Food Waste in Australian Households

Evidence for designing interventions

FIGHT FOOD WASTE
Cooperative Research Centre
REDUCE - TRANSFORM - ENGAGE

Australian Government
Department of Industry, Science, Energy and Resources

AusIndustry
Cooperative Research Centres Program

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Table of contents

Table of Figures		**3**
List of Tables		**3**
Executive summary		**6**
1.	**Background**	**8**
1.1.	The Food Waste in Australian Households: Evidence for Designing Interventions report	8
1.2.	Household Project	8
1.3	Fight Food Waste Cooperative Research Centre	9
2.	**Key behaviours driving per capita household food waste and potential interventions**	**10**
2.1.	Potential interventions to encourage the adoption of priority behaviours	11
3.	**Potential interventions to reduce key products wasted**	**13**
4.	**Segments of Australian households to target**	**15**
5.	**Formulating intervention messages**	**21**
6.	**Measuring food waste**	**22**
7.	**Frameworks for behaviour change**	**25**
7.1.	Opportunity Motivation Ability (OMA) for consumer food waste	25
7.2.	The Easy, Timely, Social and Attractive (EAST) framework for enacting changes in behaviours	26
8.	**References**	**27**

Table of Figures

Figure 1: Priority behaviours to focus on for development of household food waste interventions	5
Figure 2: Over Providers – who are they?	10
Figure 3: Over Providers – behaviours to encourage	11
Figure 4: Under Planners - who are they?	12
Figure 5: Under Planners - behaviours to encourage	13
Figure 6: Considerate Planners - who are they and what role could they play in reducing household food waste?	14

List of Tables

Table 1: Interventions focusing on priority behaviours	6
Table 2: Top 5 products to prioritise for interventions (based on dollar value)	8

Executive summary

The Australian economy loses $36.6 billion each year due to food waste with households alone contributing $19.3 billion (Food Innovation Australia, 2021).

According to the National Food Waste Strategy Feasibility Study, at least a 30% reduction in household food waste is required to achieve Australia's goal of halving food waste by 2030 (Food Innovation Australia, 2021). This report is for practitioners seeking to help households reduce food waste. Using the key insights provided will help to ensure their interventions achieve the highest possible impact. This evidence is based on the most comprehensive research on food provisioning in households ever conducted in Australia. It outlines priority behaviours, products, and consumer segments to focus on when developing household food waste reduction interventions. This report also includes the message frames shown to resonate most with consumers and how to best measure the impact of food waste interventions.

Behaviours to prioritise are preparing appropriate amounts of food, planning for changes in meal plans, eating leftovers, purchasing appropriate amounts, eating oldest items first, appropriate storage in fridge/freezer, and plating small servings. Meat and sea food, and fresh vegetables and fresh herbs are the top two food categories that contributed to dollar value of food waste. The top five most wasted products (in terms of dollar value) are cooked beef, sliced bread and bread rolls, vegetable salads, banana and cooked rice and should be prioritised for household food waste reduction interventions. When assessing food waste, consumers fall into one of three identified segments: over providers, under planners and considerate planners, with the first two most associated with higher waste. Message frames centred around "Save money" work as a hook that attracts all consumers to engage with subsequent food waste avoidance messages. This can then be followed by a loss aversion message (e.g. "throwing money in the bin") or an environmental message that emphasises the waste of energy, water and other resources lost in producing edible food that is later disposed.

"This evidence is based on the most comprehensive research on food provisioning in households ever conducted in Australia."

In terms of monitoring and evaluation, surveys, electronic diaries, and bin audits can be used to evaluate the impact of interventions. Based on relatively low cost per respondent, the ability to capture all disposal routes, changes in food provisioning behaviours and quantities of food wasted, surveys are recommended to be used for evaluating the impact (change in behaviour and/or quantity of food wasted) of interventions. However, all three methods have limitations and often underestimate food waste. As such, this report provides three adjustments factors (surveys x 1.7, electronic diaries x 1.2, bin audits x 1.9 due to non-bin disposal via home compost, feeding to pets etc) that should be used by practitioners using any of these three methods to ensure a more accurate measurement of food waste.

Internationally WRAP UK and Netherlands Nutrition Centre (NNC) are exemplars for developing food waste reduction interventions. WRAP's "Love Food Hate Waste" campaign sets a global standard and continues to be used in many countries. Both WRAP and the NNC engage with households through integrated national campaigns. Practitioners are advised to explore ideas and campaigns used by these two organisations to guide the development of their own campaigns, potentially saving time and money. And finally, the Opportunity-Motivation-Ability (OMA) framework provides a wholistic approach and is recommended to assist in organising the development of food waste intervention campaigns.

