
# Quantified consumer insights on food waste

## Pan-European research for quantified consumer food waste understanding

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## Authors

Lisanne van Geffen, Wageningen UR

Erica van Herpen, Wageningen UR

Hans van Trijp, Wageningen UR

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Tom Quested, WRAP; Raquel Díaz-Ruiz Centre for Agro-food Economy and Development; Anna-Carina Diedrich, Collaborating Centre on Sustainable Consumption and Production; Katalin Újhelyi, Hungarian Foodbank Association; Marco Setti, UNIBO; Simone Piras, UNIBO, Simone Righi, UNIBO; Matthew Grainger, Newcastle University, Gavin Stewart, Newcastle University; Ivo van der Lans, Wageningen UR.

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# Glossary

## Food waste

| | |
|---|---|
| Household food waste | Edible food and drink fractions from products or meals that are acquired with the intention to be consumed by humans, but remain unconsumed and are discarded. This concerns food and drink products that are prepared, stored, and/or in part consumed in the household. |

## Food waste prevention household practices

| | |
|---|---|
| FWP household practices | Food waste prevention household practices. |
| Planning | Household food planning occurs before food enters the household and while food is in stock. This includes e.g. meal plans, shopping lists, storage checks. |
| Impulse buying | Buying food on impulse, without prior planning. This is considered the most relevant waste prevention household practice in the provisioning stage |
| Overview of the food in stock | The extent to which consumers know the type and amount of food that they have in stock. The key relevant waste prevention household practice in the storing stage. |
| Cooking precisely | Being precise in determining the amount of food that needs to be prepared for a meal / consumption moment. The relevant waste prevention household practice in the preparing stage. |
| Storing & using leftovers | Storing and using leftovers from the plate or pan. The relevant waste prevention household practices in the consuming stage. |

## Broad constructs in the consumer food waste model

| | |
|---|---|
| Motivation to prevent food waste | A person's willingness to perform actions that reduce the likelihood or amount of food waste being generated. Relevant aspects of motivation are attitude, awareness, and social norms. |

| | |
|---|---|
| Competing goals | Multiple food-related goals that consumers have, and that compete with the goal to prevent food waste. |
| Ability to prevent food waste | A person's proficiency to solve the problems that he or she encounters when performing actions that help prevent food waste. Relevant aspects of ability are knowledge and skills. |
| Opportunity to prevent food waste | The availability and accessibility of materials and resources required to prevent food waste. Relevant aspects of opportunity are time and schedule, material and technologies, and infrastructure. |

## Motivation constructs

| | |
|---|---|
| Awareness of consequences | Extent of consumers' awareness that food waste has consequences in terms of environmental, social, and financial effects. |
| Attitude towards wasting | The affective feelings and cognitive thoughts related to the generation of food waste. |
| Injunctive social norm | The consumer's belief that his/her relevant social group disapproves of generating food waste. |
| Descriptive social norm | The consumer's belief that people in his/her social group waste food. |

## Ability constructs

| | |
|---|---|
| Accurate planning | The level of difficulty that consumers perceive to accurately plan how much food will be eaten in their household. |
| Creative cooking | Level of difficulty that consumer perceive to cook tasty meals, among which with leftover products or leftover meals. |
| Assessing food safety | Level of difficulty that consumers perceive to correctly assess when food products are still safe to eat, by understanding the date-labels, or by viewing, smelling, or tasting the products. |
| Knowledge on prolonging shelf-life | Level of knowledge on how to correctly store each product to prolong its shelf life. |

## Opportunity constructs

| | |
|---|---|
| Availability of products | Extent to which the frequented supermarket offers the quality and quantity (packaging sizes) of products that the consumer seeks. |
| Accessibility of stores | Perceived accessibility of food stores and markets as determined by opening hours and location. |
| Available storage equipment | Extent to which consumers perceive that they have enough storage space and equipment of sufficient quality to store foods at home. |
| Prevalence of unforeseen events | Perceived extent to which there is unpredictability in the time and structure of the household food management (e.g., unpredictability in when meals are consumed and how many people are present for a meal). |

# 1 Executive summary

This report is part of the EU project REFRESH (Resource Efficient dRink for the Entire Supply cHain), which aims to contribute towards reducing food waste across Europe. It presents a wide range of quantified insights about:

- in-home food waste including the amounts wasted
- households' food waste prevention (FWP) practices
- and motivation, abilities and opportunities to avoid food waste.

Its scope is pan-European, with data collected in Germany, Hungary, Spain and the Netherlands. The results improve our understanding of what determines in-home household food waste, and provide insights into potential targets for food waste reduction and intervention strategies.

A model for understanding food waste in the home has first been proposed in the REFRESH theoretical framework on "Causes and Determinants of Consumers' Food Waste" (Van Geffen et al., 2016a), and has been qualitatively tested by REFRESH in "National Qualitative Insight on Household & catering food waste" (van Geffen et al., 2016b). In the current report, the model is empirically tested using survey data. The model states that motivation to prevent food waste is translated into more food waste prevention household practices, and thus less food waste, if a consumer has the ability and opportunity to do so; see Figure 1.

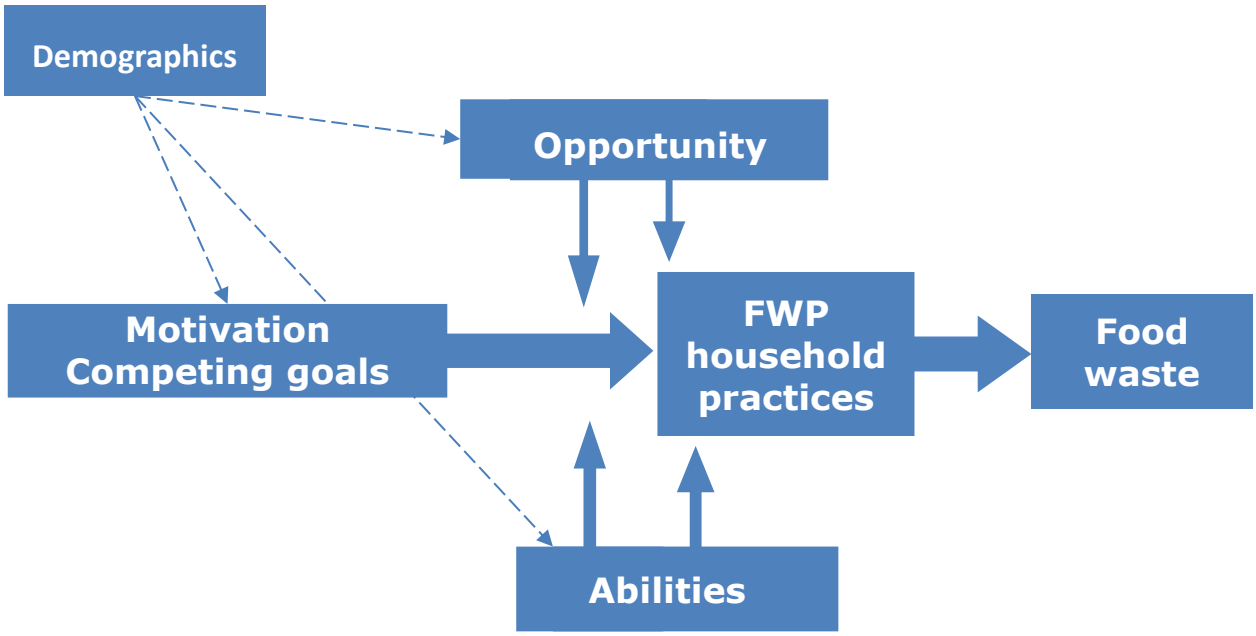



**Figure 1 Consumer Food Waste Model.**

## 1.1 The survey

The model has been empirically tested in a survey with 3354 households. Respondents were the person in their households mainly responsible for food shopping and cooking. They reported the amount of food wasted by their household by means of a validated REFRESH method of which the details can be found in Van Herpen et al. (2016b). In addition, they received questions about their food waste prevention (FWP) household practices, their motivation to prevent food waste and their ability and their opportunity to do so.

The survey is available in the Appendix. In case other organisations are interested in applying this research in their country, they are authorized and encouraged to use this survey, provided that they acknowledge the source, give the publisher prior notice, and send the publisher a copy of the results. You can contact us via: info@eu-refresh.org.

## 1.2 Main conclusions

### The Consumer Food Waste Model is useful for understanding food waste in the home

The results of this study are consistent with the Consumer Food Waste Model (see Figure 1). This suggests that it is a useful model for understanding food waste in the home. Motivation, abilities and opportunities are associated with how much food is wasted in-home. Consumer motivation is driving household food waste, but consumers' ability to prevent food waste is also of high importance. Without relevant skills and knowledge on handling food a consumer is less able to prevent food waste even though she/he may aim to do so. Similarly, consumers' opportunity to prevent food waste is essential, as a lack of perceived opportunities forms a barrier to prevent food waste. Additionally, there are direct effects of the abilities and opportunities on FWP household practice.

### The survey provides reliable measures to investigate in-home food waste across countries

The constructs as presented in this research were shown to be reliable across countries, which means that the questions belonging to one construct were highly interrelated in each country. This implies that the research can reliably be applied in various developed countries. Application in, for instance, emerging economies has not yet been examined.

The research presents a way to gain insights into consumers' motivation, abilities, opportunity and food waste prevention (FWP) household practices, and allows for identifying the key aspects driving household in-home food waste. Additionally, the model is flexible enough to take into account cross-cultural aspects. Thus, the models and constructs developed in this research can be used to enlarge the understanding of in-home food waste and its drivers across cultures in- and outside Europe.

## How much and what kind of food is wasted?

In-home household food waste is defined as all discarded parts of the food and drink products that were once edible and bought with the intention of being consumed by members of the household. The highest amount of average household food waste in one week is reported in Spain (534 gram, per household per week), which is higher than the other three countries. The amounts reported in the other countries do not statistically significantly differ from each other: Hungary (417 gram), Germany (425 gram) and the Netherlands (365 gram). The higher amount of household food waste in Spain appears due to the higher number of large households in that country. Indeed, the amount of food waste per person (above age 14) is not significantly different in Spain, Hungary, and Germany, while it is lower in the Netherlands. The survey measure that was used to determine household food waste has been shown to be able to distinguish well between households with more or with less food waste, but also gives an underestimation of the actual amount of household food waste (see van Herpen et al., 2016a).

Across countries, most reported wasted food is food that has been partly used (37%) or not used at all (29%), and a smaller share of the food is wasted as leftovers on plates and in pots (21%) or as leftovers which were previously stored (13%). In most countries, bread, fresh fruit and fresh vegetables are disposed of most often, followed by non-alcoholic drinks (including milk), yoghurt, meat and potatoes. An exception is Hungary, where soup (often prepared from fresh vegetables) is disposed more often than fresh vegetables.

This indicates that predominantly perishable products are wasted, and that this food is often not used, or only partially used, before being thrown away.

## FWP household practices are related to household food waste

In-home food waste is the consequence of an accumulation of household practices performed over time, rather than of a single behaviour. Taken together, FWP practices (planning of food shopping and use, less impulse buying, overview of the food in stock, cooking precisely, and using leftovers) account for 22% of the variance in household food waste, which is high for these types of empirical models. Therefore, FWP practices are an important policy target.

## Food waste prevention via motivation: Consumers who think that others waste little, waste less themselves

Consumers' motivation to prevent food waste is associated with how much food is wasted. In particular, their attitude (thoughts and feelings) towards wasting food and their belief that relevant others (do not) waste food are relevant. Interestingly, the more strongly consumers believe that relevant others (e.g., family members, friends) waste food, the more food they waste themselves. Their awareness of the consequences of food waste and belief that relevant others disapprove when they (i.e., the consumer) waste food have no significant influence on food waste levels. In other words, the behaviour of others matters whereas (dis)approval does not.

Extrapolating from these results, it is suggested that stressing the scope and consequences of food waste may be a less effective or insufficient strategy to reduce food waste levels. In contrast, in-home food waste may be better influenced

by positive messages, as that others (e.g., friends, family, and neighbours) aim to prevent food waste.

Special attention should be paid to other consumer goals related to food. Consumers who aim to have sufficient and tasty food are more likely to waste food. This indicates that people may be more willing to prevent food waste if solutions are found that also ensure they have enough, tasty food. Another goal which influences food waste levels, is the importance of price. Consumers who are price sensitive are less likely to waste food.

### Food waste prevention via abilities: Consumers with good food planning, preparation, and storage skills waste less

The level of skills and knowledge consumers have to prevent food waste, influences how much they waste. Consumers who have good skills to plan accurately, to cook creatively with leftovers, and who know how to prolong shelf life of products, waste less food. This has potential implications in terms of educating consumers. Providing help with creative cooking (e.g., recipes), planning, and shelf life, could be effective in reducing household food waste.

### Food waste prevention via opportunities: Consumers who have fewer unforeseen changes in their meal schedule, and who perceive that stores have food in the quality and quantity that they need, waste less

Consumers who have opportunities to prevent food waste are also more likely to do so. For instance, the offered supply in stores influences food waste levels. Consumers who can buy products matching their household needs in terms of quality and quantity, are likely to make use of the possibility and hence waste less. Additionally, the prevalence of unforeseen events strongly influences food waste levels. Consumers who more often encounter unforeseen changes in their schedule (or the schedules of others in their household) tend to waste more food.

### Recommendations for policy makers, NGO's, and food retailers

Based on the results of this report, several recommendations can be made to effectively contribute to the goal of reducing household food waste.

It is essential to take into account consumers' motivation, abilities and opportunities simultaneously when designing intervention strategies (e.g., by combining motivational campaigns with educational offerings).

It is important to communicate positively with people by emphasizing that we, as a society, aim to prevent food waste, rather than emphasizing the scope and (negative) consequences of food waste.

The various FWP household practices linked to food waste prevention should be brought to the attention of consumers, accompanied by practical tips and tricks to perform these practices. For instance, providing information or tools to increase skills to plan accurately, to prolong shelf life, or to cook creatively with leftover (products), can all help in diminishing household food waste levels.

The food retail sector could contribute to food waste prevention by offering good quality products in suitable-sized quantities. Most products are unused or only partly used when disposed, indicating that these foods may have been bought in too large quantities for the household in question. Offering their customers various pack sizes, or allowing them to buy in individualized units, could increase the opportunity of consumers to buy appropriate amounts for their needs. Also, it will make it easier for them to additionally act upon their aims to have enough, tasty and well-priced food.

By weight, bread, fruit & vegetables are disposed most often and so these are important food categories for waste prevention. However, animal-based products such as milk, yoghurt, and meat, generate high environmental impacts per kilogramme, and this should be taken into consideration as well when deciding which products to target for food waste preventive interventions.

More research is needed to explore the details of how to implement these recommendations.

# 2 General background

This work is part of the Horizon 2020 project REFRESH. The aim of REFRESH is to contribute towards reducing food waste across the supply chain in Europe. In Work Package 1 the focus lies on reducing consumer food waste.

This report builds on and derives its structure from previous work of REFRESH Work Package 1 on Consumer Understanding. As described in the REFRESH theoretical framework on "Causes and Determinants of Consumers' Food Waste" (Van Geffen et al., 2016a) consumer food waste refers to food waste generated by the consumer in-home as well as in the out-of-home setting.

This report focuses on the in-home setting, including the purchase of food for in-home consumption. This decision is based on the insight derived from our former work, that consumer influence in cutting back food waste levels is larger in the in-home setting than in food consumption out-of-home.

## 2.1 Aim of the work

The main objective of the work reported here is to develop a quantified pan-European insight into the causes of in-home food waste which can be used to identify potential targets for the reduction of food waste, and intervention strategies.

In the REFRESH theoretical framework on "Causes and Determinants of Consumers' Food Waste" (Van Geffen et al., 2016a) the explanatory model of consumer food waste in the in-home setting has first been proposed. Next, this model has been qualitatively addressed by REFRESH in "National Qualitative Insight on Household & catering food waste" (van Geffen et al., 2016b). The current report is the result of a large quantitative survey conducted in Germany, Hungary, Spain, and the Netherlands to further empirically test the model.

# 3 Introduction

Across the globe, roughly one-third of all food produced is wasted (Stenmarck et al., 2016), unnecessarily harming the environment and leaving sections of humanity needlessly undernourished. The major part of food waste in higher income-countries is generated at the consumer level. Consumer food waste is estimated to be between 30 and 50% of total food waste (Stenmarck et al., 2016). Therefore, it is important to understand why consumers waste food in their households.

In "Causes and Determinants of Consumers' Food Waste" (Van Geffen et al., 2016a), a model is proposed that takes an integrative perspective on why consumers waste food. The main assumption behind this model is that consumer food waste is the consequence of an accumulation of food waste prevention (FWP) household practices. This makes preventing food waste complex, as there is no single behaviour to target. Additionally, this model assumes that motivation to prevent food waste is not the sole driver of consumer food waste. Rather, it assumes that motivation to prevent food waste is translated into FWP household practices when abilities (i.e., knowledge and skills) and opportunities provided by the external environment are present. This model has been qualitatively addressed by REFRESH in "National Qualitative Insight on Household & catering food waste" (van Geffen et al., 2016b). Based on insights gained in the qualitative focus groups, we specified the model further. The conceptual model is presented in **Figure** 2. All aspects of the model will be further explained below.

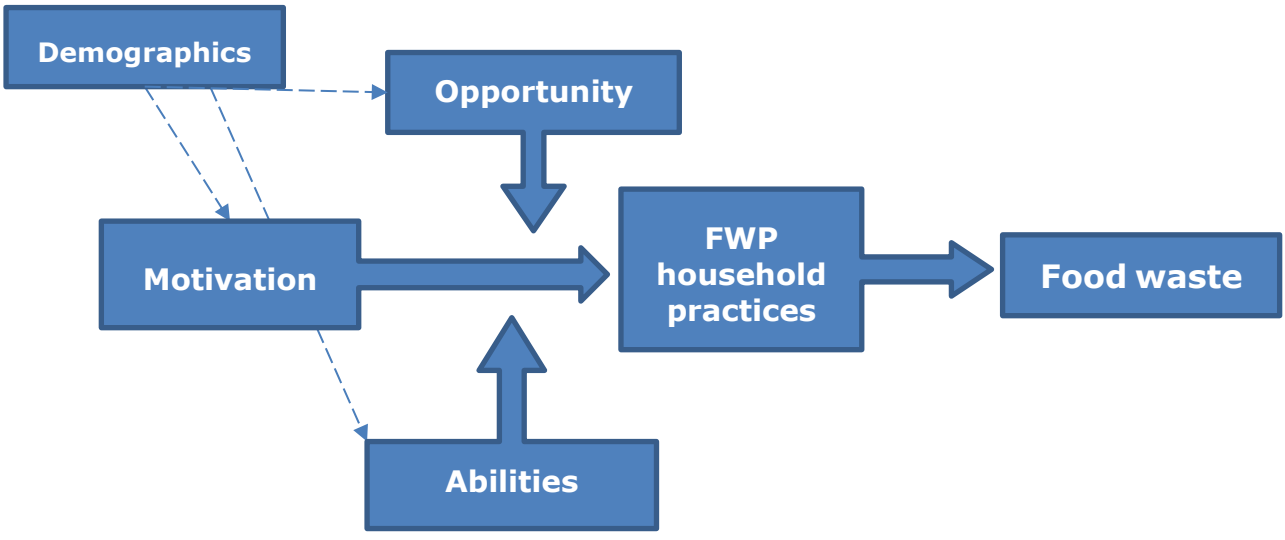



**Figure 2 Consumer Food Waste Model, as presented in earlier REFRESH work. Note: an updated model is presented in the section *Conclusions about the model*, in which direct effects of opportunities and abilities on FWP household practices are included.**

## 3.1 Household food waste

In congruence with the REFRESH theoretical framework (Van Geffen et al., 2016a) in-home household food waste has been defined as *all discarded parts of the food and drink products that were once edible and bought with the intention of being consumed by members of the household*. Thus, all food and drink products that are brought into the household but were not consumed are included, regardless of whether these were spoiled at the moment of disposal or not, and regardless of the method of disposal (e.g., in the bin, given to pets, or otherwise). It does not include the parts of food products that are inedible such as bones and peals.

## 3.2 Food waste prevention household practices

Household food waste is not the consequence of one single behaviour. Rather, multiple food waste prevention (FWP) household practices related to managing food in the household, contribute to wasting food (Quested 2013; Mondejar-Jimenez, 2016; Graham-Rowe, Jessop and Sparks 2014). This insight is supported by studies showing the influence of household management routines on food waste levels (Stancu et al., 2016; Stefan et al., 2013; Visschers et al., 2016; Principato et al., 2015). The FWP household practices linked to food waste in-home can be grouped into five stages, namely planning, provisioning, storing, preparing, consuming.

In the planning stage, food waste may be generated because a consumer lacks proper insight into how much food should enter the household or lacks proper insight into when certain products need to be consumed to prevent spoilage (Quested et al., 2013; Schmidt, 2016). Yet, planning too many meals in advance may also contribute to food waste. Too much planning may lead to an inflexibility to change plans. Sometimes, flexibility is needed to consume all products in time, for instance if products spoil sooner than expected or leftovers are generated unintentionally (WRAP 2014). We hypothesize that the relationship between planning and food waste level is curvilinear, with a U-shape. In other words, we propose that there is an optimum amount of **planning the shopping and use of food** which is beneficial in preventing food waste.

In the provisioning stage buying more than will be consumed by the household is a behaviour that can contribute to food waste. This can be caused by **impulsively buying** too many products (Stefan et al., 2013, Parizeau et al., 2015). In this research, we hypothesize that lower levels of impulse buying will lead to lower food waste levels.

Food waste in the storing stage can be caused by a lack of **overview of the food in stock** which increases the risk of forgetting which products are in stock (Quested et al., 2011; Evans, 2012; Farr-Wharton et al., 2014; Porpino et al., 2016). It is thought that the better overview consumers have over their food in stock, the less likely it is that products are bought in abundance and/or get spoiled.

A key behaviour in the preparing stage that can contribute to food waste is the preparation of larger meals than will be consumed by the household (Williams et

al., 2012; Evans, 2012). Thus, we hypothesize that when consumers report higher levels of **cooking precisely**, food waste is more likely to be prevented.

Behaviours in the consuming stage can also lead to food being wasted. When consumers do not **store or use the plate and pan leftovers**, this increases the likelihood of food waste. Consumers can be unwilling to eat leftover foods in general (Porpino, Wansink, and Parente 2016), or forget about the leftovers that were stored (Evans, 2012).

FWP household practices in each stage may increase the likelihood of food being wasted. Yet, it will not necessarily lead to waste as consumers can still prevent binning the products by changing their FWP household practices at a later stage. For instance, buying too many vegetables increases the risk of spoilage. However, if the consumer decides to freeze the products or make changes in the meal planning, spoilage and therefore waste can be prevented. In summary, regarding FWP household practices to prevent food waste, we hypothesize that:

*H1. FWP household practices influence food waste. Specifically:*
*(a) an average to high amount of planning,*
*(b) lower levels of impulse buying,*
*(c) higher levels of overview of the food in stock,*
*(d) higher level of cooking precisely, and*
*(e) higher levels of using leftovers*
*will lead to lower levels of household food waste.*

It is likely that the degree of motivation to prevent food waste influences which FWP household practices a consumer performs and how often. Also, it is likely that perceived barriers in terms of opportunities and abilities influence how well motivation is translated into these practices. With a strong motivation and no perceived barriers respondents are more likely to perform FWP household practices; however, in the presence of many perceived barriers this is not necessarily the case. We turn to the factors of motivation, ability, and opportunity next.

## 3.3 Motivation

The motivation of a consumer to prevent food waste is likely to influence how much food is wasted. Specifically, awareness of the consequences of food waste, attitudes towards wasting food and social norms surrounding wasting food have been shown to be related to in-home food waste levels (Graham-Rowe et al., 2014; Graham-Rowe et al., 2015; Secondi et al., 2015; Stancu et al., 2016; Visscher et al., 2016; Quested et al., 2011; Williams, et al., 2012). We hypothesize that these motivational constructs do not influence the level of food waste directly, but via their influence on FWP (i.e., food waste prevention) household practices.

**Awareness of consequences** refers to consumers' knowledge of the multiple consequences of food waste, in terms of environmental, social and financial effects (Parizeau et al., 2015; Farr-Wharton et al., 2012; Quested et al., 2011; Williams, et al., 2012; Klöckner, 2013). We hypothesize that higher awareness leads to more FWP household practices, and hence to less food waste.

**Attitude towards wasting food** refers to the affective feelings and cognitive thoughts related to the generation of food waste. A more negative attitude towards wasting food is hypothesized to lead to more FWP household practices and, thus, less food waste (Graham-Rowe et al., 2014; Graham-Rowe et al., 2015; Secondi et al., 2015; Stancu et al., 2016; Visscher et al., 2016; Williams, et al., 2012).

**Injunctive social norm** is the consumer's belief that his/her relevant social group disapproves of generating food waste (Stefan et al., 2013). We hypothesize that higher levels of perceived injunctive social norm will lead to more FWP household practices, and thus less food being wasted.

**Descriptive social norm** is the consumer's belief that his/her social group wastes food. We hypothesize that higher levels of perceived descriptive social norm of wasting food will lead to fewer FWP household practices and thus higher food waste levels.

With respect to motivation, we hypothesize the following:

*H2. The strength of the motivational factors influences how often FWP household practices are performed:*
*(a) higher awareness of negative consequences of food waste,*
*(b) more negative attitude towards wasting food,*
*(c) stronger experience of the injunctive social norm to not waste food, and*
*(d) weaker experience of the descriptive social norm that others waste food,*
*lead to higher levels of FWP household practices and to less household food waste.*

## 3.4 Competing goals

**Competing goals** concern the influence of food related goals on FWP household practices. Consumers have a variety of goals while managing food in their household. Food may be sacrificed (i.e., wasted) in order to reach such a goal, such as preventing disliked tastes of dishes (Evans, 2011), eating healthily, convenience (Evans, 2011), purchasing larger quantities at discounted price (to save money) and avoiding having too little food (Evans, 2011; Visscher et al., 2016). The stronger these goals are, the less likely it is that motivation to prevent food waste will be translated into FWP household practices and therefore the more likely it is that more food waste will be generated. Additionally, consumers can have the goal to ensure not having too much food, which is in alignment with the aim to prevent food waste. This aim most likely will lead to less food waste.

With respect to competing goals, we hypothesize the following:

*H3. Stronger presence of competing goals (health, taste, price, convenience, having enough) lead to lower levels of FWP household practices and more food waste. Stronger presence of the goal of not having too much food leads to higher levels of FWP household practices and less food waste.*

## 3.5 Ability

A lack of sufficient skills and knowledge acts as a barrier for consumers to translate their motivation into FWP household practices such that food waste is prevented (Thøgersen, 1995). Skills and knowledge that have been related to food waste are skills to accurately plan how much food is needed in the household, of creative cooking, to properly assess food safety, and knowledge on how to prolong shelf-life. A lack of these abilities may make it less likely that motivation to prevent food waste will lead to lower food waste levels. Additionally, recent literature suggests that abilities have a direct effect on FWP household practices (Roodhuyzen et al., 2017). Therefore, we will investigate the moderating and direct effect of abilities on FWP household practices.

**The perceived difficulty with accurate planning** is the level of difficulty consumers perceive to accurately plan how much food will be eaten in their household.

**The perceived difficulty with creatively cooking** is the level of difficulty consumers perceive to cook tasty meals, among which with leftover products or leftovers meals.

**The perceived difficulty with assessing food safety** is the level of difficulty consumers perceive to correctly assess when food products are still safe to eat, by understanding the date-labels, or by viewing, smelling, or tasting food products.

**The knowledge of prolonging shelf-life** is the level of knowledge on how to correctly store each product (Aschemann-Witzel et al., 2015; Graham-Rowe et al., 2015; Cox and Downing 2007; Williams, et al., 2012).

In summary with respect to the moderating effect of abilities, we hypothesize that:

*H4. Higher level of abilities leads to motivation being translated into more FWP household practices. Thus:*

- *lower levels of perceived difficulty with accurate planning*
- *lower levels of perceived difficulty with assessing food safety*
- *lower levels of perceived difficulty with creative cooking, and*
- *higher knowledge on prolonging shelf-life*

*lead to motivation being translated into more FWP household practices (interaction effect) and therefore less food waste.*

With regards to the direct effect of abilities (irrespective of the level of motivation), we hypothesize that:

*H5. Higher level of abilities leads to more FWP household practices. Thus:*

- *lower levels of perceived difficulty with accurate planning*
- *lower levels of perceived difficulty with assessing food safety*
- *lower levels of perceived difficulty with creative cooking, and*
- *higher knowledge on prolonging shelf-life*

*lead to more FWP household practices and less food waste.*

## 3.6 Opportunity

Several opportunities in the environment of consumers have been identified as influencing factors. A lack of these opportunities can act as a perceived barrier for consumers to translate their motivation into FWP household practices such that food waste is prevented. Opportunities include the availability and accessibility of products, available storage equipment, and the prevalence of unforeseen events. Recent literature suggests that opportunities may influence FWP household practices directly (Roodhuyzen et al., 2017). Therefore, we also investigate the direct effect of opportunity on FWP household practices.

**Availability of products** includes the type of products offered by retail outlets in terms of quality and quantity (packaging sizes) (Van Geffen et al., 2016a; Mondéjar-Jiménez et al., 2016). A low or unpredictable product quality makes it more difficult for the consumer to use food in time (Evans, 2011). Additionally, retailers can use strategies which increase the likelihood that consumers buy more products than needed, ending up with waste (Quested et al., 2013). For instance, retail outlets can offer solely large package sizes of certain products (e.g., bulk packaging), offer products on discount or otherwise stimulate consumers to buy more (of a) products than intended (Mondéjar-Jiménez et al., 2016).

**Accessibility to stores** refers to the opening hours and location of (super)markets (Evans, 2011; van Geffen et al., 2016a; Mondéjar-Jiménez et al., 2016). A lower accessibility to food stores may cause consumers to buy more products in one shopping trip, increasing the likelihood that food is left over (Evans, 2011; Abeliotis et al., 2014).

**Available storage equipment** refers to the available kitchen equipment. Consumers may be limited in their (quality of) equipment, such as too little storage space or a low-quality fridge or freezer. Being limited in equipment makes it difficult for the consumer to prolong the shelf-life of products (Canali et al., 2014) and thus increases the likelihood that food products will be spoiled.

**Prevalence of unforeseen events** refers to the availability of time and structure regarding food management in the household (Evans, 2011). In qualitative studies, consumers have argued that a busy or dynamic lifestyle constrains them in performing FWP household practices (Van Geffen et al., 2016b; Quested and Luzecka, 2014). In particular, unexpected events are proclaimed to be of influence, as for instance due to changes in their or household members' schedules, working hours, or people joining for dinner.

In summary, for the moderating effect of opportunities, we hypothesize that:

*H6. Higher level of opportunity to prevent food waste leads to motivation being translated into more FWP household practices. Thus:*

- *better accessibility to stores*
- *higher level of availability of products*
- *higher level of availability of equipment, and*
- *lower occurrence of unforeseen events*

*lead to motivation being translated into more FWP household practices (interaction effect) and therefore less food waste.*

With regard to the direct effect of opportunities (irrespective of the level of motivation), we hypothesize that:

*H7. Higher level of opportunity to prevent food waste leads to more FWP household practices. Thus:*
- *better accessibility to stores*
- *higher level of availability of products*
- *higher level of availability of equipment, and*
- *lower occurrence of unforeseen events*

*lead to more FWP household practices and less food waste.*

## 3.7 Socio-demographics and psychographics

Several socio-demographics have been linked to the amount of food waste in households (Van Geffen et al., 2016a; Roodhuyzen et al., 2017). We hypothesize that these influences occur via the above-mentioned constructs of FWP household practices, motivation, ability, and opportunity. Socio-demographics that may be of influence are: gender, age, household size, presence of children in the household, level of education, and income level. As the literature is inconsistent about the direction of these variables, no predefined directions are hypothesized (Roodhuyzen et al., 2017).

*H8. Several socio- demographic and psychographic factors influence food waste level via their influence on motivation, abilities and opportunities, namely:*

*(a) Gender*
*(b) Age*
*(c) Household size*
*(d) Household composition, with regards to the presence of children or multiple adults.*
*(e) Education*
*(f) Income*

Additionally, based on qualitative focus groups (Van Geffen et al., 2016b), several psychographic factors have been suggested to influence food waste levels (especially given that we will collect data in four culturally different countries), namely, (i) the amount of **attention for food waste prevention by the consumers' parents during the upbringing**, (ii) the general **involvement of the consumer in handling food** and (iii) the **perceived financial constrains to buy preferred food products**. We hypothesize that these variables effect food waste levels via FWP household practices, motivation, and abilities.

*(g) Higher level of attention to food waste prevention during upbringing is related to higher levels of motivation and to higher levels of ability to prevent food waste.*
*(h) Higher levels of food involvement is related to higher levels of ability to prevent food waste.*
*(i) Higher levels of perceived financial constrains to buy preferred foods is related to higher levels of motivation to prevent food waste.*

# 4 Method

## 4.1 Recruitment for the main study

Respondents were members of a panel of the market research agency GfK, and lived in Germany, Hungary, Spain, or the Netherlands. Panel members over the age of 18 years were contacted via email. As this study collects information on household level food waste we only recruited respondents who were responsible for at least half of the shopping trips and meal preparations in their household. Given that this study collected household level data, the sample should match the national distribution in terms of household characteristics. Quota were set on household size. Additionally, we ensured that the sample contained enough variation in terms of gender, age, education level and income; no fixed quota were set on these latter sociodemographic characteristics.

