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Διερεύνηση στάσεων και συμπεριφοράς των καταναλωτών απέναντι στα απόβλητα τροφίμων: Στοιχεία από τα Ελληνικά νοικοκυριά

Ανίσα Δημάρκο

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UNIVERSITY OF PIRAEUS

SCHOOL OF ECONOMICS, BUSINESS AND INTERNATIONAL STUDIES DEPARTMENT OF ECONOMICS

MSc. in Bioeconomy, Circular Economy & Sustainable Development

Investigating consumer attitudes and behavior towards food waste: Evidence from Greek households

Anisa Dhimarko

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Στους γονείς μου, στην αδερφή μου,

και στα τετράποδα παιδιά μου

την Ίρις, το Τζιτζικάκη και την Κίρα

Ευχαριστίες

Θα ήθελα να ευχαριστήσω θερμά την επιβλέπουσα καθηγήτρια μου κ. Ματζουρίδου Φανή για τη σημαντική συμβολή της στην περάτωση της διπλωματικής μου εργασίας, η οποία με τις καίριες επισημάνσεις της και την συνεχή προτροπή της με βοήθησε ουσιαστικά στη συγγραφή της παρούσας μελέτης. Ακόμη, θα ήθελα να ευχαριστήσω θερμά τον κ. Μιχαηλίδη Αναστάσιο, επίσης επιβλέποντα καθηγητή της διπλωματικής μου εργασίας, που με την αδιάλειπτη βοήθεια και τις γνώσεις που μου παρείχε, κατάφερα να ολοκληρώσω την ανάλυση της διπλωματικής μου εργασίας. Επιπλέον, θα ήθελα να ευχαριστήσω όσους με στήριξαν και με βοήθησαν κατα την διάρκεια της έρευνας και ιδιαίτερα τον κ. Μιρονένκο Βασίλειο, την κ. Παπαδάτου Έλενα, την κ. Geballa-Koukoula Ariadni, την κ. Γκάτσου Ελένη, την κ. Γουλή Μαριλή και την κ. Νατάνη Πέτρος. Επιπρόσθετα, θα ήθελα να ευχαριστήσω όσους βοήθησαν στην κοινοποίηση του ερωτηματολογίου μου καθώς και όσους συμμετείχαν στην παρούσα έρευνα.

Διερεύνηση στάσεων και συμπεριφοράς των καταναλωτών απέναντι στα απόβλητα τροφίμων: Στοιχεία από τα Ελληνικά νοικοκυριά

Σημαντικοί Όροι: Ελληνικά νοικοκυριά, σπατάλη τροφίμων, καταναλωτικές στάσεις, καταναλωτικές συμπεριφορές, βιωσιμότητα, οικιακή σπατάλη τροφίμων

Περίληψη

Η σπατάλη τροφίμων αποτελεί σημαντική αιτία για την εξάντληση των ενεργειακών πόρων του πλανήτη και την επιδείνωση των κοινωνικών ανισοτήτων. Τα οικιακά απορρίμματα τροφίμων αντιπροσωπεύουν περισσότερο από το ήμισυ των συνολικών απορριμμάτων τροφίμων στην Ευρώπη, ενώ η Ελλάδα είναι μία από τις χώρες με τα υψηλότερα ποσοστά απορριμμάτων τροφίμων στην Ευρώπη. Ο εντοπισμός των στάσεων και των συμπεριφορών των Ελλήνων καταναλωτών που οδηγούν στη σπατάλη τροφίμων θα μπορούσε να μας καθοδηγήσει στην εξεύρεση πιθανών λύσεων για τη μείωση της σπατάλης τροφίμων. Για τη διεξαγωγή της έρευνας εφαρμόστηκε ποιοτική ανάλυση, συνοπτική στατιστική, μοντέλο κατηγορικής παλινδρόμησης και διερεύνηση ερευνητικών υποθέσεων. Τα δεδομένα συλλέχθηκαν μέσω έρευνας σε δείγμα 467 Ελλήνων καταναλωτών που πραγματοποιήθηκε τον Νοέμβριο του 2022 στην περιοχή της Αττικής. Τα αποτελέσματα της έρευνας δείχνουν ότι τα δημογραφικά χαρακτηριστικά, οι στάσεις και οι συμπεριφορές των Ελλήνων καταναλωτών στο στάδιο της αγοράς και της διαχείρισης των τροφίμων, καθώς και οι απόψεις τους για την αειφορία και την ασφάλεια των τροφίμων, αποτελούν σημαντικούς παράγοντες για τη δημιουργία ή την πρόληψη της σπατάλης τροφίμων. Επιπλέον, όσον αφορά τη σπατάλη τροφίμων, τα φρούτα, και τα λαχανικά είναι τα τρόφιμα που απορρίπτονται συχνότερα από τους καταναλωτές. Για να μειωθεί η σπατάλη τροφίμων, είναι απαραίτητο οι Έλληνες πολίτες να ενημερωθούν σωστά από την πολιτεία για την καλύτερη διαχείριση των τροφίμων τους και τις επιπτώσεις της σπατάλης τροφίμων στο περιβάλλον και την κοινωνία.

Investigating consumer attitudes and behavior towards food waste: evidence from Greek households

Keywords: Greek households, food waste, consumer attitudes, consumer behaviors, sustainability, household food waste

Abstract

Food waste is a major cause of the depletion of the planet's energy resources and the deterioration of social inequalities. Household food waste accounts for more than half of total food waste in Europe, while Greece is one of the countries with the highest rates of food waste in Europe. Identifying the attitudes and behaviours of Greek consumers that lead to food waste could guide us to find possible solutions to reduce it. A qualitative analysis, summary statistics, a categorical regression model, and an investigation of research hypotheses were applied to conduct the research. Data were collected through a survey of a sample of 467 Greek consumers carried out in November 2022 in the Attica region. The results of the research show that the demographic characteristics, attitudes and behaviors of Greek consumers at the stage of food purchase and management as well as their views on sustainability and food security, are important factors in creating or preventing food waste. Furthermore, in terms of food waste, fruits, and vegetables are the food products that are most often discarded by consumers. To reduce food waste, it is necessary for Greek citizens to be properly informed by the state about the better management of their food and the impact of food waste on the environment and society.

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Chapter 1

1.1 Introduction

In 2021 the United Nations Environment Programme (UNEP) reported that Greece wastes nearly twice the global average amount of food and ranks first in Europe with food waste[1]. According to the results of a survey conducted by the Institute of Retail Consumer Goods (IELKA), in the period 5-11 November 2021 with a sample of 1.000 consumers from all over Greece, the average household food waste in Greek households is 6%. More specifically, according to the same survey, seven out of ten Greeks say that their household wastes food, while 300 thousand tonnes of food end up in the waste stream annually.

The IELKA (2021) reported that of the reasons Greek consumers attribute to waste, 21% believe they mismanage leftover food in the household, and 18% believe they buy more than they need. 30% of Greek consumers believe food retailers should help with this issue. This result shows that Greek consumers feel to a greater extent that they are responsible for reducing waste, but they also need the help of third parties. The main objective of our research is to identify the attitudes and behaviors that lead Greek consumers to create food waste and to identify the categories of food that are most often wasted.

FAO (Food and Agriculture Organization of the United Nations) (2019), stated that "food waste refers to the reduction in the quantity or quality of food resulting from the decisions and actions of retailers, food service providers, and consumers." Beretta et al. (2013) reported that the most avoidable food waste is generated in households. Kubíčková et al. (2021), stated that "avoidable" means preventable food waste with the most significant potential reduction capacity. Although households contribute significantly to food waste generation, no detailed household-level data in Greece consistently track household-level waste generation.

[1] According to FAO (2013): "Food waste refers to food appropriate for human consumption being discarded, whether or not after it is kept beyond its expiry date or left to spoil. Often this is because food has spoiled but it can be for other reasons such as oversupply due to markets, or individual consumer shopping/eating habits".

In 2019, approximately 931 million tons of food waste were produced worldwide, of which 61% was produced by households, 26% by food services, and 13% by retailers, as reported by UNEP (2021). In the European Union (EU) during the year of 2020, more than half of all food waste was produced in households (53%), as per Eurostat (2023).

However, FAO et al. (2022) reported that despite a great deal of food wasted by households, more than 828 million people suffered from severe hunger in 2021. In addition, an estimated 149 million children under five years of age had stunted growth and development due to a chronic lack of nutritious food. Moreover, FAO et al. (2022) estimated that 2.3 billion people in the world were food insecure in the same year, while gender inequality in food security continued to widen, with 31.9% of the world's women experiencing moderate or severe food insecurity, compared to 27.6% of men.

The gap between populations that can afford enough food and those that cannot is growing, suggesting that food distribution is unequal. In 2022, World Health Organization (WHO) reported that over a billion people globally are obese, 650 million adults, 340 million adolescents, and 39 million children. By 2025, WHO (2022) estimated that about 167 million people, both adults, and children, are expected to be overweight or obese. Moreover, WHO (2022) at the European Regional Report on Obesity, estimated that one in three school-age children, one in four adolescents, and almost 60% of adults are overweight or obese. High body mass index is a significant health risk factor for non-communicable diseases, particularly cancer and cardiovascular disease. Moreover, according to Eurostat (2019), in most EU Member States, the percentage of nearly all obese men was consistently higher than that of women.

The previous COVID-19 pandemic increased inequalities between and within countries, which the economic recovery has not yet been able to reverse, as stated by FAO et al. (2022). In 2020, the COVID-19 pandemic spread rapidly worldwide and revealed many setbacks, with populations facing increasing food insecurity and worsening inequalities. Despite gross domestic product (GDP) growth in many countries in 2021, more robust food security was needed. Those with lower incomes and poorer access to essential critical services were most affected, as per FAO et al. (2022).

Another ongoing crisis is the war in Ukraine, which will continue to affect the global food security sector. FAO et al. (2022), reported that global agricultural and trade markets will

be disrupted in many ways by this war, which will impact production and prices, further challenging the achievement of the Sustainable Development Goals (SDGs) in general.

In 2015, the United Nations adopted the Sustainable Development Goals (SDGs) as a worldwide call to action to eliminate world poverty, protect the planet's environment and ensure that by 2030 all people live in peace and prosperity. The SDGs aim to eliminate global poverty, hunger, AIDS, and discrimination against all women and children (UNDP, n.d.). Responsible production and consumption are the 12th goal of the SDGs, a central aspect to consider for this research.

The 12th goal aims for both economic growth and sustainable development, which requires the reduction of the ecological impact on the world by transforming how our goods and resources are produced and consumed (UNDP, n.d.). However, much of the world's population consumes too little water and food to meet their basic needs. Agriculture is the world's largest consumer of water, and the irrigation sector now requires nearly 70% of the world's freshwater for human use (UNDP, n.d.). Halving global per capita food waste at the retailer and end-consumer level is crucial in order to create more efficient production and distribution chains. According to UNDP (n.d.), food waste reduction can improve food security and shift toward a more resource-efficient economy.

1.2 Literature Review

1.2.1 Attitudes towards food waste

According to Zimbardo & Leippe (1991), attitude is related to behavior and emotion. However, attitude precedes behavior and emotion, as it relates to expectations, action plans, and feelings that precede our actions. Often, these are neither implemented nor externalized accordingly and, therefore, cannot form part of the whole behaviour, as per Zimbardo & Leippe (1991). The meaning of the term attitude is divided into three dimensions, the affective, the behavioural, and the cognitive dimension (Zimbardo & Leippe, 1991). What one knows, how one feels, and how one wishes to act all contribute to one's attitude towards another or about a situation (Zimbardo & Leippe, 1991). According to Vaske & Donnelly (1999), attitude is a person's fixed tendency to react positively or negatively toward a particular object.

According to Visschers et al. (2016), past studies show that consumers' attitudes toward environmental protection and awareness are closely related to their intentions and behaviors to minimize food waste. Schmidt (2016) and Melbye et al. (2016) confirm the significant effects of environmental concerns, including environmental attitudes, ethical norms, and other motivations, on the intention to reduce food waste. Kim et al. (2019) reported that the perceived value of sustainability positively affects attitudes toward waste reduction.

McCarthy & Liu (2017) cited that green consumers are defined as consumers who follow consumption practices that are considered environmentally friendly. Moreover, Gilg & Ford (2005), Connolly & Prothero (2008) Huttunen & Autio (2010) stated that these consumption practices are diverse, such as reducing consumption, recycling, buying products with less packaging, eating less meat, buying organic food, fair trade products, and other products that have reduced environmental impacts. Furthermore, Kim et al. (2019) found that being vegetarian means stronger attitudes toward waste reduction and environmentally friendly eating behaviour. On the other hand, as Frederiks et al. (2015) cited, there is often a large discrepancy between people's attitudes and behaviours. Moreover, according to Cecere et al. (2014), green consumers or recyclers also produce food waste.

McCabe (2017) and Willett et al. (2019) cited that reducing red meat and sugar consumption and increasing the consumption of plant foods such as fruits, vegetables, nuts, and legumes can also improve personal health and produce an environmental benefit. McCarthy & Liu (2017) reported that becoming vegetarian or eating less meat can reduce carbon emissions and pressure on natural systems. Hall et al. (2009) found that food waste can affect the environment by emitting air pollutants, inappropriate use of fertilizers, and excessive use of fresh water, land, and energy. According to Turner-McGrievy et al. (2016) and Willett et al. (2019), intensive meat production systems can lead to groundwater contamination, significant amounts of untreated waste, land degradation, loss of wildlife habitat, deforestation, and greater use of biocides compared to plant-based food systems.

On the other hand, McCarthy & Liu (2017) reported no significant difference in food-wasting behaviour between organic and non-organic groups or between vegetarians and non-vegetarians. Specifically, they found that some green consumers wasted as much food as non-green consumers. Their study showed that about 5-10% of the sample claimed, they did not waste food. This may be due to misunderstanding about what constitutes food waste. McCarthy

& Liu (2017) cited, that green consumers including vegetarians, were still determining whether food waste harms the environment since food is natural and biodegradable. Additionally, Makhal (2020) cited that many consumers need to realize the environmental impact of food and that wasting food is one of the leading causes of hunger elsewhere around the globe.

In addition, another cause of food waste is the perception of consumers and therefore their attitude towards foods that are considered optimal and non-optimal. According to the research of Aschemann-Witzel et al. (2015), a significant amount of food waste is produced by individual preferences and taste preferences, especially by perceptions of edibility. For households, this means, as per Porpino et al. (2016) and Watson & Meah (2012) that they need to buy more food to meet the dietary preferences of all household members, cope with selective consumers, and understand the nutritional risks associated with the edible quality of food.

According to Melbye et al. (2016), in markets, food products are always divided into two types, "optimal" and "suboptimal" products. De Hooge et al. (2017) referred to suboptimal foods as foods under the supermarket standard, which are still eaten but are considered undesirable, inedible and suboptimal for consumption. They are characterized by their appearance, packaging condition, or shelf life. Principato et al. (2021) reported that the Food Standards Agency had clarified the distinction between the "use by" expiry date, which refers to food safety, meaning that food becomes harmful if consumed after a specific date, and the "best before" date, which informs consumers that before the specified date the product is in the best condition for consumption, but can be consumed after that date.