Food waste in Australian households: evidence for designing interventions

- Wasting food costs the Australian economy $36 billion every year.
- Wasting food costs Australian households $19 billion every year, accounting for half the amount wasted from farm to fork.
- Reducing the amount of food waste from households means targeting areas where the biggest impacts can be made:
  - targeting behaviours most linked to less waste (e.g. preparing the right amount)
  - focusing on the products wasted most often (e.g. high value products like meat, or quantities like bread)
  - supporting high waste consumer groups (e.g. families with children living at home)
- For those working to reduce food waste, these pages outline the key areas recommended to focus interventions on.

  Whether the focus is on, a specific behaviour, types of food or an audience, this report outlines those able to achieve greater impacts for campaigns and interventions.

  The full detailed results can be found in the "Food waste in Australian households: evidence for designing interventions" report delivered by the Fight Food Waste Cooperative Research Centre.

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Behaviours to be encouraged

(Based on synthesis of 40 behaviours)

1. Prepare appropriate amount
2. Plan for changes in plans
3. Eat leftovers
4. Purchase appropriate amount
5. Eat oldest items first
6. Appropriate storage in fridge/freezer
7. Encourage small servings

Food categories to be prioritised

(top 5 out of 13 based on $ value)

1. Meat and seafood
2. Fresh vegetables/ fresh herbs
3. Meals
4. Condiments, dried herbs, spices, spreads, oils
5. Bread, bakery, confectionary and snacks

Products to be prioritised

1. Beef steak (cooked)
2. Bread rolls
3. Cheese
4. Salads
5. Ham
6. Sliced bread
7. Chicken (cooked)
8. Yoghurt
9. Bananas
10. Apples
11. Tomatoes
12. Milk
13. Potatoes (cooked)
14. Pasta (cooked)
15. Rice (cooked)

Households to target

	Over providers (23%)	Under planners (32%)	Considerate planners (45%)
Who	> Mostly young couples (below 45 years), with young children living at home	> Mostly middle aged (35 – 64 years) single or couple, no young children living at home	> Mostly older couples (55 years or more), no young children living at home
Context	> Managing busy schedules (often with both working), and multiple food preferences > Often eat out	> Lack of interest in food provisioning > The least likely to plan food shopping and cooking	> Generally current behaviours support reducing food waste
Attitude to changing behaviours	> Moderately motivated > Feels it requires effort	> Least motivated > Feel not much effort required	> Most motivated > Feel not much effort required
Behaviours to encourage	> Plan for changes in plans, purchase appropriate amount > Prepare appropriate amount > eat leftovers	> Purchase appropriate amount > Prepare appropriate amount	> Provide support for continuation of current behaviours > Encourage them to become mentors for Over providers and Under planners

Message frames that are most effective

Save money ($ or %) by reducing food waste

Avoid throwing money in the bin by reducing food waste

Save water, land and other scarce resources used in producing the food which is wasted

Methods to measure household food waste

Survey
Scaling Factor 1.7

Electronic-Diary
Scaling Factor 1.2

Bin Audit
Scaling Factor 1.9

> Survey is recommended as most cost-effective method

> All methods have limitations and underestimate food waste in households

> Accurate weight of food waste is determined by multiplying the total food waste derived by the method used, by the relevant scaling factor

Actions Required

> Create **Simple** messages to encourage the behaviours

> Pick one message to **Amplify**

> Provide consumers with **Consistent** message from multiple stakeholders, and

> **Repeat** over sustained period of time to **help consumers stop wasting food**

1. Background

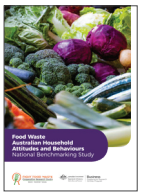
1.1. The Food Waste in Australian Households: Evidence for Designing Interventions report

This report synthesizes key findings from across seven individual research areas within the "Designing effective interventions to reduce household food waste" project (the Household Project), undertaken by ENGAGE Program within Fight Food Waste Cooperative Research Centre (FFW CRC). This report collates the priority insights practitioners should use when developing interventions to reduce household food waste. If readers wish to know more detail about these findings, they can refer to the individual Work Package reports (listed below) or contact the authors.

1.2. Household Project

The Household Project provides evidence-based insights through seven (7) Work Packages (WP) covering: food waste behaviours and attitudes of Australian households; quantification of perceived and actual household food waste; advice regarding priority segments; identification of global best practise interventions; household food waste reduction interventions for priority segments; messages for selected intervention; and cost-effective methodologies for evaluating the impact of selected interventions.