Unfortunately, due to a miscommunication the quota on household size were calculated mistakenly in Germany and Hungary. In the Netherland and Spain the quotas were calculated by dividing the national percentage of each household size (e.g., 1 person household) relative to the total amount of households in that country. In Germany and Hungary quota for each type of household size (e.g., 1 person household) were mistakenly expressed relative to the total number of inhabitants of that country. To resolve this mistake, the research company randomly filtered the Hungarian and German data based on the correct quota for household size. This means that a proportion of respondents were randomly excluded from the sample, to ensure the remaining respondents were in proportion to the population with regard to household size. The company used a fixed starting point for the random filtering, which allows for replication. For more information, please see the accompanying web form.

## 4.2 Design of the survey

The survey was administered online. It was split into two parts, which can be found in appendix 9.1. The first questionnaire had several goals: 1) to exclude respondents who were not responsible for most of the shopping and cooking in their household, as they may not have a good overview of the households' food waste levels and FWP practices, 2) to collect socio-demographic background information to ensure the data sample is representative to the number of households in each country, and 3) to collect information about respondents' competing goals, before making them aware that the survey is about food waste. The second questionnaire, one week later, collected information about the amount of food waste, the FWP household practices, motivation, abilities and opportunities.

Two screening questions were used to ensure that the respondent was the main responsible for handling of food in the household: *"How often are you responsible for the grocery shopping in your household?"* and *"How often are you responsible of the cooking in your household?"* on which the respondent had to tick the box *"at least half of the times"* or *"more than half of the times"* in both cases, to be eligible and selected for our study. Respondents who were included based on the screening

questions were further asked about their competing goals (e.g. *Regarding food in my household it is important to me that the food is tasty*).

At the end of the first questionnaire, respondents were made aware that the topic of the research was food waste and they were asked to keep track of their food waste for one week (without specifying how). Although this may increase awareness, this was deemed necessary to obtain valid measurements.

The second questionnaire contained questions about the respondents' household food waste level. Additionally, it contained blocks of questions related to the respondents' FWP household practices, motivation, ability, and opportunity. In each block several topics were addressed. The order of these four blocks, the topics within each block and the questions within each topic were varied randomly among respondents. The items of the survey were based on prior literature and tested in two pilot studies in the Netherlands, for more information see Appendix 9.2.

## 4.3 Measurements

The dependent variable of interest (the amount of food waste) was measured at the start of the second questionnaire. The method to measure in-home food waste was developed in a prior REFRESH subproject (Van Herpen et al., 2016a; 2016b).

For 24 food categories, respondents were asked to tick the boxes in which they had wasted food in the past week. Next, respondents were asked to indicate the amount of food they wasted in each of the ticked (varying from 0-24) categories. The amounts were presented in measures appropriate for the category (e.g., spoons of vegetables and units of fruit). Additionally, respondents indicated the state most of the food was in when it was thrown away, namely unused, partly used, cooked, or previously stored leftover. For instance, if the respondent ticked the box "vegetables" they were asked:

*"In your household, how much fresh vegetables were disposed of in the past week? One serving spoon equals 50 gram. As a reference: this is equal to halve a leek or four mushrooms.*

- *Less than one serving spoon*
- *1 to 2 serving spoons*
- *3 to 4 serving spoons*
- *5 to 6 serving spoons*
- *More than 6 serving spoons"*

In addition, they were asked in which state the majority of the disposed food was.

*"To which category did the (majority of) disposed fresh vegetables and salads belong? Please tick the category that occurred the most. You can tick more than one box if multiple states occurred in the same amount.*

- *Completely unused foods: food that is disposed which is not used at all (e.g., a leek)*
- *Partly used foods: food that is disposed after it has been party used (e.g., half an union)*
- *Meal leftovers: meal leftovers that are disposed after these were left on the plate or in the pots*
- *Leftovers after storing: Meal leftovers that are disposed after these were stored"*

This method has been developed and tested in previous REFRESH research (Van Herpen et al., 2016a). In appendix 9.1 the questionnaire can be found in English. Some adjustments to the original version have been made, to ensure that respondents could report all their foods waste in one of the categories. Additionally, the examples for several product categories were adjusted in each country, to match each national situation. This helped respondents understand which quantities of particular foods were referred to, as well as understand the different food waste states.

The respondents' answers were calculated to grams and then summed; see Appendix 9.3 for more details. The amount of food waste per state was calculated by dividing the amount of food waste of each category by the number of states ticked by the respondent, e.g. if a respondent reported 100 gram of vegetable food waste and ticked the unused and leftovers box, then we assumed that the respondent wasted 50 grams of unused and 50 grams of leftovers vegetable food waste.

For the second questionnaire, we have selected FWP household practices, motivation, ability and opportunity constructs which are likely to influence food waste levels, based on prior literature. Appendix 9.1 provides a list of items (i.e. questions asked), reliability scores, and references to literature to develop each question. For each of the constructs that were measured with multiple items, the mean of the items was calculated and used in the analyses.

### FWP household practices

Planning of shopping and use
Impulse buying
Overview of food in stock
Cooking precisely
Using leftovers

Respondents reported the frequency in which they perform FWP household practices on a 7-points scale with answer options: never, rarely, occasionally, sometimes, frequently, usually and every time.

### Motivation to prevent food waste

Awareness of the negative consequences of food waste.
Attitude (thoughts and feelings) towards wasting food.
Belief that relevant others disapprove when they (i.e. the respondent) waste food (social norm injunctive).
Belief that relevant others waste food (descriptive social norm).

Awareness, social norm injunctive and social norm descriptive answers were given on a 7-points scale with answers ranging from strongly disagree, to strongly agree. For the attitude measure each item had a different 7-points scale, namely ranging from: very foolish to very wise, very irresponsible to very responsible, very sad to very happy, and very guilty to very indifferent.

### Competing goals to prevent food waste

The importance of:

The healthiness of food
The taste of food
The convenience of food
Having enough food
Having cheap food
Not having too much food

Competing goals were answered on a 7-points scale that ranged from very unimportant to very important. This was included in the first questionnaire.

### Abilities

Perceived difficulty with assessing food safety
Perceived difficulty with cooking creatively
Perceived difficulty with accurate planning
Perceived knowledge on prolonging shelf life

Respondents reported how strongly they agreed with several statements on a 7-points scale with end poles labelled strongly disagree and strongly agree. All abilities were defined as competences, rather than barriers, meaning that we ask about their perceived level of competence, without linking it to food waste.

### Opportunities

Perceived availability of products in terms of correct packaging sizes and quality
Perceived accessibility to the store in terms of distance
Perceived availability of equipment and space in the household to store foods
Perceived prevalence of unforeseen events

All opportunities were defined in general terms as perceived barriers without linking these directly to food waste. All answers were given on a 7-points scale that ranged from strongly disagree to strongly agree.

### Socio-demographics and psychographics

Gender
Age
Household size
Education
City size
Net monthly household income
Age of other household members
Attention of parents during upbringing
Perceived financial situation
Food involvement

Questions for level of education and net monthly household income were adjusted to the national situation, based on GfK sources.

Some additional variables were included in the survey, which we did not analyse in this report, namely: area of living, postal code, number of household members that typically join for meals, the frequency of grocery shopping, frequency of online grocery shopping and type of grocery shopping (i.e. one shopping trip for many products at once of many shopping trips with few products at once).

## 4.1 Data analyses

Before analysing the data, we first checked for inaccurate or untrustworthy response patterns. Respondents who answered the questions extremely fast may have merely clicked through the survey (e.g., to receive the compensation for participation) without reading and responding to the questions that were being asked. To detect this, we examined the absolute deviation around the median response time to calculate a cut-off score (Leys et al., 2013). As described in Leys et al. (2013), the cut-off value was determined by subtracting the median response time from each individual's personal response time and turned into an absolute value. Next, the median of these absolute values was multiplied by 1.4826 (a constant linked to the assumption of normality, disregarding the abnormality induced by outliers) and by 3 to correct for outliers three times the standard deviation. No respondents scored below the cut-off score, so no respondents were excluded based on this criteria. The dataset contained respondents who took very long to answer the questions, but this long response time did not indicate a lack of interest in the survey as it was possible for respondents to take a pause when answering the questionnaire and returning to it at a later moment. This option to pause was commonly provided by the research company in the surveys administered to the panel. Therefore, we retained respondents with a relative long response time in the dataset.

Additionally, we checked if respondents had reported the same answer across a block with multiple topics and many items (e.g., motivation). Answering exactly the same throughout is an indication that a respondent may have simply clicked through the survey without paying attention to the question asked. Based on this, we removed 117 respondents (2.8% of the sample).

As described above, quotas were set on household size to allow for generalisation to national household level and cross-country comparison during data collection. This does not mean that the predefined quota are exactly met, as there is always a deviation from the quota due to the nature of data collection and because respondents without variation in response pattern have been excluded.

In Table 1, the sample and national population distributions (based on Eurostat 2016) are presented. To enable generalisation to the national level and for cross-country comparison an equal proportional distribution of household sizes in the national household population and the sample is desirable. Therefore, we calculated a weight factor, by dividing the national proportion of households in 2016 as presented by Eurostat (Eurostat, 2016), with the number of households in the sample. Subsequently, we multiplied the amount of food waste in grams with this weight factor. To further allow for cross-country comparison we calculated the amount of food waste per food category and the state the food was in, proportionally of the national amount of food wasted, e.g. for a German respondent the amount of vegetable waste divided by the German total amount of food waste. The presented percentages were multiplied with the weight factor to allow for cross-country comparison. Thus, the presented grams and percentages of food waste are based on data weighted to the national distribution. The descriptive analyses and regressions are done on the unweighted data.

Univariate Analysis of Variance (ANOVA) in SPSS was used to investigate whether the total amount of reported food waste differed across countries, gender, age group, number of persons in the household, household composition, city size, education, and income level. We used the Bonferroni post-hoc procedure, to reveal which groups significantly differed from each other. Repeated measures ANOVA was used to investigate which product categories and food waste states were most often reported.

We also used ANOVA to investigate whether motivation, ability and opportunity differed across the socio-demographic groups. All socio-demographic constructs were included in the analyses simultaneously to control for potential correlation among the socio-demographic variables, with the exception of income and city size. Approximately 13% of the respondents were unwilling to provide information about their income, which would lead to the exclusion of these cases if income was taken up in the analysis. The same was true for city size, where approximately 4% of the respondents did not report their city size. Therefore, as sensitivity analysis, we first ran the analyses with income included, then with city size instead of income, and next without income and city size to investigate the effect of the other socio-demographic groups without excluding respondents. This means that the presented results are not controlled for income or city size.

Regression analysis in SPSS was used to investigate the effect of motivation, abilities, opportunities and FWP household practices on the reported level of food

waste. First, we looked into the main effects of FWP household practices on food waste and those of motivation, ability and opportunity on food waste. Additionally, we looked into the influence of motivation, ability and opportunity on FWP household practices. Next, we looked into the potential moderating effects of ability and opportunity on the effect of motivation on FWP household practices. Finally, we looked into the effect of the model per country and per wasted food state. To investigate the moderating effect of abilities and opportunities, we mean centered on construct level for the interaction term, based on the country mean.

In our sample, 22% of all respondents did not report any food waste. To check if these were valid answers (i.e., not from respondents who wanted to skip several questions and save time), we investigated if drivers of food waste differed when these respondents were excluded versus included. We used regression as described in the previous paragraph on respondents with food waste only, to compare this with the results when respondents without food waste were included as well. These models show a large overlap in result pattern, indicating that inclusion of respondents who report zero waste does not have a large impact on results and all respondents can be investigated as one sample. The only differences in the model with FWP household practices, motivation, ability, opportunity, and demographics predicting household food waste, are that the effects of three constructs (overview of food in stock, importance of price, and prevalence of unforeseen events) no longer reached significance. Given that differences were minute, we report our analyses on the basis of the total sample.

# 5 Results

## 5.1 Respondents

In total, 3354 respondents were included in the analyses, consisting of 841 German, 464 Hungarian, 1020 Spanish and 1029 Dutch respondents (see Appendix 9.4). The sample almost matched the national distribution of households in each country, with household size in Spain as the largest deviation (see Table 1).

As mentioned before, each respondent was the main responsible for the household and reported the food waste levels of the complete household. We collected several individual characteristics of these respondents to allow for comparison based on socio-demographic characteristics. In total, more females (58%) than males (41%) were included in the sample. This pattern was similar across countries, although in Hungary the difference in the number of females (65%) versus males (35%) was larger than in the other countries.

Approximately one-third of the respondents were between 50-65 years (32%) and one-third between the 35-49 years old (30%). The least respondents were in the group with the smallest range namely between the 18-24 years old (7%). The other respondents were between 25-34 years old (15%) or 65+ (15%). In Spain, there were fewer respondents included who were 65+ than in the other countries.

One-fifth of the sample were respondents of households with at least one child younger than 13 years. In Spain compared to the other countries, relatively more households with young children were included. Approximately 11% of the respondents were from households with children who are between 13 and 17 years old. One-fifth of the respondents were from households with more than 2 adults. In Spain and Hungary this was more common than in Germany and the Netherlands.

Most respondents had an average (41%) or high (43%) education level (adjusted for the national system). In Spain, relatively few respondents with low education level were included in the sample (2.6%), while in Germany relatively many respondents had a low education level (27%).

Income levels were categorized as low, medium, or high, based on national median household income. Most respondents had an average (49%) income, however in Hungary relatively many respondents had a high income (38.4%). Across countries, 13.2% of respondents did not provide their income level.

Most respondents lived in large (52%) or average sized cities (31%), the remaining respondents came from rural areas (12%). Across countries, 4% of the respondents did not provide information about their city size.

**Table 1 Distribution of household sizes in the sample versus population**

| Household size distribution | Sample | Population distribution / after weighting |
|---|---|---|
| **Germany (N = 841)** | | |
| 1 Person household | 41.1% | 40.7% |
| 2 Person household | 34.4% | 34.2% |
| 3 Person household | 12.5% | 12.4% |
| 4 Person household | 9.2% | 9.3% |
| 5+ Person household | 2.9% | 3.4% |
| **Hungary (N = 464)** | | |
| 1 Person household | 34.1% | 33.7% |
| 2 Person household | 30.2% | 30.4% |
| 3 Person household | 16.6% | 16.7% |
| 4 Person household | 12.7% | 12.4% |
| 5+ Person household | 6.5% | 6.9% |
| **Spain (N = 1020)** | | |
| 1 Person household | 10.5% | 25.4% |
| 2 Person household | 23.1% | 30.5% |
| 3 Person household | 28.1% | 20.9% |
| 4 Person household | 30.6% | 17.4% |
| 5+ Person household | 7.6% | 5.8% |
| **The Netherlands (N = 1029)** | | |
| 1 Person household | 43.8% | 37.7% |
| 2 Person household | 32.0% | 32.8% |
| 3 Person household | 9.5% | 12.0% |
| 4 Person household | 10.3% | 12.4% |
| 5+ Person household | 4.4% | 5.2% |

Note: Eurostat data is used as a reference.

## 5.2 How much and what kind of food is wasted?

### How much food is being wasted?

Across all four countries, the average amount of food waste reported by respondents was 439 grams per household per week. In all countries, approximately equal amounts of food were wasted, with the exception of Spain. Spanish households wasted the most food (534g / hh / wk). This was followed by Germany with 425 grams, Hungary with 417 grams and the Netherlands with 365 grams (see Figure 3 and Appendix 9.5, table 9.5.1).

When examining the food waste per household member above the age of 14, the result pattern was different. The highest amount of food waste per household member was reported in Spain (284 grams), but this did not differ significantly from the amount of food waste per household member in Hungary (232 grams) or Germany (258 grams). Food waste per household member was lowest in the Netherlands (214 grams).

Across countries, of all disposed food, the largest proportion came from partly used foods (36%). This includes products that are not completely used, for instance, half an onion, a few slices of bread, or a half full bag of apples. Another large share came from completely unused foods (31%), this includes unused products when bought in single units, or unopened packages. Next, plate and pot leftovers were disposed most often (20%), followed by leftovers that were stored prior to disposal (13%). This distribution of food waste states differed somewhat across countries (see Figure 4 below, and Appendix 9.5, Table 9.5.1). In all countries, unused or partly used foods were disposed most often and, with the exception of Hungary, leftovers the least. Yet, in Spain and the Netherlands, compared to Germany and Hungary, more unused and less partly used food waste was disposed. Further, in Hungary, more food waste from stored leftovers was reported than in the other countries.

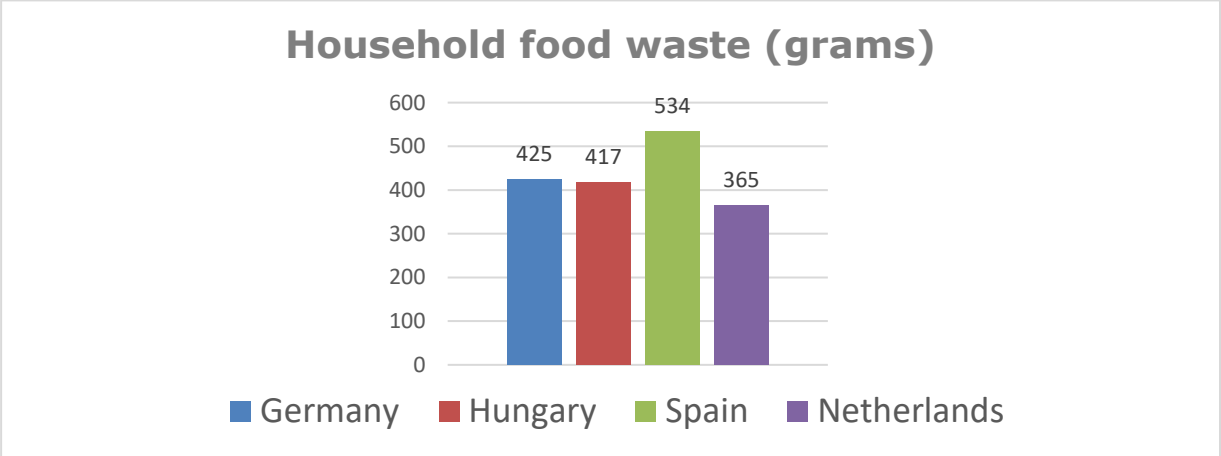



**Figure 3 Average food waste per week per household in grams.**

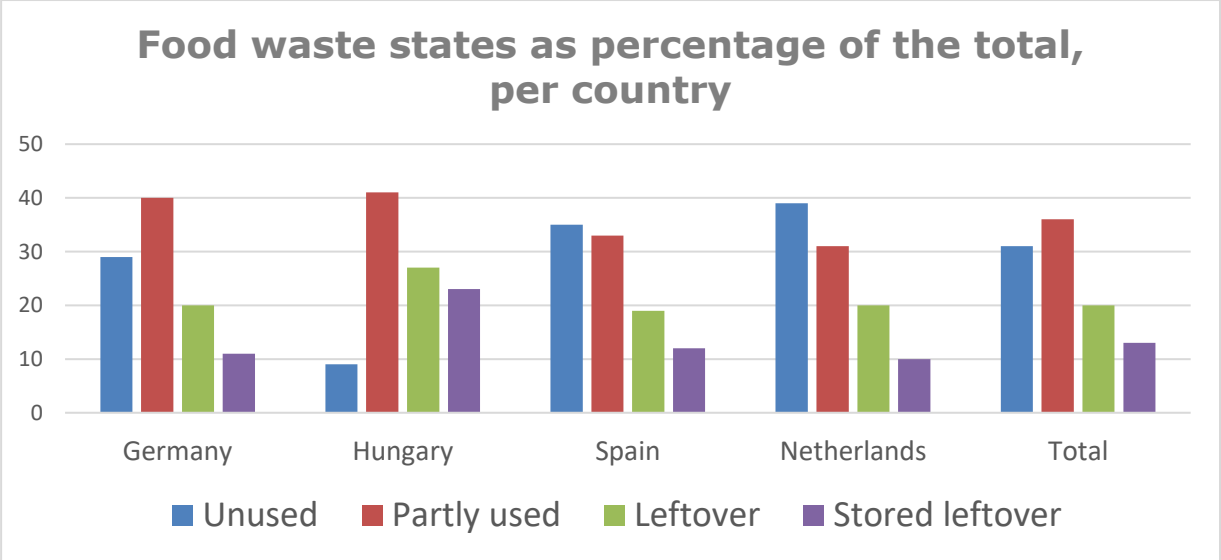



**Figure 4 Average food waste (HH / week) per country, in percentages.**

## Which foods are being wasted?

Across all countries, specific products that were disposed of most often were: bread, fruit, vegetables, non-alcoholic drinks (including milk), yoghurt and meat (see Figure 5 and Appendix 9.5, Table 9.5.2). In proportion to the national total amount of food waste, in Hungary, bread was especially discarded often and fruits and vegetables relatively little. A different pattern was found in Spain, the Netherlands and Germany where fruit and vegetables were discarded in percentage similar to bread. Indeed, when zooming in on each country separately, we found a slightly different top 6 (see Appendix 9.5, Table 9.5.4). In Germany the top 3 is equal to the pan-European pattern, followed by non-alcoholic drinks, yogurt and potato respectively. In Spain, the top 6 is equal to the pan-European pattern, except for that yogurt and non-alcoholic drinks switched places. In Hungary, bread is also most often discarded, but second is soup, followed by fruit, non-alcoholic drinks, vegetables and yogurt respectively. This may be because "főzelék" - a curry/soup-type dish, is a typical and often consumed national dish. In the Netherlands, fruits are discarded most often, followed by vegetables, bread, yogurt, non-alcoholic drinks and potatoes respectively, despite the fact that bread is commonly consumed during Dutch breakfast and lunch.

Perishables were often disposed of as unused or partly used (see Appendix 9.5, Table 9.5.3). An exception was soup which was often discarded as leftovers, probably because this product can be bought pre-cooked or can be freshly made of vegetables. This pattern was similar across countries.

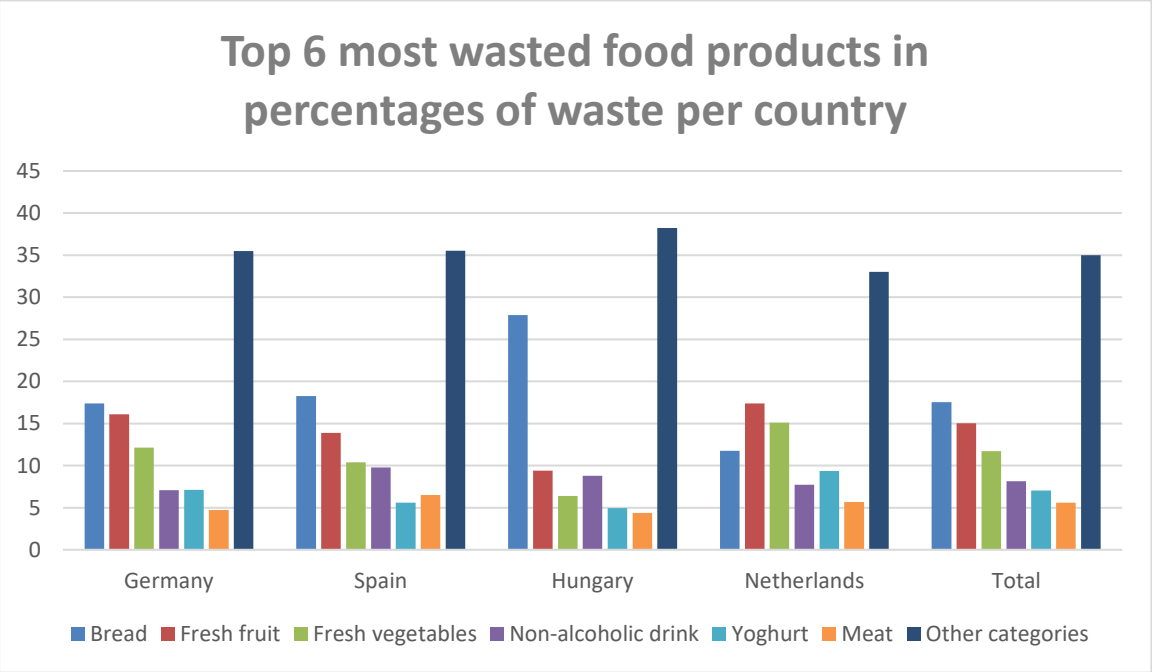



**Figure 5 The top 6 most wasted food products, in terms of the percentage of overall country food waste in each of the product categories.**

**In summary, bread, fresh fruit, vegetables, non-alcoholic drinks (incl. milk), yogurt and meat are disposed most often. Products that are wasted are predominately unused or partly used at the moment of disposal.**

## 5.3 Differences across socio-demographic groups

We investigated if there were differences across socio-demographic groups, in terms of food waste, FWP household practices, motivation, abilities and / or opportunities. In each analysis, we tested the difference across groups based on nationality, gender, age, household size, household composition, and education simultaneously, to control for the other socio-demographic effects when looking into one socio-demographic variable. Additionally, we checked if the found pattern was similar or different across countries.

### 5.3.1 Does food waste differ across socio-demographic groups?

**Socio-demographic effects on total food waste and food waste states.**

Older respondents reported less household food waste compared to younger respondents (see Figure 6 and Appendix 9.6, Table 9.6.1). This effect was found for all food waste states, except for leftovers. This could be due to the increased availability of time (i.e., retirement) (Quested & Luzecka, 2014) or to a cohort effect, with older respondents wasting less food due to differences in the time period in which they grew up.

The larger the household, the more food waste was reported (see Figure 6). This was in particular true for food waste from leftovers and stored leftovers. Both effects were found in all countries, except for Spain, where the pattern was similar but did not reach significance.

Gender, household composition, education and income did not have a significant influence on the amount or category of food waste reported, with four small exceptions. Male respondents reported more partly used food waste than females and respondents with a higher education reported more unused food waste. Also, in Germany households with older children (12-18 years old) reported more food waste compared to household without older children. In Hungary, respondents who live in smaller cities reported more food waste than those in larger cities.

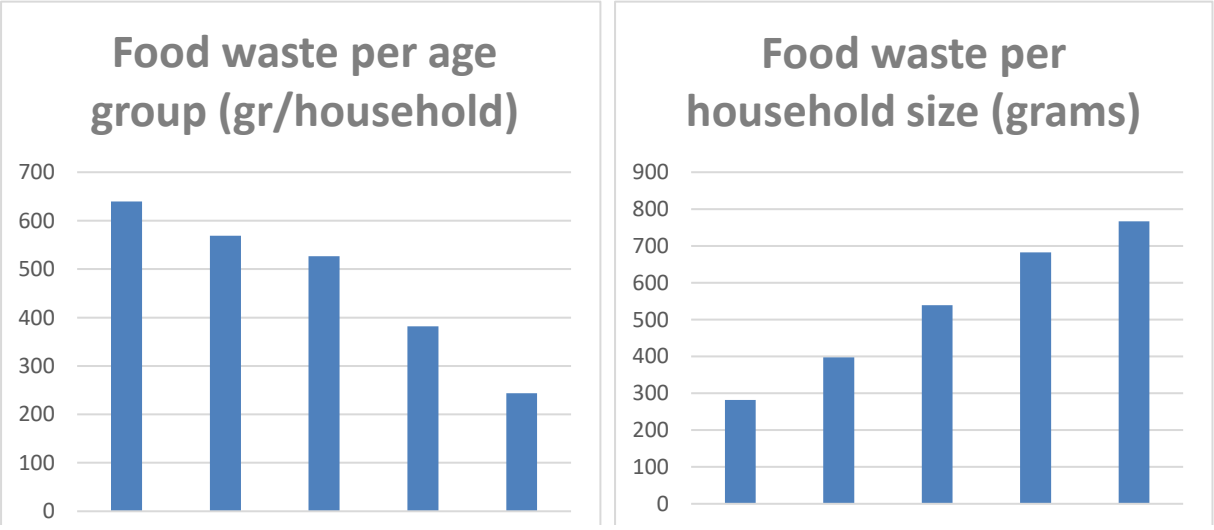



**Figure 6. Household food waste per age group and household size, per week.**

**In summary, when controlling for other socio-demographic factors, the amount of food waste differs across age groups and according to household size. Households with an older main responsible waste less compared to those with a younger main responsible, especially unused foods, partly used foods and stored leftovers. Respondents of households with more members also report more waste, especially from leftovers and stored leftovers.**

### 5.3.2 Do household management practices differ across socio-demographic groups?

#### Socio-demographic effects on FWP household practices

Older respondents, compared to younger respondents, reported higher levels of planning, overview of the food in stock and precise cooking and lower levels of impulsive buying (see **Figure** 7 and Appendix 9.6, Table 9.6.3). Further, respondents of single households reported lower levels of planning than all other households (see **Figure** 8). Possibly because they have no other household's members' preferences and schedules to take into account. Households with young children compared to households without, reported higher levels of planning. Next, households with a female as main responsible reported higher levels of planning and overview of the food in stock compared to households with a male responsible. Further, households with a responsible who has a lower education reported higher levels of overview of what was in stock and respondents with a lower income reported lower levels of impulse buying.

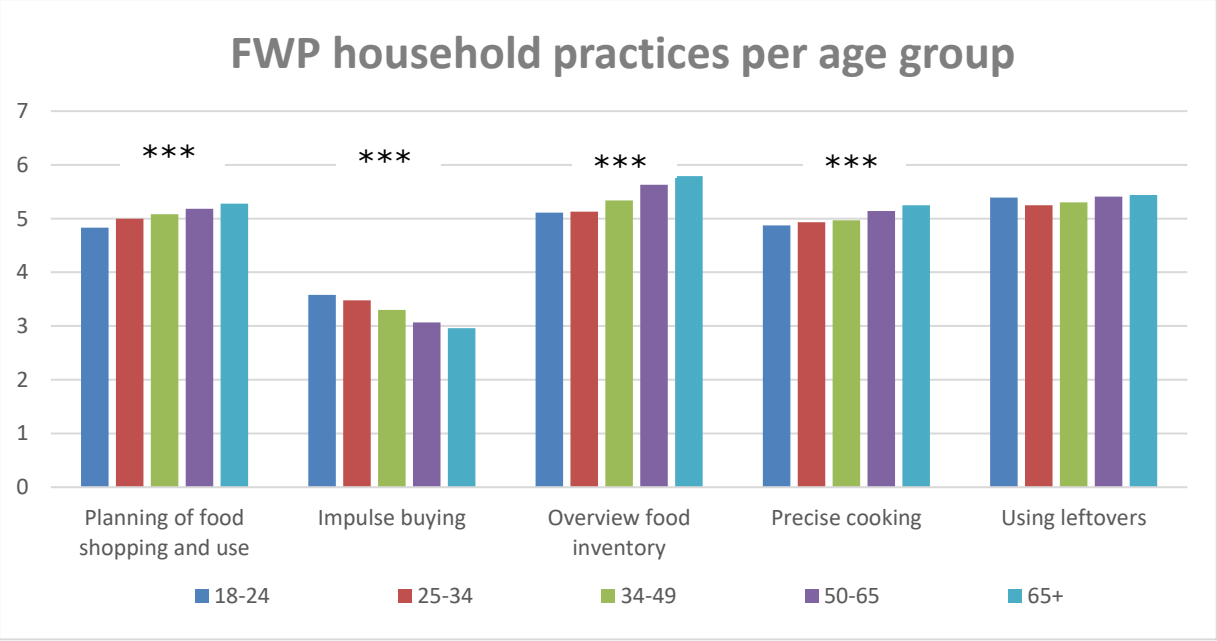



**Figure 7. Practices per age group (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

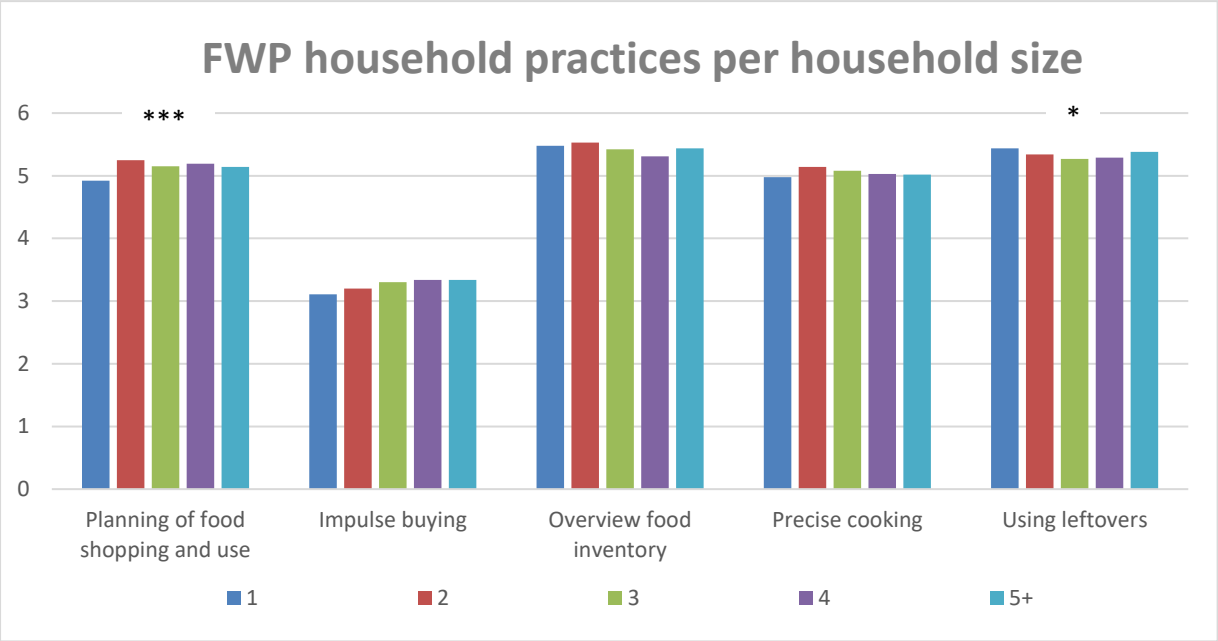



**Figure 8. FWP household practices per household size (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

## Similarities & differences across countries

Differences in level of food waste prevention household practices performed in each country were relatively minor (see **Figure** 9). Impulsive buying of products was least prevalent in the Netherlands, followed by Spain, Germany and Hungary respectively. In Hungary, compared to the other countries, respondents were more likely to report having a good overview of the food they have in stock. Cooking precisely was more frequently reported in Spain compared to the other countries. Interestingly, using leftovers was lowest in the Netherlands, compared to the other countries. Nonetheless, respondents from the Netherlands reported to least often waste leftovers or stored leftovers. This seems to indicate that Dutch respondents do not often encounter situations in which they have leftovers from meals and therefore do not have to store and consume them in order to prevent waste. The opposite pattern was found for Hungarian respondents. These respondents reported to most often use their leftovers compared to the other countries, and also reported the most food waste from leftovers on plates and in pots and previously stored leftovers.