According to Aschemann-Witzel et al. (2015), a significant proportion of avoidable food waste results from consumers' perceptions about the edibility of food. According to Block et al. (2016) and Melbye et al. (2016), these perceptions are influenced by beliefs about the food's safety and freshness to protect one's health. As per the studies of Milne (2012), Wilson et al. (2015) and de Hooge et al. (2017), security and freshness (or quality) of food are determined with the help of date labels and appearance, where foods that surpass these (best before/use by) dates or look atypical are perceived to be undesirable, inedible, and suboptimal for consumption. Aschemann-Witzel et al. (2015) called "suboptimal" those foods that consumers reject or discard because they are perceived as "relatively undesirable" compared to other similar foods because they are either close to or past the expiration date or have a visually different appearance from what is considered "normal" or "optimal". According to Makhal

(2020), suboptimal foods include foods consumers perceive as undesirable because they are approaching or past the expiration date or have surface damage to the package.

As per Aschemann-Witzel, (2018), consumers generally prefer optimal foods to non-optimal foods. Hingston & Noseworthy (2020) cited that a critical determinant of food waste is rejecting products that deviate from the image of a category prototype. According to studies by Wansink & Wright (2006) and Wilson et al. (2017) concerning perceived product quality, data labels play a particular role in communicating freshness and hygiene. Products close to their expiration date are perceived as less fresh and less healthy and, therefore, more likely to be wasted.

1.2.2 Behaviours toward food waste

Furthermore, according to Neal et al. (2012), behavior refers to the actions taken by someone or a group of individuals, a company, or an organization, at a given time. Moreover, as per the same study behavior is the reaction to stimuli from the social environment and, it is the way an individual manages events and situations and interacts with the material and immaterial environment.

McCarthy & Liu (2017) reported that consumers waste food due to various food management behaviors such as shopping habits, meal planning, cooking, and food storage. According to the studies of Krisjanti & Quinta (2020) and Ammann et al. (2021), the problems of food-wasting behavior arise from food purchasing behavior, as people who tend to buy more food out of habit or buy discounted products often tend to waste more food.

Moreover, according to Koivupuro et al. (2012) and Stefan et al. (2013), customers' purchasing behaviors and shopping habits have been described as "deeply ingrained routines". As per research of Beharrell & Denison (1995), Thomas & Garland (2004) and Sobal & Bisogni (2009), food-related behaviors can become routine due to their repetitive nature, leading to the facilitation of daily life. The importance of routines in consumer behavior is recognized, and due to the interrelatedness of food-related behaviors, these may be important in explaining food-wasting behavior. Research of Lyndhurst et al. (2007), Maubach et al. (2009) and Evans et al. (2012), suggested that consumer shopping behavior appears to be, to some extent, routine, and

buying excessive amounts of food during shopping is common. Such patterns could contribute to increased food waste. This suggestion is supported by Evans (2011), which found that families using shopping lists often buy the same types of food weekly, end up stockpiling produce and ignore old food to accommodate newer, fresher produce.

Graham-Rowe et al. (2014) and Pearson & Perera (2018) argued that planned shopping and using shopping lists will only be effective if customers have high self-regulation and control, ensuring that they do not deviate from the list or make impulsive and unnecessary purchases. Moreover, Corrado (2007) cited that pre-purchase planning and shopping lists are good examples of good practices for minimizing food waste. Quested et al. (2013) stated that what is even more interesting is its solid and positive association with two others closely related pre-purchase planning behaviors, namely advance meal planning and checking food levels before shopping. This seems to be confirmed by research Chandon & Wansink, (2006), Bell et al. (2011) and Stefan et al. (2013), according to which planning routines such as advance meal planning or checking stock levels could help reduce food waste, reduce the likelihood of understocking and buying food already in the home and possibly contribute to more robust routines for reusing leftovers.

According to Liao et al. (2022), during shopping, most consumers pay more attention to price and price comparison, especially people with a limited budget. When consumers find the price unusually low and attractive, they will likely buy impulsively, as per the research of Park et al. (2012) and Lahath et al. (2021). Pearson and Perera (2018) reported that consumers are often vulnerable to supermarket offers in the form of bulk purchase discounts and other shopping promotions. According to Liao et al. (2022), in marketing and promotions, retailers always give more discounts for bulk packs or provide a special offer, which induce price-sensitive consumers to buy large quantities of products that exceed their consumption needs. Liao et al. (2022) cited that excessive purchases that exceed actual requirements can ultimately contribute to food waste. Ponis et al. (2017) stated that this “compulsive” buying behavior, combined with poor home storage procedures and infrastructure and ignoring key expiry dates of products, increases household food waste.

Graham-Rowe et al. (2014) reported that consumer food-wasting behaviors appear to be linked to a lack of “good food management skills”, which, if they existed, would lead to more efficient shopping and cooking practices. According to Cox & Downing, (2007),

Aschemann-Witzel et al. (2015), Graham-Rowe et al. (2015), Porpino et al. (2015) and Waitt & Philips (2016), food waste can be reduced or avoided by proper food storage. However, many people do not know much about how to store food properly, manage food shelf life, or which foods should be placed on specific refrigerator shelves to extend food shelf life and avoid food waste. Furthermore, according to research of Terpstra et al. (2005) and Marklinder & Eriksson (2015), it has been found that most people set their refrigerators at higher temperatures than recommended, which accelerates food spoilage. Leray et al. (2016) and Martindale et al. (2014) stated that, freezing food is another easy way to preserve food because it extends the shelf life and prevents waste. Moreover, according to Hoek et al. (2017), healthy foods, such as fruit, are sometimes stored in a sub-optimal way. Evans et al. (2012) demonstrated that parents try to instill healthy eating habits in their children by placing fruit in a bowl instead of in the refrigerator. On the other hand, according to the studies of Koivupuro et al. (2012), Stefan et al. (2013) and Graham-Rowe et al. (2014), those with food-management skills tend to cook large batches of food when they are less busy and freeze them for future use during peak periods, facilitating quick use of fresh ingredients and keeping food fresh and healthy for longer. As per Ananda et al. (2021), such food-management skills may suit consumers with modern and busy lifestyles.

Moreover, as Evans (2011) reported, modern lifestyles and careers often lead to unplanned but convenient last-minute options such as eating out, ordering takeaway food, or home delivery. These choices lead to food waste as they ignore planned and purchased food products, as per the studies of Graham-Rowe et al. (2014), Graham-Rowe et al. (2015), Schmidt, (2016) and Gaiani et al. (2018). According to Hamerman et al. (2017), a possible solution to the issue of food waste in restaurants is for consumers to take uneaten home leftovers for future consumption.

On the other hand, Lyndhurst (2007) argues that cooking too much food contributes significantly to food waste and that reusing leftovers could contribute to lower levels of food waste. According to Wansink & Van Ittersum (2007) and Griffin et al. (2009), excessive cooking or meal preparation, which renders food inedible, and unwarranted increases in food portions are documented in the literature to contribute to the volume of household food waste. For example, in 2011, the Waste and Resource Action Program (WRAP) reported that in the UK, around two-thirds of household waste is due to food spoilage due to untimely use. Another third is because people cook poorly or in oversized portions leading to plating scraping.

Furthermore, according to the research of Bava et al. (2008), individuals with a lack of cooking skills have limited food choices as they have low confidence in their cooking skills, which is associated with their reluctance to experiment with cooking. Individuals' skills or ability to engage in food provisioning activities are essential in food waste.

Another interesting finding, according to Mallinson et al. (2016), is that people who eat many ready meals, junk food, and takeaway food tend to waste more. Therefore, it confirms again that food management skills are essential for waste generation. However, emphasis is placed on the management of leftover food. Furthermore, Misiak et al. (2021) stated that sharing leftover food with people outside the home prevents food waste.

According to Porpino et al. (2016), food waste occurs during consumption when people leave leftovers on dishes that need to be reused. Indeed, according to Evans (2012), consumers often throw leftovers stored in refrigerators. Stancu et al. (2016) and Stefan et al. (2013) reported that reusing leftovers is one of the best practices for avoiding food waste within the household. People who regularly eat leftovers produce less food waste.

Additionally, Armstrong et al. (2021) examined the relationship between self-reported food waste and food security. As per Armstrong et al. (2021), food-insecure participants reported more purchased and cooked food waste than food-secure participants. Food secure participants reported throwing away less bought and cooked food of all food types.

1.2.3 Demographic characteristics and food waste

According to Parfitt et al. (2010), family size and composition are among the main factors influencing the amount of food waste. Typically, according to Cox & Downing (2007) and Parizeau et al. (2015), households with children tend to produce more food waste to accommodate the unpredictable nature of family members' food preferences. Moreover, according to Graham-Rowe et al. (2014) and Porpino et al. (2016), parents also want to maintain their identity as good parents by submitting to their children's demands. Similarly, according to studies by Williams et al. (2012) and Parizeau et al. (2015), smaller households waste more food as opposed to larger households. On the other hand, according to Quested et al. (2013), larger households waste more than smaller households. Moreover, according to the research of

Quested & Luzecka (2014), families with children tend to waste more food than households with only adults of the same size since children are fussy consumers and for food safety reasons. Furthermore, according to the research of Visschers et al. (2016), another reason for food waste by children may be related to older children making last-minute decisions to eat out, wasting food prepared at home. Furthermore, according to the research of Campbell et al. (2007) and Chen et al. (2021), sometimes, parents overbuy or have more frequent supplemental shopping in response to children's spontaneous requests to buy or make food available to them just in case. According to Haselhoff et al. (2014) research, children use persuasion, begging and emotions and sometimes even become aggressive to convince their parents to impulsively buy products with attractive packaging or advertised on television. Supermarkets, according to the research of Chen et al. (2021), generally target children with marketing appeals, as children have the power to influence parents to satisfy their impulse buying requests. According to the research of Graham-Rowe et al. (2014), some parents often oversize dinner portions for children to discourage the consumption of unhealthy snacks, which could lead to more food waste. Finally, the research of Damen et al. (2019), Porpino (2016) and Revilla & Salet (2018) showed that parents' childhood experiences with food shortages may also influence them to have plenty of food for their children by keeping their cupboards stocked with convenience foods, such as cookies and frozen foods for children.

In addition, according to the research of Parfitt et al. (2010), Stancu et al. (2016), Principato (2018), Richter & Bokelmann (2018), Ilakovac et al. (2020) and Przezbórska-Skobiej & Wiza (2021), the age of household members is a main factor that influences the household's food waste, as younger family members waste more food, while older family members tend to waste less food. Hebrok & Boks (2017) reported that younger consumers place more importance on the hedonic value of food than older consumers, who place more importance on food's health and economic value. Moreover, according to Cappellini & Parsons (2012), Evans (2011) and Block et al. (2016), older consumers tend to prefer foods such as fruits and vegetables, while younger family members tend to waste more livestock products. Furthermore, according to Quested et al. (2013) and Watson & Meah (2012), having grown up in times of war and experienced periods of food shortages and food rationing, older consumers tend to be more frugal when handling food. According to the research cited by Przezbórska-Skobiej & Wiza (2021), a significant segment of consumers is the elderly group, the size of which is increasing every year.

Furthermore, Baker et al. (2009), Stancu et al. (2016) and Ilakovac et al. (2020) stated that one of the factors influencing household food waste includes the gender of the family member shopping. According to the research of Bozdağ & Çakiroğlu (2021), women produce more food waste than men, while the studies of Secondi et al. (2015) and Visschers et al. (2016) show that men produce more food waste. Visschers et al. (2016) found that female respondents rejected more food than male respondents, while the vital role of gender in food waste generation was also reported in the survey conducted by Koivupuro et al. (2012), according to which the amount of food waste was significantly higher in households where women were mainly responsible for food purchase.

Moreover, while Cox & Downing (2007) cited that household income has little effect on the amount of food wasted, Stefan et al. (2013) reported that higher-income households waste more food than lower-income households. On the other hand, according to WRAP (2010) the lower-income consumers waste more food than higher-income consumers due to their "living for the day" lifestyle and their inability to plan. Furthermore, Porpino et al. (2015) found that lower-income households also produce large amounts of food waste.

1.2.4 Food waste categories

Our research also investigates what type of food is most often wasted. Loebnitz & Grunert (2018) reported that in terms of product characteristics, previous studies have shown that the amount of food wasted is related to the food category. Parfitt et al. (2010) stated that, the most crucial source of food waste is perishable foods, especially fresh fruits and vegetables, bread, dairy products, meat, and fish. Buzby & Hyman (2012) identified three main food groups that are most wasted: meat, vegetables, and dairy. Furthermore, Conrad (2020) found that "meat and seafood" and "fruits and vegetables" were the main waste categories.

According to Buzby et al. (2011), as a significant proportion of global food waste comes from fruit and vegetable waste, focusing on reducing fruit and vegetable waste can help reduce the overall scale of food loss and waste. According to Priefer et al. (2016), to achieve the ambitious goal of halving food waste by 2030, it is vital to understand the reasons or factors that facilitate this.

Chapter 2 - Methodology

2.1 Data collection

For data collection, was conducted both a qualitative and a quantitative survey. Initially, qualitative research was conducted, specifically online interviews with a sample of 20 consumers in two focus groups of 10. A semi structured questionnaire was used as a qualitative research tool to collect the following data for the following consumer aspects:

- Consumer attitudes and behaviour
- Consumer food management
- Consumer food waste
- Consumer sustainability awareness
- Consumer demographic characteristics

The main purpose of the qualitative research and analysis was to collect data and information for the quantitative survey design and, more importantly, for structuring the final questionnaire. The interviews were conducted online in the networks of the municipalities of Attica. The sample was attempted to represent the entire demographic characteristics of the questionnaire.

In conjunction with the literature review, the sample of responses created a fully structured questionnaire for the quantitative research. Most questions were formulated on a five-point Likert scale. The final structured questionnaire was divided into five sections:

PART I. Consumer attitudes and behaviours at the stage of food purchase

PART II. Consumer attitudes and behaviours at the stage of food consumption and food management

PART III. Consumer attitudes and behaviours at the stage of food waste

PART IV. Consumer attitudes and behaviours toward sustainability issues

PART V. Consumer demographic characteristics

The questionnaire was distributed to 467 consumers, which indicates a representative sample in terms of population and demographic characteristics. Data collection was carried out between 08 November 2022 until 24 December 2022.

2.2 Validity Analysis

The validation of quantitative questionary content by expert judgment is identified as an evidence-based opinion by people with a proven background in the field, who are considered by others to be qualified experts and who can offer insights, information, ideas, judgments, and evaluations. Content validations are generally conducted either during the design of a test or to validate the translation and standardization of an instrument for use in a different culture. In either case, the role of experts is fundamental in clarifying, adding, and modifying the necessary aspects. According to Fernández-Gómez et al. (2020) the evaluation through expert review consists of asking several individuals to judge an instrument or express their opinion for a particular assessment purpose.

This study conducted a validity test for the qualitative and quantitative elements. Five experts in questionnaires and statistics, food biotechnology, economics, sustainability, and agricultural product technology, respectively, checked the semi-structured questionnaire before it was distributed to consumers. The checking process was carried out through each expert's evaluation. In each observation, the evaluators suggested an alternative form of the survey elements, and the experts re-evaluated the semi-structured questionnaire. This process was repeated until an agreement was reached between the experts on the final structure and format of the questionnaire.

2.3 Reliability Analysis

Cronbach's alpha is a statistical index that tests and scales if constructed or adopted for research projects are fit for purpose. According to Taber (2018), many scholars use a wide range of different qualitative descriptions to interpret the calculated alpha values. Thus, alpha values were described as excellent (0,93–0.94), strong (0,91–0,93), reliable (0,84–0,90), robust (0,81), fairly high (0,76–0,95), high (0,73–0,95), good (0,71–0,91), relatively high (0,70–0,77),

slightly low (0,68), reasonable (0,67–0,87), adequate (0,64–0,85), moderate (0,61–0,65), satisfactory (0,58–0,97), acceptable (0,45–0,98), sufficient (0,45–0,96), not satisfactory (0,4–0,55) and low (0,11). This diverse list of terms suggests that there is no clear consensus on the most appropriate characterizations to describe the values obtained when calculating alpha.