Full reports available from the seven Work Packages (WP) are:



WP1 - Australian household attitudes and behaviours national benchmarking study

This research was commissioned to establish a national baseline on current community knowledge, attitudes and behaviours around household food management and food waste.

https://fightfoodwastecrc.com.au/wp-content/uploads/2019/11/Summary-Report_final.pdf

WP2 - Australian household food waste behaviours, attitudes and perceived and actual food waste

This Work Package quantified Australian household food waste amounts using a survey, electronic diary, and bin audits, with findings published over six reports in the series called "Australian household food waste". The six reports include a summary of the implications, along with five reports outlining the detailed results of the various methodologies used to quantify household food waste amounts:

1. "A summary of behaviours, attitudes, perceived and actual food waste"(Karunasena, Pearson, & Fight Food Waste CRC, 2021a)
2. "Survey findings of behaviours and perceived food waste"(Karunasena, Pearson, & Fight Food Waste CRC, 2021f),
3. "Electronic-diary findings of recorded food waste and disposal methods"(Karunasena, Pearson, & Fight Food Waste CRC, 2021c),
4. "Kerbside bin audit findings of actual food waste"(Karunasena, Pearson, & Fight Food Waste CRC, 2021e),
5. "Focus group findings of attitudes to food waste"(Karunasena, Pearson, & Fight Food Waste CRC, 2021d), and,
6. "Choice model findings of food waste reduction interventions"(Karunasena, Pearson, & Fight Food Waste CRC, 2021b).

https://fightfoodwastecrc.com.au/wp-content/uploads/2021/07/FINAL-summary_report.pdf

WP3 - Profiles of Australian households for food waste reduction interventions

Using data from WP2, this report presents three consumer segments that can be used to support intervention design, by outlining the demographics and behaviours across these audience segments most correlated with food waste.

https://fightfoodwastecrc.com.au/wp-content/uploads/2021/09/wp3-report-28092021.pdf

WP4 - Global best practice for designing interventions to reduce household food waste

Looking at the success of various worldwide programs and interventions designed to reduce food waste, this report outlines eleven (11) recommendations that can be applied to food waste programs in Australia.

https://fightfoodwastecrc.com.au/wp-content/uploads/2020/10/Best-Practice-Intervention-Report_Final.pdf

WP5 - Priority behaviours for interventions to reduce household food waste in Australia

Based on the data collected in earlier WP 1 and WP2, this report identifies seven (7) behaviours and fifteen (15) products most critical to reducing household food in Australia.

https://fightfoodwastecrc.com.au/wp-content/uploads/2021/12/WP5-Priority-behaviours-for-interventions-to-reduce-household-food-waste-in-Australia.pdf

WP6 - Framing food waste reduction messages

This research assessed a range of messages that can be used to frame the issue of food waste with Australian consumers, to identify which resonate most strongly. It identifies three key messages worth using when communicating to consumers to maximise engagement.

https://fightfoodwastecrc.com.au/wp-content/uploads/2022/01/WP6-Framing-messages-for-priority-interventions-to-reduce-household-food-waste-in-Australia_final.pdf

WP7 - Methodologies to measure impact of priority interventions to reduce household food waste in Australia

Evaluating household food waste can be challenging for many practitioners. This report provides robust measurement methodologies practitioners can use to evaluate the effectiveness of household food waste interventions they implement. It compares the effectiveness of surveys, electronic diaries, and bin audits for gathering this data, and which methods are best used to evaluate food waste programs.

https://fightfoodwastecrc.com.au/wp-content/uploads/2021/12/WP7-Methodologies-to-measure-impact-of-priority-interventions-to-reduce-household-food-waste-in-Australia.pdf

1.3 Fight Food Waste Cooperative Research Centre

The Fight Food Waste Cooperative Research Centre (FFWCRC) was established in 2018 to support the Australian government in its efforts to halve food waste by 2030 as outlined in the National Food Waste Strategy. Within the FFWCRC, the ENGAGE program has several research projects providing evidence and advice on how to best reduce household food waste.

2. Key behaviours driving per capita household food waste and potential interventions

The empirical analysis identified seven (7) behaviours to prioritise when developing household food waste interventions (see Figure 1).

It is recommended these be the focus for interventions as they have the strongest measured relationships with reducing food waste. A total of forty (40) behaviours were identified through combining international literature and the experiences of Australian based experts. An empirical investigation of these behaviours with households in Australia (Karunasena, Pearson, & Fight Food Waste CRC, 2021a) identified twelve (12) that had statistically significant correlations with high food waste and six (6) with a statistically significant correlation with lower levels of food waste. These eighteen (18) behaviours were then workshopped with a panel of Australian food waste experts, resulting in the selection of the seven behaviours shown in Figure 1 (Ananda, Karunasena, & Pearson, 2021a).

Figure 1: Priority behaviours to focus on for development of household food waste interventions
Source: (Ananda et al., 2021a)

2.1. Potential interventions to encourage the adoption of priority behaviours

Table 1 presents potential interventions that recommended by practitioners to encourage the practice of seven overall priority behaviours presented in Figure 1.