With a few exceptions, the pattern of reported food waste prevention household practices across the socio-demographic groups was similar across countries, only what reached significance differed in some cases. In all countries except for Germany, younger respondents reported lower levels of planning than older respondents. In Hungary and the Netherlands respondents with a lower education reported higher levels of overview of food in stock. Also, in Germany and the

Netherlands respondents with higher education reported higher levels of using leftovers. Further, only in Hungary respondents from smaller cities reported higher levels of using leftovers than respondents from middle sized or large cities. Only in two cases was the pattern different: in Germany, household with older children reported higher levels of planning, while in Netherlands those respondents reported lower levels of planning. Additionally, in Germany, higher levels of overview of food in stock were reported by respondents of households without multiple adults, while in Spain those respondents reported lower levels of overview.

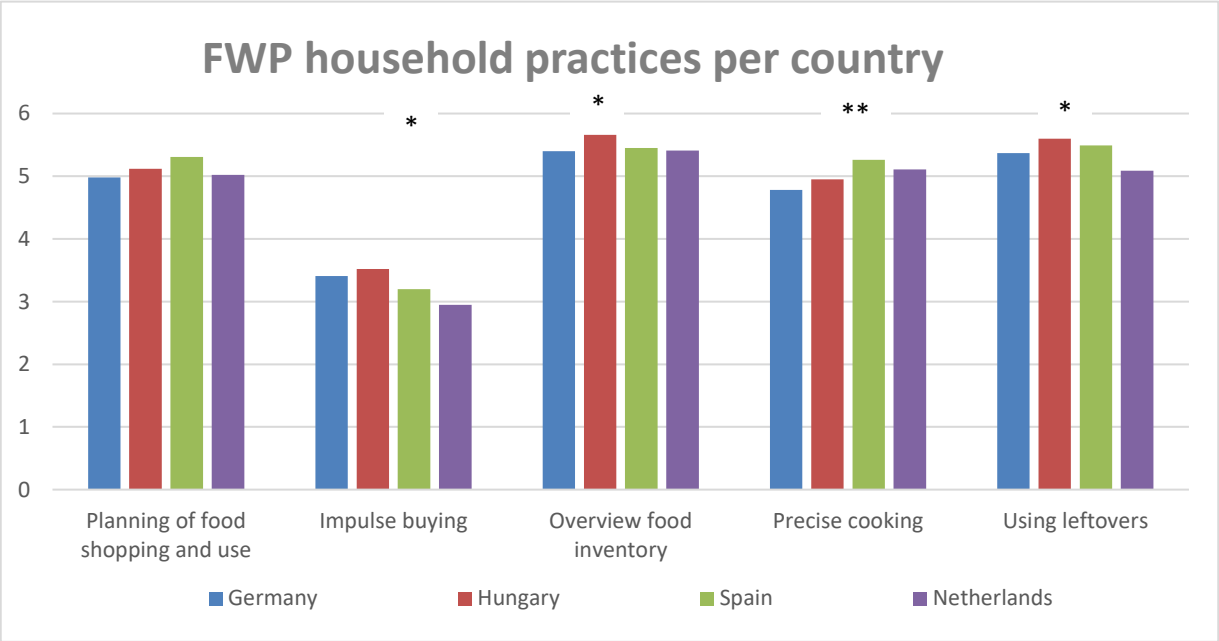



**Figure 9. FWP household practices per country (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

**In summary, the amount of FWP household practices differs across age groups and household sizes. Compared to households with a younger person mainly responsible for food, those with an older responsible person report higher levels of FWP household practices. Further, respondents of single households report lower levels of planning compared to all other households. This pattern is similar across countries.**

### 5.3.3 Do motivations differ across socio-demographic groups?

#### Socio-demographic effects on motivation

Similar to food waste and FWP household practices, we found the motivation of respondents to differ across age groups (see **Figure** 10 and Appendix 9.6, Table 9.6.4). Compared to younger respondents, older respondents had a more negative attitude towards wasting food and were less likely to hold the belief that others important to them (e.g., friends or neighbours) waste food. Further, female respondents had higher awareness of the consequences of food waste and more negative attitude towards wasting food (see Figure 11). Compared to larger households, respondents of single person households less strongly believed that relevant others disapprove when they waste food, most likely because there are no other household members who see them wasting food.

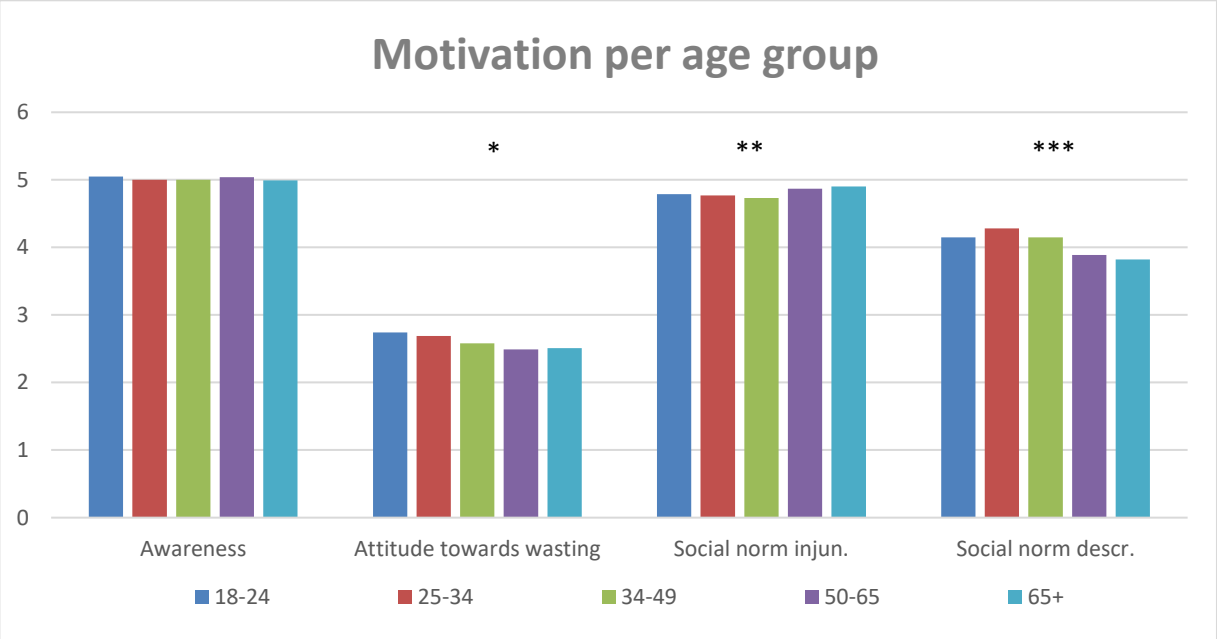



**Figure 10. Motivation per age group (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

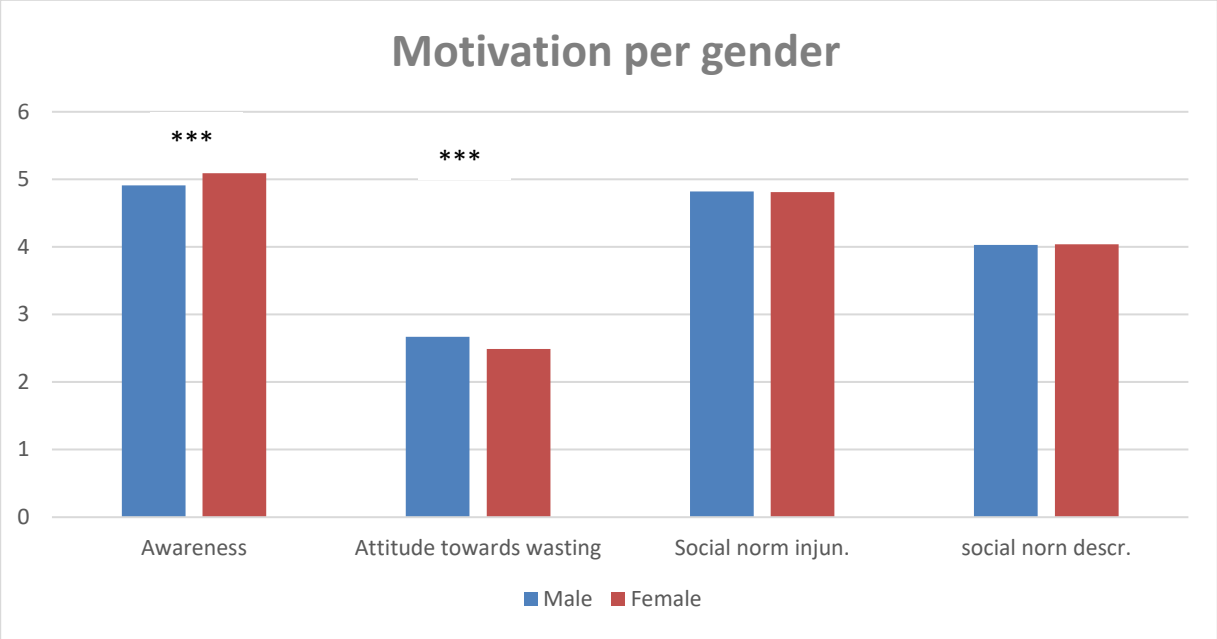



**Figure 11. Motivation per gender (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

## Similarities & differences across countries

When comparing countries, the results showed that respondents from Spain and Hungary reported higher awareness of consequences compared to Germany and the Netherlands (see **Figure** 12). Respondents from Spain and Hungary also reported more strongly to perceive a disapproval of relevant others when wasting food (injunctive social norm). Further, Spanish respondents reported the highest negative attitude towards wasting food. This indicates that Hungarian and Spanish respondents have higher motivation to prevent food waste than respondents from the other two countries.

With regards to household size, the pan-European pattern was found in each country, although this did not always reach significance. Compared to larger sized households, in Germany smaller households reported lower levels of perceived disapproval when wasting food (injunctive social norm), and in Germany and Hungary younger respondents perceived more strongly than older respondents that others waste (descriptive social norm).

A few interactions not found in the overall analyses, reached significance in some of the countries. Females in the Netherlands reported higher levels of the injunctive norm and females in Spain reported lower levels of descriptive social norm. Respondents with young children in Germany, reported lower levels of negative attitude towards wasting food. In the Netherlands, respondents with a higher income reported lower levels of negative attitude towards wasting food and in Spain, respondents with a higher income reported higher levels of negative attitude.

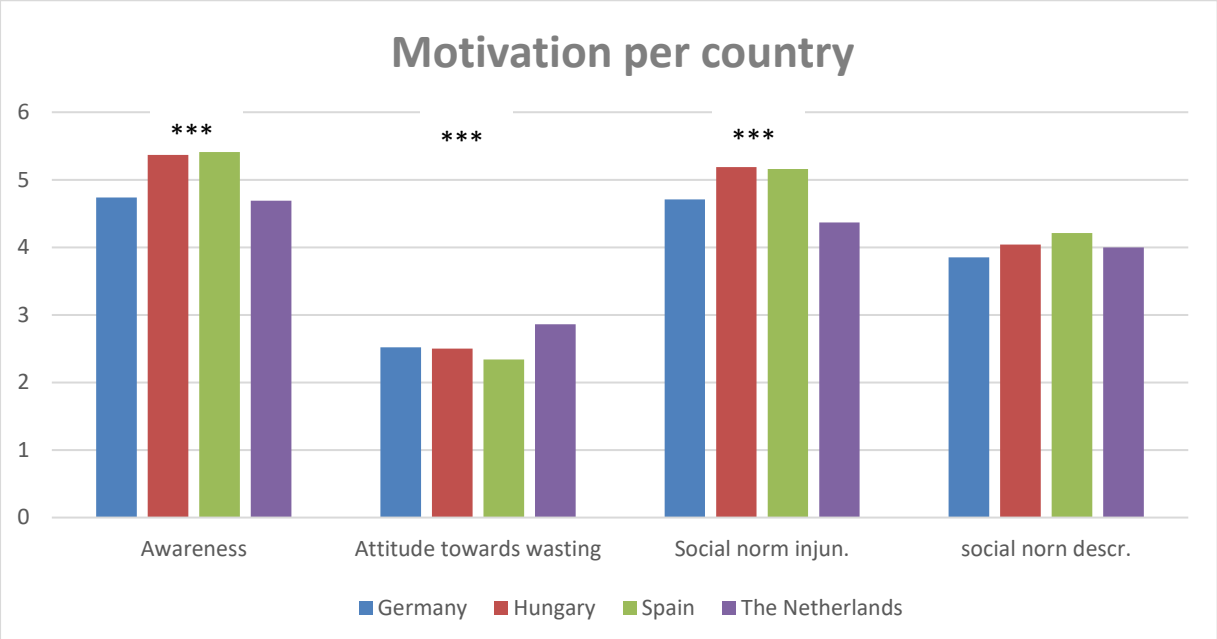



**Figure 12. Motivation per country (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

**In summary, the level of motivation differs across age groups. Compared to younger respondents, older respondents report higher levels of negative attitude (thoughts and feelings) towards wasting food, and stronger descriptive social norms (the belief that others waste food). Motivation differs across gender: females report higher levels of awareness of the consequences and higher levels of negative attitude towards wasting food than males.**

### 5.3.4 Do competing goals differ across socio-demographic groups?

#### Socio-demographic effects on competing goals

Overall, respondents found the taste and healthiness of their food very important. Differences were found between the importance of several competing goals and gender (see **Figure** 13), age and household size (**Figure** 14) (for details see Appendix 9.6, Table 9.6.5). Compared to males, females reported higher levels of importance of all goals except for the goal of not wanting to have too much. Younger respondents reported lower levels of importance for healthiness of food and higher importance for convenience and price. However, the differences in healthiness and convenience across the age groups were not very pronounced. Single person households reported less importance for healthiness and wanting to have enough food, and more importance for convenience. Further, respondents with a low education or low income found price more important than respondents with an average or high education or income level. Also, respondents with a low education found healthiness of the food less important than respondents with an average or high education.

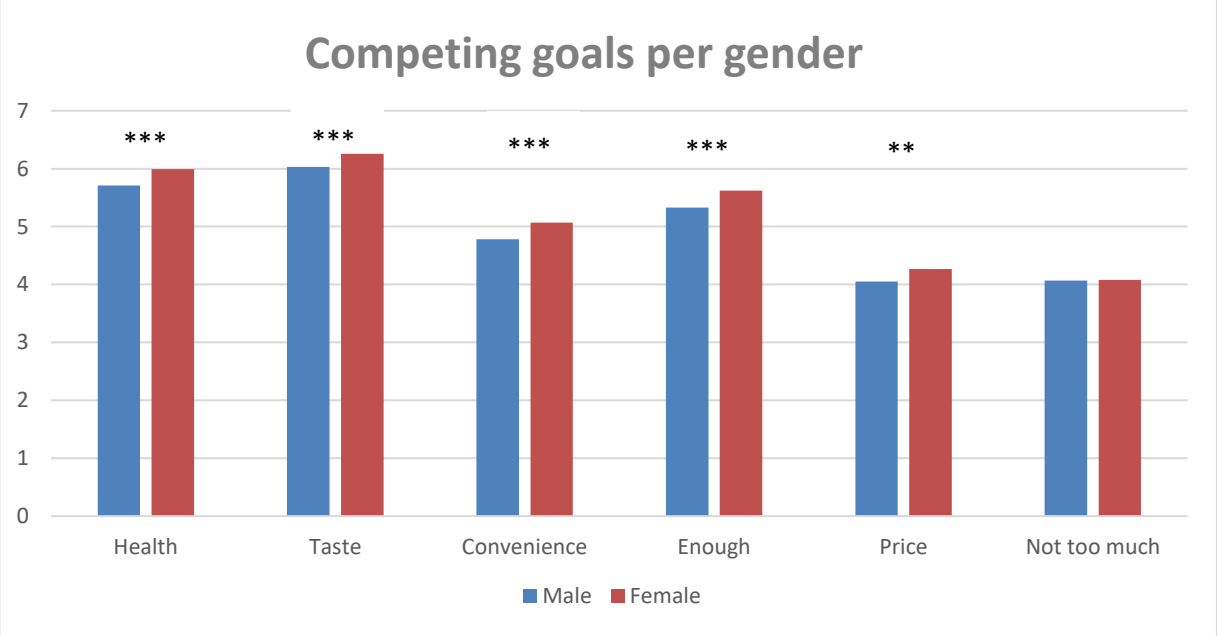



**Figure 13. Competing goals per gender (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

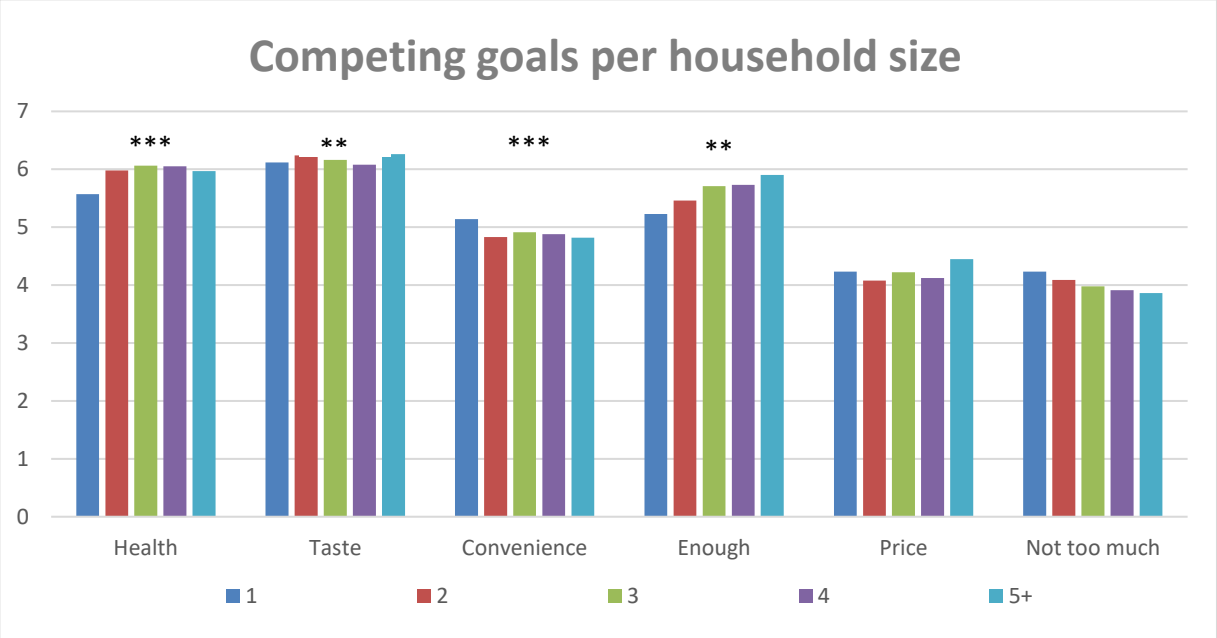



**Figure 14. Competing goals per household size (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

## Similarities & differences across countries

Regarding competing goals (see Figure 15 and Appendix 9.6, Table 9.6.5), we found that health was most important in Spain, followed by Hungary, the Netherlands and Germany, respectively. For the goal to have enough and to have cheap food a similar pattern was found, with the goals being most important in Hungary, followed by Spain, the Netherland and Germany respectively.

The pan-European pattern was largely similar to the pattern in each country, only what reached significance was different. In all countries, females found convenience more important than males, and older respondents found price more important than younger respondents. The only difference across countries is that in Hungary respondents from small cities find convenience most important, in Germany respondents from middle sized cities and in Spain from large cities.

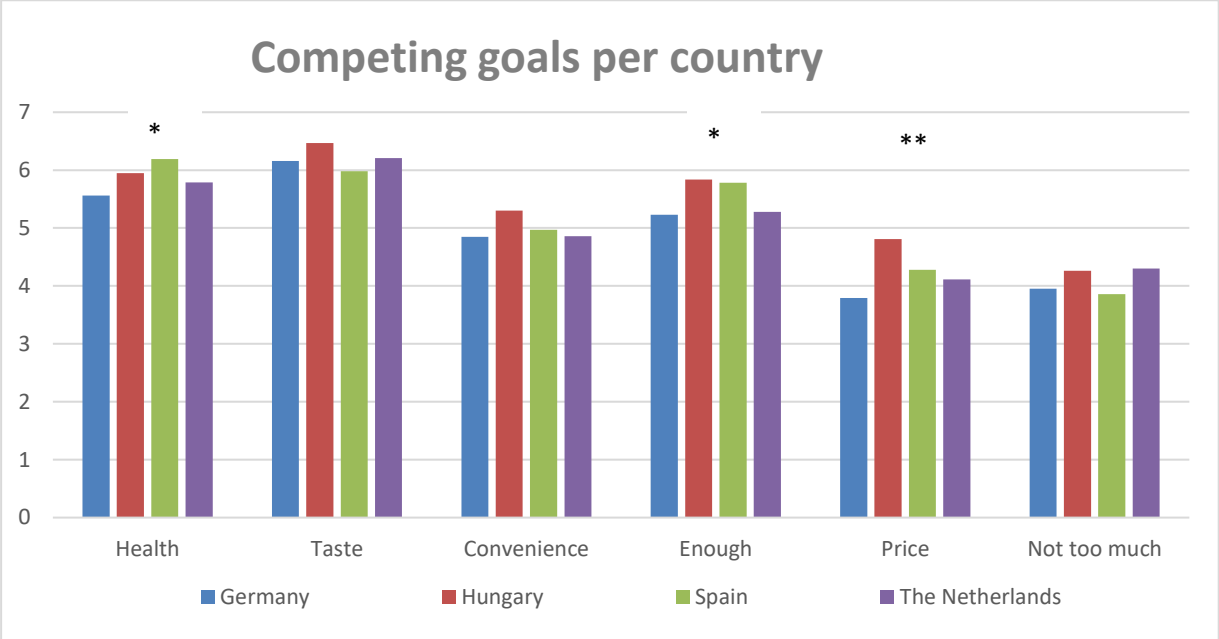



**Figure 15. Competing goals per country (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

**In summary, taste and health are important competing goals. The importance of the goals differs depending on gender, age, and household size and across countries. Females attach more importance to almost all goals than males do. Compared to older respondents, younger respondents find healthiness less important and convenience and price more important. Single person households report less importance for healthiness and wanting to have enough and more importance for convenience. Across countries, respondents of Spain and Hungary find the goal to have healthy, and cheap food, and to have enough more important than respondents of the Netherlands and Germany.**

### 5.3.5 Do abilities differ across socio-demographic groups?

#### Socio-demographic effects on abilities

The level of skills and knowledge reported differed across age groups (see **Figure** 16 and Appendix 9.6, Table 9.6.6). Compared to younger respondents, older respondents reported lower levels of perceived difficulties with assessing food safety, creative cooking and accurate planning, and higher levels of shelf life knowledge. Further, compared to males, female respondents perceived fewer difficulties with assessing food safety, creative cooking and shelf life knowledge (see **Figure** 17). Also, households with young children (<12 years old) and with multiple adults (more than 3) reported to perceive more difficulties with accurate planning than households with neither young children or without multiple adults.

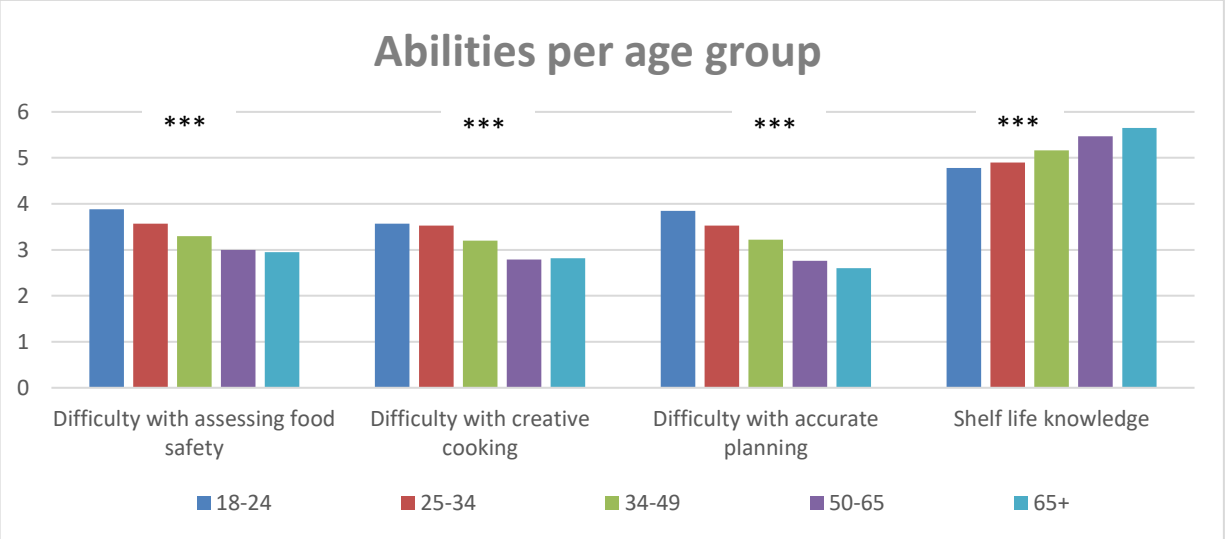



**Figure 16. Abilities per age group (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

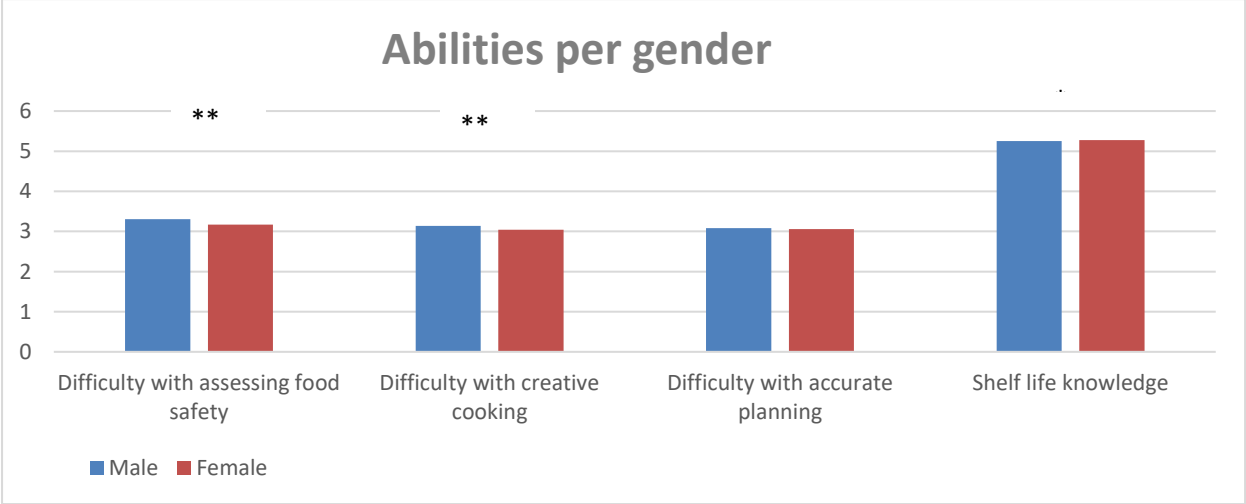



**Figure 17. Abilities per gender (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

### Similarities & differences across countries

Compared to the other countries, Hungarian respondents reported to have the most shelf life knowledge and to perceive the least difficulties with assessing food safety.

The differences across socio-demographic groups, were similar to the pan-European pattern but what reached significance differed. In Hungary, respondents from households with multiple adults perceived more difficulty with accurate planning and Hungarian females reported to have more shelf life knowledge than men. There was only one interaction across socio-demographic groups which was not significant when investigating all countries, namely, only in the Netherlands respondents with a lower education perceived more difficulty with creative cooking.

**In summary, abilities differ across age groups and gender, with younger respondents and males perceiving more difficulties with the abilities than older respondents and females.**

## 5.3.6 Do opportunities differ across socio-demographic groups?

### Socio-demographic effects on opportunities

We found that opportunities differed across socio-demographic groups in many ways. The opportunities investigated refer to aspects in the surrounding or day-to-day life of respondents. Therefore, it is not surprising that these differ across several socio-demographic groups (see Appendix 9.6, Table 9.6.7).

Opportunities differed across age group (see Figure 18) and gender (see **Figure** 18). Compared to male respondents, female respondents more strongly agreed that that their (online) (super)market offers a good supply and that their (super)market is easily accessible and that they encounter unforeseen events. Respondents from smaller cities agreed less with the statement that their (online) (super)market has good supply and that their (super) market is easily accessible. Compared to younger respondents, older respondents agreed more strongly that their (online)(super)market has a good supply (offers the right type and size of products), that they have enough space to store all foods, and agreed less strongly that they encounter unforeseen events. Respondents with a higher education agreed more that their (super)market is easily accessible and that they encounter unforeseen events. Respondents with higher income, agreed more that their (super)market has a good supply and that they themselves have enough storage space. Finally, opportunities differed across household composition; respondents with small children agreed more strongly that they encounter unforeseen events and respondents with older children agreed more that their (super)market has a good supply.

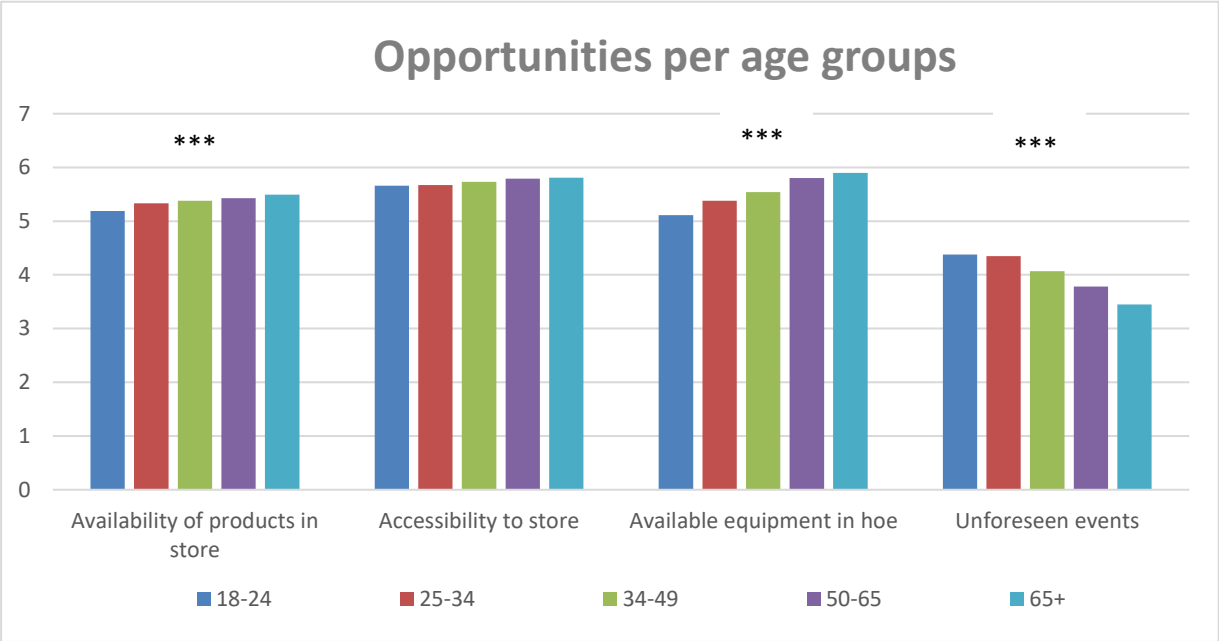



**Figure 18. Opportunities per age groups (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

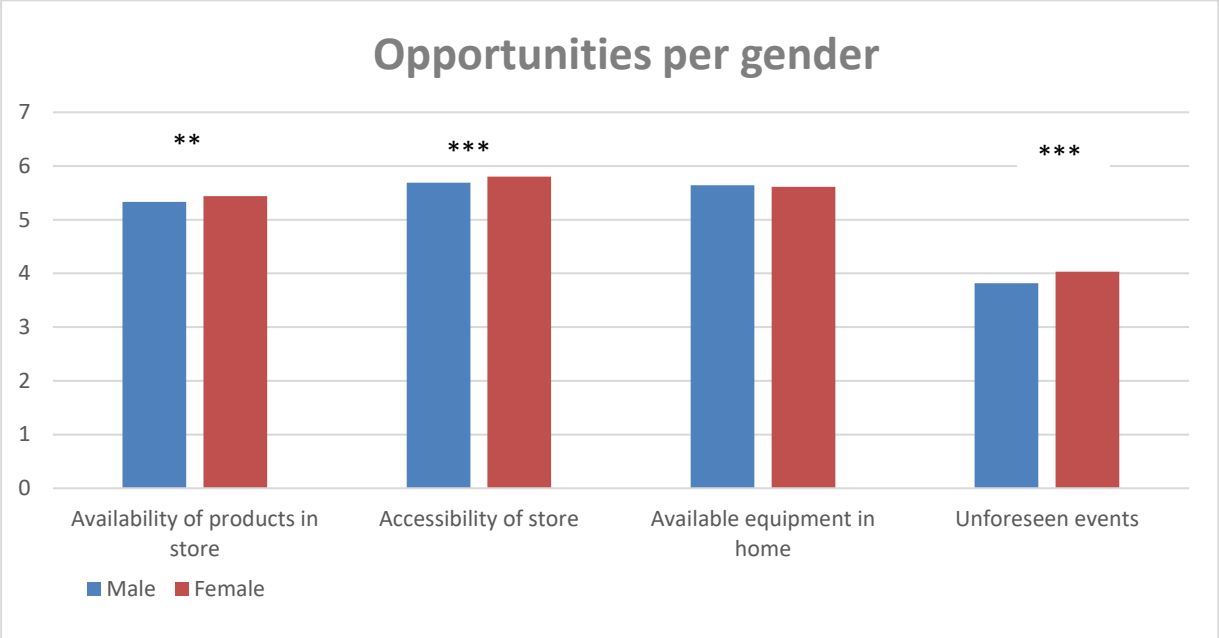



**Figure 19. Opportunities per gender (asterisk = significant construct; 1-7 scale). * p <.05 | ** p <.01 | ***p <.001**

### Similarities & differences across countries

Only slight differences appeared across countries in the association across socio-demographic variables and opportunities. In the Netherlands, households with young kids reported to have less availability of products in store. In Germany, females reported to have more storage equipment available than males. In Hungary, households with multiple adults reported to have less storage equipment. Regarding education, Hungarian respondents with lower education reported to have more, and Dutch respondents with lower education reported to have less available storage equipment. Also in those two countries, females reported higher level of prevalence of unforeseen events than men.