The Cronbach's a test was used to determine the reliability of the research element and identify the cases that need to be excluded. A total of 30 variables were included and analysed to determine the extent to which these variables were related and identify the questionnaires that need to be excluded. The value of the a-Cronbach coefficient was equal to 0,665, indicating an acceptable, adequate and satisfactory scale of the survey case elements.

Case Processing Summary

		N	%
Cases	Valid	467	100.0
	Excluded[a]	0	.0
	Total	467	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.665	.677	30

Figure 1 Cronbach's alpha reliability test

Chapter 3 - Results

3. Results

This chapter presents the results obtained from the qualitative analysis, the summary statistics, and the categorical regression of the sample of consumers who participated in the survey. In the first section, the results of the qualitative analysis are presented, while the second section presents the socioeconomic characteristics of the sample and the results of the summary statistics. The third section includes the results of the categorical regression. Finally, the fourth section presents the testing of the research hypotheses.

3.1 Qualitative analysis

The interviews conducted for the needs of the qualitative research using the questionnaire helped to identify possible weaknesses and the corresponding improvements in its structure. The following new variables emerged from the analysis of the qualitative data.

In the first part of the questionnaire “Consumer attitudes and behaviours at the stage of food purchase”, questions were added on whether they follow a type of diet based on which they shop and what type of diet the respondents follow. These variables were also confirmed by the literature review.

In the second part “Consumer attitudes and behaviours at the stage of food consumption and food management”, the new variables that emerged concerned the participants' attitudes and behaviours regarding the management and preservation of their food.

In the third part, “Consumer attitudes and behaviours at the stage of food waste”, we determined variables related to the frequency with which respondents discard their waste, the types of food discarded and the reasons why respondents would discard a food item.

In the fourth part, “Consumer attitudes and behaviours toward sustainability issues”, we added questions related to the frequency with which respondents recycle, sustainability, and food safety.

Finally, in the fifth part, “Consumer demographic characteristics”, the necessary variables for the population’s demographic characteristics were retained, such as gender, age, marital status, occupation, and annual income, were retained.

From the data collected from the qualitative research and the literature review, the variables and questions were created, forming the quantitative research questionnaire.

3.2 Summary statistics

3.2.1 Consumer demographic characteristics

A total of 467 consumers participated in this survey, 113 (24,2%) men and 353 (75,6%) women and 1 consumer (0,2%) who did not wish to answer (Figure 2 Consumer Gender).

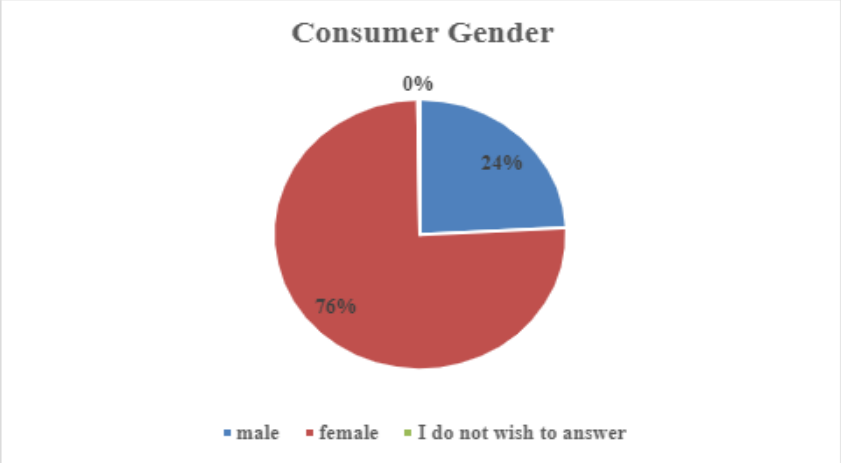

Figure 2 Consumer Gender

Furthermore, 171 (36,6%) of the respondents are between 26 to 35 years old, 88 (18,8%) participants are between 36 to 45 years old, 85 (18,2%) are between 46 to 55 years old, and 52 (11,1%) between 18 to 25 years old. Furthermore, 50 (10,7%) respondents are between 56 to 65 years old and 21 (4,5%) belong to the age group of 66+ (Figure 3 Consumer Age).

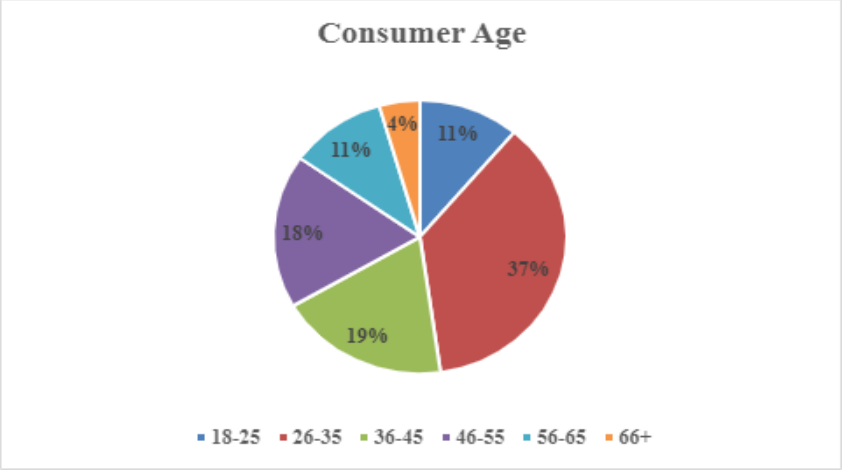

Figure 3 Consumer Age

Regarding the consumers' family type, the 238 (51%) of the respondents are married, cohabiting, or in a long-term relationship, while 188 (40,3%) participants are single. The 33 (7,1%) respondents are divorced or widowed, while 8 (1,7%) participants did not wish to answer (Figure 4 Household type).

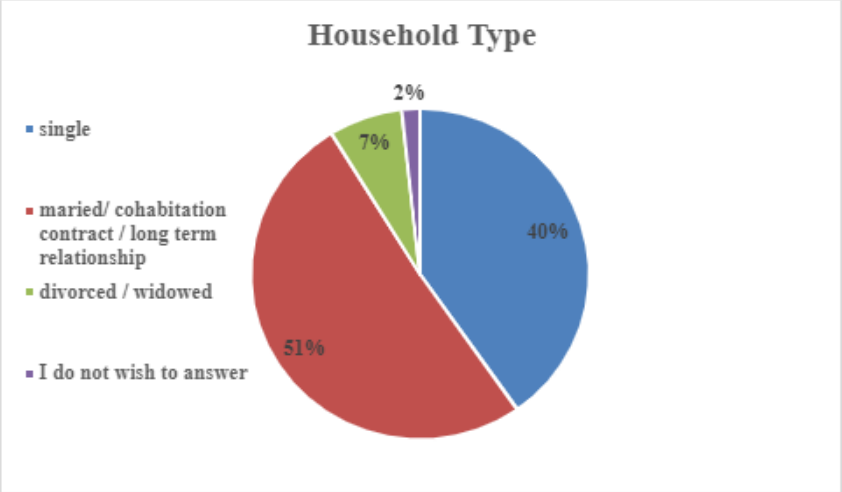

Figure 4 Household Type

The most significant proportion of consumers in the survey do not have children, 277 (59,3%) respondents. Furthermore, 183 (39,2%) participants do have children, while 7 (1,5%) of the consumers did not wish to answer (Figure 5 Kids).

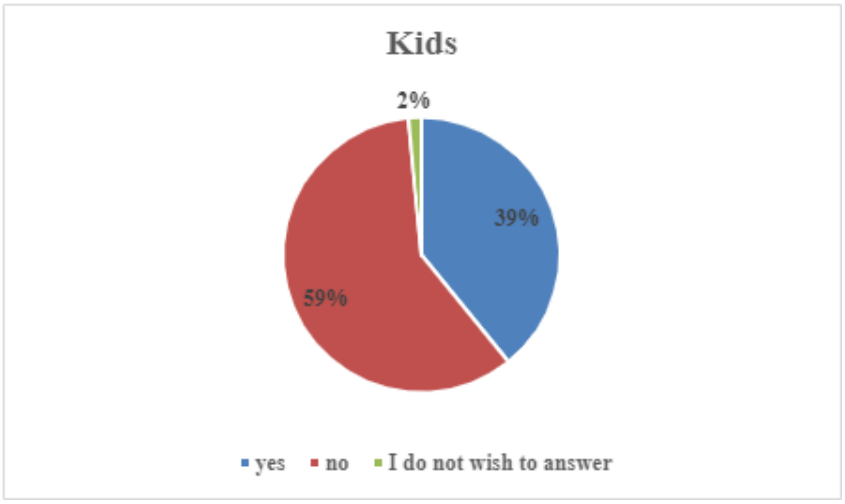

Figure 5 Kids

The distribution of the sample by occupation is shown in Figure 6 Job Type. The highest proportion of consumers are 258 public or private employees (55,2%), followed by 67 self-employed and entrepreneurs (14,3%), 39 students (8,4%), 38 pensioners (8,1%), 35 unemployed (7,5%), 21 homemakers (4,5%), and 9 people who did not wish to answer (1,9%).

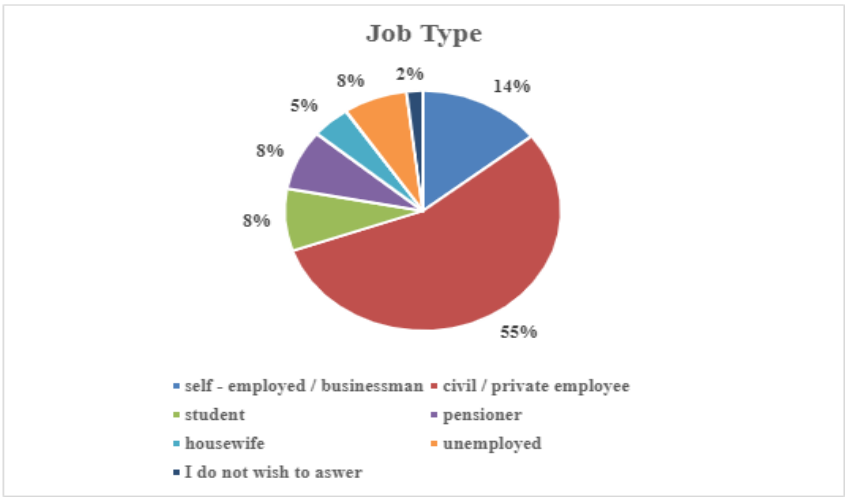

Figure 6 Job Type

The Figure 7 shows the distribution of the sample by personal annual income. The 131 (28,1%) consumers stated that they have a personal annual income between €10,001-18,000, 84 (18%) have a personal annual income between €5,001-10,000, 79 (16,9%) participants have a personal annual income of €0-5,000, and 55 (11,8%) of respondents did not wish to answer.

Furthermore, the 34 (7,3%) participants had a personal annual income of 25,001-30,000€, 18 (3,9%) respondents had a personal annual income of more than 40,000€, and 16 (3,4%) had a personal annual income of 30,001-40,000€.

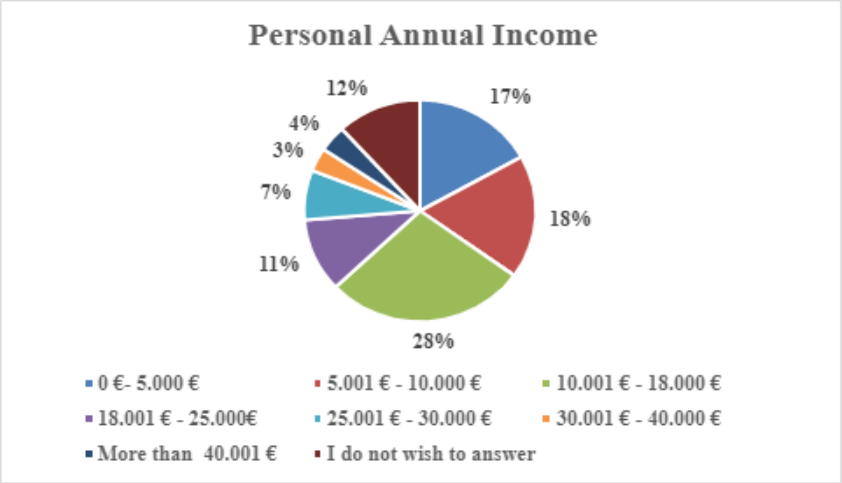

Figure 7 Personal Annual Income

Based on all the above data, the representative consumer in the survey sample is a woman, 35-46 years old, married, cohabiting, or in a long-term relationship. Also, she has no kids, is a student, and her personal annual income is between 18,001€ to 25,000€ (Figure 8 The representative consumer).

Figure 8 The representative consumer

3.2.2 Consumer attitudes and behaviours at the stage of food purchase

The figure below shows the frequency with which respondents visit food shops and farmers' markets. Out of 467 respondents, 149 (31,9%) stated that they go to food and farmers' markets once a week, 131 (28,1%) twice a week, 98 (21%) less than once a week, 56 (12%) three times a week, 32 (6,9%) four or more times a week, while 1 (0,2%) of the respondents did not wish to answer (Figure 9 Grocery Shopping).

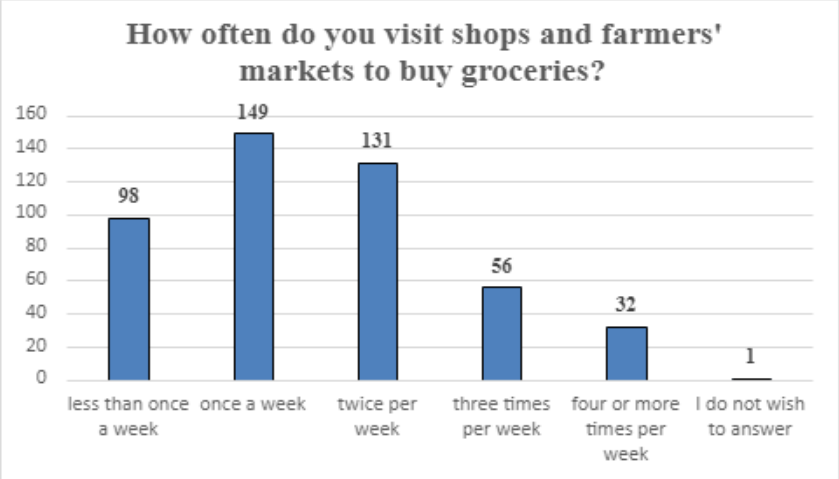

Figure 9 Grocery Shopping

Furthermore, on the question, "how often do you make a shopping list?", the 148 (31,7%) of respondents answered "always", 122 (26,1%) responded "often" and 96 (20,6%) stated that "sometimes" make a shopping list. The 62 (13,3%) participants stated that "rarely", write down a shopping list and 39 (8,4%) answered that they "never" make a shopping list (Figure 10 Shopping List).