Table 1: Interventions focusing on priority behaviours

Overall priority behaviour	Specific actions required	Interventions recommended for the priority behaviours
1. Preparing appropriate amount of food	Ahead of cooking the food: > Plan how many meals need to be cooked during a week > Check how many people will be at home for meals > Make a meal plan (e.g. for a weekly shopping cycle plan to cook/prepare meals for four days and allocate 1-2 days for eating leftovers, and 1-2 for eating out)	> Education and tools to support meal planning and food preparation: e.g. templates for meal plans, app-based tools for list-making, recipe ideas for different ingredients and common leftover ingredients > Involve household members in planning meals
	When cooking meals: > Cook meals that were planned > Check how hungry people are and cook the appropriate amount of food based on their levels of hunger > Minimise extra food being prepared (to reduce the amount of leftovers)	> Calculators and guides to help household food managers work out portions and amounts needed: e.g. cups/scales, calculator tools and apps, portions shown on packaging > Commitment techniques – have meal plans visible in a home and have household members agree to the plan/menu
2. Plan for changes in plans	> Check how many people will be at home for meals before planning and cooking meals > Allocate 1-2 days to eat the leftovers from other meals during week	> Education and tools to support meal planning and food preparation (as listed above) > Communication campaigns encouraging checking in with other members of the family; making who is at home visible in the household easily (via calendars, etc) > Communication campaigns that focus on creating a "leftover day" or a "use-it-up day" as an integral part of meal planning.
3. Eat leftovers	> Store prepared leftovers in the fridge/ freezer > Label prepared leftovers with an 'eat by' date when storing them > Eat prepared leftovers before the 'eat by' date > Use leftover ingredients (i.e., un-prepared) before they 'go off' > Plan for a "leftover day" or "use-it-up day" when making their meal plans as part of their weekly meals	> Providing recipe ideas for different ingredients and common leftover ingredients; and ways for household members to search for meal ideas based on ingredients > Label templates, stickers, or tapes to have by the fridge to use on containers with leftovers > Setting aside an "use-it-up" area or shelf in the fridge for things that need to be eaten sooner > Containers for leftovers with 'eat by date' labels > Tools to increase motivation to use and eat leftovers > Making the "leftover day" or "use-it-up" day prominent in the home (e.g. nominating a leftover only day ahead of time, public commitments, prompts in the household)

Overall priority behaviour	Specific actions required	Interventions recommended for the priority behaviours
4. Purchase appropriate amounts	> Look in fridge/freezer/cupboards to check supplies available ahead of planning meals or purchasing items > Write a shopping list based on planned meals and existing supplies > Buy items on the list / stick to the list when shopping > Minimise impulse purchases of additional items	> Portion calculator and shopping lists in convenient forms and templates (e.g. web/ app/paper) > Online and app-based shopping encouraged to avoid impulse buys > Encourage people to shop after having eaten and not when hungry (so less likely to make impulse purchases) > Provide tools and materials for labelling, storing, and arranging items in cupboards and fridges to make them easier to see (containers, labels, shelf inserts, etc)
5. Eat oldest items first	> Label a section in fridge/freezer/ cupboards as "Use me first" and store items in this section that need to be used > Eat these items first and encourage others to do same	> Provide a product or tools (e.g. box, tray, tag for shelf, containers, labels) to identify products or leftovers that need to be used first (including those nearing their 'use by' and 'best before' dates)
	> Check and adhere to the 'use by' and 'best before' date labels > Use smell and sight to determine if food is OK to eat – alongside use of 'best before' dates	> Education and communications on differences between 'use by' and 'best before' labels > Standardise and simplify date labels on products > Provide simple rules-of-thumb for consumers to use to identify when food is no longer safe to eat
6. Appropriate storage in fridge/ freezer	> Store products to optimize their shelf life (e.g. follow the on-pack instructions for storing items) > Ensure food is visible in storage spaces	> Provide information on how to store all products correctly and encourage this through education > Standardise and simplify date labels on products > Provide simple rules-of-thumb for consumers to use to identify when food is no longer safe to eat > Provide tools and materials for labelling, storing, and arranging items in cupboards and fridges to make them easier to see (containers, labels, shelf inserts, etc) and to know which needs to be used first
7. Encourage small servings	> Offer small servings > Provide opportunity for people to have second helping	> Allow people to serve themselves at mealtimes > Use smaller plates when serving

Source: Adapted from Ananda et al., 2021a and Karunasena, Pearson, Nabi, & Fight Food Waste CRC, 2020

3. Potential interventions to reduce key products wasted

The most wasted products in Australian households can also be categorised in two ways: a) by the dollar value of the products wasted, and b) by the overall weight of waste produced. Using the dollar value allows practitioners to better highlight the potential savings able to be made by a household in reducing their food waste.

Analysis of the data from Australian households sampled identified the top food categories and items contributing to household waste based on dollar value and looked at the behaviours most correlated with waste in those items. Meat and sea food (grouped together), and fresh vegetables and fresh herbs (grouped together), were the top two categories of food that contributed to the dollar value of food waste. Five food items that were identified as high priorities were: cooked beef, sliced bread and bread rolls (grouped together), salads (using vegetables), bananas, and cooked rice. The behaviours most associated with driving waste across these five products are outlined in Table 2, along with potential interventions to address them. Some of the interventions overlap with those listed in Table 1.

Top 5 products to prioritise for interventions

Beef (cooked)

Bread (sliced and rolls)

Salads (using vegetables)

Banana

Rice (cooked)

Table 2: Top 5 products to prioritise for interventions (based on dollar value)

Top 5 products (based on $ value)	Behaviours to address with interventions	Potential interventions
Beef (cooked)	> Improper use of fridge/freezer for storing items > Preparing too much food for meals and having leftovers that are often disposed later (not eaten) > Not finishing meals (which is also linked to preparing and serving too much food)	> Portion controlled packaging > Provide advice for storing cooked leftovers > Prompts with storage instructions: e.g. Fridge magnets/ stickers; on pack storage suggestions > Storage reminders (e.g. via food apps) > Leftover cooking tips and recipes > Encourage smaller servings
Bread (sliced and rolls)	> Improper use of fridge/freezer for storing items > Unplanned take-away and dining practices leading to leftover bread	> Prompts with storage instructions: e.g. Fridge magnets/ stickers; on pack storage suggestions > Storage reminders (e.g. via food apps) and rules-of-thumb for knowing when to freeze bread > Education and tools to support meal planning and food preparation so that consumers buy the right quantities of bread by planning for dining out/take away and eating leftovers > Provide advice for using bread in different ways when no longer fresh
Salads (using vegetables)	> Improper use of fridge/freezer for storing the items	> Prompts with storage instructions: e.g. Fridge magnets/ stickers; on pack storage suggestions > Storage reminders (e.g. via food apps)
Banana	> Preference to eat fresh	> Storing tips to keep food fresh for longer > Leftover cooking tips and recipes
Cooked rice	> Lack of meal planning	> Calculators and guides to help household food managers work out portions and amounts needed: e.g. cups/scales, calculator tools and apps, portions shown on packaging > Storing tips to keep food fresh for longer > Leftover cooking tips and recipes > Education and tools to support meal planning and food preparation: e.g. templates for meal plans, app-based tools for list-making, recipe ideas for different ingredients and common leftover ingredients > Involve household in meal planning

Source: Adapted from Ananda et al., 2021a and Karunasena, Pearson, Nabi, & Fight Food Waste CRC, 2020

4. Segments of Australian households to target

Analysing the data on food provisioning in Australian households identified three audience profiles or segments (Karunasena, Pearson, Borg, & Boulet, 2021): Over Providers (Figures 2 and 3), Under Planners (Figures 4 and 5) and Considerate Planners (Figure 6). The Over Providers segments should be prioritised for food waste reduction interventions and programs due to their positive motivation to change along with their relatively high amount of food wasted.

Food waste is prevalent in all three segments. However, the dynamics and practises of food provisioning differ in each. Interventions which address these differences are likely to have a larger impact on reducing the overall amount of food waste.

It is recommended that different approaches be taken when addressing and engaging with the three segments.

All these segments share a dislike of food waste and reported feeling guilty when it happened. However, many of their food-related practices are habituated and performed unthinkingly. Further, most of the food is purchased a supermarket chain. Hence many of their food-related practices are enacted based on what is available in these supermarkets.

The three audience profiles/segments are:

Over Providers

Under Planners

Considerate Planners

Over Providers

Typically parents in young families with children, Over-Providers **waste the most food**. While they plan meals and shopping, they purchase and cook more than is needed, and don't eat leftovers. They are motivated to change their behaviours to reduce food waste, but feel it would require some effort, particularly due to the unpredictable tastes and appetites of their children.

2.3 out of 10 household food managers in Australia are Over Providers

How much food do they waste?

6.33kgs per week

What influences their food waste?

- Buy extra food because children are unpredictable in what they like
- Their parents also bought and cooked more than needed
- Express love for family and guests by over-catering
- Full fridges and frequent eating out means less leftovers are eaten

> *"Because I don't like to leave people hungry and that can mean I am a bit of an over caterer... think I've got that from my mom. I just never want anyone to leave my house hungry."*

> *"The kids can be unpredictable... because they might eat a quarter of what you give them. Sometimes they eat it all, you just never know with them [but] at least 50% of the time you're throwing out a lot of their food."*

Who are they?

- Men and women, usually under 45 years
- Both work
- Have children under 17 years at home
- Highest income
- Shop mainly at large supermarkets
- More likely to eat out or take-away
- Share responsibility for shopping and cooking

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Figure 2: Over Providers – who are they?

How motivated are they to reduce food waste?

They are motivated to reduce food waste, especially by:

- **Financial savings**
- **Environmental issues**
- **Doing the right thing for their children**
- **Healthy eating**

What makes it hard to change?

They feel change requires an effort due to:

Busy schedules

Children's unpredictable appetites and preferences

What can help change their behaviours to reduce food waste?

- Promote a 'use what you have day' as part of their meal plans
- Reminders in the supermarket to buy the right amount
- Involve children in food preparation at home
- Help fridge management with a 'USE ME' area in the fridge
- Remind them at home at meal-times to cook the right amount
- Partner with health and fitness providers to promote weekly healthy meal plans and leftover recipes

What behaviours could be targeted to reduce their food waste?

Make a complete shopping list before food shopping

Manage fridge and freezers for food that needs to be used up

Stick to their shopping list and only buy what is needed

Cook and serve based on family hunger levels

Use oldest food first and use leftovers when cooking

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Figure 3: Over Providers – behaviours to encourage

Under Planners

Part of single or couple households, without young children, Under Planners are less likely to plan shopping and cooking. The **second most wasteful group**, they are generally disinterested in food shopping or cooking and the least motivated to change their behaviours to reduce food waste, despite perceiving change to not require much effort.

3.2 out of 10 household food managers in Australia are Under Planners

How much food do they waste?

4.46kgs per week

What influences their food waste?

- General disinterest in shopping and cooking
- Want to be time-efficient when shopping and cooking

> *"I hate cooking .. and when I cook, I will try and do a couple of meals out of that... I want to spend as little time in the kitchen as possible."*

> *"The last three salads that I've had, I didn't even cut up the carrot. I put the whole carrot on the plate and ate it like Bugs Bunny, because it just seemed easier...When you're by yourself...you slacken off."*

Who are they?

- Women, 35 – 64 years old
- Live alone or part of a couple
- Often don't have children at home
- Second highest income
- One person responsible for shopping and cooking

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Figure 4: Under Planners - who are they?

How motivated are they to reduce food waste?

They are the least motivated to change, but are:

Somewhat interested by financial savings

Motivated by saving time

What makes it hard to change?

They feel change does not require an effort but have a:

Lack of interest in planning

Lack of interest in shopping

What can help change their behaviours to reduce food waste?

- Emphasise the financial loss due to food waste
- Promote online shopping as time efficient and an easy way to plan meals
- Show how time can be saved by meal and shopping planning
- Partner with supermarkets to provide greater options to purchase right amount for smaller households

What behaviours could be targeted to reduce their food waste?

Make a meal plan for a set number of days

Check food stocks at home before going food shopping

Make a complete shopping list before food shopping

Store food correctly at home after a food shop

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Figure 5: Under Planners - behaviours to encourage

Considerate Planners

Coming from older couple households, Considerate Planners **waste the least food overall**. They have a strong interest and love for food and show pride in being organized. With children no longer living at home, they have time and experience to engage in a range of planning, shopping and cooking practices that reduce food waste.

4.5 out of 10 household food managers in Australia are Considerate Planners

How much food do they waste?

3.72kgs per week

What influences their food waste?

- The way their own parents shopped and cooked
- Love cooking and food
- Express love for family through food
- Take pride in being organised

How motivated are they to reduce food waste?

They are motivated to reduce food waste, especially by:

- **Financial savings**
- **Environmental issues**
- **Setting a good example**

They do not feel change requires an effort.

> *"I love to cook. And since I've been home, I've been cooking even more, but I'm very conscious to be sustainable so that we don't throw things out. So I'll make sure that if I overbuy, I know that I'm going to use it.*

Who are they?

- Women, 55+ years
- Live with a partner
- No longer have children at home
- Lowest income generally
- One person responsible for shopping and cooking

What role could they play in reducing household food waste?

This segment already engages in many food reduction behaviours and waste the least. They can be used as catalysts of change by sharing their knowledge and skills with other segments, especially Over Providers.

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Figure 6: Considerate Planners - who are they and what role could they play in reducing household food waste?

5. Formulating intervention messages

Recent research (Karunasena et. al., 2022) identified the most relevant message framing approaches to encourage households to reduce food waste.

Based on the impact analysis of message frames it is recommended saving money be the lead message frame used as a hook to engage audiences. This initial frame can then be followed up and supported by frames of loss aversion (e.g. money you throw away each week by wasting food) or highlighting the waste of environmental resources (e.g. water, energy, transport etc. involved in producing food). This dual frame approach maximises potential to drive behaviour change and forms a valid basis for developing creative communications. Using these frames helps align communications with the interests of the recipients and increases the likelihood of them taking notice and being enticed to change their behaviour.

It is recommended the message frames be optimised in the following ways:

- Save money: Using clear, real-world examples of what audiences could do now and how much money they would save through addressing waste (e.g. preparing appropriate amount of food could save your family X dollars per week)
- Personal loss / loss aversion: This frame could be linked to monetary value and enacted with a visual prompt in the home – such as a sticker on the kitchen bin. This would assist in reminding people to try and use their food rather than throw them out. A visual message of throwing money into the bin could be a creative expression of this frame.
- Environmental resources / saving environment: This message frame bought a new (for some) perspective to food waste by bringing the wider process of the whole supply chain into the picture. It included the water that went into producing the food, the energy from production and transport and packaging material used. However, care must be taken not to draw too big a link to the broader climate change issues as audience may feel it is a too big a problem to handle.

"...it is recommended **saving money** be the lead message frame used as a hook to engage audiences..."

6. Measuring food waste

As part of WP2, food waste was measured and quantified using a range of methodologies: self-report surveys (survey), self-report kitchen diaries (diary) and audits of household bins to determine waste amounts in each (bin audit) (Ananda, Karunasena and Pearson, 2021b).

A review of these different methodologies was undertaken as part of this research program, as each has different advantages, limitations and costs, which are outlined in Table 3. Bin Audits provide a more actuate number. However, it only captures waste in the audited bin, ignoring other routes of disposal. On balance, self-report surveys were recommended as being the main method for practitioners to use in gathering data on household food waste quantities. Despite some limitations in the data they provide, surveys require less cost and effort to administer (both for practitioners and respondents), making them a more feasible tool. Although surveys are the overall recommended evaluation method when considering pros and cons of each, the quantities provided by respondents through self-report surveys would need to be subsequently adjusted to better quantify actual food waste amounts – in this case by multiplying amounts by 1.7. This adjustment needs to occur because the respondents routinely under-reports the amount of waste it produces in surveys. Reviewing all three methodologies over time, with the same respondents, enabled the researchers to cross-check the various methodologies and identify the adjustment factors required for each of the methods to get a more accurate result.

For the purposes of this report household food waste includes waste from all food consumed in the home (i.e. food prepared at home, takeout food eaten at home, and food delivered to the home). These foods could be disposed of through multiple routes such as kerbside bin system, home composting, down the sink, and fed to animals. To ensure data collected is relevant and representative of an average week, it is important to avoid times when there are unusual patterns of behaviour in the home (i.e. school holidays, festive periods like Christmas or New Year). Further details of the recommended methods for use of Survey, Diary and Bin Audit are available in the report Methodologies to measure impact of priority interventions to reduce household food waste in Australia (Ananda et al., 2021b).

Table 3: Summary of methods for measuring household food waste

Instrument	Advantages	Disadvantages	Cost (estimates in 2022)
Survey	> Comparatively economical method > Facilitates gathering of behavioural and food waste information simultaneously	> Relies on self-reports (e.g. estimate over last seven days) – which can be affected by bias > Underestimates food waste.	> $22 per participant for a 15-minute survey. > Minimum 1000 participants.
Diary	> Enables the measurement of (value and weight) of food waste by specific products (e.g. cooked beef, banana etc.) which can be aggregated into food categories (e.g. meat, fresh vegetable etc.) and total food waste. > Captures waste when it occurs (e.g. diary entries four times per day over seven-day period) > Can include data on where food disposed of – providing more context behind the behaviours.	> Requires large amount of input (time and effort) of both diary participants (to log information) and the researchers (to analyse). > The act of recording food waste has the potential to influence behaviour – making the measurement an intervention. > Large effort is required from diary participants requires high levels of compensation to ensure they stay involved > Relies on self-reports which can be affected by bias. > Underestimates food waste.	> $65 per participant for 7 day electronic diary. > Minimum 1000 participants.
Bin Audit	> Most accurate as measures actual waste and limits self-reporting bias	> Only captures one disposal route (as does not include home compost, fed to animals at home, poured down the sink) > Expensive on a per participant basis	> $300 per participant > Minimum of 100 participants.

Source: Adopted from (Ananda et al., 2021b)

For determining an estimate of the actual amount of food wasted in households it is necessary to adjust all of the amounts determined by the Survey, Diary, or Bin Audit (see Table 4).

Table 4: Adjustment factors for estimating actual household food waste from different methods

	Adjustment Factor*
Survey	1.7
Diary	1.2
Bin Audit	1.9

* For example, actual food waste equals amount determined from Survey multiplied by 1.7

This is based on the WP1 report that presents household food waste from Survey (Mean = 2.04 kg/week/household; SD = 2.08) and Diary (Mean = 2.89 kg/week/household; SD = 2.74), Bin Audit (Mean = 1.78 kg/week/household) and actual amount 3.4 kg/week/household (Karunasena, Pearson, & Fight Food Waste CRC, 2021a).

7. Frameworks for behaviour change

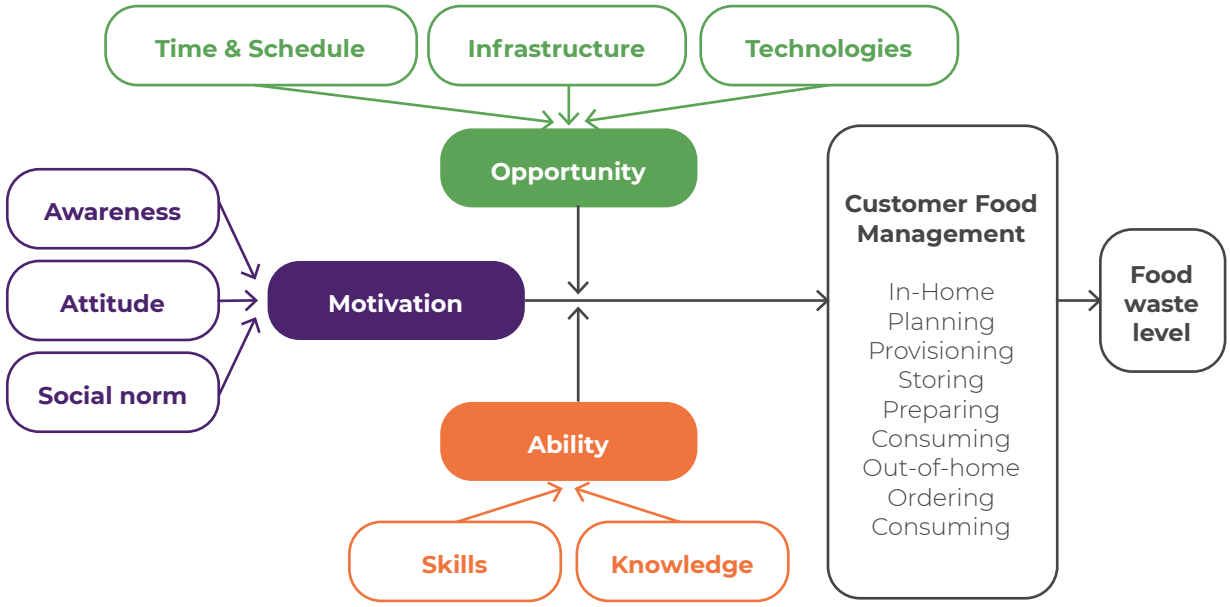
Numerous approaches and frameworks have been developed and used to assist in organising activities seeking to achieve changes in behaviour.

Opportunity-Motivation-Ability (OMA) and the EAST framework are two that offer a powerful combination for understanding and developing activities seeking to encourage consumers to reduce the amount of food they waste.

In all cases, the impact from activities will be increased by having a detailed understanding of the outcome being sought (such as reducing amount of food waste caused by consumers) along with the behaviours that need to be changed to achieve this outcome (such as preparing appropriate amounts of food).

7.1. Opportunity Motivation Ability (OMA) for consumer food waste

Recently researchers in the European Union REFRESH food waste project used the old and well-established Opportunity Motivation Ability (OMA, or MOA) framework to create detailed understanding of the particular issues needing to be considered for activities seeking to reduce consumer food waste.



Source: van Geffen, van Herpen, van Trijp, (2016)

7.2. The Easy, Timely, Social and Attractive (EAST) framework for enacting changes in behaviours

The EAST framework was developed around 10 years ago by the Behavioural Insights Team in the UK. It is now widely utilised across the world as a straightforward framework to encourage a behaviour by seeking to make the change Easy, Accessible, Social and Timely (Four Simple Ways to Apply Behavioural Insights https://www.bi.team/publications/east-four-simple-ways-to-apply-behavioural-insights/).

Following is a summary of the approach used by the Easy, Timely, Social and Attractive framework:

Easy: This refers to making it easier to perform a particular behaviour and making it harder to perform an unwanted or competing behaviour.

Attractive: Ensure the intervention stands out from the clutter and noise surrounding the target consumers to get their attention.

Social: Show the behaviour you want by stressing that's what most people do. The idea is to emphasise the proposed behaviour as the social norm. This is based on the principle as social beings we are constantly influencing and being influenced by the people around us. Personalising messages can help make the connection with the target audience.

Timely: People are more likely to change their behaviour at certain times – when they're more receptive to the change. You need to provide support at a time and place when people are most likely to making the decision which is relevant to the change in behaviour being sought.

We encourage the combined use of these frameworks to guide the development of household food waste interventions.

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