**In summary, opportunities differ across socio-demographic groups, namely among age, gender, size of city of residence, education, income and household composition. Opportunities refer to aspects in the day-to-day surrounding of respondents, it is therefore in line with expectations that these differ across several socio-demographic groups.**

## 5.3.7 Should some socio-demographics be included in the model?

In several analyses, we investigated whether socio-demographic groups differed in terms of food waste level, FWP household practices, motivation, abilities and opportunities. In almost all analyses effects of gender, age, household size and country were significant. Therefore, we decided to include these factors when investigating the model (see Figure 20).

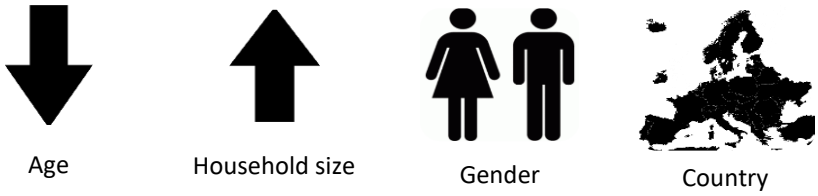



**Figure 20. Main socio-demographic groups that differ in food waste levels, FWP household practices, motivation, competing goals, abilities and/or opportunities.**

## 5.4 Influences of FWP household practices on food waste

### Do FWP household practices affect household level food waste?

In this section, we examine the extent to which FWP household practices, influence household food waste levels (see Appendix 9.7). We investigated these effects while controlling for relevant demographic and psychographic variables.

As shown in the last column of table 9.7.1 in this appendix, all FWP household practices were individually correlated with total amount of food wasted. Higher level of planning, overview of the food in stock, cooking precisely and using leftovers, and lower levels of impulse buying were associated with lower food waste levels.

When investigating the influence of the FWP household practices on food waste simultaneously in a regression, we found support for our model (see Figure 21). All practices except for planning (both as a direct and as a U-curve (squared term)) were associated with how much food is wasted. In other words, the lower the level of reported impulse buying, and the higher the level of reported overview of the food in store, cooking precisely or use of leftovers, the less food waste was reported. Together, the FWP household practices accounted for 22% of the variance in household food waste.

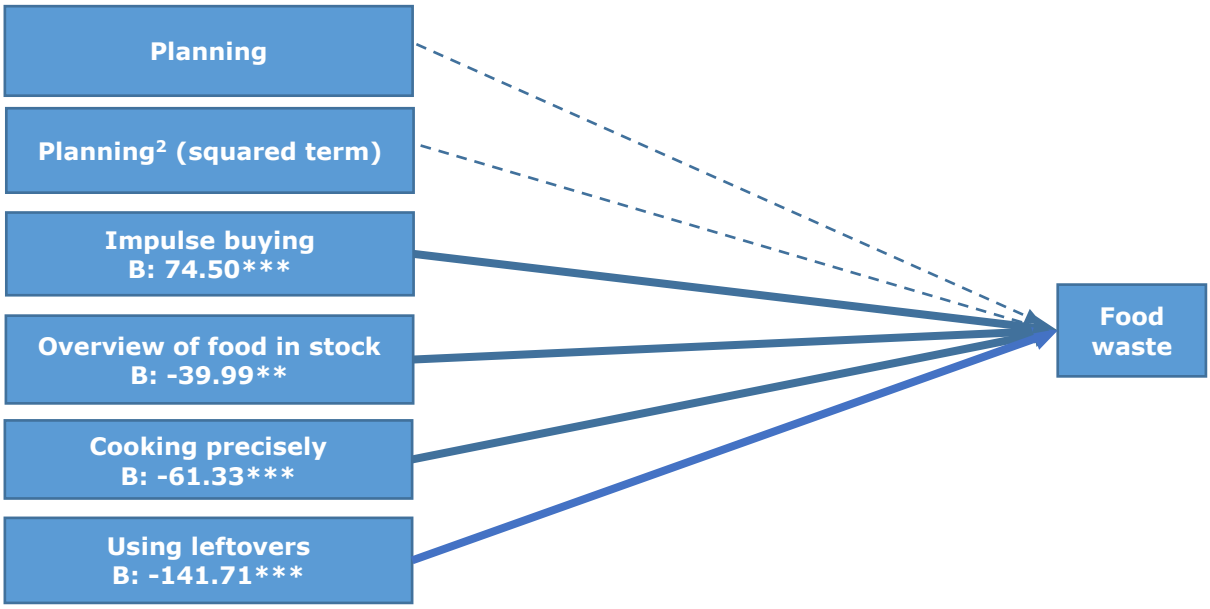
In the case of planning, it seems that its effect disappears when taking into account the other practices. This could be, because other practices could to some extent overcome the consequences of a lack of planning. If consumers are not tempted to buy products impulsively, have a good overview of what is in stock, cook precisely and use their leftovers, additional planning may not contribute to lower food waste levels. Yet, when examining effects for each of the states of food waste (unused, partly used, leftovers, stored leftovers) separately, the effect of planning became apparent (see Appendix 9.7, table 9.7.2). Planning had a significant effect on amount of food waste from partly used food, also after taking into account the other practices.

Higher levels of impulsive buying led to more food waste in all states, but in particular unused and partly used foods. It seems that these impulsively bought products remain unconsumed or replace other products which then become spoiled.

Higher levels of overview of the food in stock led to lower food waste levels, especially unused and partly used foods. It may be that if consumers know what they have in stock, it is easier for them to avoid buying too much food and prevent spoilage.

Higher levels of cooking precisely led to lower food waste levels in all states.

Higher levels of using leftovers, also led to lower food waste levels in all states. In particular, it was found to prevent the unused, partly used and leftover food waste, but less strongly the stored leftovers. This may be because people who do not use leftovers are unlikely to have stored leftovers to waste.




**Note**: The effect of the socio-demographic and psychographic variables were investigated in the same analysis, of which age (B= -3.64), household size (B= 75.32***), Spain (B= 107.32***), and the food inventory scale (B= 22.15*) were significant.

**Figure 21. Effects of FWP household practices on food waste.**

## Similarities and differences across countries

In all countries, the practice of using leftovers had a strong effect on food waste reduction, whereas planning had no significant influence on food waste levels (see Appendix 9.7, table 9.7.3). There were a few differences across the countries: the influence of impulsive buying was found in all countries except for Spain, overview of the food in stock was only significant in Germany and Hungary and cooking precisely was significant in all countries except for Germany.

**In summary, most FWP household practices (impulsive buying, overview of the food in stock, cooking precisely, and use of plate & pan leftovers) are associated with food waste levels. In particular, the effect of the use of plate and pan leftovers on food waste prevention is strong in all countries.**

## 5.5 Effects of motivation, ability, and opportunity on food waste

Next, we examined if motivation, ability and opportunity are correlated with and influence food waste levels (see Appendix 9.8). In our regression, we controlled for country, age, gender and household size as we have found that these factors influenced the amount of food waste in previous analyses (see section 5.3). Additionally, we included several psychographic variables (attention paid to food waste prevention during upbringing, perceived financial possibility to buy preferred foods and involvement with food), to control for these as well.

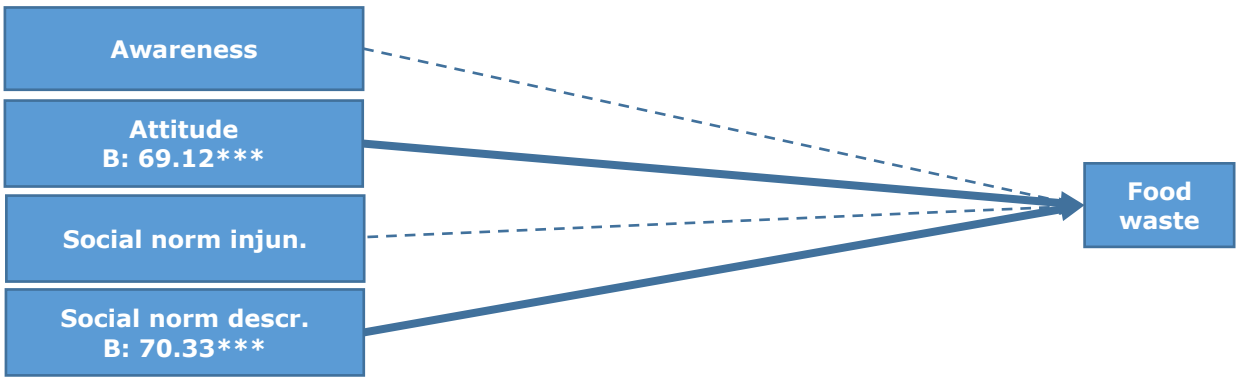
### 5.5.1 Does motivation affect food waste?

Motivation was strongly associated with food waste levels, also when taking into account the influences of abilities and opportunities on food waste. Motivation included the awareness of the consequences of food waste, the attitude towards wasting food, the belief that others disapprove of wasting food (injunctive social norm), the belief that others waste (descriptive social norm) and competing goals. Not all aspects influenced food waste (see Figure 22 and Appendix 9.8, table 9.8.1).

The strongest association with food waste was with the belief that others important to them (e.g., friends or neighbours) waste food. The stronger that belief, the more food waste was reported. This may be because the (descriptive) social norm justifies wasting food. Thus, the norm that others waste, may make it a more acceptable behaviour and hence less likely that a consumer aims to prevent it. This belief had a strong e total food waste as well as the four food waste states (see Appendix 9.8, table 9.8.2).

The second strongest effect came from the attitude towards wasting food. A more negative attitude (thoughts and feeling) towards wasting food led to less reported food waste. This was true when investigating the correlation with total amount of food waste as well as for its influence when taking into account the other motivations, abilities and opportunities. The effect was present for the total amount of food waste as well as for partly used foods, leftovers and stored leftovers.

Interestingly, the belief that important others disapprove when they (the respondents) waste food, did not have a significant effect on the total level of food waste. This could be because household food waste occurs in a private setting: few other people see when, what, or how much is wasted. Also, awareness about the environmental, social and financial consequences of food waste did not influence how much food waste was reported. It may be that awareness of the consequences of food waste does not become salient when handling food in a day-to-day setting, or that awareness alone is insufficient to affect household food waste.




**Note**: Competing goals, abilities, opportunities, and the socio-demographic and psychographic variables were included in the same analysis.

**Figure 22. The effects of motivation on food waste.**

## Similarities and differences across countries

Across all counties, we found several similarities as well as differences in effects of motivation on food waste levels (see Appendix 9.8, table 9.8.3).

The belief that relevant others waste food (descriptive social norm) strongly affected food waste levels in all countries, whereas the belief that others disapprove of wasting food (injunctive social norm) did not have an effect in any of the countries. This indicates that the effect of social norms on food waste is similar, irrespective of different national social contexts. Further, awareness of consequences did not affect food waste levels in any of the countries.

Regarding the differences, we found that a more negative attitude (more negative thoughts and feelings) towards food waste led to significant lower food waste in all countries, except for the Netherlands.

**In summary, the belief that important others waste food most strongly influences food waste levels. The stronger the belief, the more food is wasted across food waste states and countries. A negative attitude (thoughts and feelings) towards wasting food also leads to less food waste. Interestingly, the belief that others disapprove of wasting food and awareness of the consequences of food waste do not affect food waste levels. These findings are similar across countries.**

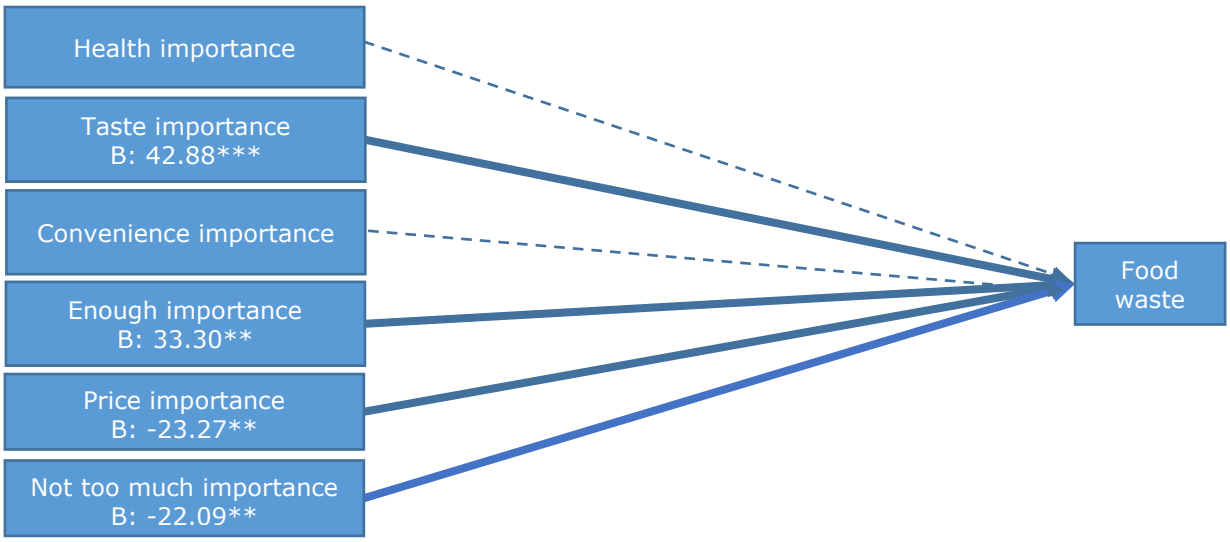
### 5.5.2 Do competing goals predict food waste?

Several competing goals were strongly associated with food waste levels, when also taking into account the direct influences of abilities and opportunities on food waste (see Figure 23 and Appendix 9.8, table 9.8.1).

The importance of the taste of food was strongly linked to higher food waste levels. It influenced the total amount of food waste, as well as the unused and partly used products. Is seems that taste is especially in competition with preventing food waste when (partly) unused products are in stock, but the respondent (or other household members) do not prefer the taste of the foods anymore.

The importance of having enough food was also strongly linked to higher food waste levels. In particular, the goal to have enough was linked to higher food waste levels from the unused, leftover and stored leftover states. This seems to indicate that the aim to have enough is in competition with preventing food waste when shopping, leading to the unused food waste, as well as when cooking, leading to the waste from (stored) leftovers waste (see Appendix 9.8, table 9.8.2).

As expected, the importance of not wanting to have too much food, which in essence is similar to preventing food waste, was strongly linked to lower food waste levels. Surprisingly, it predominately affected the level of waste from stored leftovers, while its effect on unused products was not found. This may indicate that respondents who find it important to not have too much food, are better in avoiding the disposal of previously stored leftovers. Further, the importance of having cheap food was related to lower food waste levels, in particular from unused and leftover food waste. It seems that respondents who pay attention to their financial expenses, are less likely to buy surplus products of to discard plate and pot leftovers. Lastly, we did not find an effect of convenience (how easy it is to prepare the foods) or healthiness of the food on overall food waste.




**Note**: Motivation, abilities, opportunities, and socio-demographic and psychographic variables were included in the same analysis.

**Figure 23. Effects of competing goals on food waste.**

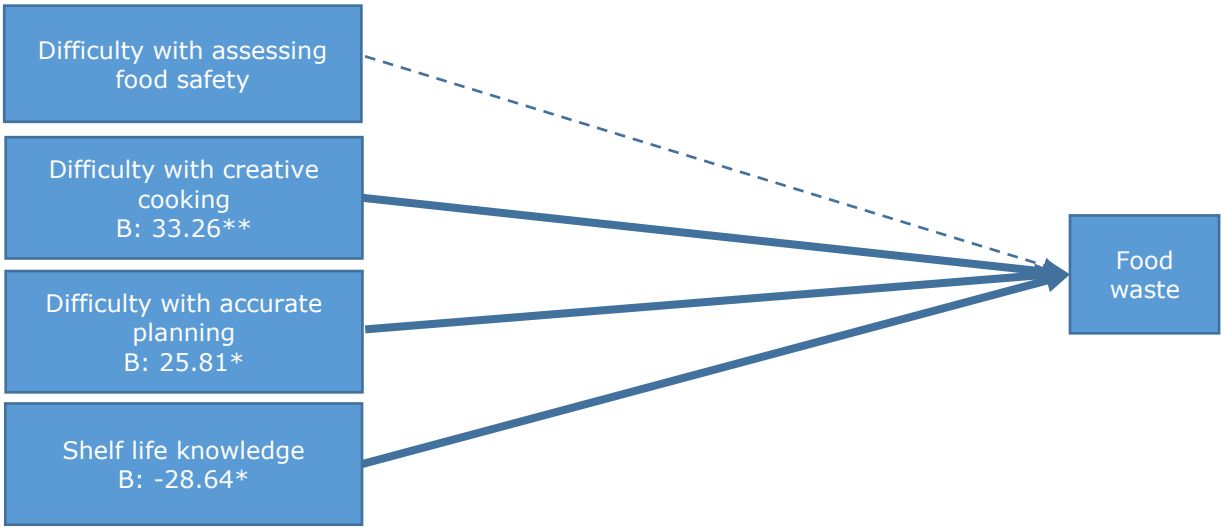
### Similarities and differences across countries

The importance of price was linked to lower food waste levels in Spain only, and not wanting to have too much food in Hungary only. Interestingly, the importance of health was linked to lower food waste levels in Hungary, while it was linked to higher food waste levels in Germany. We found that the importance of taste influenced food waste in all countries except for Germany, and that the importance of having enough food only reached significance in Germany (see Appendix 9.8, table 9.8.3).

**In summary, several competing goals have an effect on waste levels. The importance of taste and wanting to have enough food in the household are both linked to higher food waste levels, while the importance of not having too much and price are linked to lower food waste levels.**

## 5.5.3 Do abilities affect food waste?

When investigating the abilities individually, we found that they all were significantly correlated with food waste levels. When investigating their effect on food waste simultaneously, together with motivation and opportunities, we found that the more respondents perceived difficulties with cooking creatively, planning accurately and prolonging shelf life, the more food waste was reported (see Figure 24 and Appendix 9.8, table 9.8.1). Perceived difficulty with assessing food safety did not reach significance.




**Note**: Motivation, competing goals, opportunities, and socio-demographic and psychographic variables were included in the same analysis.

**Figure 24. Effects of abilities on food waste.**

More perceived difficulty with creative cooking was linked to more food waste from the unused, partly used and leftover state (see Appendix 9.8, table 9.8.2). It seems that respondents are less likely to consume all their products if they lack the skill to create tasty meals from these ingredients. More perceived difficulty with accurate planning was linked to more food waste from partly used products, and not – as may be expected – from leftovers. More shelf-life knowledge was linked to less food waste from unused products, which may indicate that products are less likely to be spoiled if they are well stored.

#### Similarities and differences across countries

When looking at the influence of abilities on food waste per country, no effect of abilities on food waste was found in Germany and Hungary. In the Netherlands, more difficulty with assuring food safety and accurate planning led to more food waste. In Spain, more perceived knowledge about the shelf life of products led to less food waste (see Appendix 9.8, table 9.8.3).

**In summary, more perceived difficulty with assuring food safety, cooking creatively, accurate planning and shelf life knowledge is linked with higher food waste levels.**

### 5.5.4 Do opportunities effect food waste?

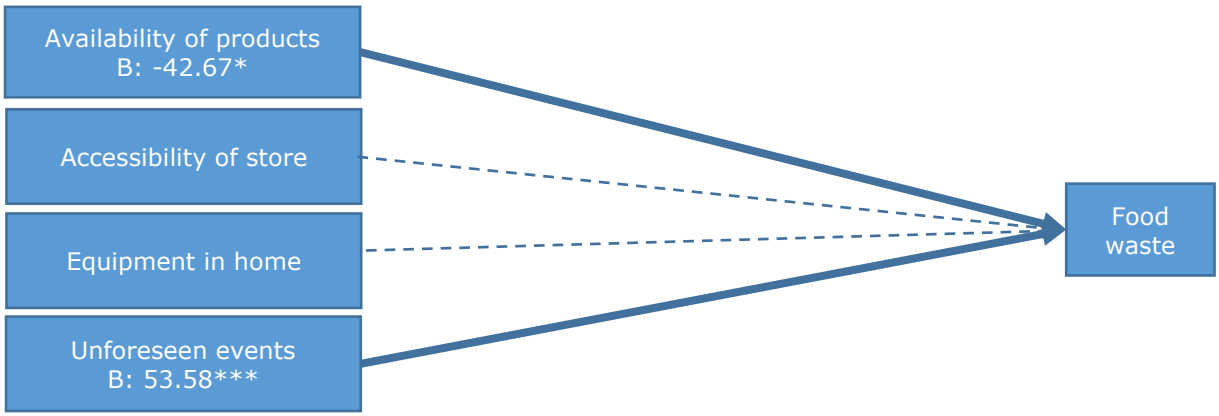
All four opportunities were significantly correlated with food waste levels, such that higher levels of perceived barriers were linked to higher food waste levels. When investigating the relationships simultaneously, and together with motivation and abilities, the prevalence of unforeseen events and the availability of the product in store significantly affected total food waste levels (see Figure 25 and Appendix 9.8, table 9.8.1).

The more often respondents encountered unforeseen events in their day-to-day life, the more food waste was reported, particularly more unused food waste (see Appendix 9.8, table 9.8.2).

Respondents with access to good quality foods and right packaging sizes in their store, reported less waste. In particular, they reported less food waste from partly used products and stored leftovers. This indicates that they less often end up with too large packaging sizes.

We did not find an effect of available storage equipment in the home on overall food waste, but did see that it led to more unused food waste. This seems to indicate that respondents tend to use the extra space to store more products than they need, but that this effect might be compensated with less food waste in the other categories.

Also, we did not find an effect of accessibility of the stores on total amount of food waste but did find that respondents with higher perceived accessible to stores reported more food waste from partly used products. This may suggest that respondents are more likely to buy too many products when they live nearby a (super)market.




**Note**: Motivation, competing goals, abilities, and the socio-demographic and psychographic variables were included in the same analysis.

**Figure 25. Effects of opportunities on food waste.**

## Similarities and differences across countries

When investigating the influences of opportunity on food waste per country, the prevalence of unforeseen events led to more food waste in all countries except Hungary (see Appendix 9.8, table 9.8.3). Further, better availability of the right food products (size) led to less food waste in Germany and Hungary. Better accessibility of stores was linked to more food waste in Germany.

**In summary, we found that the prevalence of unforeseen events and the availability of products in store most strongly influence food waste levels.**

## 5.6 Effects of household practices and motivation, ability, and opportunity jointly

Readers interested in regression results in which FWP household practices as well as motivation, ability, and opportunity are included (while controlling for demographics and psychographic variables) are referred to Appendix 9.9. Effects are in line with the results reported so far.

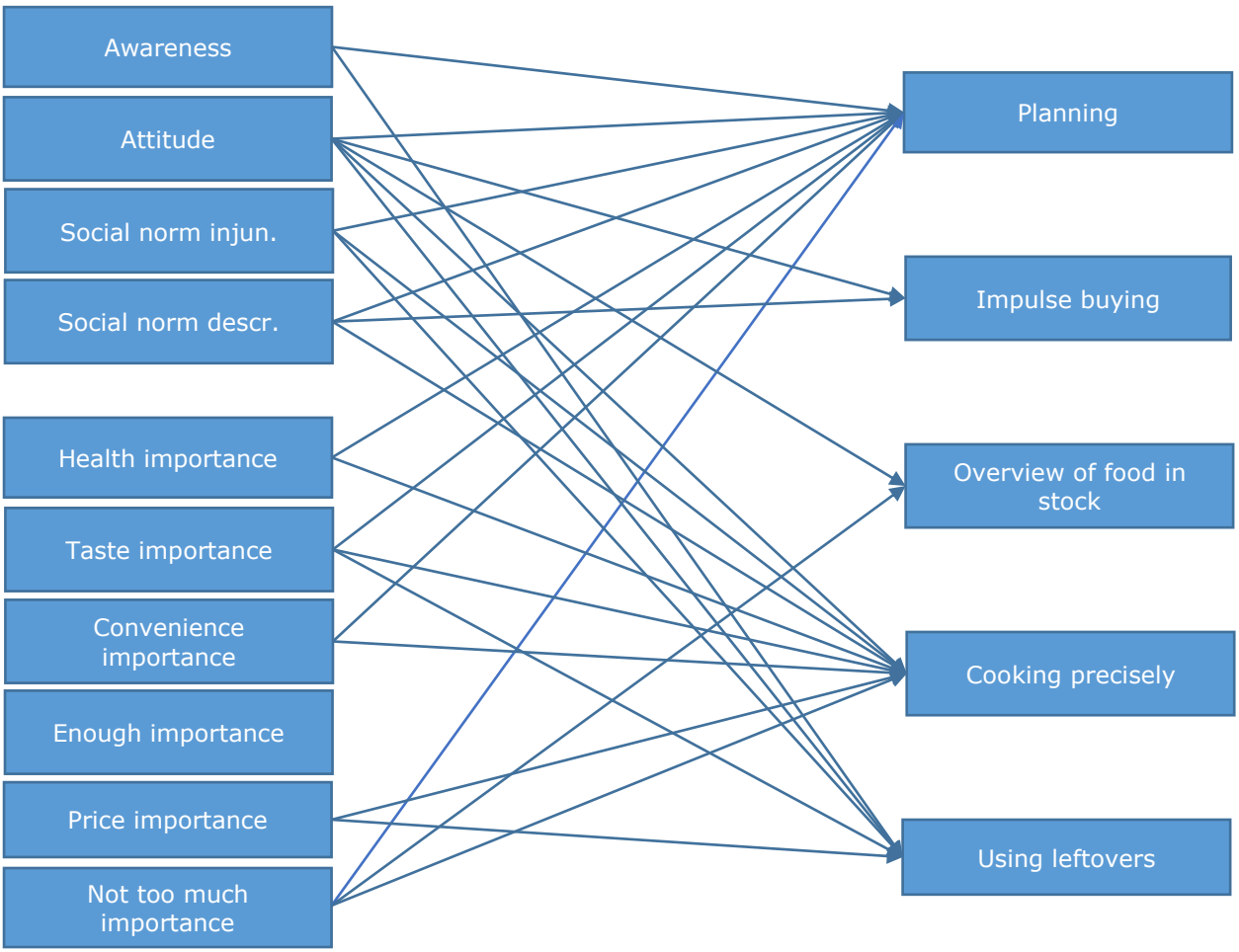
## 5.7 Effects of motivation, ability, and opportunity on FWP household practices

### 5.7.1 Do motivations & competing goals affect FWP household practices?

Additional to the influence of motivation and competing goals on food waste, we also looked into the influence of motivation and competing goals on the FWP household practices, when also taken into account the influences of abilities and opportunities (see Figure 26 and Appendix 9.10).

Most motivational factors influenced several FWP household practices. A higher level of negative attitude (negative thoughts and feelings towards wasting food) led to higher levels of FWP household practices in all cases (more planning, overview of the food in stock, cooking precisely and use of leftovers and less impulse buying). The belief that others disapprove of them wasting food did not have an effect on food waste levels, yet it was related to higher levels of planning, cooking precisely and use of leftovers. The belief that relevant others waste food was linked to more planning and more impulse buying. Higher awareness of the consequences of food waste was related to higher level of planning and using leftovers.

Regarding the competing goals, respondents who found taste important reported lower levels of planning and cooking precisely and use of leftovers. Not wanting to have too much food in stock, was related to higher levels of planning, overview of food in stock, cooking precisely and use of leftovers. Further, convenience was found to lead to higher levels of planning and cooking precisely. Health was related to higher levels of planning and cooking precisely. The importance of wanting to have enough did not affect the level of FWP household practices.




**Note**: Abilities, opportunities, and socio-demographic and psychographic variables were included in the same analysis.

**Figure 26. Effects of motivation & competing goals on FWP household practices.**

**In summary, several motivational factors influence FWP household practices, especially attitude, the injunctive social norm, the goal of wanting to have tasty food and not having too much. In particular, planning and cooking precisely are relatively strongly influenced by the motivational factors.**

### 5.7.2 Do abilities affect FWP household practices?

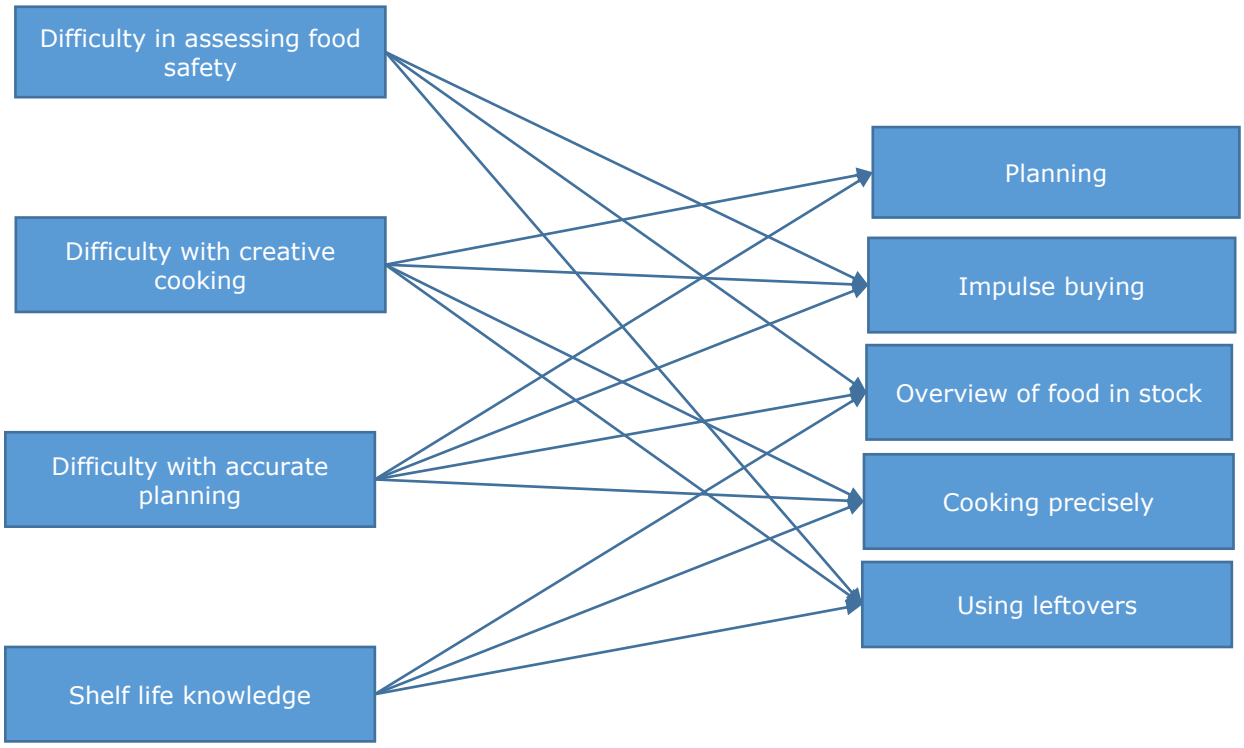
Abilities strongly influenced the FWP household practices (see Figure 27 and Appendix 9.10). The lack of certain abilities was associated with lower levels of FWP household practices in which these abilities were relevant. Although the causality of this association cannot be confirmed based on this research, this may indicate that a lack of ability leads to avoidance of certain FWP household practices. For instance, respondents who perceived difficulties with accurate planning reported lower levels of planning and higher levels of buying impulsively. Also, they reported lower levels of (aim to) cooking precisely or consuming leftovers. If accurate planning is perceived as difficult, planning, cooking precisely or planning to consume the leftovers may be considered as unpleasant practices, which are hence likely to be avoided.

Similarly, respondents who perceived to have less knowledge on how to increase the shelf life of products, were less likely to plan their food management, to have an overview of what is in stock, to aim to cook precisely or to use their leftovers. All these practices benefit from sufficient shelf life knowledge, as it is easier to plan when to consume certain products if he/she is able to prolong the shelf life (to prevent spoilage), to store items and to use leftovers when he/she knowns how to prolong the period in which leftovers can be consumed.

Also, respondents who experience difficulties with assessing food safety, were less likely have an overview of their food in stock or to use their leftovers and were more likely to buy impulsively and cook precisely. This way, they may be less often confronted with their difficulty to estimate food safety. By avoiding checking the food in stock and creating or eating leftovers, they less often put themselves in a situation that they need to make an estimation of the food safety of the products.

Respondents who experience difficulty with creative cooking were less likely to use their leftovers, which avoids situations in which they need to prepare a meal with leftovers foods. However, in contrast to the other abilities, a lack of perceived creative cooking skill was also linked to more planning and to cooking precisely. This could indicate that consumers avoid putting themselves in a situation in which they need to prepare a meal creatively, by planning which meals will be prepared when, and by making sure no leftovers are created.

**In summary, more difficulties with the abilities is associated with less FWP household practices.**




**Note**: Motivation & competing goals, opportunities, and socio-demographic and psychographic variables were included in the same analysis.

**Figure 27. Effect of abilities on FWP household practices.**

### 5.7.3 Do opportunities affect FWP household practices?

Similar to what was found with regards to abilities, lower level of opportunities to prevent food waste were associated with less performance of certain practices (see Figure 28 and Appendix 9.10). It is important to note, that causality of this association cannot be confirmed without further research. In other words, we cannot confirm whether the lack of opportunity led to lower levels of practices or that lower levels of practices led to more perceived lack of opportunity.

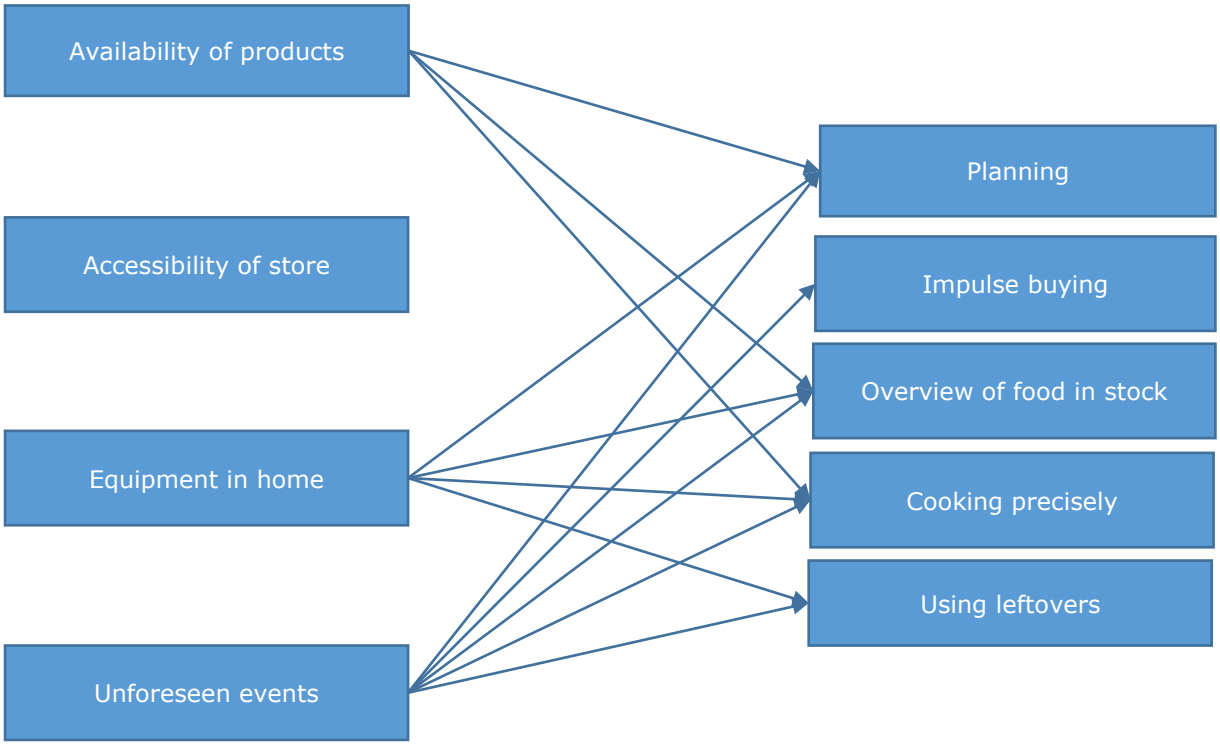
Results indicate that respondents who experience lower levels of opportunities to prevent food waste, were less likely to perform higher levels of FWP household practices. For instance, the more unforeseen events respondents had, the lower levels of FWP household practices were reported (except impulsive buying of which higher levels were reported). Perhaps, the knowledge that they will most likely encounter unforeseen events, makes them less willing to invest time in good FWP household practices, since its influence on food waste prevention is not guaranteed.

Further, lower levels of good (super)market supply (in terms of quality and size of the packaging) were associated with lower levels of planning, overview of food in stock and cooking precisely. Perhaps, respondents do not feel in control over what they can purchase due to the lack of right packaging sizes or quality, and therefore

find it not effective to invest time in closely monitoring how much food is needed and what is in stock.

Also, respondents who perceived that they do not have sufficient space and equipment to store their food, reported lower levels of food planning, overview of their food in stock, cooking precisely or using leftovers. A lack of storing space makes it difficult for respondents to store products (correctly), makes it less likely that they can store food for multiple days, and thus create stronger need for meal planning. Also when checking their food in stock, it is less likely that they can change something, for instance to place apples into the fridge to prolong shelf-life. Also, it is less likely that they will store or use their leftovers as it will take up space in their kitchen.

**In summary, lower levels of opportunities to prevent food waste are associated with less FWP household practices.**




**Note**: Motivation & competing goals, abilities and socio-demographic and psychographic variables were included in the same analysis.

**Figure 28. Effects of opportunities on FWP household practices.**

### 5.7.4 Do abilities and opportunities moderate the effect of motivation on food waste or food waste prevention household practices?

Additional to the direct effects of abilities and opportunities on FWP household practices and food waste, we have investigated whether they moderate the effect of motivation on food waste (overall and per country), on the food waste states and on the FWP household practices. Per analysis, we tested all 40 potential interactions between motivation & competing goals and abilities (e.g., the interaction between awareness and the skill to estimate food safety on food waste) (see Table 2 below) and 40 potential interactions between motivation & competing goals and opportunities (see Table 3 below). These interaction effects were included simultaneously.

#### Moderations on total food waste

In the analyses on total food waste we found eight significant interactions, of which five in the hypothesized direction. This equals 6.3%, which is only slightly higher than what would be expected based on chance (5%). Interestingly, for the interactions that were not in the expected direction, we found that respondents with low perceived barriers waste equal amount regardless of their motivation, while respondents with high perceived barriers waste less when they also have the motivation to prevent waste (although they still waste less than respondents with low perceived barriers, which is against what we expected).

We found a similar pattern for the different food waste states, in particular for food waste from previously stored leftovers, where we found nineteen significant interactions of which twelve in the expected direction. Many interactions were with opportunities and showed that motivation leads to lower waste of stored leftovers if the opportunities to do so are also present. The interactions in the unexpected directions were less easy to interpret.

For the other food waste states fewer interactions were significant. In case of unused food waste, we found nine significant interactions, of which seven in the expected direction. For partly used products we found only two significant interactions of which one in the expected direction, and for leftover food waste we found seven significant interactions of which three in the expected direction.

We also investigated the effect of the moderation per country. Similar to the interactions found on overall levels of food waste, we found some evidence that the effect of motivation on lower food waste levels was stronger if abilities and opportunities were also present. In most countries, the number of significant interactions was higher than chance (four interactions). Specifically, the number of significant interactions in the expected direction were five, eight, five and four for Germany, Hungary, Spain and the Netherlands, respectively.

### Moderation on FWP household practices

We investigated if abilities and opportunities moderate the effect of motivation on the FWP household practices. We found that if abilities and opportunities to prevent food waste were present, motivation was linked to higher levels of FWP household practices than if abilities and opportunities were absent. Also, we found that competing goals contribute less to lower levels of FWP household practices if abilities and opportunities were present. However, the number of significant interactions in the expected direction was limited and also counter intuitive findings were found. We found three, four, five, seven and three significant interactions in the expected direction for planning of food shopping and use, impulse buying, overview of food in stock, cooking precisely and use of leftovers, respectively.

We predominately found that the presence of abilities amplified the effect of motivation on higher levels of FWP household practices and prevented competing goals from leading to lower levels of FWP household practices.

**In summary, we find some evidence that if abilities and opportunities to prevent food waste are present, the effect of motivation on lower levels of food waste and higher levels of FWP household practices is amplified compared to when abilities and opportunities are absent. Also, abilities and opportunities, in some occasions, seem to prevent that competing goals lead to higher food waste levels or lower levels of FWP household practices. However, the number of significant results was limited and we also found results which were in the opposite direction of what was expected.**

**Table 2. Interaction of abilities with motivation & competing goals in predicting food waste.**

| | Food safety | Creative cooking | Accurate planning | Shelf life knowledge |
|---|---|---|---|---|
| **Awareness** | Overview+<br>Cooking precisely+ | | **Hungary+**<br>Overview+<br>**Stored+** | **Stored+** |
| **Attitude** | **Hungary+**<br>Using leftovers- | **Hungary-** | Impulse+<br>**Unused+** | **Total-**<br>**Unused-**<br>**Stored-** |
| **Social norm injun.** | **Total+**<br>**Hungary-**<br>**Netherlands+**<br>**Stored+** | **Hungary+** | **Planning-**<br>**Netherlands-** | Cooking precisely+<br>**Leftover+** |
| **Social norm descr.** | **Hungary+**<br>Impulse+<br>Cooking precisely+ | | **Hungary-** | Cooking precisely+<br>**Spain-** |
| **Health** | **Total+**<br>**Leftover+**<br>**Stored+** | | **Hungary+**<br>**Leftover-**<br>**Stored-** | **Spain+** |
| **Taste** | Cooking precisely+ | Planning-<br>**Netherlands +** | Impulse+ | **Unused-**<br>**Spain -** |
| **Convenience** | Impulse+<br>Overview+ | **Netherlands+**<br>**Stored+**<br>**Germany-** | | **Hungary-**<br>Overview+<br>Cooking precisely+ |
| **Enough** | Planning+ | **Netherlands-** | **Leftover+**<br>**Spain+** | Cooking precisely+<br>**Leftover-** |
| **Price** | | **Spain-**<br>**Hungary-**<br>**Germany+** | **Total-**<br>Planning+ | |
| **Not too much** | **Total-**<br>**Spain-** | **Hungary-** | | **Germany+** |

This table represents the significant interaction effects between motivation and abilities on total food waste (indicated with ***total***), food waste per country, (indicated with the **country name**), per state (**state**) & on each FWP household practice (**household practice**). If the result is in the expected direction, a "+" is noted, if not than a "– ".

**Table 3. Interaction of opportunities with motivation & competing goals in predicting food waste.**

| | Availability of products | Accessibility of store | Equipment In-home | Unforeseen events |
|---|---|---|---|---|
| **Awareness** | | Cooking precisely- | Stored- | Planning-<br>Using leftovers+<br>Stored+ |
| **Attitude** | Partly-<br>Stored+<br>Germany- | Netherlands-<br>Stored+<br>Germany+ | Cooking precisely-<br>Netherlands- | Using leftovers+<br>Stored+ |
| **Social norm injun.** | | Netherlands+<br>Overview-<br>Unused+ | Using leftovers- | |
| **Social norm descr.** | Unused+ | | Unused+<br>Leftover–<br>Netherlands- | |
| **Health** | Total+<br>Using leftovers-<br>Stored-<br>Spain- | Using leftovers+<br>Stored+ | | Stored+ |
| **Taste** | Stored+<br>Spain+ | Stored-<br>Germany- | Germany+ | Leftover-<br>Stored-<br>Unused+<br>Hungary+ |
| **Convenience** | Netherlands- | Total+<br>Unused+<br>Netherlands+<br>Spain+ | Germany+ | Stored-<br>Germany–<br>Planning+ |
| **Enough** | | Using leftovers- | Overview- | |
| **Price** | Hungary-<br>Cooking precisely- | Hungary+<br>Overview+ | Total+<br>Unused+<br>Partly+<br>Spain+ | Planning- |
| **Not too much** | | | | Hungary+ |

This table represents the significant moderations between motivation and opportunities on total food waste (indicated with *total*), food waste per country, (indicated with the **country name**), per state (state) & on each FWP household practice (household practice). If the result is in the expected direction, a "+" is noted, if not than a "– ".

### 5.7.5 What is the impact of the socio-demographic and psychographic factors?

In all tested models, we included the effect of age, household size, gender, country as we found differences in food waste levels when comparing the socio-demographic groups (see chapter 5.3). Older respondents reported less food waste than younger respondents, especially in Germany and the Netherlands. This effect remained present in our regression results, which indicates that the difference in food waste levels across age groups cannot fully be explained by the differences in FWP household practices, motivation, abilities and opportunities. Likewise, a similar pattern was found for household size in all countries; the larger the household the more food waste was reported and this effect remained in the regression analyses. This indicates that the difference in food waste levels across household with different sizes, cannot be fully explained by the differences in FWP household practices, motivation, abilities and opportunities. Gender was not significant in the regression results, expect for the Netherlands. In the Netherlands a direct effect remained, where females tend to waste less than males.

#### Psychographic variables

The effects of several psychographic variables were also investigated; awareness of the parents for food waste prevention during upbringing, perceived financial control and food involvement.

Awareness of parents for food waste prevention during the upbringing did not affect food waste levels, when taking into account differences in FWP household practices, motivation, ability, and opportunity. It did have an effect on several FWP household practices. Higher awareness during the upbringing, led to better overview of the food in stock, cooking precisely and use of leftovers. These differences could be explained by differences in motivation, ability and opportunity.

The respondents' perceived financial struggle to buy products they like, was linked to higher food waste levels, and its effect could be explained by differences in motivation, abilities, opportunities and FWP household practices. It was linked to more planning, frequent overview of the food in stock and more cooking precisely.

The food involvement scale was used to control for cultural differences regarding the handling of food. More food involvement did not influence overall food waste levels, when controlling for differences in motivation, ability, opportunity and FWP household practices.

**In summary, age, household size and country have an effect on food waste levels, additional to the differences in motivation, ability, opportunity, or FWP household practices. The psychographic factors have indirect effects on food waste levels which could be explained by differences in motivation, ability, opportunity, and FWP household practices.**

### 5.7.6 Conclusions about the model

The model that we tested hypothesized that FWP household practices influence food waste levels (H1), that motivation (H2) and competing goals (H3) influence food waste, that abilities (H4) and opportunities (H6) moderate the effect of motivation of FWP household practices and that abilities (H5) and opportunities (H7) directly affect FWP households practices, and that socio-demographic and psychographic factors (H8) affect food waste via their effect on motivation, ability and opportunity (see final model below).

The first hypothesis can be confirmed, **FWP household practices**, namely impulsive buying, overview of the food in stock, cooking precisely and use of plate & pan leftovers influence food waste levels, such that higher levels of practices lead to lower levels of food waste. Planning food shopping and use is also associated with household food waste, but it does not affect general food waste levels when taking into account the other practices.

The second hypothesis can also largely be confirmed. Several **motivations** influence food waste levels. Regarding motivation, the belief that important others waste food (descriptive social norm) and negative attitude (thoughts and feelings) towards food waste have a strong effect on food waste levels across food waste states and countries. Interestingly, the belief that others disapprove of wasting food and the awareness that food waste has negative consequences does not significantly affect food waste levels.

The **goals** to have tasty food and to have enough food, are in competition with food waste prevention. The more important these goals are, the more food waste is reported. The goal to have cheap food, is not in competition with food waste prevention, rather, consumers who are price orientated have less food waste. The goals to have convenient (in terms of meal preparation) or healthy food are not related to food waste levels.

Also, we found that **abilities** are associated with food waste levels. More perceived difficulty with cooking creatively, accurate planning and less shelf life knowledge lead to more food waste. Similarly, regarding **opportunities**, the availability of products in store and the prevalence of unforeseen events influences food waste levels.

For the fourth and fifth hypotheses some proof is found, but it cannot be fully confirmed. In some cases, motivation is more strongly translated into less food waste if abilities and opportunities are present. In other cases, these abilities and opportunities can help prevent that some competing goals contribute to food waste. However, we also tested many moderations which did not affect food waste and found several results which are in the opposite direction of what would be expected.

The sixth and seventh hypotheses can be confirmed: abilities and opportunities seem to (at least in part) influence household practices directly.

The eighth hypothesis is confirmed for the **psychographic factors**. More awareness for food waste prevention of the respondents' parents during upbringing is related to lower levels of food waste, and its effect can be explained by differences in motivation, abilities and opportunities. The same is true for perceived

difficulty with purchasing preferred items and food involvement. Yet, contrary to our expectations, several socio-demographic variables, namely respondents' age, household size and nationality, influenced food waste levels directly, also when taking motivation, ability, opportunity, and FWP household practices into account.

**In summary, FWP household practices, motivation, ability and opportunity factors all influence food waste levels. Age and household size have an additional effect on food waste.**

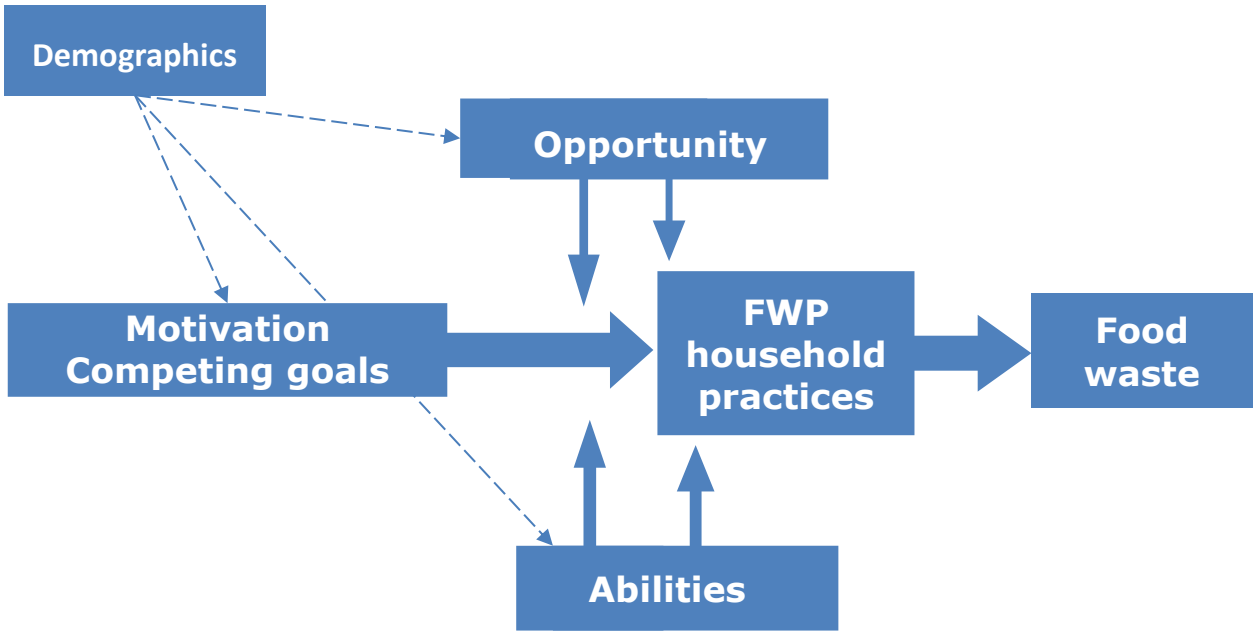



**Figure 29 Consumer food waste model**

# 6 Conclusion and discussion

### The Consumer Food Waste Model is useful for understanding food waste in the home

The results of this study are consistent with the Consumer Food Waste Model (see Figure 1). This suggests that it is a useful model for understanding food waste in the home. Motivation, abilities and opportunities are associated with how much food is wasted in-home. Consumer motivation is driving household food waste, but consumers' ability to prevent food waste is also of high importance. Without relevant skills and knowledge on handling food a consumer is less able to prevent food waste even though she/he may aim to do so. Similarly, consumers' opportunity to prevent food waste is essential, as a lack of perceived opportunities forms a barrier to prevent food waste. Additionally, there are direct effects of the abilities and opportunities on FWP household practice.

### The survey provides reliable measures to investigate in-home food waste in- & outside Europe

The constructs as presented in this research were shown to be reliable across countries, which means that the questions belonging to one construct were highly interrelated in each country. This implies that the research can reliably be applied in various developed countries. Application in, for instance, emerging economies has not yet been examined.

The research presents a way to gain insights into consumers' motivation, abilities, opportunity and FWP household practices, and allows for identifying the key aspects driving household in-home food waste. Additionally, the model is flexible enough to take into account cross-cultural aspects. Thus, the models and constructs developed in this research can be used to enlarge the understanding of in-home food waste and its drivers across cultures in- and outside Europe.

### How much and what kind of food is wasted?

The highest amount of average household food waste in one week is reported in Spain (534 gram, per household per week), which is higher than the other three countries. The amounts reported in the other countries do not statistically significantly differ from each other: Hungary (417 gram), Germany (425 gram) and the Netherlands (365 gram). The higher amount of household food waste in Spain appears due to the higher number of large households in that country. Indeed, the amount of food waste per person (above age 14) is not significantly different in Spain, Hungary, and Germany, while it is lower in the Netherlands.

Across countries, most reported wasted food is food that has been partly used (37%) or not used at all (29%), and a smaller share of the food is wasted as leftovers on plates and in pots (21%) or as leftovers which were previously stored (13%). In most countries, bread, fresh fruit and fresh vegetables are disposed of most often, followed by non-alcoholic drinks (including milk), yoghurt, meat and potatoes. An exception is Hungary, where soup (often prepared from fresh vegetables) is disposed more often than fresh vegetables.

This indicates that predominantly perishable products are wasted, and that this food is often not used, or only partially used, before being thrown away.

### FWP household practices are related to household food waste

In-home food waste is the consequence of an accumulation of household practices performed over time, rather than of a single behaviour. Together, FWP practices (planning of food shopping and use, less impulse buying, overview of the food in stock, cooking precisely, and using leftovers) account for 22% of the variance in household food waste. Therefore, FWP practices are an important policy target.

### Food waste prevention via motivation: Consumers who think that others waste little, waste less themselves

Consumers' motivation to prevent food waste is associated with how much food is wasted. In particular, their attitude (thoughts and feelings) towards wasting food and their belief that relevant others (not) waste food matter. Interestingly, the more strongly consumers believe that relevant others waste food, the more food they waste themselves. Their awareness of the consequences of food waste and belief that relevant others disapprove when they (i.e., the consumer) waste food have no significant influence on food waste levels.

Extrapolating from these results, it is suggested that stressing the scope and consequences of food waste may be a less effective or insufficient strategy to reduce food waste levels. In contrast, in-home food waste may be better influenced by positive messages, as that others (e.g., friends, family, and neighbours) aim to prevent food waste.

Special attention should be paid to other consumer goals related to food. Consumers who aim to have sufficient and tasty food are more likely to waste food. This indicates that people may be more willing to prevent food waste if solutions are found that also ensure they have enough, tasty food. Another goal which influences food waste levels, is the importance of price. Consumers who are price sensitive are less likely to waste food.

### Food waste prevention via abilities: Consumers with good food planning, preparation, and storage skills waste less

The level of skills and knowledge consumers have to prevent food waste, influences how much they waste. Consumers who have good skills to plan accurately, to cook creatively with leftovers, and who know how to prolong shelf life of products, waste less food. This has potential implications in terms of educating consumers. Providing help with creative cooking (e.g., recipes), planning, and shelf life, could be effective in reducing household food waste.

### Food waste prevention via opportunities: Consumers who have fewer unforeseen changes in their meal schedule, and who perceive that stores have food in the quality and quantity that they need, waste less

Consumers who have opportunities to prevent food waste are also more likely to do so. For instance, the offered supply in stores influences food waste levels. Consumers who can buy products matching their household needs in terms of quality and quantity, are likely to make use of the possibility and hence waste less.

Additionally, the prevalence of unforeseen events strongly influences food waste levels. Consumers who more often encounter unforeseen changes in their schedule (or the schedules of others in their household) tend to waste more food.

## Limitations of the study

The food waste method used in this study allows for detailed investigations of the categories and states of the food disposed. Yet, although great care was taken to accurately measure household food waste, the method has been shown to give an underrepresentation of the actual amount of food wasted (van Herpen et al. 2016a). This should be taken into consideration when interpreting the amounts of food waste reported. This is also evident when comparing the results with previous studies, in which amounts of food waste were typically higher than those reported here (e.g., German households: Kranet et al., 2012 (as discussed in Frohnmaier et al., 2015), 775 grams; Dutch households: Van Westerhoven (2013), 903 grams). Yet, results for the relative proportion of food categories within the overall food waste found in the current study were similar to those reported in prior research. As shown before, the most wasted product categories were bread, vegetables, fruits, dairy and meat. Likewise, both in our study and in prior research, the state of the food when disposed is similar (predominately uncooked products).

During the preparation of the food waste measure and survey questions, much attention has been directed to the cross-cultural dimension of this study. Frequent meetings were set up to discuss wording and interpretation with the local partners when designing the questions and during translation. This strongly reduces the risk of different interpretations across countries. Our reliability measures also show that there is high similarity across items belonging to the same construct, across countries. Nonetheless, this risk that individual question are interpreted slightly differently in different countries can never be completely excluded.

The results presented in this report are based on a correlational study. In order to be certain about causal effects further research is needed, for example studies using an experimental design or intervention studies.

# 7 Policy implications

This report summarizes the findings of a large-scale survey on household food waste levels, as well as on the effects of motivation, abilities, opportunities and food waste prevention (FWP) household practices on levels of food waste. The study was conducted in Germany, Hungary, Spain and the Netherlands. Based on the results, policy implications can be extracted. Yet, future research is needed to explore each option in more detail, especially in regards to the effectiveness of specific policy interventions.

**Normalise food waste prevention.** The stronger people's belief that others waste food, the more they waste themselves. It seems that this social norm leads to a normalisation of wasting food. If people perceive that everyone wastes food, then why should they act? Therefore, it is advised to be careful with awareness campaign that emphasize the large amounts of waste generated by consumers. This may unintendedly normalise the behaviour, and make it less likely that consumers will act to lower their waste level. Instead, it is advised to strengthen the belief that everyone is taking action to prevent food waste.

**Keep reinforcing that food waste is negative behaviour.** People predominantly think and feel negatively about wasting food. Still, persons with the most negative thoughts and feelings have the least food waste in their household. Therefore, it may be beneficial to keep reinforcing that wasting food is a negative behaviour. However, the focus should not be on the injunctive social norm, thus people's belief that others in their social network disapprove when they waste food, as this was found to have no significant impact on food waste levels. Rather, their own negative thoughts and feelings could be reinforced.

**Supplement campaigns to increase awareness of the consequences of food waste with other strategies.** People's awareness of the consequences of food waste had little effect on food waste levels. This implies that emphasizing the scope and consequences of food waste may only be effective in reducing food waste levels if combined with other strategies as those to improve abilities.

**Improve the skills & knowledge of people.** Consumers who feel more able to plan accurately, to estimate food safety, to cook creatively and to prolong shelf-life, perform more behaviours which are linked to food waste prevention, and have less food waste. Also, other food related goals as having tasty food or having enough, are less likely to drive food waste if the right abilities are present. Recently, several devices have entered the consumer market, as smart fridges or tools to estimate food safety. These developments could overcome people's lack of ability to prevent waste. Yet, it should be taken into account that implementation of these devices requires investments and attention. Another strategy to increase ability, is to provide detailed instructions on packages. This way, the right information is available at the moment when it is needed.

**Optimize the store supply.** Stores could contribute to combating household food waste levels by offering smaller portion sizes, especially for perishable products. People who perceive a lack of the right supply in terms of quality and quantity

report more food waste. Too large packaging increases the likelihood that products are spoiled before they are consumed.

**Stimulate improvement of consumers' FWP household practices.** Improving the FWP practices is likely to reduce food waste. This means that impulse buying should be discouraged, and overview of the food in stock, cooking precisely and storing & using of leftovers encouraged.

**Health versus food waste campaigns.** Based on our results, the goal to eat healthily does not affect food waste levels. A potential worry was that the societal focus on eating healthily may increase food waste levels. It was thought that consumers may buy more perishable products because of their health aim, but end up spoiling these products. We do not find support for this claim, which would imply that education campaigns aiming at both healthy eating (e.g., in appropriate portion sizes) and reducing food waste are feasible. These goals do not seem to be in competition and, therefore, more broader-based food education may be a promising policy option.

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# 9 Annex

## 9.1 Questionnaire

### Questionnaire A.

Thank you for participating in this research.

This questionnaire is part of consumer survey for the European project REFRESH. In this research we would like to ask you a few questions about how food is handled in your household. There are no correct or incorrect answers, it is about understanding your situation. This questionnaire will take about 6 minutes.

In case you fit the target group of this research, you can be in invited for the second part of this research after completing this questionnaire. For this, you will soon be asked to pay attention for one week to what kind of food you have in your household. After this week, we would like to ask you a few more questions.

Are you willing to participate in both parts?

1. Yes
2. No

What is your gender?

1. Man
2. Woman

What is your age?

[answer recorded in years]

What is your highest level of education (completed)?

[Answer options adjusted for the national situation]

In which province do you live?

[Answer options adjusted for the national situation]

Of how many people does your household consist, including yourself?

[Answer in number]

How often do you do the groceries in your household? [screening question]

1. Less than half the times. [screen out]
2. Half the times.
3. More than half the times

How often do you do the cooking in your household? [screening question]

1. Less than half the times. [screen out]
2. Half the times.
3. More than half the times

First of all, we would like to know what you think is important. Regarding food in my household it is important to me that… [items in randomized order, 7-point answering scale ranging from not at all important to extremely important]

1. the food is healthy.
2. the food is tasty.
3. the food is easy to prepare.
4. I have enough food at home.
5. the food is cheap.
6. I don't have too much food at home.

We would like to ask you a few questions about yourself.

What is the size of the place where you live?

[Answer options adjusted for the national situation]

What is your net monthly household income? For this, add up your net income with the net income of your other family members.

[Answer options adjusted for the national situation]

How old are the people you live with? [not reported upon in the current document]

[Multiple answers in years]

How many people usually join the main meal, including yourself? [not reported upon in the current document]

1. … persons
2. This varies greatly

For each day, please indicate how many persons usually join the main meal: [not reported upon in the current document]

1. Monday: … persons
2. Tuesday: … persons
3. Wednesday: … persons
4. Thursday: … persons
5. Friday: … persons
6. Saturday: … persons
7. Sunday: … persons

What are the XXX numbers of your ZIP-code?

[Answer options adjusted for the national situation]

How often do you your grocery shopping online? [not reported upon in the current document]

[7-point scale ranging from never to every time]

What describes how you do your grocery shopping best? [not reported upon in the current document]

1. I buy for multiple days at once
2. I buy as many products as possible at once and buy a few products at other times
3. I buy a few products each time

How often do you go grocery shopping? [not reported upon in the current document]

4. 1x per month
5. 2x per month
6. 1x per week
7. 2/3 x per week
8. 4/5x per week
9. Daily

On average, how long does it take you to prepare the main meal of the day (in minutes)? [not reported upon in the current document]

[Answer in minutes]

Finally, we would like to ask you a few questions about the considerations you make. Each time, you will see two different statements. Please indicate which of the two statements is most decisive to you. [items in randomized order] [not reported upon in the current document]

1. The food is healthy
2. The food is tasty

1. The food is healthy
2. The food is easy to prepare

10. The food is healthy
11. I have enough food at home

1. The food is healthy
2. The food is cheap

1. The food is healthy
2. I don’t have too much food at home

1. The food is tasty
2. The food is easy to prepare

1. The food is tasty
2. I have enough food at home

1. The food is tasty
2. The food is cheap

1. The food is tasty
2. I don’t have too much food at home

1. The food is easy to prepare
2. I have enough food at home

1. The food is easy to prepare
2. The food is cheap

1. The food is easy to prepare
2. I don't have too much food at home

1. I have enough food at home
2. The food is cheap

1. I have enough food at home
2. I don't have too much food at home

1. The food is cheap
2. I don't have too much food at home

Thank you for completing this survey. You have been selected to participate in the full research.

For the second part of this research we would like to ask you to pay close attention to the food and drink products you throw away in the upcoming week: from this Monday [DATE] up to and including Sunday [DATE].

After this week, you will receive a survey with questions about what you have thrown away.

This question will be about: All edible food and drink products you have bought in the (online) (super) market or have home-grown that are thrown away. This also includes products that are spoiled or past their expiration date. It does not matter if you have thrown the food away in the general trashcan, food waste container, compost heap or gave it to an animal (pet, birds, et cetera), or otherwise. It is all included.

It will not be about:

1. Bones, peels, seeds or stumps.
2. Food and drink products that are thrown away when eating in a restaurant or canteen.

Thank you very much in advance!

### Introduction to the second survey

Last week you received an email to pay close attention to the food and drink product you have thrown away. This questionnaire will be about those products. As a reminder:
This question **will** be about:

- All edible food and drink products you have bought in the (online) (super) market or have home-grown that are thrown away.
- This also includes products that are spoiled or past their expiration date.
- It does not matter if you have thrown the food away in the general trashcan, food waste container, compost heap or gave it to an animal (pet, birds, et cetera), or otherwise. It is all included.

It will **not** be about:

1. Bones, peels, seeds or stumps.
2. Food and drink products that are thrown away when eating in a restaurant or canteen.

## Questionnaire B – food waste measure

### Food categories

Question 1: Please tick the boxes of the products that are disposed of in your household in the past week. In case of complete meals, please report the main ingredients separately.

- ☐ Fresh vegetables and salads
- ☐ Non-fresh vegetables (jar / canned / frozen)
- ☐ Fresh fruit
- ☐ Non-fresh fruit (jar / canned / dried / frozen)
- ☐ Potatoes
- ☐ Potato products (fries, chips, baby or precooked potatoes, et cetera)
- ☐ Pasta
- ☐ Rice and remaining grains (including wraps, couscous, et cetera)
- ☐ Beans, lentils, chickpeas, et cetera.
- ☐ Meat (please report cold meat slices at "bread toppings")
- ☐ Meat substitute
- ☐ Fish
- ☐ Bread toppings (cold meats slices, cheese slices, sweet topping, et cetera)
- ☐ Bread
- ☐ Cereals (muesli, granola, oat, brinta, et cetera)
- ☐ Yoghurt, custard, et cetera
- ☐ Cheese (cheese cubes, French cheese, sprinkle cheese. Excluded: cheese as bread topping)
- ☐ Eggs
- ☐ Soups / curry
- ☐ Sauce (ketchup, mayonnaise, cocktail sauce, et cetera)
- ☐ Candy / cookies / granola bars / chocolate bars
- ☐ Crisps / nuts
- ☐ Non-alcoholic beverages (milk, juice, soda. Excluded: water, tea, coffee, diluted syrup)
- ☐ Alcoholic beverages
- ☐ I have not thrown away any food or drink products

### Instructions to the second survey

Food waste states

We split food waste into several categories, which are explained below. Please read this carefully as these categories will be used in the next questions.

Food waste can be categorised into:

1) Completely unused foods: food that is disposed of which is not used at all. For instance, unopened packages, including unopened parts of multipacks, moulted apples, dried leek, complete bread.
2) Partly used foods: food that is disposed of after it has been party used. For instance, a few bread slices, halve a package of meat cuts, halve an onion or halve a package of milk.
3) Meal leftovers: leftovers that are disposed of after these were left on the plate, pots or pans. For instance, potato mash or rice that is left on the plate or in the pan, sandwiches that were not eaten during lunch.
4) Leftovers after storing: meal leftovers that are disposed of after these were stored in

the fridge or freezer to be eaten at a later moment. For instance, a frozen pasta portion of last week.

You will receive several questions about different type of food and drink products you have disposed of in the past week. First, we ask how much of a certain product your household disposed of in the past week. Next, we ask to which category (unused, partly used, meal leftovers, leftover after it was stored) the majority of the disposed of food product belonged when it was disposed of. Please pay attention to which food product if refers!

### Respondents received questions corresponding to their ticked boxes

Question 2: Fresh vegetables and salads.

In your household, how much fresh vegetables were disposed of in the past week?

*One serving spoon equals 50 gram. As a reference: this is equal to halve a leek or four mushrooms.*

- ❍ Less than one serving spoon
- ❍ 1 to 2 serving spoons
- ❍ 3 to 4 serving spoons
- ❍ 5 to 6 serving spoons
- ❍ More than 6 serving spoons

Question 3: To which category did the (majority) of the disposed of fresh vegetables and salads belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., a leek)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half an union)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: Meal leftovers that are disposed of after these were stored

Question 4: Non-fresh vegetables (jar / canned / frozen).

In your household, how many non-fresh vegetables (jar / canned / frozen) were disposed of in the past week?

*One serving spoon equals 50 gram. As a reference: this is equal to halve a leak or four mushrooms.*

- ❍ Less than one serving spoon
- ❍ 1 to 2 serving spoons
- ❍ 3 to 4 serving spoons
- ❍ 5 to 6 serving spoons
- ❍ More than 6 serving spoons

Question 5: To which category did the (majority of) disposed of non-fresh vegetables belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., unopened frozen / canned spinach package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half used frozen / canned spinach package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: Meal leftovers that are disposed of after these were stored

Question 6: Fresh fruit.

In your household, how many fresh fruits were disposed of in the past week?

*One apple or banana is one piece of fruit. In case of small fruits, such as strawberries or grapes, one small bowl is considered 'one piece'.*

- Approximately one fourth of a piece of fruit or less
- Approximately halve a piece of fruit
- Approximately 1 piece of fruit
- 2 to 4 pieces of fruit
- More than 4 pieces of fruit

Question 7: To which category did the (majority of) disposed of fresh fruit belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- Completely unused foods: food that is disposed of which is not used at all (e.g., an apple)
- Partly used foods: food that is disposed of after it is party used (e.g., half an apple that is not used in a dish)
- Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans (e.g., half eaten apple or a fruit salad)
- Leftovers after storing: Meal leftovers that are disposed of after these were stored (e.g. fruit salad after it was stored)

Question 8: Non-fresh fruit (jar / canned / dried / frozen).

In your household, how many non-fresh fruits (jar / canned / dried / frozen) were disposed of in the past week?

*One pear or peach from a can is one piece of fruit. In case of small fruits, as blueberries or tangerine wedges, one small bowl is considered 'one piece'.*

- Approximately one fourth of a piece of fruit or less
- Approximately halve a piece of fruit
- Approximately 1 piece of fruit
- 2 to 4 pieces of fruit
- More than 4 pieces of fruit

Question 9: To which category did the (majority of) disposed of non-fresh fruit belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount*.

- Completely unused foods: food that is disposed of which is not used at all (e.g., unopened fruit can)
- Partly used foods: food that is disposed of after it is party used (e.g., half full fruit can)
- Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans (e.g. bowl with fruit)
- Leftovers after storing: Meal leftovers that are disposed of after these were stored (e.g. fruit salad after it was stored)

Question 10: Potatoes

In your household, how many potatoes were disposed of in the past week?

*One serving spoon equals 50 gram. As a reference: this is equal to halve a midsize potato.*

- Less than one serving spoon
- 1 to 2 serving spoons
- 3 to 4 serving spoons
- 5 to 6 serving spoons
- More than 6 serving spoons

Question 11: To which category did the (majority of) disposed of potatoes belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- Completely unused foods: food that is disposed of which is not used at all (e.g., complete potato package)
- Partly used foods: food that is disposed of after it is party used (e.g., half a potato package)
- Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans (e.g. smashed potato)
- Leftovers after storing: meal leftovers that are disposed of after these were stored (e.g. smashed potato after it was stored)

Question 12: Potato products (fries, baby potatoes, precooked potatoes, et cetera).

In your household, how many potato products (fries, precooked potatoes, et cetera) were disposed of in the past week?

- ❍ Less than 10 fries / baby potatoes / pieces
- ❍ 10 to 25 fries / baby potatoes / pieces
- ❍ More than 25 fries / baby potatoes / pieces (approximately half a package of 500 gram)
- ❍ Full package (750 gram) fries / baby potatoes / pieces
- ❍ More than a package (750 gram) fries / baby potatoes / pieces

Question 13: To which category did the (majority of) disposed of potato products belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete potato fries package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a potato fries package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 14: Pasta

In your household, how much pasta was disposed of in the past week?

*One serving spoon equals 50 gram.*

- ❍ Less than one serving spoon
- ❍ 1 to 2 serving spoons
- ❍ 3 to 4 serving spoons
- ❍ 5 to 6 serving spoons
- ❍ More than 6 serving spoons

Question 15: To which category did the (majority of) disposed of pasta belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete pasta package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half pasta package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 16: Rice and remaining grains (including wraps, couscous, et cetera).

In your household, how much rice and remaining grains (including wraps, couscous, et cetera) was disposed of in the past week?

*One serving spoon equals 50 gram.*

- ❍ Less than one serving spoon
- ❍ 1 to 2 serving spoons
- ❍ 3 to 4 serving spoons
- ❍ 5 to 6 serving spoons
- ❍ More than 6 serving spoons

Question 17: To which category did the (majority of) disposed of rice belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete rice package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half rice package)
- ☐ Meal leftovers: meal leftovers that are disposed of after it was left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after it was stored

Question 18: Beans, lentils, chickpeas, et cetera.

In your household, how much beans, lentils, chickpeas, et cetera were disposed of in the past week?

- ❍ Less than one serving spoon
- ❍ 1 to 2 serving spoons
- ❍ 3 to 4 serving spoons
- ❍ 5 to 6 serving spoons
- ❍ More than 6 serving spoons

Question 19: To which category did the (majority of) disposed of beans, lentils, chickpeas, et cetera belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., unopened bean jar)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half full bean jar)
- ☐ Meal leftovers: meal leftovers that are disposed of after it was left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after it was stored

Question 20: Meat.

In your household, how much meat was disposed of in the past week?

*A portion refers to one chicken breast, one steak, et cetera. In case of smaller pieces, as minced meat, try to estimate it in whole pieces of meat (e.g., one package of minced meat is equal to two portions).*

- ❍ Approximately half a portion or less
- ❍ Approximately one portion
- ❍ 2 to 3 portions
- ❍ 4 to 5 portions
- ❍ More than 5 portions

Question 21: To which category did the (majority of) disposed of meat belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., sausage package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a sausage package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 22: Meat substitutes.

In your household, how much meat substitutes were disposed of in the past week?

*A portion refers to a vegetarian burger, et cetera. In case of smaller pieces, as minced meat, try to estimate it in whole pieces of meat (e.g., one package of minced vegetarian meat is equal to two portions).*

- ❍ Approximately half a portion or less
- ❍ Approximately one portion
- ❍ 2 to 3 portions
- ❍ 4 to 5 portions
- ❍ More than 5 portions

Question 23: To which category did the (majority of) disposed of meat substitutes belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., vegetarian burger package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a vegetarian burger package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 24: Fish.

In your household, how much fish was disposed of in the past week?

*A portion refers to one fish filled, one piece of salmon, et cetera.*

- ❍ Approximately half a portion or less
- ❍ Approximately a complete portion
- ❍ 2 to 3 portions
- ❍ 4 to 5 portions
- ❍ More than 5 portions

Question 25: To which category did the (majority of) disposed of fish belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete fish package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a fish package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 26: Bread toppings (cold meats slices, cheese slices, sweet topping, et cetera). In your household, how much bread toppings (cold meats slices, cheese slices, sweet topping, et cetera) were disposed of in the past week?

*One portion is what is used on one slice of bread / sandwich / portion of baguette.*

- ❍ Approximately half a portion or less
- ❍ Approximately a complete portion
- ❍ 2 to 3 portions
- ❍ 4 to 5 portions
- ❍ More than 5 portions

Question 27: To which category did the (majority of) disposed of bread toppings belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete package with meat slices)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a package with meat slices)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 28: Bread.

In your household, how much bread was disposed of in the past week?

*A (raisin) bun, portion of baguette or sandwich is similar to one slice of bread.*

- ❍ Less than one slice of bread
- ❍ One or a few slices of bread
- ❍ Approximately half a loaf
- ❍ Approximately one loaf
- ❍ More than one loaf

Question 29: To which category did the (majority of) disposed of bread belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount*.

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., whole loaf)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., slices of bread)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans (e.g., bread crusts)
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 30: Cereal (muesli, granola, oat, porridge, et cetera).

In your household, how much cereal (muesli, granola, oat, porridge, et cetera) was disposed of in the past week?

*A portion is the amount of cereals used for one bowl of breakfast.*

- ❍ Less than half a portion
- ❍ A half to one and a half portion
- ❍ Multiple portions (approximately half a package)
- ❍ Approximately a complete package
- ❍ Multiple packages

Question 31: To which category did the (majority of) disposed of cereals belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete cereal package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a cereal package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 32: Yoghurt, custard, et cetera.

In your household, how much yoghurt, custard, et cetera was disposed of in the past week?

*A portion is a small bowl with yoghurt / custard / et cetera.*

- ❍ Less than half a portion
- ❍ A half to one and a half portion
- ❍ Multiple portions (approximately half a litre package)
- ❍ Approximately a complete litre package
- ❍ Multiple litre packages

Question 33: To which category did the (majority of) disposed of yoghurt, custard, et cetera belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete yoghurt package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a yoghurt package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 34: Cheese (cheese dices, French cheese, sprinkle cheese; excluded: cheese as bread topping).

In your household, how much cheese (cheese dices, French cheese, sprinkle cheese; excluded: cheese as bread topping) was disposed of in the past week?

*A handful of cheese can be seen as a dice of cheese.*

- ❍ Less than one dice of cheese
- ❍ Approximately one dice of cheese
- ❍ 1 to 3 cheese dices
- ❍ 4 to 5 cheese dices
- ❍ More than 5 cheese dices

Question 35: To which category did the (majority of) disposed of cheese belong? *Please tick the category that occurred the most.*

*You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete French cheese)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., partly used French cheese)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 36: Eggs.

In your household, how many eggs were disposed of in the past week?

- ❍ Less than 1 egg
- ❍ 1 egg
- ❍ 2 to 3 eggs
- ❍ 4 to 5 eggs
- ❍ More than 5 eggs

Question 37: To which category did the (majority of) disposed of eggs belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete eggs)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., egg white)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 38: Soups / curry.

In the household, how much soup / curry was disposed of in the past week?

- ❍ Less than half a ladle
- ❍ Half to one and a half ladle
- ❍ Multiple ladles (approximately half a litre)
- ❍ Approximately 1 litre
- ❍ More than 1 litre

Question 39: To which category did the (majority of) disposed of soup belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete soup package). Not applicable in case of home-made soup
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a soup package). Not applicable in case of home-made soup
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans (warmed package of soup or home-made soup)
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 40: Sauces (ketchup, mayonnaise, cocktail sauce, et cetera).

In your household, how much sauce (ketchup, mayonnaise, cocktail sauce, et cetera) was disposed of in the past week?

*One tablespoon equals 15 grams.*

- ❍ Less than a table spoon
- ❍ 1 to 3 table spoons
- ❍ Multiple table spoons
- ❍ Approximately half a jar / bottle
- ❍ More than one jar / bottle

Question 41: To which category did the (majority of) disposed of sauces belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount*.

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., complete sauce jar)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a sauce jar)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 42: Candy / cookies / granola bars / chocolate bars.

In your household, how much candy / cookies / granola bars / chocolate bars were disposed of in the past week?

*A portion is a handful of sweets, small chocolate bar, a cookie, et cetera.*

- ❍ Approximately half a portion or less
- ❍ Approximately one portion
- ❍ 2 to 3 portions
- ❍ 4 to 5 portions
- ❍ More than 5 portions

Question 43: To which category did the (majority of) disposed of candy belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., one cookie package)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a cookie package)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 44: Crisps / nuts.

In your household, how much crisps / nuts were disposed of in the past week?

*A portion is a handful of crisps or nuts.*

- ❍ Approximately half a portion or less
- ❍ Approximately one portion
- ❍ 2 to 3 portions
- ❍ 4 to 5 portions
- ❍ More than 5 portions

Question 45: To which category did the (majority of) disposed of crisps / nuts belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: food that is disposed of which is not used at all (e.g., bag of crisps)
- ☐ Partly used foods: food that is disposed of after it is party used (e.g., half a bag of crisps)
- ☐ Meal leftovers: meal leftovers that are disposed of after these were left on the plate, pots or pans
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 46: Non-alcoholic beverages (milk, juice, soda; excluded: water, tea, coffee, diluted syrup).

In your household, how much non-alcoholic beverages (milk, juice, soda; excluded: water, tea, coffee, diluted syrup) was disposed of in the past week?

- ❍ Less than half a glass
- ❍ A half to one and a half glass
- ❍ Multiple glasses (approximately half a litre)
- ❍ Approximately one litre
- ❍ More than one litre

Question 47: To which category did the (majority of) non-alcoholic beverages belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: drinks that are disposed of which are not used at all (e.g., a milk package)
- ☐ Partly used foods: drinks that is disposed of after it is party used (e.g., half a milk package)
- ☐ Meal leftovers: beverage that is left in the glass
- ☐ Leftovers after storing: meal leftovers that are disposed of after these were stored

Question 48: Alcoholic beverages.

In your household, how many alcoholic beverages were disposed of in the past week?

- ❍ Less than half a beer glass
- ❍ Half to one and a half beer glass
- ❍ Multiple beer glasses (approximately half a litre)
- ❍ Approximately one litre
- ❍ More than one litre

Question 49: To which category did the (majority of) alcoholic beverages belong?

*Please tick the category that occurred the most. You can tick more than one box if multiple categories occurred in the same amount.*

- ☐ Completely unused foods: drinks that are disposed of which are not used at all (e.g., a bottle of wine)
- ☐ Partly used foods: drinks that are disposed of after it is party used (e.g., half a bottle of wine)
- ☐ Meal leftovers: beverage that is left in the glass
- ☐ Leftovers after storing: beverage leftovers that are disposed of after these were stored

Thank you very much for completing this questionnaire. In case you of any comments, you can type these in the space below.

**NOTE**: The food examples given in each question were adjusted where needed to match the country specific situation and enlarge the respondents' understanding.

## Questionnaire B items

| Construct statements (Items based on) | Cronbach α | Reference |
|---|---|---|
| **Planning of food shopping and use[A]** | .76 | Based on Exodus, 2007; Stefan et al., 2013; FRL |
| I make a shopping list | | |
| I plan what I am going to cook on each day of the week | | |
| I make sure that food that is almost spoiled gets eaten first | | |
| I plan the handling of food in my household | | |
| I plan the buying and cooking of food. | | |
| **Impulse buying[A]** | .69 | Ridgway et al., 2008 |
| I buy products that I did not need | | |
| I buy food that I had not plan to buy | | |
| Regarding food, I consider myself an impulsive buyer | | |
| **Overview of food in stock[A]** | .82 | Developed |
| I know exactly what I have in stock | | |
| I can see what I have in stock in one glance | | |
| I make sure that food that needs to be eaten first lies in sight | | |
| My shelves and/or fridge are organised | | |
| **Cooking precisely[A]** | .77 | Based on Quested et al., 2013 |
| I aim to not have any unnecessary leftovers | | |
| I measure the ingredients of the meal | | |
| I'm precise in cooking the right quantities | | |
| Before cooking, I think carefully about the quantities I need | | |
| **Using leftovers[A]** | .83 | Developed; Based on Exodus, 2007; Brook Lyndhurst, 2007 |
| I finish my plate | | |
| If I have dished too much on my plate, I save the leftovers | | |
| If I have cooked too much, I save the leftovers | | |
| The leftovers I store, will be eaten | | |
| All my prepared food will eventually be eaten (incl. leftovers) | | |
| If I have leftovers on the plate or in the pan, then these will be saved. | | |
| **Awareness of consequence[B]** | .89 | Based on Klöckner 2013 |

| | | |
|---|---|---|
| If I throw away food then this is bad for the environment | | |
| If I throw away food, then this has consequences for future generations | | |
| If I throw away food then this have consequences for less fortunate people | | |
| If I throw away food, then this has consequences for the division of food across the world | | |
| If I throw away food, then this has negative consequences | | |
| If I throw away less food, then I contribute to a better world | | |
| If I throw away food, then this has financial consequences for my household | | |
| **Attitude[C1-4]** | .89 | Based on Ajzen, 1991,2005 |
| For me, throwing away food is: | | |
| For me, throwing away food is: | | |
| Throwing away food gives me a … feeling: | | |
| Throwing food gives me a … feeling: | | |
| **Social norm injunctive[B]** | .84 | Based on Stefan et al., 2013 |
| Most people important to me disapprove of me throwing away food | | |
| Most people important to me support me if I do not throw away food | | |
| Most people important to me expect me to not throw away food | | |
| **Social norm descriptive[B]** | .86 | |
| Most people important to me throw away food regularly | | |
| My neighbours and acquaintances throw away food regularly | | |
| My friends throw away food regularly | | |
| **Difficulty with assessing food safety[B]** | .91 | Developed |
| I find it difficult to estimate if food is still safe to eat based on seeing, smelling, and / or tasting | | |
| It is difficult to estimate if food is still safe to eat | | |
| Sometimes I do not know if food is still safe to eat | | |
| **Difficulty to cook creatively[B]** | .85 | Developed |
| I find it difficult to prepare a meal from (parts of) products I happen to still have at home | | |
| I find it difficult to prepare leftovers into new meals | | |
| I find it difficult to deviate from a (for me known) recipe | | |
| I leave food in the fridge for too long, because I do not know what to cook with it | | |

| | | |
|---|---|---|
| **Difficulty to plan accurately[B]** | .91 | Developed: Stancu et al., 2016 |
| I find it difficult to estimate how much food I need to buy | | |
| I find it difficult to estimate how much food my household shall eat during the week | | |
| I find it difficult to estimate how much food I need to cook for a main meal | | |
| **Shelf-life knowledge[B]** | .90 | Based on Exodus, 2007 |
| I know the best way to keep fruit and vegetables fresh as long as possible | | |
| I know the best way to keep meat and fish fresh as long as possible | | |
| I know at which temperature I should keep the fridge to keep my food fresh as long as possible | | |
| I know how to keep products fresh as long as possible | | |
| **Availability of products[B]** | .84 | Developed |
| The (online) (super)market where I buy most of my food products: has good quality products | | |
| has package sizes which match the quantities I need | | |
| has a supply which match with what I need for my household | | |
| has the right supply available | | |
| helps me to buy accurately | | |
| **Accessibility to store[B]** | .82 | Developed |
| The (online) (super)market where I buy most of my food products: has convenient openings hours | | |
| has a convenient location | | |
| Is accessible when I want to shop for food | | |
| **Equipment and space in home[B]** | .88 | Developed |
| I have enough space in my cupboards to store my food | | |
| I have enough space in my fridge to store my food | | |
| I have enough space in my freezer to store my food | | |
| I have enough kitchen supply at home (e.g. plastic containers) | | |
| I have enough possibilities to store food in my kitchen | | |
| **Prevalence of unforeseen events[B]** | .77 | Developed |
| The amount of people that join for dinner often changes last-minute | | |

| | | |
|---|---|---|
| Sometimes I am too tired to prepare the meal for which I bought the products | | |
| Due to a busy schedule or last-minute plans, I sometimes do not prepare the meal for which I bought the products | | |
| Due to unexpected circumstances, I sometimes have food left over | | |
| Sometimes the meals during the week diverge from what I had planned | | |
| I often feel under time pressure in my day to day life | | |
| **Parents' attention to preventing food waste[B]** | .84 | Developed |
| My parents paid attention to preventing throwing away food | | |
| My parents taught me to handle food with appreciation and care | | |
| When growing up, I was not allowed to throw away food | | |
| **Perceived financial situation[B]** | | Developed |
| It is a financial struggle for me to buy the foods I like | | |
| **Food involvement scale[B]** | .86 | Bell and Marshall, 2003 |
| Cooking or barbequing is much fun | | |
| Talking about what I ate of am going to eat is something I like to do. | | |
| Compared to other daily decisions, my food choices are very important | | |
| I enjoy cooking for others and myself | | |
| I like to mix or chop food | | |
| I think much about food each day. | | |
| For me, meal time is an important moment of the day | | |

All items were answered on a 7-points scale.
[A] Never– Rarely – Occasionally – Sometimes –Frequently – Usually - Every time
[B] Strongly disagree - Disagree - Somewhat disagree - Neutral - Somewhat agree - Agree - Strongly agree
[C1] Very foolish – Foolish- Somewhat foolish Neutral - Somewhat wise - Wise -Very wise
[C2] Very irresponsible - Irresponsible - Somewhat irresponsible - Neutral - Somewhat responsible - Responsible - Very responsible
[C3] Very sad - Sad - Somewhat sad - Neutral - Somewhat happy – Happy - Very happy
[C4] Very guilty – Guilty - Somewhat guilty - Neutral - Somewhat indifferent – Indifferent - Very indifferent

## 9.2 Pilot studies

The survey was developed based on prior literature and tested in two pilot studies in Dutch.

### First pilot

In the first pilot, 185 respondents participated. They were approached via an email list with Dutch citizens who gave consent to receive invitations to participate in research conducted by the Marketing and Consumer Behaviour group of Wageningen University. Among the respondents one coupon of 25 euro was raffled. The respondents had a mean age of 45.50 years and 66.50% was female.

Based on this pilot, we decided to delete or change the wording of several items to improve the operationalisation of constructs. Also, the conclusion was drawn that several constructs may be formative rather than reflective constructs. In line with Diamantopoulos and Winklhofer (2001) we added reflective items to the formative constructs to improve the analysis. Additionally, we changed the way we operationalised competing goals. In the first pilot, this was formulated as "I think it is permissible to waste food if…" which was rated for various food aspects (e.g., the food is healthy). To more explicitly measure the trade-offs between goals, we decided instead to force respondents to choose between sets of two goals instead, asking them "Regarding food in my household it is most decisive to me that…" with two options indicated (e.g., "the food is healthy" and "the food is tasty"). Additionally, we asked the respondents to rate the importance of several competing goals.

### Second pilot

The second pilot was conducted via an intermediary (Qualtrics), who contacted market research agencies and set out the survey in a panel. In this second pilot, 310 consumers participated, of whom 50.6% was female; 33.5% was between 18-29 years, 33.9% between 30-49 years, 30% between 50 – 69% and 2.6% was older than 70 years old; 10.9% had a low, 49.7% had a medium and 39.3% a high educational level. Based on the results of this pilot, we decided to merge cognitive and affective attitude into one construct, and divide descriptive and injunctive social norm into two constructs. Also, we decided to operationalise ability constructs in a subjective rather than objective way. For instance, we decided to ask respondents in the main study whether they think they have certain skills rather than objectively testing these skills, because standard measures for objective knowledge and skills were not available and the objective measures that were tested in the pilot study showed little variance across respondents. Opportunity constructs are also measured subjectively in the main study, because the perceived opportunity (e.g., perceived accessibility to stores) theoretically should be more influential than the actual opportunity (e.g., actual distance to the store). Additionally, we concluded that several constructs could be analysed as reflective constructs due to high Cronbach alphas, showing high reliability and correspondence between the items.

## 9.3 Calculation of the food waste measure, in gram

This list indicates for each answer option provided for the questions in the second survey (related to how much was wasted in the categories), the number of grams that was used in the calculations.

1) Vegetable = 25.
2) Vegetable = 75.
3) Vegetable = 150.
4) Vegetable = 250.
5) Vegetable = 350.

1) Non fresh veg = 25.
2) Non fresh veg = 75.
3) Non fresh veg = 150.
4) Non fresh veg = 250.
5) Non fresh veg = 350.

1) Fruit = 25.
2) Fruit = 50.
3) Fruit = 100.
4) Fruit = 300.
5) Fruit = 500.

1) Non-fresh fruit = 20.
2) Non-fresh fruit = 40.
3) Non-fresh fruit = 80.
4) Non-fresh fruit = 240.
5) Non-fresh fruit = 400.

1) Potato = 25.
2) Potato = 75.
3) Potato = 150.
4) Potato = 250.
5) Potato = 350.

1) Potato Prod = 25.
2) Potato Prod = 88.
3) Potato Prod = 375.
4) Potato Prod = 750.
5) Potato Prod = 1125.

1) Pasta = 25.
2) Pasta = 75.
3) Pasta = 150.
4) Pasta = 250.
5) Pasta = 350.

1) Rice = 25.
2) Rice = 75.
3) Rice = 150.
4) Rice = 250.
5) Rice = 350.

1) Legumes = 25.
2) Legumes = 75.
3) Legumes = 150.
4) Legumes = 250.
5) Legumes = 350.

1) Meat = 75.
2) Meat = 150.
3) Meat = 375.
4) Meat = 675.
5) Meat = 900.

1) Meat sub = 45.
2) Meat sub = 90.
3) Meat sub = 225.
4) Meat sub = 405.
5) Meat sub = 540.

1) Fish = 75.
2) Fish = 150.
3) Fish = 375.
4) Fish = 675.
5) Fish = 900.

1) Topping = 10.
2) Topping = 20.
3) Topping = 50.
4) Topping = 90.
5) Topping = 120.

1) Bread = 18.
2) Bread = 35.
3) Bread = 400.
4) Bread = 800.
5) Bread = 1200.

1) Cereal = 10.
2) Cereal = 40.
3) Cereal = 250.
4) Cereal = 500.
5) Cereal = 1000.

1) Yoghurt = 38.
2) Yoghurt = 150.
3) Yoghurt = 500.
4) Yoghurt = 1000.
5) Yoghurt = 2000.

1) Cheese = 5.
2) Cheese = 10.
3) Cheese = 20.
4) Cheese = 45.
5) Cheese = 60.

1) Egg = 30.
2) Egg = 60.
3) Egg = 150.
4) Egg = 270.
5) Egg = 360.

1) Soup = 38.
2) Soup = 150.
3) Soup = 500.
4) Soup = 1000.
5) Soup = 1500.

1) Sauce = 10.
2) Sauce = 30.
3) Sauce = 90.
4) Sauce = 225.
5) Sauce = 675.

1) Candy = 10.
2) Candy = 20.
3) Candy = 50.
4) Candy = 90.
5) Candy = 120.

1) Chips = 10.
2) Chips = 20.
3) Chips = 50.
4) Chips = 90.
5) Chips = 120.

1) Non-alcohol = 68.
2) Non-alcohol = 250.
3) Non-alcohol = 500.
4) Non-alcohol = 1000.
5) Non-alcohol = 1500.

1) Alcohol = 75.
2) Alcohol = 300.
3) Alcohol = 500.
4) Alcohol = 1000.
5) Alcohol = 1500.

## 9.4 Result tables – sample characteristics

### Respondents in each socio-demographic group, unweighted.

| | Germany N= 841 25.1% | Hungary N= 464 13.8% | Spain N = 1020 30.4% | Netherlands N = 1029 30.7% | Total N= 3354 |
|---|---|---|---|---|---|
| **Gender of respondent** | | | | | |
| Female | 59.0% | 65.3% | 55.3% | 56.6% | 58% |
| Male | 41.0% | 34.7% | 44.7% | 43.4% | 42% |
| **Mean age of respondent** | | | | | |
| 18-24 | 5.8% | 7.8% | 6.2% | 8.1% | 6.9% |
| 25-34 | 11.4% | 17.0% | 16.8% | 16.5% | 15.4% |
| 35-49 | 26.2% | 22.6% | 39.0% | 28.2% | 30.2% |
| 50-65 | 37.8% | 34.5% | 30.6% | 28.8% | 32.4% |
| 65+ | 18.8% | 18.1% | 7.5% | 18.5% | 15.1% |
| **Size household** | | | | | |
| 1 | 41.1% | 34.1% | 10.5% | 43.8% | 31.7% |
| 2 | 34.4% | 30.2% | 23.1% | 32.0% | 29.6% |
| 3 | 12.5% | 16.6% | 28.1% | 9.5% | 16.9% |
| 4 | 9.2% | 12.7% | 30.6% | 10.3% | 16.5% |
| 5+ | 2.9% | 6.5% | 7.6% | 4.4% | 5.3% |
| **Household composition** | | | | | |
| Without young children | 87.6% | 80.8% | 67.6% | 86.2% | 80.2% |
| Young children | 12.4% | 19.2% | 32.4% | 13.8% | 19.8% |
| | | | | | |
| Without older children | 90.6% | 93.3% | 84.9% | 91.4% | 89.5% |
| Older children | 9.4% | 6.7% | 15.1% | 8.6% | 10.5% |
| | | | | | |
| Without multiple adults | 89.7% | 80.0% | 64.4% | 91.0% | 81.0% |
| With multiple adults | 10.3% | 20.0% | 35.6% | 9.0% | 19.0% |
| **Education** | | | | | |
| Low | 27.0% | 15.5% | 2.6% | 19.3% | 15.7% |
| Average | 55.9% | 43.1% | 41.9% | 27.9% | 41.3% |
| High | 17.1% | 41.4% | 55.5% | 52.8% | 43.1% |
| **Income** | | | | | |
| Low | 12.5% | 13.4% | 9.8% | 8.3% | 10.5% |
| Average | 49.7% | 36.4% | 58.8% | 44.7% | 49.1% |
| High | 23.5% | 38.4% | 23.0% | 29.3% | 27.2% |
| Missing | 14.3% | 11.9% | 8.3% | 17.7% | 13.2% |
| **City size** | | | | | |
| Small | 15.8% | 13.4% | 8.1% | 12.6% | 12.2% |
| Middle | 36.5% | 31.7% | 25.8% | 32.8% | 31.4% |
| Large | 46.8% | 51.9% | 63.0% | 45.4% | 52.0% |
| I don ’t know | 0.8% | 3.0% | 3.0% | 9.2% | 4.4% |

The percentage of respondents per group are presented.

## 9.5 How much and which food is wasted?

**Table 9.5.1. Food waste in grams per state, weighted based on household size.**

| | Germany N = 841 | Hungary n = 464 | Spain n = 1020 | Netherlands n = 1029 | Total N = 3354 |
|---|---|---|---|---|---|
| Respondents without food waste | 27% | 24% | 18% | 22% | 22% |
| **Total** | 425.26[a] | 416.93[a] | 534.28[c] | 364.54[a] | 438.63 |
| **State** | | | | | |
| Unused | 122.12 | 38.06 | 189.52 | 141.28 | 136.87 |
| | *29%*[a] | *9%*[b] | *35%*[c] | *39%*[c] | *31%* |
| | | | | | |
| Partly used | 172.19 | 169.60 | 178.15 | 114.56 | 155.96 |
| | *40%*[a] | *41%*[a] | *33%*[a] | *31%*[b] | *36%* |
| | | | | | |
| Leftover | 83.06 | 114.50 | 100.06 | 72.45 | 89.32 |
| | *20%*[a] | *27%*[b] | *19%*[a,b] | *20%*[s] | *20%* |
| | | | | | |
| Stored leftovers | 47.89 | 94.77 | 66.55 | 36.25 | 56.48 |
| | *11%*[a,c] | *23%*[b] | *12%*[s] | *10%*[c] | *13%* |

Weighted mean food waste in grams are presented. Equal subscripts indicate no significant difference within that state across countries. Additionally, weighted percentage of food wasted in each state are presented. Equal subscripts indicate no significant difference in terms of percentages wasted in each state across countries. Note: the paired comparison analyses are based on the unweighted data.

**Table 9.5.2. Food waste in gram per category & in percentage of waste, weighted.**

| | Germany | Hungary | Spain | Netherlands | Total |
|---|---|---|---|---|---|
| Bread | 77.68 | 116.25 | 92.85 | 42.90 | 76.96 |
| *%* | *18.27%* | *27.88%* | *17.38%* | *11.77%* | *17.55%* |
| Fruit | 59.09 | 39.18 | 86.03 | 63.37 | 65.84 |
| *%* | *13.90%* | *9.40%* | *16.10%* | *17.38%* | *15.01%* |
| Vegetable | 44.23 | 26.68 | 64.90 | 55.00 | 51.39 |
| *%* | *10.40%* | *6.40%* | *12.15%* | *15.09%* | *11.72%* |
| Non-alcohol | 41.61 | 36.57 | 37.77 | 28.20 | 35.63 |
| *%* | *9.78%* | *8.77%* | *7.07%* | *7.74%* | *8.12%* |
| Yoghurt | 23.85 | 20.62 | 37.95 | 34.05 | 30.82 |
| *%* | *5.61%* | *4.95%* | *7.10%* | *9.34%* | *7.03%* |
| Meat | 20.04 | 18.23 | 34.76 | 20.72 | 24.48 |
| *%* | *4.71%* | *4.37%* | *6.51%* | *5.68%* | *5.58%* |
| Potato | 30.46 | 12.83 | 26.82 | 22.47 | 24.46 |
| *%* | *7.16%* | *3.08%* | *5.02%* | *6.16%* | *5.58%* |
| Soup | 11.00 | 73.16 | 21.79 | 6.89 | 21.62 |
| *%* | *2.59%* | *17.55%* | *4.08%* | *1.89%* | *4.93%* |
| Pasta | 17.78 | 16.74 | 17.67 | 16.10 | 17.09 |
| *%* | *4.18%* | *4.02%* | *3.31%* | *4.42%* | *3.90%* |
| Rice | 6.29 | 12.76 | 16.57 | 11.85 | 12.02 |
| *%* | *1.48%* | *3.06%* | *3.10%* | *3.25%* | *2.74%* |
| Egg | 15.40 | 7.19 | 9.97 | 8.70 | 10.56 |
| *%* | *3.62%* | *1.72%* | *1.87%* | *2.39%* | *2.41%* |
| Alcohol | 14.16 | 1.23 | 10.98 | 9.98 | 10.12 |
| *%* | *3.33%* | *0.30%* | *2.06%* | *2.74%* | *2.31%* |
| Potato product | 9.67 | 8.24 | 7.60 | 12.95 | 9.85 |
| *%* | *2.27%* | *1.98%* | *1.42%* | *3.55%* | *2.25%* |
| Fish | 9.67 | 2.59 | 19.19 | 3.57 | 9.72 |
| *%* | *2.27%* | *0.62%* | *3.59%* | *0.98%* | *2.22%* |
| Non fresh veg. | 10.39 | 5.70 | 8.47 | 6.71 | 8.03 |
| *%* | *2.44%* | *1.37%* | *1.59%* | *1.84%* | *1.83%* |
| Topping | 9.95 | 4.53 | 5.94 | 5.87 | 6.73 |
| *%* | *2.34%* | *1.09%* | *1.11%* | *1.61%* | *1.53%* |
| Sauce | 6.83 | 3.27 | 9.86 | 3.76 | 6.32 |
| *%* | *1.61%* | *0.78%* | *1.85%* | *1.03%* | *1.44%* |
| Legumes | 4.44 | 1.12 | 12.18 | 1.96 | 5.57 |
| *%* | *1.04%* | *0.27%* | *2.28%* | *0.54%* | *1.27%* |
| Non fresh fruit | 4.70 | 6.64 | 4.01 | 0.83 | 3.57 |
| *%* | *1.11%* | *1.59%* | *0.75%* | *0.23%* | *0.81%* |
| Cereal | 2.77 | 0.30 | 3.55 | 2.17 | 2.48 |
| *%* | *0.65%* | *0.07%* | *0.66%* | *0.60%* | *0.57%* |
| Candy | 1.53 | 1.59 | 2.11 | 1.42 | 1.68 |
| *%* | *0.36%* | *0.38%* | *0.39%* | *0.39%* | *0.38%* |
| Meat- substitute | 1.97 | 0.38 | 0.72 | 1.83 | 1.33 |
| *%* | *0.46%* | *0.09%* | *0.13%* | *0.50%* | *0.30%* |
| Cheese | 1.15 | 0.57 | 1.37 | 1.50 | 1.24 |
| *%* | *0.27%* | *0.14%* | *0.26%* | *0.41%* | *0.28%* |
| Chips | 0.59 | 0.55 | 1.24 | 1.77 | 1.14 |
| *%* | *0.14%* | *0.13%* | *0.23%* | *0.49%* | *0.26%* |

**Table 9.5.3. Food waste in gram per state and food category, weighted.**

| | Unused | Partly used | Leftover | Stored leftovers |
|---|---|---|---|---|
| **Per category** | | | | |
| Vegetable | 15.07 | 18.25 | 12.07 | 6.00 |
| Non fresh vegetable | 1.29 | 2.99 | 2.43 | 1.31 |
| Fruit | 45.65 | 10.47 | 4.76 | 4.96 |
| Non fresh fruit | 0.86 | 1.02 | 0.79 | 0.91 |
| Potato | 7.52 | 7.12 | 7.40 | 2.42 |
| Potato product | 2.38 | 2.82 | 3.25 | 1.39 |
| Pasta | 1.05 | 2.31 | 9.70 | 4.02 |
| Rice | 0.91 | 1.25 | 5.80 | 4.06 |
| Legumes | 0.56 | 1.07 | 1.95 | 1.99 |
| Meat | 5.51 | 7.58 | 7.32 | 4.06 |
| Meat- substitute | 0.44 | 0.46 | 0.27 | 0.15 |
| Fish | 2.92 | 3.04 | 2.75 | 1.01 |
| Topping | 0.85 | 4.47 | 0.57 | 0.84 |
| Bread | 12.96 | 47.29 | 10.64 | 6.07 |
| Cereal | 0.50 | 1.53 | 0.38 | 0.07 |
| Yoghurt | 13.14 | 12.38 | 2.89 | 2.40 |
| Cheese | 0.17 | 0.70 | 0.12 | 0.25 |
| Egg | 6.93 | 2.10 | 0.85 | 0.67 |
| Soup | 2.47 | 3.32 | 8.39 | 7.44 |
| Sauce | 0.90 | 3.90 | 0.59 | 0.92 |
| Candy | 0.48 | 0.72 | 0.22 | 0.26 |
| Chips | 0.24 | 0.61 | 0.15 | 0.15 |
| Non-alcohol | 10.19 | 17.92 | 4.63 | 2.90 |
| Alcohol | 3.84 | 2.65 | 1.41 | 2.22 |

**Table 9.5.4. Top 6 most wasted products, per state & country in %, weighted.**

| | Unused | Partly used | Leftover | Stored Leftovers |
|---|---|---|---|---|
| **Germany** | | | | |
| Bread | 14.71% | 70.09% | 9.48% | 5.73% |
| Fruit | 60.20% | 23.39% | 6.88% | 9.53% |
| Vegetables | 33.91% | 32.71% | 23.72% | 9.66% |
| Non-alcoholic drinks | 18.56% | 52.08% | 18.00% | 11.36% |
| Potato | 24.65% | 38.63% | 32.73% | 3.99% |
| Yogurt | 41.34% | 36.03% | 10.42% | 12.22% |
| **Hungary** | | | | |
| Bread | 7.92% | 64.04% | 18.69% | 9.35% |
| Soup | 0.00% | 6.81% | 53.01% | 40.18% |
| Fruit | 34.55% | 34.67% | 13.40% | 17.38% |
| Non-alcoholic drinks | 0.00% | 65.51% | 14.46% | 20.03% |
| Vegetables | 10.25% | 49.48% | 17.21% | 23.05% |
| Meat | 1.49% | 32.35% | 24.30% | 41.85% |
| **Spain** | | | | |
| Bread | 21.57% | 53.38% | 14.41% | 10.64% |
| Fruit | 73.66% | 12.33% | 7.75% | 6.26% |
| Vegetables | 35.96% | 38.01% | 15.96% | 10.07% |
| Yogurt | 48.50% | 30.42% | 14.34% | 6.74% |
| Non-alcoholic drinks | 40.22% | 42.08% | 14.32% | 3.38% |
| Meat | | | | |
| **Netherlands** | | | | |
| Fruit | 80.16% | 9.76% | 5.09% | 4.99% |
| Vegetables | 22.74% | 31.37% | 33.48% | 12.41% |
| Bread | 20.72% | 62.79% | 13.06% | 3.43% |
| Yogurt | 41.17% | 50.39% | 2.14% | 6.30% |
| Non-alcoholic drinks | 41.97% | 50.09% | 4.33% | 3.60% |
| Potato | 36.13% | 19.48% | 37.29% | 7.11% |

## 9.6 Results – comparing socio-demographic groups

**Table 9.6.1. Food waste per socio-demographic group.**

| | Germany | Hungary | Spain | Netherlands | Total |
|---|---|---|---|---|---|
| **Gender** | | | | | |
| Female | 433.89 | 425.39 | 578.95 | 351.48 | 449.97 |
| Male | 403.64 | 397.62 | 618.08 | 342.92 | 453.09 |
| **Mean age** | *** | | | *** | *** |
| 18-24 | 866.98[a] | 448.89[a,b] | 743.33 | 510.00[a] | 639.84[a] |
| 25-34 | 491.29[b,c] | 580.35[a] | 728.43 | 446.81[a] | 568.86[a] |
| 35-49 | 526.50[b] | 446.13[a,b] | 619.81 | 428.41[a] | 526.75[a] |
| 50-65 | 360.74[c] | 396.59[a,b] | 498.97 | 273.87[b] | 382.06[b] |
| 65+ | 216.92[d] | 245.26[b] | 455.51 | 180.28[b] | 243.60[c] |
| **Size household** | ** | * | | ** | *** |
| 1 | 293.06[a] | 293.34[a] | 380.75 | 245.81[a] | 281.87[a] |
| 2 | 425.74[a,b] | 363.33[a,b] | 475.05 | 331.07[a,b] | 397.32[b] |
| 3 | 586.44[b] | 461.68[a,b,c] | 569.03 | 460.48[b,c] | 538.91[c] |
| 4 | 578.99[b] | 632.14[c] | 751.54 | 582.16[c] | 682.43[d] |
| 5+ | 994.58[c] | 761.67[c] | 740.15 | 693.91[c] | 766.54[d] |
| **Household composition** | | | | | |
| Without young children | 389.29 | 369.46 | 528.51 | 308.49 | 395.60 |
| Young children | 649.58 | 610.82 | 738.49 | 593.07 | 676.45 |
| | * | | | | |
| Without older children | 389.74[a] | 415.50 | 582.19 | 324.76 | 428.53 |
| Older children | 730.27[b] | 419.26 | 676.62 | 593.66 | 645.26 |
| | | | | | |
| Without multiple adults | 392.81 | 381.91 | 575.44 | 334.29 | 415.32 |
| With multiple adults | 669.92 | 550.76 | 634.46 | 483.29 | 604.97 |
| **Education** | | | | | |
| Low | 364.92 | 311.15 | 549.89 | 272.40 | 331.99 |
| Average | 440.19 | 379.18 | 532.58 | 380.50 | 447.50 |
| High | 449.58 | 493.08 | 646.85 | 358.07 | 498.24 |
| **Income[1]** | | | | | |
| Low | 452.56 | 238.24 | 514.27 | 339.15 | 404.96 |
| Average | 405.66 | 393.91 | 588.00 | 294.67 | 439.88 |
| Higher | 505.23 | 521.25 | 709.25 | 446.15 | 541.32 |
| **City size[2]** | | | | | |
| Small | 412.35 | 735.10[a] | 514.33 | 316.98 | 451.75 |
| Middle | 437.23 | 381.12[b] | 601.27 | 348.97 | 442.12 |
| Large | 407.11 | 364.29[b] | 615.20 | 340.14 | 459.95 |

* $p$ <.05 | ** $p$ <.01 | ***$p$ <.001 | Mean weighted food waste in grams are presented. Equal alphabetic subscripts indicate no significant difference. Number subscripts indicate different significant results across countries.

**Table 9.6.2. Food waste states per socio-demographic groups.**

| | Unused | Partly used | Leftovers | Stored leftovers |
|---|---|---|---|---|
| **Total** | 140.22 | 159.87 | 93.11 | 58.08 |
| **Gender** | | * | | |
| Female | 138.75 | 153.52[a] | 95.05 | 62.65 |
| Male | 142.23 | 168.66[b] | 90.43 | 51.77 |
| **Mean age** | ** | ***[1] | [2] | * |
| 18-24 | 182.41[a] | 255.79[a] | 118.59 | 83.05[a] |
| 25-34 | 181.03[a] | 199.64[a,b] | 117.45 | 70.74[a] |
| 35-49 | 171.66[a] | 177.43[b] | 111.45 | 66.21[a] |
| 50-65 | 117.73[b] | 136.31[c] | 78.42 | 49.59[a,b] |
| 65+ | 64.93[c] | 91.27[d] | 51.61 | 35.79[b] |
| **Size household** | | | *** | ** [4] |
| 1 | 94.71 | 114.57 | 40.83[a] | 31.75[a] |
| 2 | 124.30 | 138.51 | 78.91[b] | 55.60[b] |
| 3 | 169.55 | 190.45 | 114.23[c] | 64.68[b,c] |
| 4 | 205.64 | 234.76 | 158.36[d] | 83.67[c] |
| 5+ | 203.84 | 219.40 | 214.55[e] | 128.75[v] |
| **Household composition** | | | | |
| Without young children | 124.50 | 144.58 | 73.32 | 53.20 |
| Young children | 203.78 | 221.74 | 173.11 | 77.81 |
| | | | | [5] |
| Without older children | 135.69 | 151.43 | 86.63 | 54.79 |
| Older children | 178.83 | 231.96 | 148.34 | 86.13 |
| | | | | |
| Without multiple adults | 131.32 | 148.91 | 84.38 | 50.72 |
| With multiple adults | 178.25 | 206.76 | 130.41 | 89.54 |
| **Education** | * | | [3] | [6] |
| Low | 82.53[a] | 119.78 | 75.02 | 54.66 |
| Average | 128.88[b] | 163.55 | 95.97 | 59.09 |
| High | 172.03[c] | 170.93 | 96.93 | 58.35 |
| **Income** | | | | |
| Low | 115.30 | 147.93 | 94.83 | 46.90 |
| Average | 137.70 | 158.49 | 84.19 | 59.49 |
| Higher | 165.52 | 190.65 | 119.22 | 65.93 |
| **City size** | | | | |
| Small | 116.31 | 169.33 | 107.56 | 58.55 |
| Middle | 144.41 | 157.10 | 87.40 | 53.21 |
| Large | 142.49 | 163.80 | 93.68 | 59.98 |

* $p$ <.05 | ** $p$ <.01 | ***$p$ <.001 | Mean weighted food waste in grams are presented. Equal alphabetic subscripts indicate no significant difference. Number subscripts indicate different significant results across countries.

**Table 9.6.3. Food waste FWP household practices per socio-demographic group.**

| | Planning | Impulse buying | Overview food in stock | Cooking precisely | Using leftovers |
|---|---|---|---|---|---|
| **Total** | 5.11 | 3.22 | 5.45 | 5.05 | 5.35 |
| **Country** | | * | * | ** | * |
| Germany | 4.98 | 3.41[a] | 5.40[a] | 4.78[a] | 5.37[a] |
| Hungary | 5.12 | 3.52[a] | 5.66[b] | 4.95[a,c] | 5.60[b] |
| Spain | 5.31 | 3.20[b] | 5.45[a] | 5.26[b] | 5.49[a,b] |
| Netherlands | 5.02 | 2.95[c] | 5.41[a] | 5.11[c] | 5.09[c] |
| **Gender** | *** | | *** | | |
| Female | 5.19[a] | 3.26 | 5.51[a] | 5.05 | 5.37 |
| Male | 5.01[b] | 3.16 | 5.37[b] | 5.07 | 5.33 |
| **Mean age** | *** [1] | *** | *** | *** | |
| 18-24 | 4.83[a] | 3.58[a] | 5.11[a] | 4.87[a] | 5.39 |
| 25-34 | 5.00[a,b] | 3.48[a] | 5.13[a] | 4.93[a] | 5.25 |
| 35-49 | 5.08[b,c] | 3.30[b] | 5.34[b] | 4.97[a] | 5.30 |
| 50-65 | 5.18[c,d] | 3.07[c] | 5.63[c] | 5.14[b] | 5.41 |
| 65+ | 5.28[d] | 2.96[c] | 5.79[c] | 5.25[b] | 5.44 |
| **Size household** | *** | | | | * |
| 1 | 4.92[a] | 3.11 | 5.48 | 4.98 | 5.44[a] |
| 2 | 5.25[b] | 3.20 | 5.53 | 5.14 | 5.34[a,b] |
| 3 | 5.15[b] | 3.30 | 5.42 | 5.08 | 5.27[b] |
| 4 | 5.19[b] | 3.34 | 5.31 | 5.03 | 5.29[a,b] |
| 5+ | 5.14[a,b] | 3.34 | 5.44 | 5.02 | 5.38[a,b] |
| **HH composition** | * | | | | |
| Without young children | 5.10[a] | 3.18 | 5.49 | 5.07 | 5.39 |
| Young children | 5.17[b] | 3.39 | 5.31 | 5.00 | 5.22 |
| | [2] | | | | |
| Without older children | 5.12 | 3.21 | 5.46 | 5.06 | 5.37 |
| Older children | 5.11 | 3.31 | 5.41 | 5.05 | 5.18 |
| | | | [3] | | |
| Without multiple adults | 5.09 | 3.20 | 5.45 | 5.04 | 5.34 |
| With multiple adults | 5.21 | 3.29 | 5.46 | 5.11 | 5.41 |
| **Education** | | | ** [4] | | [5] |
| Low | 5.01 | 3.10 | 5.65[a] | 4.88 | 5.29 |
| Average | 5.14 | 3.30 | 5.51[b] | 5.01 | 5.36 |
| High | 5.13 | 3.19 | 5.33[c] | 5.16 | 5.38 |
| **Income** | | * | | | |
| Low | 5.10 | 3.09[a] | 5.49 | 5.01 | 5.44 |
| Average | 5.11 | 3.23[b] | 5.46 | 5.05 | 5.35 |
| Higher | 5.13 | 3.26[a,b] | 5.38 | 5.06 | 5.29 |
| **City size** | | ** | | | [6] |
| Small | 5.20 | 3.06[a] | 5.56 | 5.05 | 5.35 |
| Middle | 5.13 | 3.27[b] | 5.49 | 5.08 | 5.30 |
| Large | 5.08 | 3.24[b] | 5.41 | 5.05 | 5.41 |

* $p$ <.05 | ** $p$ <.01 | *** $p$ <.001| Mean of the FWP household practices are presented. Equal alphabetic subscripts indicate no significant difference. Number subscripts indicate different significant results across countries.

**Table 9.6.4 Motivation per socio-demographic group.**

| | Awareness | Attitude | Social norm injun. | Social norm descr. |
|---|---|---|---|---|
| **Total** | 5.01 | 2.57 | 4.81 | 4.03 |
| **Country** | *** | *** | *** | |
| Germany | 4.74[a] | 2.52[a] | 4.71[a] | 3.85 |
| Hungary | 5.37[b] | 2.50[a] | 5.19[b] | 4.04 |
| Spain | 5.41[b] | 2.34[b] | 5.16[b] | 4.21 |
| Netherlands | 4.69[a] | 2.86[c] | 4.37[c] | 4.00 |
| **Gender** | *** | *** | 5 | 7 |
| Female | 5.09[a] | 2.49[a] | 4.81 | 4.04 |
| Male | 4.91[b] | 2.67[b] | 4.82 | 4.03 |
| **Mean age** | 2 | * | **^ | *** 8 |
| 18-24 | 5.05 | 2.74[a] | 4.79 | 4.15[a] |
| 25-34 | 5.00 | 2.69[a] | 4.77 | 4.28[a] |
| 35-49 | 5.00 | 2.58[a,b] | 4.73 | 4.15[a] |
| 50-65 | 5.04 | 2.49[b] | 4.87 | 3.89[b] |
| 65+ | 4.99 | 2.51[b] | 4.90 | 3.82[b] |
| **Size household** | | | ** 6 | |
| 1 | 4.86 | 2.57 | 4.57[a] | 3.85 |
| 2 | 4.99 | 2.53 | 4.90[b] | 3.96 |
| 3 | 5.17 | 2.54 | 4.95[b] | 4.22 |
| 4 | 5.12 | 2.65 | 4.92[b] | 4.22 |
| 5+ | 5.25 | 2.58 | 4.95[b] | 4.34 |
| **Household composition** | | 3 | | |
| Without young children | 4.99 | 2.54 | 4.80 | 3.96 |
| Young children | 5.11 | 2.68 | 4.86 | 4.33 |
| | | | | |
| Without older children | 5.00 | 2.57 | 4.81 | 4.01 |
| Older children | 5.15 | 2.56 | 4.84 | 4.21 |
| | | | | |
| Without multiple adults | 4.96 | 2.58 | 4.75 | 4.00 |
| With multiple adults | 5.23 | 2.49 | 5.07 | 4.17 |
| **Education** | | | * | |
| Low | 4.86 | 2.61 | 4.61[a] | 3.92 |
| Average | 4.98 | 2.56 | 4.80[b] | 4.03 |
| High | 5.11 | 2.56 | 4.90[b] | 4.08 |
| **Income** | * | 4 | | |
| Low | 5.14[a] | 2.50 | 4.73 | 3.95 |
| Average | 5.04[a,b] | 2.52 | 4.80 | 4.06 |
| Higher | 4.97[b] | 2.65 | 4.90 | 4.05 |
| **City size** | | | | |
| Small | 4.89 | 2.56 | 4.73 | 4.06 |
| Middle | 5.03 | 2.58 | 4.79 | 4.02 |
| Large | 5.06 | 2.54 | 4.87 | 4.03 |

* $p$ <.05 | ** $p$ <.01 | *** $p$ <.001 Mean of the motivation constructs are presented. Equal alphabetic subscripts indicate no significant difference. Number subscripts indicate different sign. results across countries.

**Table 9.6.5 Competing goals per socio-demographic groups.**

| | Health | Taste | Convenience | Enough | Price | Not too much |
|---|---|---|---|---|---|---|
| **Total** | 5.88 | 6.16 | 4.95 | 5.50 | 4.18 | 4.07 |
| **Country** | * | | | * | ** | |
| Germany | 5.56[a] | 6.16 | 4.85 | 5.23[a] | 3.79[a] | 3.95 |
| Hungary | 5.95[b] | 6.47 | 5.30 | 5.84[b] | 4.81[b] | 4.26 |
| Spain | 6.19[c] | 5.98 | 4.97 | 5.78[b] | 4.28[c] | 3.86 |
| Netherlands | 5.79[b] | 6.21 | 4.86 | 5.28[a] | 4.11[d] | 4.30 |
| **Gender** | *** | *** | *** 2 | *** | ** | |
| Female | 5.99[a] | 6.26[a] | 5.07[a] | 5.62[a] | 4.27[a] | 4.08 |
| Male | 5.71[b] | 6.03[b] | 4.78[b] | 5.33[b] | 4.05[b] | 4.07 |
| **Mean age** | *** | 1 | ** | | *** 4 | 5 |
| 18-24 | 5.68[a] | 6.22 | 4.94[a,c] | 5.38 | 4.69[a,b] | 4.04 |
| 25-34 | 5.80[a,b] | 6.09 | 5.04[a,b] | 5.46 | 4.42[a] | 4.09 |
| 35-49 | 5.92[b] | 6.15 | 5.05[a,b] | 5.55 | 4.16[a,b] | 3.96 |
| 50-65 | 5.91[b] | 6.21 | 4.92[b,c] | 5.56 | 4.10[a,b] | 4.11 |
| 65+ | 5.87[a,b] | 6.13 | 4.74[c] | 5.33 | 3.90[b] | 4.21 |
| **Size household** | *** | ** | *** | ** | | |
| 1 | 5.57[a] | 6.12[a] | 5.14[a] | 5.23[a] | 4.23 | 4.23 |
| 2 | 5.98[b] | 6.24[b] | 4.83[b] | 5.46[b] | 4.08 | 4.09 |
| 3 | 6.06[b] | 6.16[a,b] | 4.91[b] | 5.71[c] | 4.22 | 3.98 |
| 4 | 6.05[b] | 6.08[a] | 4.88[b] | 5.73[c] | 4.12 | 3.91 |
| 5+ | 5.97[b] | 6.26[a,b] | 4.82[b] | 5.90[c] | 4.45 | 3.86 |
| | | | | | | |
| **Household composition** | | | | | | |
| Without young children | 5.84 | 6.17 | 4.94 | 5.44 | 4.17 | 4.10 |
| Young children | 6.02 | 6.13 | 4.98 | 5.72 | 4.21 | 3.94 |
| | | | | | | |
| Without older children | 5.86 | 6.16 | 4.96 | 5.47 | 4.17 | 4.09 |
| Older children | 6.05 | 6.23 | 4.89 | 5.70 | 4.20 | 3.95 |
| | | | | | | |
| Without multiple adults | 5.83 | 6.17 | 4.99 | 5.42 | 4.16 | 4.11 |
| With multiple adults | 6.05 | 6.15 | 4.78 | 5.83 | 4.24 | 3.90 |
| **Education** | *** | | | | *** | |
| Low | 5.65[a] | 6.23 | 4.92 | 5.53 | 4.31[a] | 4.12 |
| Average | 5.82[b] | 6.18 | 4.92 | 5.53 | 4.17[a] | 4.04 |
| High | 6.01[c] | 6.12 | 4.99 | 5.44 | 4.13[b] | 4.08 |
| **Income** | | * | | | *** | |
| Low | 5.66 | 6.10[a] | 5.00 | 5.46 | 4.86[a] | 4.19 |
| Average | 5.85 | 6.13[a] | 4.98 | 5.50 | 4.25[b] | 4.04 |
| Higher | 6.01 | 6.25[b] | 4.86 | 5.51 | 3.75[c] | 4.06 |
| **City size** | | | 3 | | | |
| Small | 5.88 | 6.18 | 4.80 | 5.47 | 4.25 | 4.11 |
| Middle | 5.87 | 6.17 | 4.91 | 5.48 | 4.14 | 4.09 |
| Large | 5.89 | 6.15 | 4.98 | 5.50 | 4.16 | 4.05 |

* $p$ <.05 | ** $p$ <.01 | *** $p$ <.001 Mean of the competing goals constructs are presented. Equal alphabetic subscripts indicate no significant difference. Number subscripts indicate different sign. results across countries.

**Table 9.6.6. Abilities per socio-demographic groups.**

| | Difficulty with assessing food safety[1] | Difficulty with creative cooking[1] | Difficulty with accurate planning[1] | Shelf-life knowledge |
|---|---|---|---|---|
| **Total** | 3.23 | 3.08 | 3.07 | 5.27 |
| **Country** | ** | | | * |
| Germany | 3.20[a] | 2.90 | 2.94 | 5.17[a,c] |
| Hungary | 2.81[b] | 3.01 | 2.96 | 5.41[b] |
| Spain | 3.41[c] | 3.28 | 3.37 | 5.25[c] |
| Netherlands | 3.26[a,c] | 3.08 | 2.92 | 5.30[a,b,c] |
| **Gender** | ** | ** | | * 4 |
| Female | 3.17[a] | 3.04 | 3.06 | 5.28[a] |
| Male | 3.31[b] | 3.14 | 3.08 | 5.25[b] |
| **Mean age** | *** | *** | *** | *** |
| 18-24 | 3.88[a] | 3.57[a] | 3.85[a] | 4.78[a] |
| 25-34 | 3.57[a] | 3.53[a] | 3.53[b] | 4.90[a] |
| 35-49 | 3.30[b] | 3.20[b] | 3.22[c] | 5.16[b] |
| 50-65 | 3.00[c] | 2.79[c] | 2.76[d] | 5.47[c] |
| 65+ | 2.95[c] | 2.82[c] | 2.60[d] | 5.65[d] |
| **Size household** | | | 2 | *** |
| 1 | 3.13 | 3.00 | 2.86 | 5.20 |
| 2 | 3.15 | 2.95 | 2.91 | 5.40 |
| 3 | 3.37 | 3.24 | 3.35 | 5.19 |
| 4 | 3.37 | 3.31 | 3.41 | 5.22 |
| 5+ | 3.36 | 3.15 | 3.24 | 5.30 |
| **Household composition** | | | * | |
| Without young children | 3.17 | 3.01 | 2.97[a] | 5.30 |
| With young children | 3.47 | 3.39 | 3.45[b] | 5.12 |
| | | | | |
| Without older children | 3.23 | 3.07 | 3.05 | 5.26 |
| With older children | 3.25 | 3.21 | 3.19 | 5.29 |
| | | | *3 | |
| Without multiple adults | 3.21 | 3.08 | 3.01[a] | 5.26 |
| With multiple adults | 3.30 | 3.12 | 3.33[b] | 5.30 |
| **Education** | | 1 | | 5 |
| Low | 3.09 | 2.97 | 2.84 | 5.35 |
| Average | 3.23 | 3.05 | 3.05 | 5.30 |
| High | 3.28 | 3.16 | 3.17 | 5.21 |
| **Income** | | | | |
| Low | 3.36 | 3.18 | 3.08 | 5.19 |
| Average | 3.24 | 3.10 | 3.10 | 5.23 |
| Higher | 3.16 | 3.04 | 3.04 | 5.32 |
| **City size** | | | | |
| Small | 3.09 | 2.94 | 2.90 | 5.38 |
| Middle | 3.26 | 3.08 | 3.05 | 5.31 |
| Large | 3.23 | 3.10 | 3.11 | 5.23 |

* p <.05 | ** p <.01 | *** p <.001 Mean of the abilities constructs are presented. Equal alphabetic subscripts indicate no significant difference. Number subscripts indicate different sign. results across countries.

**Table 9.6.7. Opportunities per socio-demographic groups.**

| | Availability of products | Accessibility to store | Available equipment | Unforeseen events |
|---|---|---|---|---|
| **Total** | 5.39 | 5.75 | 5.62 | 3.95 |
| **Country** | | | | |
| Germany | 5.30 | 5.70 | 5.59 | 3.67 |
| Hungary | 5.55 | 5.64 | 5.63 | 4.34 |
| Spain | 5.45 | 5.73 | 5.61 | 4.12 |
| Netherlands | 5.33 | 5.86 | 5.66 | 3.82 |
| **Gender** | ** | *** | 2 | *** 5 |
| Female | 5.44[a] | 5.80[a] | 5.61 | 4.03[a] |
| Male | 5.33[b] | 5.69[b] | 5.64 | 3.82[b] |
| **Mean age** | *** | | *** | *** |
| 18-24 | 5.19[a] | 5.66 | 5.11[a] | 4.38[a] |
| 25-34 | 5.33[a,b] | 5.67 | 5.38[b] | 4.35[a] |
| 35-49 | 5.38[b,c] | 5.73 | 5.54[c] | 4.07[b] |
| 50-65 | 5.43[b,c] | 5.79 | 5.80[d] | 3.78[c] |
| 65+ | 5.49[c] | 5.81 | 5.90[d] | 3.45[d] |
| **Size household** | | | | |
| 1 | 5.31 | 5.78 | 5.62 | 3.78 |
| 2 | 5.43 | 5.76 | 5.70 | 3.78 |
| 3 | 5.44 | 5.74 | 5.58 | 4.19 |
| 4 | 5.40 | 5.67 | 5.55 | 4.22 |
| 5+ | 5.47 | 5.76 | 5.61 | 4.24 |
| **Household composition** | 1 | | | * |
| Without young children | 5.38 | 5.77 | 5.65 | 3.86[a] |
| With young children | 5.41 | 5.68 | 5.52 | 4.29[b] |
| | * | | | |
| Without older children | 5.37[a] | 5.75 | 5.63 | 3.92 |
| With older children | 5.54[b] | 5.77 | 5.58 | 4.18 |
| | | | 3 | |
| Without multiple adults | 5.38 | 5.75 | 5.62 | 3.89 |
| With multiple adults | 5.41 | 5.74 | 5.62 | 4.17 |
| **Education** | | *** | 4 | * |
| Low | 5.43 | 5.70[a] | 5.71 | 3.62[a] |
| Average | 5.36 | 5.70[a] | 5.62 | 3.95[b] |
| High | 5.41 | 5.81[b] | 5.60 | 4.06[c] |
| **Income** | ** | | *** | |
| Low | 5.29[a] | 5.68 | 5.46[a] | 3.93 |
| Average | 5.36[a] | 5.74 | 5.57[a] | 3.96 |
| Higher | 5.48[b] | 5.79 | 5.73[b] | 3.97 |
| **City size** | ** | *** | | |
| Small | 5.25[a] | 5.56[a] | 5.69 | 3.82 |
| Middle | 5.40[b] | 5.74[b] | 5.68 | 3.92 |
| Large | 5.43[b] | 5.80[b] | 5.58 | 3.98 |

* p <.05 | ** p <.01 | *** p <.001 | Mean of the opportunities constructs are presented. Equal alphabetic subscripts indicate no significant difference. Number subscripts indicate different sign. results across countries.

## 9.7 Effects of FWP household practices on food waste

**Table 9.7.1. Total food waste: regression with FWP household practices.**

| | B | SE B | β | t | Correlation |
|---|---|---|---|---|---|
| Constant | 1171.74 | 165.99 | | 7.06*** | |
| **FWP household practices** | | | | | |
| Planning of food shopping and use | 62.35 | 59.33 | 0.11 | 1.05 | -0.16*** |
| Planning squared | -4.25 | 6.10 | -0.07 | -0.70 | -0.17*** |
| Impulse buying | 74.50 | 9.56 | 0.13 | 7.79*** | 0.25*** |
| Overview of food in stock | -39.99 | 12.12 | -0.07 | -3.30** | -0.26*** |
| Cooking precisely | -61.33 | 10.86 | -0.11 | -5.65*** | -0.24*** |
| Using leftovers | -141.71 | 10.40 | -0.24 | -13.62*** | -0.31*** |
| **Socio-demographics** | | | | | |
| Age | -3.64 | 0.74 | -0.08 | -4.90*** | -0.20*** |
| Household size | 75.32 | 9.05 | 0.14 | 8.33*** | 0.24*** |
| Gender, dummy | -10.19 | 10.37 | -0.02 | -0.98 | 0.00 |
| Hungary, dummy | -7.71 | 22.47 | -0.01 | -0.34 | 0.06 |
| Germany, dummy | -15.92 | 18.29 | -0.02 | -0.87 | 0.05 |
| Spain, dummy | 107.32 | 18.23 | 0.13 | 5.89*** | 0.15 |
| **Psychographics** | | | | | |
| Awareness of parents | -5.50 | 9.28 | -0.01 | -0.59 | -0.12*** |
| Perceived financial control | 11.62 | 6.04 | 0.03 | 1.92 | 0.05** |
| Food involvement scale | 22.15 | 10.05 | 0.04 | 2.20* | 0.03* |

* p <.05 | ** p <.01 | *** p <.001 | For information about the blocks see method section.
$R^2$ = .22 | $\Delta R^2_1$= .16 | $\Delta R^2_2$ = .06 | F(15,3353) = 62.62, p = .00

**Table 9.7.2. Food waste states: regression with FWP household practices and demographics.**

| | Unused | Partly | Leftovers | Stored leftovers |
|---|---|---|---|---|
| Constant | 417.59*** | 380.71*** | 291.23*** | 82.22 |
| **FWP household practices** | | | | |
| Planning of food shopping and use | -19.39 | 66.13* | -1.55 | 17.16 |
| Planning squared | 2.47 | -6.06* | 0.76 | -1.42 |
| Impulse buying | 23.83*** | 33.25*** | 8.08* | 9.34** |
| Overview of food in stock | -17.93*** | -13.41* | -2.26 | -6.39 |
| Cooking precisely | -14.61*** | -19.43*** | -14.44*** | -12.85*** |
| Using leftovers | -33.60*** | -52.78*** | -46.51*** | -8.82** |
| **Socio-demographics** | | | | |
| Age | -1.30*** | -1.61*** | -0.44 | -0.29 |
| Household size | 15.15*** | *** | 30.44*** | 12.34*** |
| Gender, dummy | -1.18 | -11.61* | -0.86 | 3.46 |
| Hungary, dummy | -82.44*** | 15.60 | 28.07** | 31.06*** |
| Germany, dummy | -3.53 | 7.62 | -6.12 | -13.89* |
| Spain, dummy | 70.66*** | 26.78** | 5.96 | 3.91 |
| **Psychographics** | | | | |
| Awareness of parents | -1.14 | -4.06 | -2.51 | 2.21 |
| Perceived financial control | 3.18 | 6.56* | 3.33 | -1.45 |
| Food involvement scale | 7.32 | -1.26 | 10.77 | 5.32 |

* $p$ <.05 | ** $p$ <.01 | *** $p$ <.001| Unused $R^2$ : .10 F(15,3338) = 24.24*** | Partly $R^2$ : .14 F(15,3338)= 36.17*** | Leftovers $R^2$ : .12 F(15,3338)= 31.64*** | Stored leftovers $R^2$ : .05 F(15,3338)=12.03***

**Table 9.7.3. Food waste: FWP household practices and demographics, per country.**

| | Germany | Hungary | Spain | Netherlands |
|---|---|---|---|---|
| Constant | 883.84** | 1968.20*** | 1671.37*** | 689.15** |
| **FWP household practices** | | | | |
| Planning of food shopping and use | 67.09 | -30.46 | 97.65 | 8.84 |
| Planning squared | -3.69 | 2.04 | -8.52 | 2.37 |
| Impulse buying | 107.63*** | 1.34 | 68.95** | 94.76*** |
| Overview of food in stock | -45.90* | -97.82** | -47.57 | 3.54 |
| Cooking precisely | -38.46 | -64.14* | -67.66* | -69.20*** |
| Using leftovers | -139.88*** | -145.21*** | -206.88*** | -83.36*** |
| **Socio-demographics** | | | | |
| Age | -4.62** | -1.26 | -2.44 | -4.59*** |
| Household size | 74.23*** | 77.11** | 73.30 | 77.85*** |
| Gender, dummy | -3.54 | 31.26 | -2.22 | -31.76* |
| **Psychographics** | | | | |
| Awareness of parents | -2.15 | 0.78 | -24.88 | 3.12 |
| Perceived financial control | 22.64* | -10.40 | -1.46 | 15.48 |
| Food involvement scale | 27.24 | 28.73 | 43.47 | 5.73 |

* p <.05 | ** p <.01 | *** p < .001 Germany $R^2$ : .25 F(12,828) = 23.40*** | Hungary $R^2$ : .21 F(12,457)= 9.86*** | Spain $R^2$ : .20 F(12,1007)=20.69*** | Netherlands $R^2$ : .24 F(12,1016)=26.10***

## 9.8 Effects of motivation, ability, and opportunity on food waste

**Table 9.8.1. Food waste: regression with MOA and demographics.**

| | B | SE B | β | t | Correlation |
|---|---|---|---|---|---|
| Constant | -395.25 | 150.43 | | -2.63** | |
| **Motivation** | | | | | |
| Awareness | -0.20 | 10.83 | 0.00 | -0.02 | -.03 |
| Attitude towards wasting food | 69.12 | 12.00 | 0.11 | 5.76*** | .18 |
| Social norm injun. | -3.96 | 9.86 | -0.01 | -0.40 | -.04** |
| Social norm descr. | 70.33 | 10.20 | 0.12 | 6.89*** | .22*** |
| **Competing goals** | | | | | |
| Health importance | -0.39 | 10.29 | 0.00 | -0.04 | .01 |
| Taste importance | 42.88 | 11.79 | 0.07 | 3.64*** | .03* |
| Convenience importance | -1.98 | 8.79 | 0.00 | -0.23 | .02 |
| Enough importance | 33.30 | 9.67 | 0.06 | 3.45** | .11*** |
| Price importance | -23.27 | 8.09 | -0.05 | -2.88** | .00 |
| Not too much importance | -22.09 | 7.20 | -0.05 | -3.07** | -.09*** |
| **Abilities** | | | | | |
| Difficulty with assessing food safety | 4.37 | 8.65 | 0.01 | 0.51 | .19*** |
| Difficulty with creative cooking | 33.36 | 10.33 | 0.07 | 3.23** | .22*** |
| Difficulty with accurate planning | 25.81 | 10.13 | 0.06 | 2.55* | .26*** |
| Shelf-life knowledge | -28.64 | 11.81 | -0.05 | -2.42* | -.16*** |
| **Opportunities** | | | | | |
| Availability of products | -42.67 | 16.81 | -0.06 | -2.54* | -.09*** |
| Accessibility to store | 21.86 | 16.52 | 0.03 | 1.32 | -.08*** |
| Equipment in home | -5.56 | 11.80 | -0.01 | -0.47 | -.14*** |
| Unforeseen events | 53.58 | 11.92 | 0.09 | 4.49*** | .24*** |
| **Socio-demographics** | | | | | |
| Age | -2.27 | 0.80 | -0.05 | -2.82** | -.20*** |
| Household size | 71.76 | 9.45 | 0.14 | 7.59*** | .24*** |
| Gender, dummy | -8.93 | 10.84 | -0.01 | -0.82 | -.00 |
| Hungary, dummy | -21.94 | 24.34 | -0.02 | -0.90 | .06*** |
| Germany, dummy | 36.44 | 19.57 | 0.04 | 1.86 | .05** |
| Spain, dummy | 68.29 | 19.60 | 0.08 | 3.48*** | .15*** |
| **Psychographics** | | | | | |
| Awareness of parents | -11.98 | 10.17 | -0.02 | -1.18 | -.12*** |
| Perceived financial control | -4.89 | 6.96 | -0.01 | -0.70 | .05** |
| Food involvement scale | 12.75 | 11.48 | 0.02 | 1.11 | .03* |

* p <.05 | ** p <.01 | *** p <.001 | For information about the blocks see method section. | $R^2$ = .18 | $\Delta R^2_1$ = .09*** | $\Delta R^2_2$ = .04*** | $\Delta R^2_3$ = .01*** | $\Delta R^2_4$ = .04*** | F(27,3326) = 27.60, p = .00

**Table 9.8.2. Food waste states: regression with MOA and demographics.**

| | Unused | Partly | Leftovers | Stored leftovers |
|---|---|---|---|---|
| Constant | -139.18 | -72.26 | **-164.24**** | -19.58 |
| **Motivation** | | | | |
| Awareness | -1.28 | -0.94 | 0.62 | 1.41 |
| Attitude towards wasting food | 8.49 | **29.15***** | **19.78***** | **11.70**** |
| Social norm injun. | -1.26 | 1.38 | -1.06 | -3.02 |
| Social norm descr. | **17.91***** | **23.52***** | **19.57***** | **9.32**** |
| **Competing goals** | | | | |
| Health importance | 7.13 | -4.97 | -1.13 | -1.42 |
| Taste importance | **13.09*** | **19.70**** | 6.32 | 3.77 |
| Convenience importance | 1.57 | 0.23 | -1.21 | -2.56 |
| Enough importance | **11.36*** | 5.85 | **8.77*** | **7.32*** |
| Price importance | **-8.72*** | -7.02 | **-6.54*** | -0.98 |
| Not too much importance | -5.97 | -6.57 | -3.29 | **-6.26**** |
| **Abilities** | | | | |
| Difficulty with assessing food safety | 0.39 | 1.77 | 2.98 | -0.78 |
| Difficulty with creative cooking | **10.33*** | **11.24*** | **9.08*** | 2.72 |
| Difficulty with accurate planning | 3.03 | **14.27**** | 7.08 | 1.43 |
| **Opportunities** | | | | |
| Shelf-life knowledge | **-20.01**** | -2.89 | -1.45 | -4.27 |
| Availability of products | 4.63 | **-24.42**** | -4.43 | **-18.44***** |
| Accessibility to store | -8.28 | **21.66**** | -0.88 | 9.37 |
| Equipment in home | **11.56*** | -10.34 | -1.87 | -4.90 |
| Unforeseen events | **29.47***** | **12.98*** | 2.85 | **8.29*** |
| **Socio-demographics** | | | | |
| Age | **-0.97*** | **-1.13**** | -0.07 | -0.09 |
| Household size | **12.76**** | **17.87***** | **30.00***** | **11.13***** |
| Gender, dummy | -4.68 | -9.70 | 1.59 | 3.87 |
| Hungary, dummy | **-93.15***** | 15.26 | **24.08**** | **31.87***** |
| Germany, dummy | 16.23 | **23.94*** | 2.61 | -6.35 |
| Spain, dummy | **56.56***** | 16.17 | -3.60 | -0.84 |
| **Psychographics** | | | | |
| Awareness of parents | -6.71 | -6.28 | -4.05 | 5.06 |
| Perceived financial control | -0.85 | 1.08 | -0.58 | **-4.54*** |
| Food involvement scale | 2.86 | -3.07 | 6.97 | 5.99 |

* p <.05 | ** p <.01 | *** p <.001 |For information about the blocks see method section. | Unused: $R^2$ = .09 | $\Delta R^2_1$ = .03*** | $\Delta R^2_2$ = .02*** | $\Delta R^2_3$ = .01*** | $\Delta R^2_4$ = .03*** | F(27,3326) = 12.51 p = .00 | Partly: $R^2$ = .11 | $\Delta R^2_1$ = .06*** | $\Delta R^2_2$ = .03*** | $\Delta R^2_3$ = .01*** | $\Delta R^2_4$ = .02*** | F(27,3326) = 15.40 p = .00 | Leftover: $R^2$ = .10 | $\Delta R^2_1$ = .05*** | $\Delta R^2_2$ = .02*** | $\Delta R^2_3$ = .00 | $\Delta R^2_4$ = .03*** | F(27,3326) = 13.55 p = .00 | Stored leftovers: $R^2$ = .06 | $\Delta R^2_1$ = .03*** | $\Delta R^2_2$ = .01** | $\Delta R^2_3$ = .01*** | $\Delta R^2_4$ = .02*** | F(27,3326) = 7.80 p = .00

**Table 9.8.3. Food waste: regression MOA, demographics and per country.**

| | Germany | Hungary | Spain | Netherlands |
|---|---|---|---|---|
| Constant | **-554.16*** | -15.33 | -313.54 | -365.71 |
| **Motivation** | | | | |
| Awareness | -9.31 | -5.49 | 8.22 | 12.47 |
| Attitude towards wasting food | **68.97**** | **75.45*** | **75.88**** | 33.83 |
| Social norm injun. | -6.66 | -22.94 | 12.07 | -12.41 |
| Social norm descr. | **49.26*** | **74.56**** | **109.69***** | **36.25*** |
| **Competing goals** | | | | |
| Health importance | **39.92*** | **-58.75*** | 7.40 | -21.95 |
| Taste importance | -10.93 | **74.28*** | **77.18**** | **60.07***** |
| Convenience importance | -17.62 | 17.93 | 6.42 | 0.86 |
| Enough importance | **45.69**** | 28.63 | 34.43 | 17.52 |
| Price importance | 4.41 | -35.01 | **-49.53**** | -9.65 |
| Not too much importance | -15.02 | **-76.40***** | -8.05 | -20.33 |
| **Abilities** | | | | |
| Difficulty with assessing food safety | 18.12 | -27.80 | -1.20 | **23.55*** |
| Difficulty with creative cooking | 31.20 | 27.74 | 30.68 | **31.65*** |
| Difficulty with accurate planning | 26.08 | 34.60 | 33.39 | 12.22 |
| Shelf-life knowledge | -3.53 | 25.64 | **-88.25***** | 3.72 |
| **Opportunities** | | | | |
| Availability of products | **-96.59**** | **-114.35*** | -9.24 | -14.22 |
| Accessibility to store | **90.83**** | 88.26 | -24.92 | -5.26 |
| Equipment in home | -6.85 | -37.13 | 18.43 | -20.00 |
| Unforeseen events | **51.21*** | 44.69 | **61.05*** | **50.50**** |
| **Socio-demographic** | | | | |
| Age | **-3.37*** | 0.39 | -2.12 | **-3.31**** |
| Household size | **72.21***** | **60.31*** | **68.90**** | **85.42***** |
| Gender, dummy | 4.72 | 9.19 | -9.59 | **-35.10*** |
| **Psychographics** | | | | |
| Awareness of parents | -10.25 | 10.63 | -44.00 | 1.48 |
| Perceived financial control | 5.98 | -31.50 | -22.40 | 3.16 |
| Food involvement scale | 25.46 | -0.92 | -1.72 | 5.01 |

* p <.05 | ** p <.01 | *** p <.001 | For more information about the blocks see method section. | Netherlands : $R^2$ = .20 | $\Delta R^2_1$ = .07*** | $\Delta R^2_2$ = .05*** | $\Delta R^2_3$ = .02*** | $\Delta R^2_4$ = .06*** | F(24, 1004) = 10.31, p = .00 | Hungary : $R^2$ = .23 | $\Delta R^2_1$ = .19*** | $\Delta R^2_2$ = .01 | $\Delta R^2_3$ = .02 | $\Delta R^2_4$ = .02 | F(24, 439) = 5.48, p = .00 | Germany : $R^2$ = .20 | $\Delta R^2_1$ = .11*** | $\Delta R^2_2$ = .04*** | $\Delta R^2_3$ = .02** | $\Delta R^2_4$ = .03*** | F(24, 840) = 8.29, p = .00 | Germany : $R^2$ = .18 | $\Delta R^2_1$ = .11*** | $\Delta R^2_2$ = .04*** | $\Delta R^2_3$ = .01 | $\Delta R^2_4$ = .02* | F(24, 995) = 8.79, p = .00

## 9.9 Effects of FWP household practices, motivation, ability, and opportunity on food waste

**Table 9.9.1. FWP household practices, MOA and demographics, on food waste.**

| | B | SE B | β | t |
|---|---|---|---|---|
| (Constant) | 376.45 | 201.96 | | 1.86 |
| **FWP household practices** | | | | |
| Planning of food shopping and use | 35.72 | 59.07 | 0.06 | 0.60 |
| Planning squared | -1.83 | 6.08 | -0.03 | -0.30 |
| Impulse buying | 51.32 | 10.14 | 0.09 | 5.06*** |
| Overview of food in stock | -40.05 | 12.51 | -0.07 | -3.20** |
| Cooking precisely | -54.65 | 11.06 | -0.10 | -4.94*** |
| Using leftovers | -124.66 | 10.91 | -0.22 | -11.43*** |
| **Motivation** | | | | |
| Awareness | 10.40 | 10.47 | 0.02 | 0.99 |
| Attitude towards wasting food | 35.70 | 11.73 | 0.06 | 3.04** |
| Social norm injun. | 5.27 | 9.54 | 0.01 | 0.55 |
| Social norm descr. | 66.01 | 9.84 | 0.11 | 6.71*** |
| **Competing goals** | | | | |
| Health importance | 5.71 | 9.95 | 0.01 | 0.57 |
| Taste importance | 32.99 | 11.39 | 0.05 | 2.90** |
| Convenience importance | -0.48 | 8.47 | 0.00 | -0.06 |
| Enough importance | 30.90 | 9.31 | 0.06 | 3.32** |
| Price importance | -16.61 | 7.82 | -0.04 | -2.12* |
| Not too much importance | -13.48 | 6.96 | -0.03 | -1.94 |
| **Abilities** | | | | |
| Difficulty with assessing food safety | -0.78 | 8.35 | 0.00 | -0.09 |
| Difficulty with creative cooking | 13.41 | 10.17 | 0.03 | 1.32 |
| Difficulty with accurate planning | -0.93 | 10.15 | 0.00 | -0.09 |
| Shelf-life knowledge | -5.97 | 11.58 | -0.01 | -0.52 |
| **Opportunities** | | | | |
| Availability of products | -31.31 | 16.21 | -0.04 | -1.93 |
| Accessibility to store | 23.51 | 15.89 | 0.03 | 1.48 |
| Equipment in home | 16.78 | 11.52 | 0.03 | 1.46 |
| Unforeseen events | 24.45 | 11.86 | 0.04 | 2.06* |
| **Socio-demographics** | | | | |
| Age | -3.26 | 0.78 | -0.07 | -4.17*** |
| Household size | 63.40 | 9.12 | 0.12 | 6.95*** |
| Gender, dummy | -13.42 | 10.49 | -0.02 | -1.28 |
| Hungary, dummy | -19.40 | 23.57 | -0.02 | -0.82 |
| Germany, dummy | 10.46 | 19.12 | 0.01 | 0.55 |
| Spain, dummy | 97.03 | 19.04 | 0.12 | 5.10*** |
| **Psychographics** | | | | |
| Awareness of parents | -0.12 | 9.81 | 0.00 | -0.01 |
| Perceived financial control | 4.76 | 6.74 | 0.01 | 0.71 |
| Food involvement scale | 10.64 | 11.26 | 0.02 | 0.94 |

* p <.05 | ** p <.01 | *** p <.001 | For information about the blocks see method section. | $R^2$ = .24 | $\Delta R^2_1$ = .16*** | $\Delta R^2_2$ = .04*** | $\Delta R^2_3$ = .00** | $R^2_4$ = .00* |$\Delta R^2_5$ = .04*** | F(33,3320) = 32.87, p = .00

**Table 9.9.2. Food waste states: FWP household practices, MOA and demographics.**

| | Unused | Partly | Leftovers | Stored leftovers |
|---|---|---|---|---|
| Constant | 159.91 | 99.24 | 98.69 | 18.61 |
| **FWP household practices** | | | | |
| Planning of food shopping and use | -27.30 | **58.75*** | -6.99 | 11.27 |
| Planning squared | 3.16 | -5.40 | 1.16 | -0.75 |
| Impulse buying | **15.76**** | **26.68***** | 2.45 | **6.44*** |
| Overview of food in stock | **-20.08**** | **-13.37*** | -2.02 | -4.58 |
| Cooking precisely | **-13.93*** | **-17.08**** | **-13.20**** | **-10.44**** |
| Using leftovers | **-30.63***** | **-46.98***** | **-42.03***** | -5.01 |
| **Motivation** | | | | |
| Awareness | 1.33 | 3.64 | 3.43 | 1.99 |
| Attitude towards wasting food | -0.61 | **16.07**** | **10.87*** | **9.37**** |
| Social norm injun. | 1.30 | 4.21 | 2.12 | -2.36 |
| Social norm descr. | **16.94**** | **21.65***** | **18.71***** | **8.72**** |
| **Competing goals** | | | | |
| Health importance | 9.28 | -3.18 | 0.07 | -0.47 |
| Taste importance | 10.53 | **16.15**** | 3.26 | 3.05 |
| Convenience importance | 2.05 | 0.38 | -0.44 | -2.46 |
| Enough importance | **11.05*** | 4.52 | **8.24**** | **7.10**** |
| Price importance | -7.14 | -4.38 | -4.16 | -0.93 |
| Not too much importance | -3.35 | -3.52 | -1.28 | **-5.33**** |
| **Abilities** | | | | |
| Difficulty with assessing food safety | -1.20 | -0.49 | 1.96 | -1.05 |
| Difficulty with creative cooking | 5.33 | 2.95 | 2.98 | 2.15 |
| Difficulty with accurate planning | -5.79 | 4.04 | 2.81 | -1.99 |
| Shelf-life knowledge | **-12.47*** | 5.09 | 3.23 | -1.83 |
| **Opportunities** | | | | |
| Availability of products | 8.46 | **-20.31*** | -1.98 | **-17.48***** |
| Accessibility to store | -7.58 | **21.96**** | -0.50 | **9.63*** |
| Equipment in home | **18.37**** | -2.05 | 3.52 | -3.05 |
| Unforeseen events | 20.46** | 0.20 | -1.08 | 4.86 |
| **Socio-demographics** | | | | |
| Age | -1.18** | -1.49*** | -0.43 | -0.15 |
| Household size | 10.69* | 14.86** | 27.18*** | 10.66*** |
| Gender, dummy | -5.35 | -11.42* | -0.02 | 3.37 |
| Hungary, dummy | -92.25*** | 15.24 | 26.80** | 30.81*** |
| Germany, dummy | 8.36 | 12.65 | -0.19 | -10.35 |
| Spain, dummy | **64.79***** | **27.58**** | 2.19 | 2.47 |
| **Psychographics** | | | | |
| Awareness of parents | -3.32 | -1.96 | -0.89 | **6.04**** |
| Perceived financial control | 2.22 | 4.56 | 1.41 | -3.44 |
| Food involvement scale | 2.46 | -5.24 | 8.03 | 5.39 |

* p <.05 | ** p <.01 | *** p <.001 | For information about the blocks see method section. | Unused: $R^2$ = .12 | $\Delta R^2_1$ = .06*** | $\Delta R^2_2$ = .02*** |$\Delta R^2_3$ = .00** | $\Delta R^2_4$ = .01*** | $\Delta R^2_5$ = .03*** | F(33,3320) = 13.28, p = .00 | Partly: $R^2$ = .15 | $\Delta R^2_1$ = .11*** | $\Delta R^2_2$ = .02*** | $\Delta R^2_3$ = .00 | $\Delta R^2_4$ = .00 | $\Delta R^2_5$ = .02*** | F(33,3320) = 18.38, p = .00 | Leftover: $R^2$ = .14 | $\Delta R^2_1$ = .08*** | $\Delta R^2_2$ = .03*** | $\Delta R^2_3$ = .00 | $\Delta R^2_4$ = .00 | $\Delta R^2_5$ = .03*** | F(33,3320) = 16.17, p = .00 | Stored leftover: $R^2$ = .07 | $\Delta R^2_1$ = .03*** | $\Delta R^2_2$ = .02*** | $\Delta R^2_3$ = .00 | $\Delta R^2_4$ = .00** | $\Delta R^2_5$ = .02*** | F(33,3320) = 7.20, p = .00

**Table 9.9.3 FWP practices, MOA, demographics, per country, on food waste.**

| | Germany | Hungary | Spain | Netherlands |
|---|---|---|---|---|
| Constant | 255.22 | 1044.89* | 604.72 | 70.21 |
| **FWP household practices** | | | | |
| Planning of food shopping and use | 55.42 | -46.80 | 98.03 | -4.07 |
| Planning squared | -2.80 | 3.48 | -8.90 | 3.02 |
| Impulse buying | 91.21*** | -13.68 | 32.66 | 73.16*** |
| Overview of food in stock | -48.20* | -128.88** | -47.07 | 6.41 |
| Cooking precisely | -49.09* | -28.56 | -43.83 | -66.11*** |
| Using leftovers | -130.79*** | -96.98** | -182.58*** | -74.01*** |
| **Motivation** | | | | |
| Awareness | 1.04 | 7.52 | 26.03 | 19.72 |
| Attitude towards wasting food | 46.05* | 42.91 | 35.97 | 5.81 |
| Social norm injun. | 15.57 | -8.74 | 11.46 | -6.88 |
| Social norm descr. | 43.04* | 66.75** | 99.53*** | 36.09* |
| **Competing goals** | | | | |
| Health importance | 39.57* | -60.30* | 1.05 | -7.22 |
| Taste importance | -10.63 | 81.98* | 62.49* | 44.16** |
| Convenience importance | -15.38 | 16.86 | 1.83 | 3.77 |
| Enough importance | 37.00* | 36.27 | 26.45 | 15.73 |
| Price importance | 4.35 | -31.62 | -34.63 | -4.78 |
| Not too much importance | -6.02 | -61.32** | -4.94 | -10.62 |
| **Abilities** | | | | |
| Difficulty with assessing food safety | 9.90 | -30.51 | -3.08 | 18.69 |
| Difficulty with creative cooking | 7.10 | 20.41 | 12.33 | 14.25 |
| Difficulty with accurate planning | -16.56 | 9.17 | 11.25 | -12.59 |
| Shelf-life knowledge | 30.00 | 44.07 | -61.83* | 13.82 |
| **Opportunities** | | | | |
| Availability of products | -86.80** | -97.88* | 3.55 | -6.62 |
| Accessibility to store | 93.09** | 105.37* | -21.43 | -5.36 |
| Equipment in home | 6.13 | -12.49 | 52.44* | -4.20 |
| Unforeseen events | 5.24 | 21.27 | 25.96 | 30.79* |
| **Socio-demographics** | | | | |
| Age | -4.76** | -0.44 | -2.18 | -4.11*** |
| Household size | 62.78** | 50.15* | 61.56** | 75.69*** |
| Gender, dummy | -8.73 | 18.36 | -3.75 | -41.94** |
| **Psychographics** | | | | |
| Awareness of parents | -2.28 | 12.67 | -17.35 | 8.13 |
| Perceived financial control | 16.72 | -16.09 | -15.06 | 8.14 |
| Food involvement scale | 1.86 | 24.78 | 13.63 | 0.28 |

* p <.05 | ** p <.01 | *** p <.001 | For information about the blocks see method section. | Netherlands: $R^2$ = .26 | $\Delta R^2_1$ = .17*** | $\Delta R^2_2$ = .02** | $\Delta R^2_3$ = .01 | $\Delta R^2_4$ = .01* | $\Delta R^2_5$ = .06*** | F(30, 998) = 11.75, p = .00 | Hungary: $R^2$ = .53 | $\Delta R^2_1$ = .17*** | $\Delta R^2_2$ = .10*** | $\Delta R^2_3$ = .01 | $\Delta R^2_4$ = .01 | $\Delta R^2_5$ = .01 | F(30, 439) = 6.19, p = .00 | Germany: $R^2$ = .38 | $\Delta R^2_1$ = .22*** | $\Delta R^2_2$ = .04*** | $\Delta R^2_3$ = .00 | $\Delta R^2_4$ = .01* | $\Delta R^2_5$ = .02*** | F(30, 840) = 10,85, p = .00 | Spain: $R^2$ = .35 | $\Delta R^2_1$ = .18*** | $\Delta R^2_2$ = .04*** | $\Delta R^2_3$ = .01 | $\Delta R^2_4$ = .01 | $\Delta R^2_5$ = .01* | F(30, 989) = 10,35, p = .00

## 9.10Effects on FWP household practices

**Table 9.10.1. FWP household practices: regression with MOA and demographics.**

| | Planning of food shopping and use | Impulse buying | Overview | Cooking precisely | Using leftovers |
|---|---|---|---|---|---|
| Constant | **2.45*** ** | **0.56*** | **2.89*** ** | **2.86*** ** | **4.91*** ** |
| **Motivation** | | | | | |
| Awareness | **0.05**** | -0.02 | 0.02 | 0.01 | **0.07*** ** |
| Attitude towards wasting food | **-0.07**** | **0.09*** ** | **-0.06**** | **-0.07*** ** | **-0.19*** ** |
| Social norm injun. | **0.06*** ** | 0.03 | 0.01 | **0.07*** ** | **0.06*** ** |
| Social norm descr. | **0.06**** | **0.04*** | 0.02 | -0.01 | -0.01 |
| **Competing goals** | | | | | |
| Health importance | **0.05**** | -0.03 | 0.02 | **0.09*** ** | 0.00 |
| Taste importance | **-0.06**** | 0.04 | 0.03 | **-0.06**** | **-0.06**** |
| Convenience importance | **0.04*** | 0.03 | 0.01 | **0.03*** | 0.01 |
| Enough importance | 0.01 | 0.03 | 0.02 | 0.00 | -0.01 |
| Price importance | -0.01 | 0.00 | 0.00 | **-0.03*** | **0.07*** ** |
| Not too much importance | **0.04**** | -0.02 | **0.03**** | **0.07*** ** | **0.03*** |
| **Abilities** | | | | | |
| Difficulty with assessing food safety | 0.02 | **0.03*** | **-0.03*** | **0.03*** | **-0.03*** |
| Difficulty with creative cooking | **0.04*** | **0.05**** | -0.01 | **0.08*** ** | **-0.16*** ** |
| Difficulty with accurate planning | **-0.19*** ** | **0.15*** ** | **-0.15*** ** | **-0.23*** ** | **-0.03*** |
| Shelf-life knowledge | **0.14*** ** | -0.02 | **0.17*** ** | **0.17*** ** | **0.06**** |
| **Opportunities** | | | | | |
| Availability of products | **0.09**** | 0.00 | **0.10*** ** | **0.06*** | 0.05 |
| Accessibility to store | 0.01 | -0.02 | 0.00 | 0.03 | 0.00 |
| Equipment in home | **0.07**** | 0.01 | **0.16*** ** | **0.08*** ** | **0.10*** ** |
| Unforeseen events | **-0.13*** ** | **0.26*** ** | **-0.12*** ** | **-0.14*** ** | **-0.05*** |
| **Socio-demographics** | | | | | |
| Age | 0.00 | 0.00 | 0.00 | **0.00**** | **-0.01*** ** |
| Household size | 0.03* | -0.02 | -0.01 | -0.01 | **-0.06*** ** |
| Gender, dummy | **0.08*** ** | 0.02 | **0.05**** | -0.02 | -0.03 |
| Hungary, dummy | -0.03 | **0.18*** ** | **0.10**** | **-0.10*** | **0.10*** |
| Germany, dummy | **-0.06*** | **0.27*** ** | **-0.07*** | **-0.21*** ** | 0.01 |
| Spain, dummy | **0.12*** ** | **-0.19*** ** | 0.02 | **0.20*** ** | **0.07*** |
| **Psychographics** | | | | | |
| Awareness of parents | 0.00 | -0.01 | **0.04**** | **0.04*** | **0.06*** ** |
| Perceived financial control | **0.03**** | -0.02 | **0.06*** ** | **0.07*** ** | **0.03*** |
| Food involvement scale | **0.15*** ** | **0.14*** ** | 0.03 | **0.07**** | 0.03 |

* p <.05 | ** p <.01 | *** p <.001| For information about the blocks see method section.
Planning: $R^2$ = .27 | $\Delta R^2_1$ = .11*** | $\Delta R^2_2$ = .11*** | $\Delta R^2_3$ = .02*** | $\Delta R^2_4$ = .03*** | F(27, 3326) = 44.81, p = .00 | Impulse buying: $R^2$ = .27 | $\Delta R^2_1$ = .08*** | $\Delta R^2_2$ = .10*** | $\Delta R^2_3$ = .05*** | $\Delta R^2_4$ = .05*** | F(27, 3326) = 46.20, p = .00 | Overview of food in stock: $R^2$ = .34 | $\Delta R2_1$ = .11*** | $\Delta R^2_2$ = .18*** | $R^2_3$ = .03*** | $\Delta R^2_4$ = .01*** | F(27,3326) = 64.02, p = .00 | Cooking precisely: $R^2$ = .29 | $\Delta R^2_1$ = .11*** | $\Delta R^2_2$ = .12*** | $\Delta R^2_3$ = .02*** | $\Delta R^2_4$ = .03*** | F(27, 3326) = 49.23, p = .00 | Using leftovers: $R^2$ = .28 | $\Delta R^21$ = .18*** | $\Delta R^2_2$ = .08*** | $\Delta R^2_3$ = .01*** | $\Delta R^2_4$ = .02*** | F(27, 3326) = 48.87, p = .00