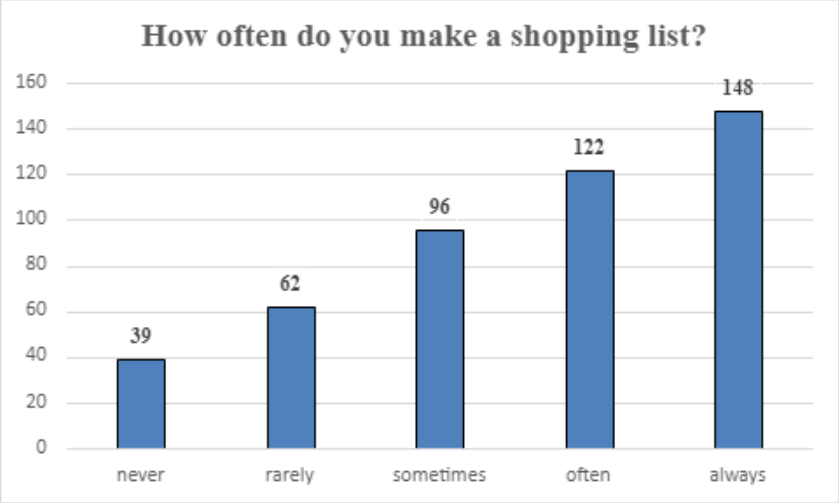

Figure 10 Shopping List

Regarding the question, “do you follow a diet plan based on which you shop?” The 282 (60%) participants answered “no”, 183 (39%) responded “yes”, and 2 (1%) participants did not wish to answer (Figure 11 Meal Plan).

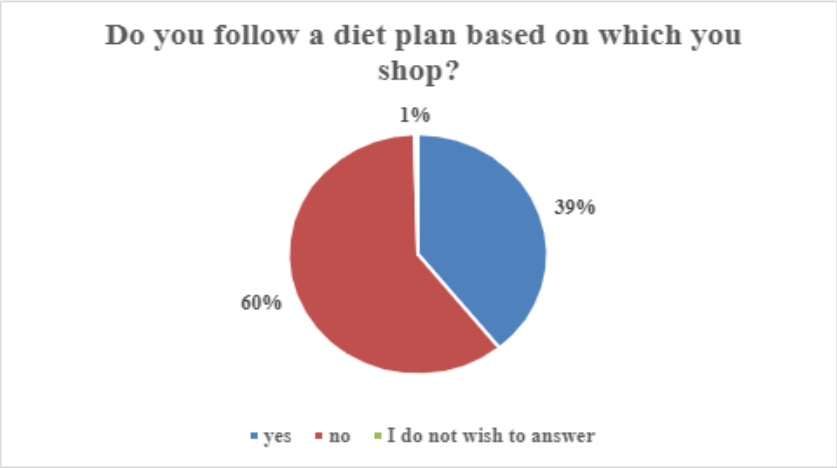

Figure 11 Meal Plan

Concerning the type of diet followed by the respondents, 271 (58%) respondents answered that they follow a Mediterranean or non-vegetarian diet. Further, 78 (16,7%) indicated that they follow a flexitarian diet, 25 (5,4%) were vegetarian, 10 (2,1%) did not wish to answer, and only 3 (0,6%) of the respondents were vegan. In comparison, 80 (17,1%)

respondents reported following a different kind of diet not mentioned in the questionnaire (Figure 12 Diet)

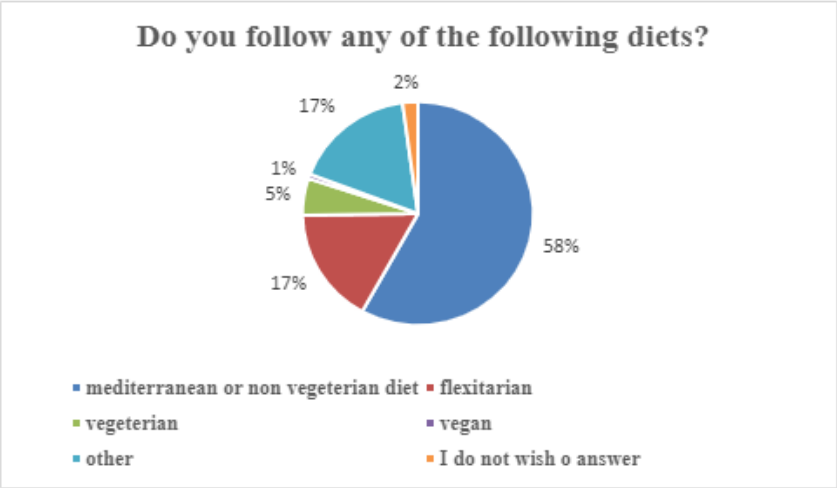

Figure 12 Diet

Furthermore, regarding whether they shop for food products based on offers, 214 (45,8%) participants answered “often,” 145 (31%) responded “sometimes,” and 66 (14,1%) participants answered “always.” Also, 37 (7,9%) participants stated that they “rarely” buy products based on offers, and 5 (1,1%) said that they “never” do this (Figure 13 Offers)

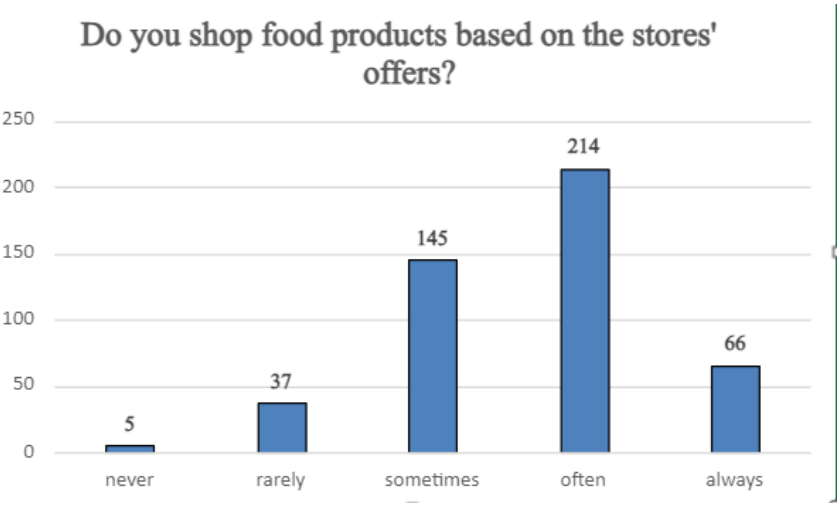

Figure 13 Offers

In response to whether they observe the expiry date of products, 192 (41.1%) answered “always”, 123 (26,3%) responded “often”, 82 (17,6%) answered “sometimes”, 49 (10.5%) participants answered “rarely”, and 21 (4,5%) answered “never|"“(Figure 14 Expiry date).

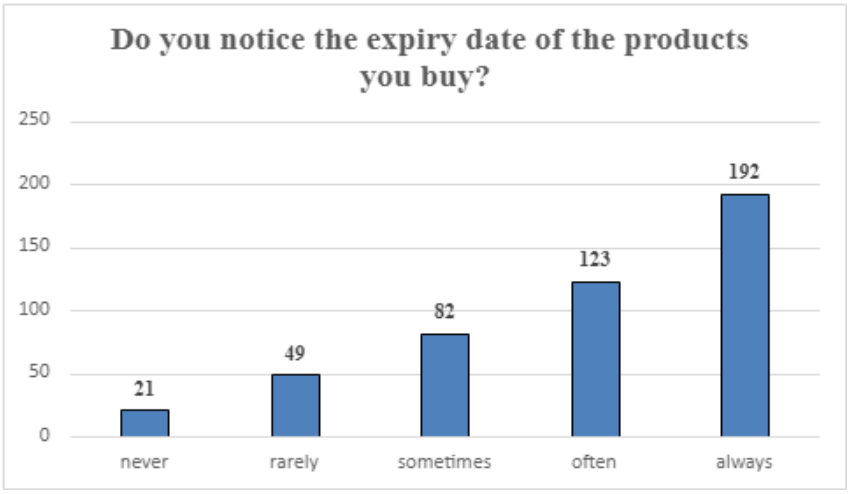

Figure 14 Expiry date

Furthermore, when asked if they knew the difference between the label “use by” and the label “best before”, 285 (61%) respondents answered yes, 181 (38,8%) answered no, and 1 (0,2%) did not wish to reply (Figure 15 Date Labels).

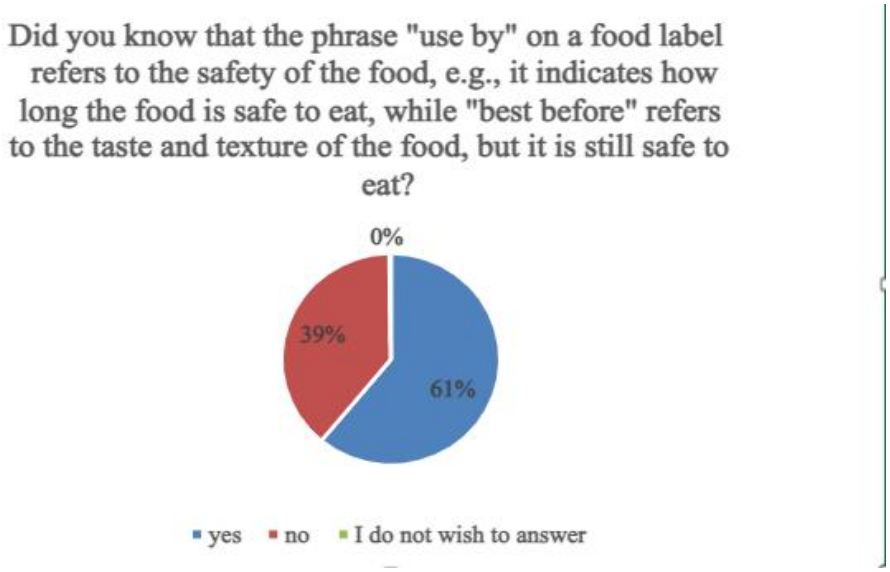

Figure 15 Date Labels

For the question on how likely they are to buy environmentally friendly products compared to similar products of the same type that are not, 220 (47,1%) answered that it is "likely", 138 (29,6%) responded that it is "neither likely nor unlikely", and 80 (17,1%) answered that it is "very likely". On the other hand, 14 (3%) responded that it is "unlikely", another 14 (3%) answered that it is "very unlikely", and 1 (0,2%) responded that they "did not wish to answer" (Figure 16 Environmentally Friendly Products).

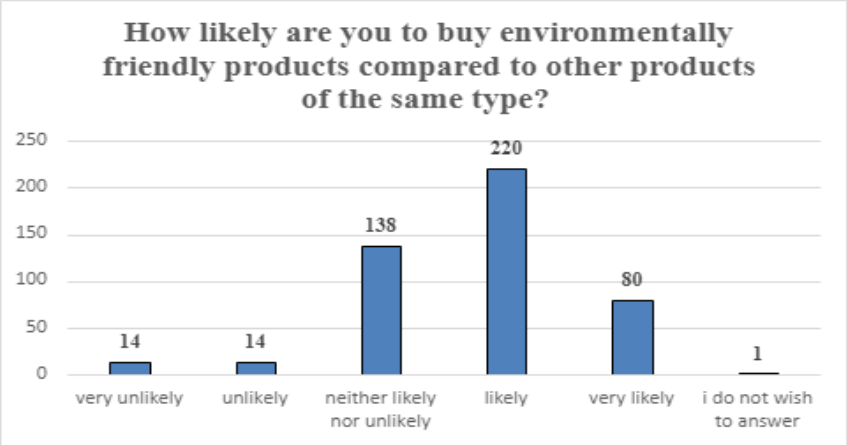

Figure 16 Environmentally Friendly Products

Regarding the question of how often the respondents order in or eat out, 212 (45,4%) answered "sometimes", 149 (31,9%) responded "rarely", 96 (20.6%) answered "often", 5 (1,1%) responded that they "never" go out to eat or order food, 4 (0.9%) answered that they "daily" eat out or order in and 1 respondent (0.2%) "did not wish to answer" (Figure 17 Order in / Eat out).

Figure 17 Order in / Eat out

On the question of whether the respondents ask the waiter to take away their leftover food, 129 (27,6%) answered that they ask “sometimes”, 103 (22,1%) responded that they “always” ask, 103 (22,1%) answered that they “rarely” ask, 100 (21,4%) responded that they “often” ask and 32 (6,9%) answered that they “never” ask (Figure 18 Takeaway a leftover meal in a restaurant).

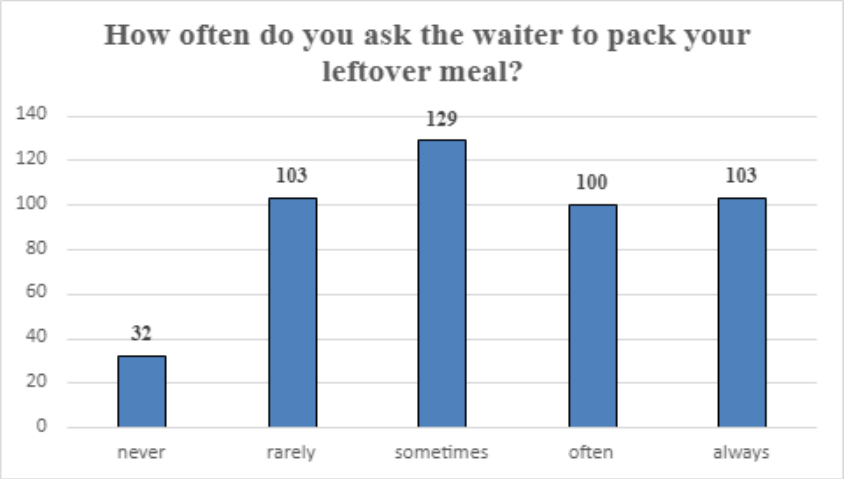

Figure 18 Takeaway a leftover meal in a restaurant

3.2.3 Consumer attitudes and behaviours at the stage of food consumption and food management

Six short questions were created about the respondents’ attitudes and behaviour regarding their food management. First, they were asked how often they store their leftover food, 266 (57%) responded that they “always” store them, 144 (30,8%) answered that they “often” store their food leftovers, and 45 (9,6%) stated that they “sometimes” store their leftover food. Further, 11 (2,4%) responded that they “rarely” store their food leftovers, while 1 (0,2%) “did not wish to answer” (Figure 19 Leftover Food Storage).

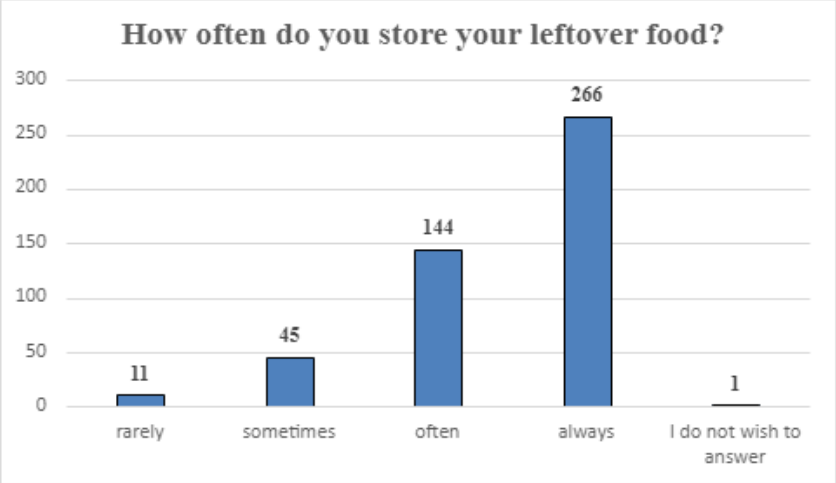

Figure 19 Leftover Food Storage

In addition, survey participants were asked if they put food approaching its expiry date in the front of their fridge or cupboard. 160 (34,3%) respondents answered that they "always" put these foods in the front of their refrigerator or pantry, 114 (24,4%) said they do this "often", and 77 (16,5%) said they "sometimes" place them in the front of their refrigerator or pantry. In addition, 60 (12,8%) of the respondents said they "never" put food that is about to spoil in the front of their refrigerator or cupboard, 53 (11,3%) of the respondents said they "rarely" do so, while 3 (0,6) said they "did not wish to answer" (Figure 20 Placing foods that are approaching their expiry date on the front of the refrigerator or cupboard).

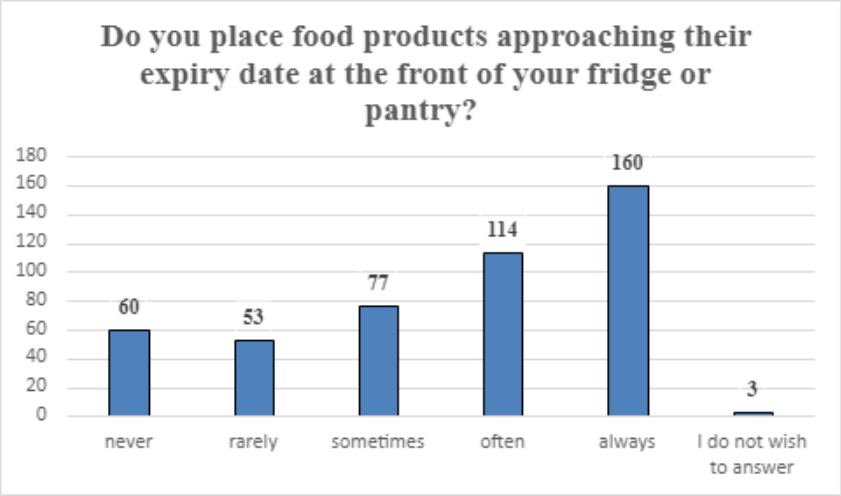

Figure 20 Placing foods that are approaching their expiry date on the front of the refrigerator or cupboard.

Regarding food preparation, participants were asked if they wash or prepare their food in advance so that it is ready for cooking or immediate consumption. Of those, 123 (26,3%) responded that they “sometimes” prepare or wash their food beforehand, 113 (24,2%) answered that they “rarely” do this, and 101 (21,6%) responded that they “often” do this. 67 (14,3%) of the respondents answered that they “always” wash or prepare their food, 60 (12,8%) responded that they “never” do this, and 3 (0,6%) “did not wish to answer” (Figure 21 Food Preparation).

Figure 21 Food Preparation

Participants were also asked if they put their leftovers and meals in the freezer to preserve them. A total of 136 (29,1%) responded that they do this “often”, 99 (21,2%) answered that they “sometimes” put their meals and leftover in the freezer, and 92 (19,7%) responded that they “always” do this. 81 of the participants (17,3%) answered that they “rarely” keep their meals and leftover food in the freezer, 58 (12,4%) responded that they “never” do this, and one (0,2%) said they “did not wish to answer” (Figure 22 Preserving food in the freezer).

Figure 22 Preserving food in the freezer

In addition, regarding food management, participants were asked if they made jam, pickle, or sauce with food that was about to spoil. 164 (35,1%) responded that they "never" do this, 109 (23,3%) answered that they "rarely" do this, and 88 (18,8%) responded that they "sometimes" make jam, pickle, or sauce with food that is about to spoil. Further, 81 (17,3%) respondents answered that they "often" make some jam, pickle, or sauce with foods that are about to expire, only 24 (5,1%) respondents answered that they "always" do this, while 1 (0,2%) respondent said that they "did not wish to answer" (Figure 23 Turning fruits and vegetables into jams, pickles and sauces).

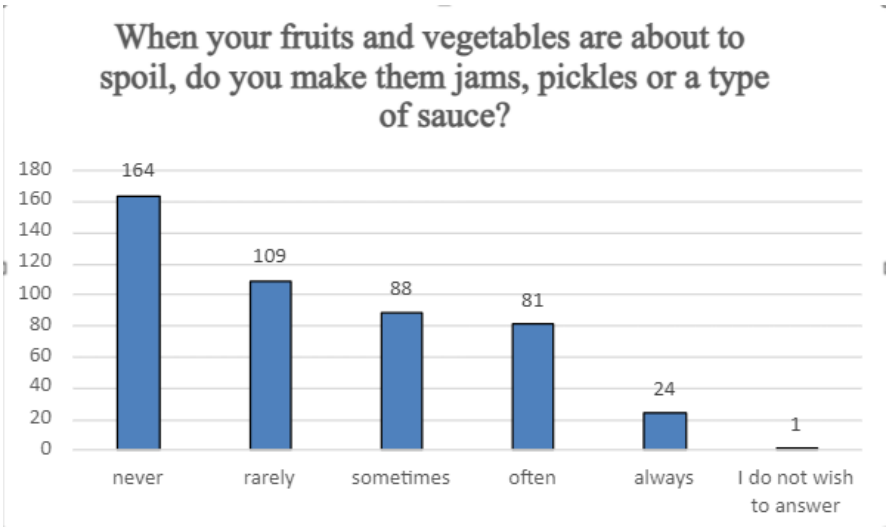

Figure 23 Turning fruits and vegetables into jams, pickles and sauces

In the sixth question, participants were asked if they share their food with people outside their homes, such as relatives, friends, and people in need. 143 (30,6%) participants responded that they "sometimes" share their food with people outside their household, 130 (27,8%) answered that they "rarely" share their food, and 88 (18,8%) participants stated that they do this "often". In comparison, 78 (16,7%) responded that they "never" share their food with people outside their households. A total of 26 (5,6%) participants responded that they "always" share their food with people outside their household, while 2 (0,4%) participants "did not wish to answer" (Figure 24 Sharing Leftover Food).

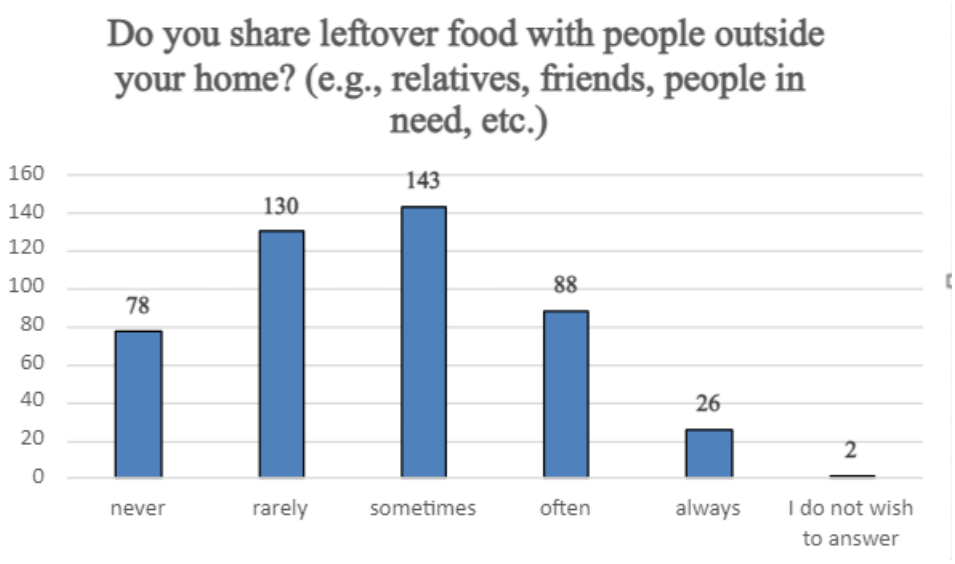

Figure 24 Sharing Leftover Food

3.2.4 Consumers attitudes and behaviours at the stage of food waste

In this section of the questionnaire, there will be questions about the attitudes and behaviour of the participants concerning the creation of food waste. In the first question, respondents are asked how often they throw away food that, while it could be eaten, ended up in the waste. 196 (42%) responded that they "rarely" throw food into waste, 159 (34%) answered that they "sometimes" do so, 62 (13,3%) responded that they "often" throw food into waste, and 44 (9,4%) answered that they "never" throw edible food into waste. Furthermore, only 3 (0,6%) participants responded that they throw food to waste "daily", while 3 participants (0,6%) said they "did not wish to answer" (Figure 25 Food waste).

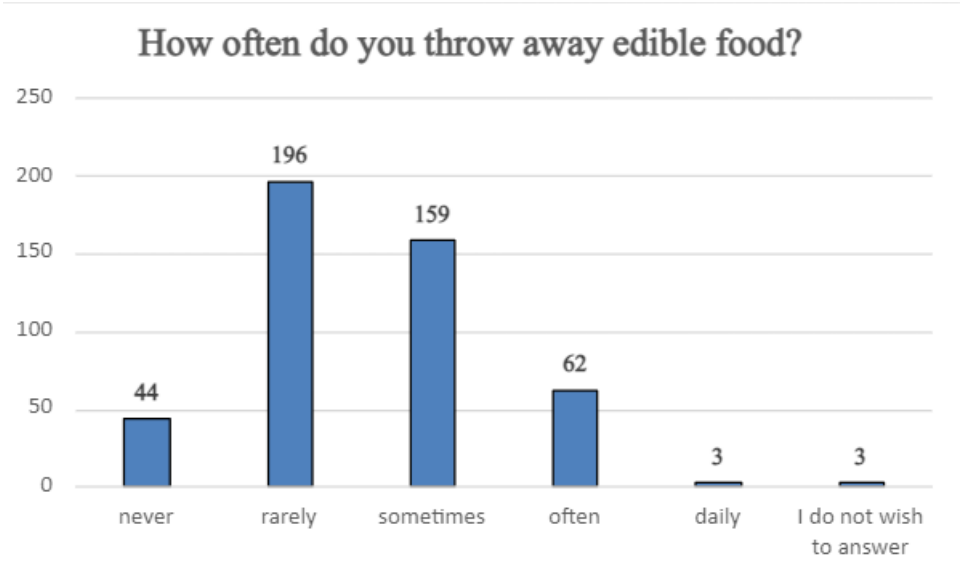

Figure 25 Food waste

Concerning food waste, the Table 3.1 (Food categories and the frequency of waste disposal) below shows the frequency with which participants throw away different types of food that, while edible, ended up in the waste.

The first category includes fruits and vegetables. The 177 (37,9%) respondents said that they “sometimes” throw away such foods while they are still edible, 161 (34,5%) responded that they “rarely” throw away such foods, and 67 (14,3%) said that they “often” throw away such foods. The smaller percentages of participants include 52 (11,1%) respondents who stated that they “never” throw away fruits and vegetables and 10 (2,1%) participants who said that they throw away such products “daily”. The mean for this food category is 2,6, which indicates that on average participant “sometimes” throws away their fruits and vegetables while they are still edible.

The second category includes dairy products. The 200 (42,8%) respondents said they “rarely” throw away such products, while the second largest proportion (26,1%) of 122 respondents said they “sometimes” throw away dairy products. The 106 (22,7%) respondents answered that they “never” throw away dairy products. In comparison, 34 (7,3%) respondents answered that they “often” throw away such food products, and 5 (1,1%) responded that they throw away dairy products “daily”. The mean value is 2,2, which means that, on average, the participants “rarely” throw away dairy products.

The third category includes bakery and farinaceous products. The 185 (39,6%) participants answered that they “rarely” throw away such foods, and 129 (27,6%) responded that they “never” throw away such foods. In comparison, 115 participants (24,6%) answered that they “sometimes” throw away bakery and farinaceous products. Furthermore, 30 (6,4%) responded that they “often” throw away such foods, 7 participants (1,5%) stated that they throw away “daily” bakery and flour products, while 1 of the participants (0,2%) said that “did not wish to answer”. The mean value of this type of product is 2,15, which indicates that the average participant “rarely” throws away bakery and flour products.

The fourth category includes vegetable and animal oils and fats. A total of 211 (45,2%) respondents answered that they “never” throw away such products, while the second largest proportion of 163 (34,9%) are those who “rarely” throw away vegetable and animal oils and fats. The 70 (15%) respondents answered that they “sometimes” throw away such food, 18 (3,9%) responded that they “often” throw away vegetable and animal oil, while 5 (1,1%) responded that they throw away vegetable and animal oils and fats “daily”. The mean value of this food category is 1,8, i.e., on average, participants “rarely” throw away vegetable and animal oils and fats.

The fifth category is meat, poultry, and their by-products. The 200 (42,8%) participants responded that they “never” throw these foods into the waste, and 195 (41,8%) answered that they “rarely” throw away meat, poultry, and their by-products while edible. On the other hand, 51 (10,9%) “sometimes” throw away such food products, 16 (3,4%) respondents answered that they “often” throw away such products, while 2 (0,4%) respondents answered that they “daily” throw away meat, poultry, and their products. Moreover, 3 (0,6%) participants stated that they “did not wish to answer”. The mean value for the first food category is 1,78, which means that most participants “rarely” generate meat and poultry waste.

The sixth category includes starchy foods (cereals, rice, beans, pasta, etc.). The 238 (51%) respondents answered that they “never” throw away such products, 160 (34,3%) participants responded that they “rarely” throw away edible starchy foods, and 49 (10,5%) respondents answered that they “sometimes” throw away such foods. 17 (3,6%) participants responded that they “often” throw starchy food products, and 3 (0,6%) respondents answered that they throw starchy food products “daily”. The mean value for this food category is 1,68, indicating that the average participant “rarely” throws away such foods.

The seventh category of fish and seafood, the most significant percentage of 238 participants (51%) answered that they "never" throw away edible fish and seafood, while the second largest share of 171 participants (36,6%) are those who "rarely" throw away fish and seafood. The 45 (9,6%) participants "sometimes" throw away such foods, 10 (2,1%) participants "often" throw away fish and seafood, and 1 (0,2%) respondent stated that he throws away "daily" fish and seafood. Moreover, 2 participants (0,4%) "did not wish to answer". The mean value for this food category is 1,65, which means that, on average, respondents "rarely" throw away fish and seafood.

Table 3.1 Food categories and the frequency of waste disposal

Select the frequency with which you usually throw away products and meals that could have been consumed from the following food categories:							
	Never [1]	**Rarely [2]**	**Sometimes [3]**	**Often [4]**	**Daily [5]**	**I do not wish to answer [6]**	**Mean Value [M]**
Fruits and vegetables	**52 (11,1%)**	**161 (34,5%)**	**177 (37,9%)**	**67 (14,3%)**	**10 (2,1%)**	**0**	**2,6**
Dairy products	**106 (22,7%)**	**200 (42,8%)**	**122 (26,1%)**	**34 (7,3%)**	**5 (1,1%)**	**0**	**2,2**
Bakery and farinaceous products (pastry and confectionery)	**129 (27,6%)**	**185 (39,6%)**	**115 (24,6%)**	**30 (6,4%)**	**7 (1,5%)**	**1 (0,2%)**	**2,15**
Vegetable and animal oils and fats	**211 (45,2%)**	**163 (34,9%)**	**70 (15%)**	**18 (3,9%)**	**5 (1,1%)**	**0**	**1,8**
Meat - poultry and their by-products	**200 (42,8%)**	**195 (41,8%)**	**51 (10,9%)**	**16 (3,4%)**	**2 (0,4%)**	**3 (0,6%)**	**1,78**
Starch products (cereals, rice, pulses, pasta, etc.)	**238 (51%)**	**160 (34,3%)**	**49 (10,5%)**	**17 (3,6%)**	**3 (0,6%)**	**0**	**1,68**
Fish and seafood	**238 (51%)**	**171 (36,6%)**	**45 (9,6%)**	**10 (2,1%)**	**1 (0,2%)**	**2 (0,4%)**	**1,65**

In addition, regarding the reasons why food ends up in the waste, participants were asked how likely they are to throw away food for six reasons listed in Table 3.2 Reasons for food rejection. The first cause of food rejection, as shown in the table, is if the food has wilted. A total of 147 (31,5%) of the participants said that it is “likely” to throw away food for this reason, 133 (28,5%) responded that it is “neither likely nor unlikely” to discard food for this reason, and 87 (18,6%) answered that it “very likely” to throw away food for this reason. On the other hand, 62 (13,3%) stated that it is “unlikely” to throw food for this reason, 36 (7,7%) answered that it is “very unlikely” to throw food for this reason, while 2 (0,4%) responded that they “did not wish to answer”. The mean value of the first cause of food rejection is 3,41, showing that for the average participant, it is “neither likely nor unlikely” to throw away his food because it is wilted.

A second reason is that the texture of the food was not the same as the original texture of the food when it was initially purchased. 145 (31%) participants responded that it is “likely” to reject food for this reason, 124 (26,6%) answered it is neither “likely nor unlikely” to discard food for this reason, and 73 (15,6%) responded that it is “very likely” to throw away food for this reason. On the other hand, 66 (14,1%) participants stated that it is “unlikely” to discard food for this reason, 58 (12,4%) responded that it is “very unlikely” to discard food for this reason, while 1 (0,2%) of the participants stated that they “did not wish to answer”. The mean value, for this reason, is 3,23, indicating that for the average participant it is “neither likely nor unlikely” to reject food if the texture of the food was not the same as the original texture when it was initially purchased.

The third reason for rejecting food is that the food does not taste good. 122 (26,1%) participants responded that it is “likely” to throw away food for this reason, 120 (25,7%) participants responded that it is “neither likely nor unlikely” to throw away food that is not tasty, and 90 (19,3%) responded that it is “unlikely” to throw away food for this reason. Furthermore, 81 (17,3%) participants responded that it is “very likely” to discard food for this reason. On the other hand, 51 (10,9%) answered that it is “very unlikely” to discard food for this reason, and 3 (0,6%) “did not wish to answer”. The mean value of this reason is 3,21, i.e., for the average participant it is “neither likely nor unlikely” to throw away food because it is not tasty.

The fourth reason for discarding food is if the appearance of the meal or food product is not appealing. The 146 (31,3%) respondents answered that it is “very unlikely” to throw away food for this reason, 108 (23,1%) respondents answered that it is “neither likely nor unlikely” to discard food for this reason, and 101 (21,6%) respondents answered that it is “unlikely” to throw away food for this reason. Further, 75 (16,1%) responded that it is “likely” to throw away food for this reason, 35 (7,5%) answered that it is “very likely” to throw away food for this reason, while 2 participants (0,4%) responded that they “did not wish to answer”. The mean value for this reason for food rejection is 2,48, i.e., for the average participant it is “unlikely” to reject food for this reason.

The fifth reason for rejecting food is that they bought more food than they needed. The 148 (31,7%) respondents said that it is “unlikely” to throw away food for this reason, 119 (25,5%) responded that it is “very unlikely” to throw away food for this reason, 97 (20,8%) of the respondents said that it is “neither likely nor unlikely” to reject food for this reason, 74 (15,8%) responded that it is “likely” to throw away food because they bought more than they eventually needed and 27 (5,8%) said that it is “very likely” to throw away food for this reason. Furthermore, 2 (0,4%) participants “did not wish to answer” this question. The mean value of this question is 2,46, which indicates that for the average participant it is “unlikely” to throw away food for this reason.

The sixth reason is that participants fill their plates with more food than they need. 142 (30,4%) responded that it is “very unlikely” to throw away food for this reason, 140 (30%) answered that it is “unlikely” to discard food for this reason, 99 (21,2%) responded that it is “neither likely nor unlikely” to throw away food for this reason, and 59 (12,6%) answered that it is “likely” to reject food for this reason. Furthermore, 24 (5,1%) participants responded that it is “very likely” to throw away food for this reason, while 3 (0,6%) participants said they “did not wish to answer”. The mean value of this reason is that 2,34, suggesting that for the average participant it is “unlikely” to throw away food because he fills his plate with more food than he needed.

Table 3.2 Reasons for food rejection

How likely are you to discard a food for the following reasons:

	Very unlikely [1]	Unlikely [2]	Neither likely nor unlikely [3]	Likely [4]	Very Likely [5]	I do not wish to answer [6]	Mean Value [M]
The food appears to have wilted.	**36 (7,7%)**	**62 (13,3%)**	**133 (28,5%)**	**147 (31,5%)**	**87 (18,6%)**	**2 (0,4%)**	**3,41**
The texture of the food is not the same as when I first bought it.	**58 (12,4%)**	**66 (14,1%)**	**124 (26,6%)**	**145 (31%)**	**73 (15,6%)**	**1 (0,2%)**	**3,23**
The food or meal is not tasty.	**51 (10,9%)**	**90 (19,3%)**	**120 (25,7%)**	**122 (26,1%)**	**81 (17,3%)**	**3 (0,6%)**	**3,21**
I do not like the appearance of the food.	**146 (31,3%)**	**101 (21,6%)**	**108 (23,1%)**	**75 (16,1%)**	**35 (7,5%)**	**2 (0,4%)**	**2,48**
I bought a large quantity of a product that I didn't need in the end.	**119 (25,5%)**	**148 (31,7%)**	**97 (20,8%)**	**74 (15,8%)**	**27 (5,8%)**	**2 (0,4%)**	**2,46**
I fill my plate with more food than I need	**142 (30,4%)**	**140 (30%)**	**99 (21,2%)**	**59 (12,6%)**	**24 (5,1%)**	**3 (0,6%)**	**2,34**

3.2.5 Consumer attitudes and behaviours toward sustainability issues

Three survey questions were created to investigate participants' attitudes and behaviours toward sustainability issues and whether these are related to food waste (Figure 26 Recycling). The first question is about the frequency with which participants recycle their waste. The 217 (46,5 %) participants answered that they recycle their waste "daily". 92 (19,7%) participants responded that they "often" recycle their waste, 58 (12,4%) answered that they recycle "sometimes", 56 (12%) responded that they "rarely" recycle, and 43 (9,2%) answered that they "never" recycle. Furthermore, 1 (0,2%) respondent stated they "did not want to answer".

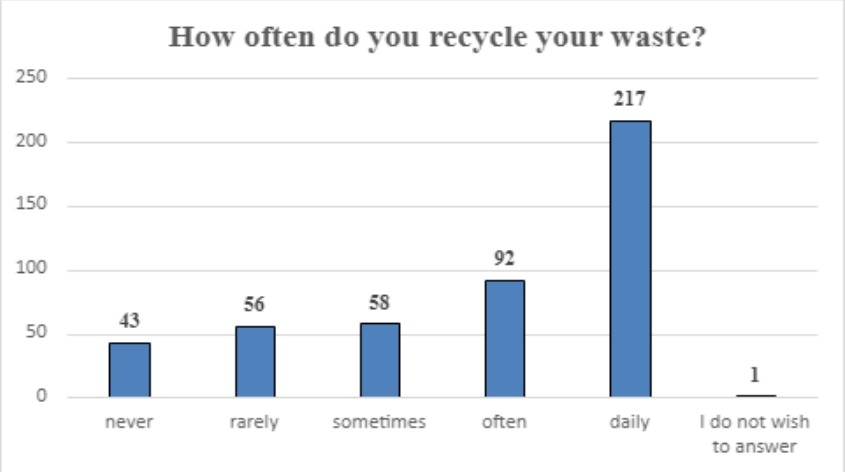

Figure 26 Recycling

The second question asks whether participants agree or disagree with the following statement: 'I am interested in issues related to the sustainability of the planet' (Figure 27 Sustainability Awareness). The 210 (45%) respondents answered that they "agree" with this statement, 170 (36,4%) responded that they "strongly agree", 73 (15,6%) stated that they "neither agree nor disagree" with this statement, 9 (1,9%) answered that they "strongly disagree" and 4 (0,9%) responded that they "disagree" with this statement. In addition, 1 (0,2%) respondent "did not wish to answer".

Figure 27 Sustainability Awareness

In the third question, participants were asked to indicate whether they agreed or disagreed with the following statement: "I am concerned about the availability of my food"

(Figure 28 Food Security). Most of the respondents 170 (36,4%) “neither agree nor disagree” with this sentence, 165 (35,3%) participants “agree”, 59 (12,6%) “disagree”, 55 (11,8%) “strongly agree”, and 15 (3,2%) “strongly disagree”. Moreover, 3 (0,6%) respondents stated that they “did not wish to answer”.

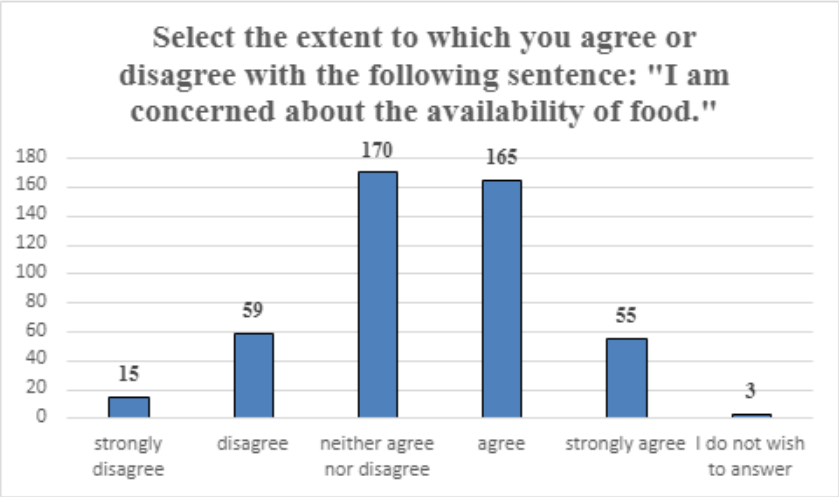

Figure 28 Food Security

3.3 Categorical Regression Model

The variable “food_waste” was used as the dependent variable for the categorical regression, which refers to the question “How often do you throw away edible food?” while all the other variables of the questionnaire were used as independent variables. Through categorical regression, we will further study this variable and determine the factors that influence the attitude and behaviour of the participants regarding the frequency with which they throw edible food into the waste.

The categorical regression extracted a value of multiple determination coefficient (R^2) =0.740 (Figure 29 Summary of the categorical regression model), which indicates that 74% of the variance of the transformed values of the dependent variable is explained by the transformed values of the independent variables involved in the regression equation. The relevant analysis of variance gave a value of F=12.750 (Figure 30 Categorical regression sample adjustment -

ANOVA test), which corresponds to a zero level of statistical significance, indicating a good fit of the categorical regression model to the transformed data.

Model Summary

Multiple R	R Square	Adjusted R Square	Apparent Prediction Error
.860	.740	.682	.260

Figure 29 Summary of the categorical regression model

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	345.529	85	4.065	12.750	.000
Residual	121.471	381	.319		
Total	467.000	466			

Figure 30 Categorical regression sample adjustment (ANOVA test)

From Figure 31 (Regression coefficients of independent variables), we test the significance of the independent variables. The statistically significant variable (sig. <0.05) is the variable “shops” which refers to the question, “How often do you visit shops and flea markets to buy food?”

Coefficients

	Standardized Coefficients				
	Beta	Bootstrap (1000) Estimate of Std. Error	df	F	Sig.
shops	.586	.317	4	3.417	.009
shopping_list	.071	.072	1	.979	.323
diet_shopping	.020	.047	1	.180	.672
kind_of_diet	.193	.124	2	2.423	.090
offers	.029	.049	2	.347	.707
expiry_date	.041	.058	1	.499	.480
best_before	.055	.065	1	.716	.398
eco_products	.038	.097	2	.154	.857
eat_out	.043	.063	2	.472	.624
take_away	.067	.058	4	1.352	.250
food_storage	-.008	.076	3	.011	.998
fridge_pantry	-.057	.071	2	.655	.520
food_preparation	.069	.069	1	1.003	.317
freezer	.009	.063	1	.018	.892
pickle_jam	-.037	.078	2	.230	.794
shared_food	-.088	.064	3	1.921	.126
meat	.043	.111	2	.153	.859
seafood	-.059	.060	3	.960	.411
diary	.044	.093	1	.226	.635
fat	-.049	.093	2	.285	.752
vegetables	-.050	.081	3	.384	.764
starch	.043	.131	3	.107	.956
bakery	.043	.120	2	.128	.880
appearance	.072	.169	3	.179	.911
texture	.551	.280	2	3.860	.022
wilted	-.076	.109	3	.489	.690
taste	.033	.142	2	.055	.947
ammount	-.040	.158	3	.063	.979
overbuy	.026	.194	2	.018	.982
recycling	-.002	.066	1	.001	.981
sustainability	-.020	.077	3	.069	.976
food_security	.051	.072	2	.491	.613
gender	-.053	.050	1	1.129	.289
age	-.015	.095	1	.026	.872
family	-.047	.076	1	.380	.538
kids	.045	.075	2	.354	.702
job	-.057	.071	2	.645	.525
income	-.016	.077	2	.046	.955
municipality	-.048	.067	7	.514	.824

Dependent Variable: food_waste

Figure 31 Regression coefficients of independent variables

The overall importance of the independent variables (Figure 32 Correlation coefficients, relative importance and tolerance values of the independent variables) appears most significant for the “shops” variable, which refers to the question “How often do you visit shops and flea markets to buy food?” and for the “texture” variable, which refers to the question: “How likely are you to throw away a food item for the following reason: The texture of the food is not the

same as when I originally bought it." Cumulatively, these variables explain 88.9% of the total importance.

The lack of multilinearity is particularly evident from the very high tolerance values of the independent variables (Figure 32 Correlation coefficients, relative importance and tolerance values of the independent variables) values that express the contribution of the variance of each independent variable that is not explained by the other independent variables.

Correlations and Tolerance

	Correlations				Tolerance	
	Zero-Order	Partial	Part	Importance	After Transformation	Before Transformation
shops	.583	.747	.573	.462	.955	.910
shopping_list	-.006	.128	.066	-.001	.869	.742
diet_shopping	.002	.037	.019	.000	.886	.872
kind_of_diet	.181	.342	.186	.047	.925	.898
offers	.063	.053	.027	.002	.870	.822
expiry_date	.044	.074	.038	.002	.852	.825
best_before	.007	.101	.052	.001	.873	.841
eco_products	.574	.004	.002	.030	.003	.686
eat_out	-.006	.055	.028	.000	.420	.708
take_away	.027	.116	.060	.002	.796	.786
food_storage	-.008	-.013	-.007	.000	.740	.712
fridge_pantry	.096	-.095	-.049	-.007	.722	.731
food_preparation	.033	.120	.062	.003	.794	.761
freezer	.024	.015	.008	.000	.834	.748
pickle_jam	.029	-.046	-.024	-.001	.400	.674
shared_food	-.102	-.155	-.080	.012	.821	.790
meat	.071	.072	.037	.004	.719	.481
seafood	.002	-.095	-.049	.000	.674	.556
diary	.003	.073	.038	.000	.722	.490
fat	.047	-.071	-.036	-.003	.537	.518
vegetables	-.008	-.079	-.040	.001	.644	.479
starch	.043	.063	.032	.003	.567	.542
bakery	.060	.070	.036	.003	.690	.558
appearance	.106	.115	.059	.010	.677	.589
texture	.574	.054	.028	.427	.003	.475
wilted	.205	-.108	-.055	-.021	.525	.477
taste	.232	.052	.026	.010	.631	.536
ammount	.097	-.068	-.035	-.005	.757	.604
overbuy	.207	.044	.022	.007	.722	.532
recycling	-.007	-.003	-.002	.000	.946	.677
sustainability	.002	-.036	-.019	.000	.855	.641
food_security	.035	.092	.047	.002	.870	.823
gender	-.084	-.095	-.049	.006	.845	.791
age	-.028	-.027	-.014	.001	.836	.450
family	-.046	-.071	-.036	.003	.604	.610
kids	-.001	.069	.035	.000	.618	.574
job	.024	-.095	-.049	-.002	.727	.813
income	.029	-.029	-.015	-.001	.785	.831
municipality	-.028	-.087	-.045	.002	.850	.893

Dependent Variable: food_waste

Figure 32 Correlation coefficients, relative importance and tolerance values of the independent variables

3.4 Investigation of research hypotheses

To investigate the research hypotheses, a normality test was first conducted. In all relevant tests, the distribution of observations satisfactorily approximated the normal standard distribution, and no further "normalization" was required.

3.4.1 Research hypotheses on consumer attitudes and behaviors at the stage of food purchase

Hypothesis 1: "The frequency of grocery shopping affects the frequency of food waste creation."

To test **Hypothesis 1**, an x^2 statistical test was conducted between the variable "shops" which refers to the question "How often do you visit shops and flea markets to buy groceries?" and the variable "food_waste" which refers to the questions "How do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: "The frequency of grocery shopping does not affect the frequency of food waste creation."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	185.490	25	<.001
Linear-by-Linear Association	3.205	1	.073
Likelihood Ratio	39.064	25	.036
N of Valid Cases	467		

Figure 33 Statistical test x^2 hypothesis 1 at the stage of food purchase

To test whether our research **hypothesis 1** is true or not, we will proceed a descriptive test (explore means). The participants who shop twice per week, they throw away "daily" edible food to waste, with a mean value of 3,00 (standard deviation 1,732). Also, the participants who

“often” throw away food waste, with a mean value of 2,62 (standard deviation 1,231), and “sometimes” throw away food waste, with a mean value of 2,50 (standard deviation 1,048), edible food to waste, they also shop twice per week. On the other, hand, participants that “never” and “rarely” throw away food waste, stated that they go for grocery shopping once per week, with a mean value of 2,50 (standard deviation 1,266) and 2,47 (standard deviation 1,174), respectively. All the above observations lead to the acceptance of **hypothesis 1.**

Descriptives

	food_waste			Statistic	Std. Error
shops	never	Mean		2.5000	.19097
		95% Confidence Interval for Mean	Lower Bound	2.1149	
			Upper Bound	2.8851	
		5% Trimmed Mean		2.4444	
		Median		2.0000	
		Variance		1.605	
		Std. Deviation		1.26675	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.467	.357
		Kurtosis		-.690	.702
	rarely	Mean		2.4745	.08387
		95% Confidence Interval for Mean	Lower Bound	2.3091	
			Upper Bound	2.6399	
		5% Trimmed Mean		2.4161	
		Median		2.0000	
		Variance		1.379	
		Std. Deviation		1.17424	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		.484	.174
		Kurtosis		-.508	.346
	sometimes	Mean		2.5031	.08316
		95% Confidence Interval for Mean	Lower Bound	2.3389	
			Upper Bound	2.6674	
		5% Trimmed Mean		2.4479	
		Median		2.0000	
		Variance		1.100	
		Std. Deviation		1.04865	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		.575	.192
		Kurtosis		-.015	.383
	often	Mean		2.6290	.15636
		95% Confidence Interval for Mean	Lower Bound	2.3164	
			Upper Bound	2.9417	
		5% Trimmed Mean		2.5878	
		Median		3.0000	
		Variance		1.516	
		Std. Deviation		1.23120	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.209	.304
		Kurtosis		-.999	.599
	daily	Mean		3.0000	1.00000
		95% Confidence Interval for Mean	Lower Bound	-1.3027	
			Upper Bound	7.3027	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		3.000	
		Std. Deviation		1.73205	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.6667	.66667
		95% Confidence Interval for Mean	Lower Bound	1.7982	
			Upper Bound	7.5351	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		1.333	
		Std. Deviation		1.15470	
		Minimum		4.00	
		Maximum		6.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 34 Descriptive test hypothesis 1 at the stage of food purchase

Hypothesis 2: "Participants that use a shopping list more frequently have less food waste."

To test **Hypothesis 2**, an x^2 statistical test was conducted between the variable "shopping list", which refers to the question "How often do you make a shopping list?" and the variable "food_waste' which refers to the questions "How do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: "Participants that use a shopping list more frequently does not have less food waste."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	41.605	20	.003
Likelihood Ratio	42.305	20	.003
Linear-by-Linear Association	3.489	1	.062
N of Valid Cases	467		

Figure 35 Statistical test x^2hypothesis 2 at the stage of food purchase

To test whether our research **hypothesis 2** is accurate, we will proceed to descriptive testing (means testing). Specifically, respondents who said that they "daily" throw away edible food, "often" make a shopping list, with a mean of 4,33 (standard deviation 0,577). In addition, participants who "rarely" throw away edible food "often" make a shopping list with a mean value of 3,72 (standard deviation 1,216). Also, participants who "sometimes" throw away edible food, they "often" make a shopping list, with a mean value of 3,63 (standard deviation 1,213). All the above observations lead to the rejection of **hypothesis 2.**

Descriptives

	food_waste			Statistic	Std. Error
shopping_list	never	Mean		3.5227	.22872
		95% Confidence Interval for Mean	Lower Bound	3.0615	
			Upper Bound	3.9840	
		5% Trimmed Mean		3.5808	
		Median		3.5000	
		Variance		2.302	
		Std. Deviation		1.51717	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.75	
		Skewness		-.464	.357
		Kurtosis		-1.220	.702
	rarely	Mean		3.7296	.08691
		95% Confidence Interval for Mean	Lower Bound	3.5582	
			Upper Bound	3.9010	
		5% Trimmed Mean		3.8107	
		Median		4.0000	
		Variance		1.480	
		Std. Deviation		1.21670	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.659	.174
		Kurtosis		-.586	.346
	sometimes	Mean		3.6352	.09627
		95% Confidence Interval for Mean	Lower Bound	3.4451	
			Upper Bound	3.8254	
		5% Trimmed Mean		3.7058	
		Median		4.0000	
		Variance		1.474	
		Std. Deviation		1.21396	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.643	.192
		Kurtosis		-.456	.383
	often	Mean		3.0806	.17857
		95% Confidence Interval for Mean	Lower Bound	2.7236	
			Upper Bound	3.4377	
		5% Trimmed Mean		3.0896	
		Median		3.0000	
		Variance		1.977	
		Std. Deviation		1.40606	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.035	.304
		Kurtosis		-1.347	.599
	daily	Mean		4.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	2.8991	
			Upper Bound	5.7676	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		4.00	
		Maximum		5.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		3.6667	.66667
		95% Confidence Interval for Mean	Lower Bound	.7982	
			Upper Bound	6.5351	
		5% Trimmed Mean		.	
		Median		3.0000	
		Variance		1.333	
		Std. Deviation		1.15470	
		Minimum		3.00	
		Maximum		5.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 36 Descriptive test hypothesis 2 at the stage of food purchase

Hypothesis 3: "Participants that do grocery shopping under a meal plan have less food waste."

To test **Hypothesis** 3, an x^2 statistical test was performed between the variables "diet_shopping" which refers to the question "Do you follow a diet plan based on which you shop?" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha>0,05$, therefore at the statistical level 5% significance level, we cannot reject the null hypothesis: "H_o = Participants that do grocery shopping under a meal plan have not less food waste."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.341	10	.867
Likelihood Ratio	5.512	10	.854
Linear-by-Linear Association	1.016	1	.313
N of Valid Cases	467		

Figure 37 Statistical test x2 hypothesis 3 at the stage of food purchase

To test whether our research **hypothesis 3** is accurate, we will proceed to descriptive testing (means testing). Specifically, respondents who said that they "daily" throw away edible food, also stated that they follow a diet plan under which they do their grocery shopping with a mean of 1,33 (standard deviation 0,577). Also, participants who "often" throw away edible food, with a mean value of 1,67 (standard deviation 0,504), participants who "sometimes" throw away edible food, with a mean value of 1,62 (standard deviation 0,497) stated that they do not follow a diet plan. Furthermore, participants who "never" create food waste, with a mean of 1,59 (standard deviation 0,497), and participants who "rarely" create food waste, with a mean value of 1,58 (standard deviation 0,493), also stated that they do not follow a diet plan. All the above observations lead to the rejection of **hypothesis 3**.

Descriptives

	food_waste			Statistic	Std. Error
diet_shopping	never	Mean		1.5909	.07498
		95% Confidence Interval for Mean	Lower Bound	1.4397	
			Upper Bound	1.7421	
		5% Trimmed Mean		1.6010	
		Median		2.0000	
		Variance		.247	
		Std. Deviation		.49735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		1.00	
		Skewness		-.383	.357
		Kurtosis		-1.944	.702
	rarely	Mean		1.5867	.03526
		95% Confidence Interval for Mean	Lower Bound	1.5172	
			Upper Bound	1.6563	
		5% Trimmed Mean		1.5964	
		Median		2.0000	
		Variance		.244	
		Std. Deviation		.49368	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		1.00	
		Skewness		-.355	.174
		Kurtosis		-1.893	.346
	sometimes	Mean		1.6289	.03945
		95% Confidence Interval for Mean	Lower Bound	1.5510	
			Upper Bound	1.7069	
		5% Trimmed Mean		1.6363	
		Median		2.0000	
		Variance		.248	
		Std. Deviation		.49751	
		Minimum		1.00	
		Maximum		3.00	
		Range		2.00	
		Interquartile Range		1.00	
		Skewness		-.382	.192
		Kurtosis		-1.472	.383
	often	Mean		1.6774	.06412
		95% Confidence Interval for Mean	Lower Bound	1.5492	
			Upper Bound	1.8056	
		5% Trimmed Mean		1.6792	
		Median		2.0000	
		Variance		.255	
		Std. Deviation		.50487	
		Minimum		1.00	
		Maximum		3.00	
		Range		2.00	
		Interquartile Range		1.00	
		Skewness		-.378	.304
		Kurtosis		-.950	.599
	daily	Mean		1.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	-.1009	
			Upper Bound	2.7676	
		5% Trimmed Mean		.	
		Median		1.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		1.6667	.33333
		95% Confidence Interval for Mean	Lower Bound	.2324	
			Upper Bound	3.1009	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.

Figure 38 Descriptive test hypothesis 3 at the stage of food purchase

Hypothesis 4: "Participants who follow plant-based diets have less food waste."

To test **Hypothesis 4**, an x^2 statistical test was performed between the variables "kind_of_diet" which refers to the question "Do you follow any of the following diets?" and the variable "food_waste" which refers to the questions "How do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: H_o= "Participants who follow plant-based diets do not have less food waste."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.064	25	.087
Likelihood Ratio	26.608	25	.376
Linear-by-Linear Association	4.323	1	.038
N of Valid Cases	467		

Figure 39 Statistical test x^2 hypothesis 4 at the stage of food purchase

To test whether our research **hypothesis 4** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "daily" throw away edible food also stated that they follow a vegetarian diet with a mean of 2,66 (standard deviation 2,081). Moreover, the respondents that follow a flexitarian diet have said that they "often" throw away edible food, with a mean value of 2,38 (standard deviation 1,822). All the above observations lead to the rejection of **hypothesis 4.**

Descriptives

	food_waste			Statistic	Std. Error
kind_of_diet	never	Mean		2.0909	.23629
		95% Confidence Interval for Mean	Lower Bound	1.6144	
			Upper Bound	2.5674	
		5% Trimmed Mean		1.9899	
		Median		1.0000	
		Variance		2.457	
		Std. Deviation		1.56737	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		1.210	.357
		Kurtosis		-.212	.702
	rarely	Mean		1.9541	.11073
		95% Confidence Interval for Mean	Lower Bound	1.7357	
			Upper Bound	2.1725	
		5% Trimmed Mean		1.8152	
		Median		1.0000	
		Variance		2.403	
		Std. Deviation		1.55016	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		1.00	
		Skewness		1.413	.174
		Kurtosis		.406	.346
	sometimes	Mean		2.0818	.12036
		95% Confidence Interval for Mean	Lower Bound	1.8440	
			Upper Bound	2.3195	
		5% Trimmed Mean		1.9727	
		Median		1.0000	
		Variance		2.303	
		Std. Deviation		1.51770	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		1.180	.192
		Kurtosis		-.149	.383
	often	Mean		2.3871	.23151
		95% Confidence Interval for Mean	Lower Bound	1.9242	
			Upper Bound	2.8500	
		5% Trimmed Mean		2.2634	
		Median		1.0000	
		Variance		3.323	
		Std. Deviation		1.82294	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		4.00	
		Skewness		.892	.304
		Kurtosis		-.909	.599
	daily	Mean		2.6667	1.20185
		95% Confidence Interval for Mean	Lower Bound	-2.5045	
			Upper Bound	7.8378	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		4.333	
		Std. Deviation		2.08167	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		.	
		Skewness		1.293	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.0000	1.52753
		95% Confidence Interval for Mean	Lower Bound	-2.5724	
			Upper Bound	10.5724	
		5% Trimmed Mean		.	
		Median		5.0000	
		Variance		7.000	
		Std. Deviation		2.64575	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		.	
		Skewness		-1.458	1.225
		Kurtosis		.	.

Figure 40 Descriptive test hypothesis 4 at the stage of food purchase

Hypothesis 5: "Buying food products based on supermarket offers increases the frequency of household food waste."

To test **Hypothesis 5**, an x^2 statistical test was performed between the variables "offers" which refers to the question "Do you shop food products based on the offers that markets are having?" and the variable food_waste which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha>0,05$, therefore at the statistical level 5% significance level, we cannot reject the null hypothesis: Ho= "Buying food products based on supermarket offers does not increase the frequency of household food waste".

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.010	20	.288
Likelihood Ratio	25.323	20	.189
Linear-by-Linear Association	.073	1	.787
N of Valid Cases	467		

Figure 41 Statistical test x2 hypothesis 5 at the stage of food purchase

To test whether our research **hypothesis 5** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food stated that they "often" buy food products based on offers with a mean of 3,68 (standard deviation 1,029) as well as the respondents that "rarely" throw away edible food with a mean of 3,59 (standard deviation 0,897). Also, the respondents that "sometimes" throw away edible food, they "often" buy food products based on offers, with a mean value of 3,70 (standard deviation 0,759). All the above observations lead to the rejection of **hypothesis 5.**

Descriptives

	food_waste			Statistic	Std. Error
offers	never	Mean		3.6818	.15515
		95% Confidence Interval for Mean	Lower Bound	3.3689	
			Upper Bound	3.9947	
		5% Trimmed Mean		3.7273	
		Median		4.0000	
		Variance		1.059	
		Std. Deviation		1.02917	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.75	
		Skewness		-.382	.357
		Kurtosis		-.358	.702
	rarely	Mean		3.5969	.06412
		95% Confidence Interval for Mean	Lower Bound	3.4705	
			Upper Bound	3.7234	
		5% Trimmed Mean		3.6304	
		Median		4.0000	
		Variance		.806	
		Std. Deviation		.89774	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-.531	.174
		Kurtosis		.235	.346
	sometimes	Mean		3.7044	.06022
		95% Confidence Interval for Mean	Lower Bound	3.5855	
			Upper Bound	3.8233	
		5% Trimmed Mean		3.7271	
		Median		4.0000	
		Variance		.577	
		Std. Deviation		.75936	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		1.00	
		Skewness		-.324	.192
		Kurtosis		-.094	.383
	often	Mean		3.5645	.10443
		95% Confidence Interval for Mean	Lower Bound	3.3557	
			Upper Bound	3.7733	
		5% Trimmed Mean		3.5717	
		Median		4.0000	
		Variance		.676	
		Std. Deviation		.82225	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		1.00	
		Skewness		.061	.304
		Kurtosis		-.489	.599
	daily	Mean		3.3333	.88192
		95% Confidence Interval for Mean	Lower Bound	-.4612	
			Upper Bound	7.1279	
		5% Trimmed Mean		.	
		Median		3.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		.935	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	2.8991	
			Upper Bound	5.7676	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		4.00	
		Maximum		5.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 42 Descriptive test hypothesis 5 at the stage of food purchase

Hypothesis 6: "Participants who have a better understanding of date-marking on food products have less food waste."

To test **Hypothesis 6**, an x^2 statistical test was performed between the variables "best_before" which refers to the question "Did you know that the phrase "use by" on a food label refers to the safety of the food, i.e., it shows how long the food is safe to eat, while the phrase "best before" refers to the taste and texture of the food, but still safe to eat?" and the variable food_waste which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: H_o= "Participants who have a better understanding of date-marking on food products have not less food waste."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	31.699	10	<.001
Likelihood Ratio	26.844	10	.003
Linear-by-Linear Association	6.806	1	.009
N of Valid Cases	467		

Figure 43 Statistical test x^2 hypothesis 6 at the stage of food purchase

To test whether our research **hypothesis 6** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food stated that they know that the phrase "use by" on a food label refers to the safety of the food, while the phrase "best before" refers to the taste and texture of the food, but still safe to eat, with a mean value 1,50 (standard deviation 0,549) as well as the respondents that "rarely" throw away edible food with a mean of 1,28 (standard deviation 0,450). On the other hand, participants that "often" throw away edible food, they did not know that the phrase "use by" on a food label refers to the safety of the food, while the phrase "best before" refers to the taste and texture of the food, but still safe to eat, with a mean of 1,58 (standard deviation 0,497), as well as the participants that "daily" throw away edible food, with a mean value of 1,66 (standard deviation 0,577). All the above observations lead to the acceptance of **hypothesis 6.**

Descriptives

	food_waste			Statistic	Std. Error
best_before	never	Mean		1.5000	.08289
		95% Confidence Interval for Mean	Lower Bound	1.3328	
			Upper Bound	1.6672	
		5% Trimmed Mean		1.4747	
		Median		1.0000	
		Variance		.302	
		Std. Deviation		.54984	
		Minimum		1.00	
		Maximum		3.00	
		Range		2.00	
		Interquartile Range		1.00	
		Skewness		.440	.357
		Kurtosis		-.954	.702
	rarely	Mean		1.2806	.03217
		95% Confidence Interval for Mean	Lower Bound	1.2172	
			Upper Bound	1.3441	
		5% Trimmed Mean		1.2562	
		Median		1.0000	
		Variance		.203	
		Std. Deviation		.45045	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		1.00	
		Skewness		.984	.174
		Kurtosis		-1.042	.346
	sometimes	Mean		1.4214	.03928
		95% Confidence Interval for Mean	Lower Bound	1.3438	
			Upper Bound	1.4990	
		5% Trimmed Mean		1.4126	
		Median		1.0000	
		Variance		.245	
		Std. Deviation		.49534	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		1.00	
		Skewness		.321	.192
		Kurtosis		-1.921	.383
	often	Mean		1.5806	.06318
		95% Confidence Interval for Mean	Lower Bound	1.4543	
			Upper Bound	1.7070	
		5% Trimmed Mean		1.5896	
		Median		2.0000	
		Variance		.247	
		Std. Deviation		.49748	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		1.00	
		Skewness		-.335	.304
		Kurtosis		-1.952	.599
	daily	Mean		1.6667	.33333
		95% Confidence Interval for Mean	Lower Bound	.2324	
			Upper Bound	3.1009	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		1.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	-.1009	
			Upper Bound	2.7676	
		5% Trimmed Mean		.	
		Median		1.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 44 Descriptive test hypothesis 6 at the stage of food purchase

Hypothesis 7: "Respondents who tend to buy environmentally friendly products waste food less frequently."

To test **Hypothesis 7**, an x^2 statistical test was performed between the variables "eco_products" which refers to the question "How likely are you to buy environmentally friendly products compared to other products of the same type?" and the variable "food_waste" which refers to the questions "How often have you thrown away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Respondents who tend to buy environmentally friendly products do not waste less frequently".

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	188.464	25	<.001
Likelihood Ratio	40.567	25	.025
Linear-by-Linear Association	2.207	1	.137
N of Valid Cases	467		

Figure 45 Statistical test x^2 hypothesis 7 at the stage of food purchase

To test whether our research **hypothesis 7** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food stated that they would "likely" buy environmentally friendly products, as well as the respondents that "rarely" throw away edible food with a mean of 3,70 (standard deviation 1,001) and 3,80 (standard deviation 0,849) respectively. On the other hand, participants that "often" and "daily" throw away still edible food were "neither likely, nor unlikely" to buy environmentally friendly products with a mean value of 3,46 (standard deviation 0,783) and a mean value of 3,33 (standard deviation 1,154) respectively. All the above observations lead to the acceptance of **hypothesis 7**.

Descriptives

	food_waste			Statistic	Std. Error
eco_products	never	Mean		3.7045	.15103
		95% Confidence Interval for Mean	Lower Bound	3.4000	
			Upper Bound	4.0091	
		5% Trimmed Mean		3.7778	
		Median		4.0000	
		Variance		1.004	
		Std. Deviation		1.00185	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-.669	.357
		Kurtosis		.692	.702
	rarely	Mean		3.8061	.06066
		95% Confidence Interval for Mean	Lower Bound	3.6865	
			Upper Bound	3.9258	
		5% Trimmed Mean		3.8526	
		Median		4.0000	
		Variance		.721	
		Std. Deviation		.84923	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-.531	.174
		Kurtosis		.566	.346
	sometimes	Mean		3.7421	.07315
		95% Confidence Interval for Mean	Lower Bound	3.5977	
			Upper Bound	3.8866	
		5% Trimmed Mean		3.8246	
		Median		4.0000	
		Variance		.851	
		Std. Deviation		.92239	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-1.129	.192
		Kurtosis		1.919	.383
	often	Mean		3.4677	.09949
		95% Confidence Interval for Mean	Lower Bound	3.2688	
			Upper Bound	3.6667	
		5% Trimmed Mean		3.4821	
		Median		3.5000	
		Variance		.614	
		Std. Deviation		.78339	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-.418	.304
		Kurtosis		.742	.599
	daily	Mean		3.3333	.66667
		95% Confidence Interval for Mean	Lower Bound	.4649	
			Upper Bound	6.2018	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		1.333	
		Std. Deviation		1.15470	
		Minimum		2.00	
		Maximum		4.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.3333	.88192
		95% Confidence Interval for Mean	Lower Bound	.5388	
			Upper Bound	8.1279	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		3.00	
		Maximum		6.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		.935	1.225
		Kurtosis		.	.

Figure 46 Descriptive test hypothesis 7 at the stage of food purchase

Hypothesis 8: "Participants that eat out or order in food have more frequently food waste".

To test **Hypothesis 8**, an x^2 statistical test was performed between the variables "eat_out" which refers to the question "How often do you eat out or order in?" and the variable food_waste which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants that eat out or order in food have not more frequently food waste".

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	73.643	25	<.001
Likelihood Ratio	72.228	25	<.001
Linear-by-Linear Association	31.772	1	<.001
N of Valid Cases	467		

Figure 47 Statistical test x^2 hypothesis 8 at the stage of food purchase

To test whether our research **hypothesis 8** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food stated that they would "rarely" eat out or order in, with a mean of 2,40 (standard deviation 0,844). Furthermore, participants who "rarely" create food waste, said that "sometimes" eat our or order in, as well as participants that "sometimes" throw away edible food, with a mean value of 2,79 (standard deviation 0,722) and 2,96 (standard deviation 0,745) respectively. Also, participants that "often" and "daily" throw away edible food stated that "sometimes" eat our or order in, with a mean value of 3,33 (standard deviation 0,745) and a mean value of 3,33 (standard deviation 1,154) respectively. All the above observations lead to the acceptance of **hypothesis 8**.

Descriptives

	food_waste			Statistic	Std. Error
eat_out	never	Mean		2.4091	.12725
		95% Confidence Interval for Mean	Lower Bound	2.1525	
			Upper Bound	2.6657	
		5% Trimmed Mean		2.3687	
		Median		2.0000	
		Variance		.712	
		Std. Deviation		.84408	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		1.272	.357
		Kurtosis		1.343	.702
	rarely	Mean		2.7959	.05162
		95% Confidence Interval for Mean	Lower Bound	2.6941	
			Upper Bound	2.8977	
		5% Trimmed Mean		2.7732	
		Median		3.0000	
		Variance		.522	
		Std. Deviation		.72266	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		1.00	
		Skewness		.494	.174
		Kurtosis		1.018	.346
	sometimes	Mean		2.9623	.05911
		95% Confidence Interval for Mean	Lower Bound	2.8455	
			Upper Bound	3.0790	
		5% Trimmed Mean		2.9581	
		Median		3.0000	
		Variance		.556	
		Std. Deviation		.74534	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		.061	.192
		Kurtosis		-.675	.383
	often	Mean		3.3387	.09466
		95% Confidence Interval for Mean	Lower Bound	3.1494	
			Upper Bound	3.5280	
		5% Trimmed Mean		3.3405	
		Median		3.0000	
		Variance		.556	
		Std. Deviation		.74534	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		1.00	
		Skewness		-.157	.304
		Kurtosis		-.453	.599
	daily	Mean		3.3333	.66667
		95% Confidence Interval for Mean	Lower Bound	.4649	
			Upper Bound	6.2018	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		1.333	
		Std. Deviation		1.15470	
		Minimum		2.00	
		Maximum		4.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		2.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	.8991	
			Upper Bound	3.7676	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		2.00	
		Maximum		3.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 48 Descriptive test hypothesis 8 at the stage of food purchase

Hypothesis 9: "Environmentally aware respondents tend to take restaurant leftovers home more frequently."

To test **Hypothesis 9**, an x^2 statistical test was performed between the variables "sustainability" which refers to the question "Select the extent to which you agree or disagree with the following sentence: "I am interested in issues related to the sustainability of the planet." and the variable "take_away" which refers to the questions "How often do you ask the waiter to pack your leftover meal?". The value of Pearson's x^2 index was found to be $\alpha>0.05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Environmentally aware respondents do not tend to take restaurant leftovers home more frequently.".

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.838	20	.035
Likelihood Ratio	33.242	20	.032
Linear-by-Linear Association	7.360	1	.007
N of Valid Cases	467		

Figure 49 Statistical test x^2 hypothesis 9 at the stage of food purchase

To test whether our research **hypothesis 9** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "strongly disagree" with the statement "I am interested in issues related to the sustainability of the planet", also stated that they "often" take away their leftover meal, with a mean value of 4,00 (standard deviation 0,118). On the other hand, participants that "disagree", "neither agree nor disagree" and "agree", stated that sometimes take away their leftover meal, with a mean value of 2,75 (standard deviation 1,500), 2,86 (standard deviation 1,193) and 3,22 (standard deviation 1,175), respectively. Furthermore, participants that "strongly agree" about sustainability awareness, said that they "often" take away their leftover meal, with a mean value of 3,53 (1,241). All the above observations lead to the rejection of **hypothesis 9.**

Descriptives

	sustainability			Statistic	Std. Error
take_away	strongly disagree	Mean		4.0000	.37268
		95% Confidence Interval for Mean	Lower Bound	3.1406	
			Upper Bound	4.8594	
		5% Trimmed Mean		4.0556	
		Median		4.0000	
		Variance		1.250	
		Std. Deviation		1.11803	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		2.00	
		Skewness		-.690	.717
		Kurtosis		-.800	1.400
	disagree	Mean		2.7500	.75000
		95% Confidence Interval for Mean	Lower Bound	.3632	
			Upper Bound	5.1368	
		5% Trimmed Mean		2.7778	
		Median		3.0000	
		Variance		2.250	
		Std. Deviation		1.50000	
		Minimum		1.00	
		Maximum		4.00	
		Range		3.00	
		Interquartile Range		2.75	
		Skewness		-.370	1.014
		Kurtosis		-3.901	2.619
	neither agree nor disagree	Mean		2.8630	.13974
		95% Confidence Interval for Mean	Lower Bound	2.5845	
			Upper Bound	3.1416	
		5% Trimmed Mean		2.8478	
		Median		3.0000	
		Variance		1.425	
		Std. Deviation		1.19391	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.272	.281
		Kurtosis		-.706	.555
	agree	Mean		3.2286	.08115
		95% Confidence Interval for Mean	Lower Bound	3.0686	
			Upper Bound	3.3885	
		5% Trimmed Mean		3.2540	
		Median		3.0000	
		Variance		1.383	
		Std. Deviation		1.17597	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.045	.168
		Kurtosis		-.935	.334
	strongly agree	Mean		3.5353	.09518
		95% Confidence Interval for Mean	Lower Bound	3.3474	
			Upper Bound	3.7232	
		5% Trimmed Mean		3.5948	
		Median		4.0000	
		Variance		1.540	
		Std. Deviation		1.24103	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.373	.186
		Kurtosis		-.959	.370

Figure 50 Descriptive test hypothesis 9 at the stage of food purchase

3.4.2 Research hypotheses on consumer attitudes and behaviours at the stage of food consumption and food management

Hypothesis 1: "Participants who store leftover food tend to waste food less often than other participants."

To test **Hypothesis 1**, an x^2 statistical test was performed between the variables "food_storage" which refers to the question "How often do you store leftover food?" and the variable "food_waste" which refers to the questions "How often do you throw edible food away?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants who store leftover food do not tend to waste food less often than other participants."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	66.067	20	<.001
Likelihood Ratio	62.011	20	<.001
Linear-by-Linear Association	26.531	1	<.001
N of Valid Cases	467		

Figure 51 Statistical test x^2 hypothesis 1 at the stage of food consumption and management

To test whether our research **hypothesis 1** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food and participants that "rarely" throw away edible food, stated that they would "always" store their leftover food, with a mean of 4,68 (standard deviation 0,739) and 4,59 (standard deviation 0,660). Furthermore, participants who "sometimes" create food waste and the ones that "often" throw away food, said that they "often" store their leftover food, with a mean value of 4,28 (standard deviation 0,820), and 4,14 (standard deviation 0,720) respectively. Also, participants that "daily" throw away edible food stated that "sometimes" store leftover food, with a mean value of 3,33 (standard deviation 1,527). All the above observations lead to the acceptance of **hypothesis 1.**

Descriptives

	food_waste			Statistic	Std. