)⁷⁸, can pool resources and knowledge and engage all steps of the food supply chain in reaching common objectives. Similar setups should be implemented in other countries, as illustrated in [Sections 3.3](#) and [4](#).



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8. Conclusions

This compendium aims to serve as a valuable resource for policymakers, businesses, non-governmental organisations (e.g. consumer, environmental), educators and other actors who are seeking practical solutions to reduce consumer food waste.

It offers readily implementable tools and best practices. Key players aiming to reduce food waste can also find specific recommendations within the compendium. The findings empower stakeholders by presenting evidence-based solutions and guidance, emphasising the need for evaluating interventions. The document fills the information gap by providing tools for practitioners to assess the effectiveness of their initiatives. Recognising the necessity for tailored interventions, the compendium emphasises the importance of gathering context-specific information to help define clear objectives and achieve desired outcomes. Taking a systemic approach is crucial, as collaboration and linking different

stakeholders and topics can enhance the impact of interventions not only as regards food waste reduction, but also by addressing other issues where behavioural change may be required (e.g. shift to healthy diets). Policymakers are acknowledged as crucial allies, playing an essential role in guiding the fight against food waste, and engaging multiple players - the compendium provides concrete recommendations to support their efforts. Additionally, the compendium identifies research gaps and suggests ways to address them. The compendium is envisioned as a living document that can be periodically updated with contributions from stakeholders sharing their findings and best practices. While showcasing promising examples of consumer food waste reduction, the compendium emphasises the need for continued and urgent action, further research, and resource allocation to effectively address this complex issue.



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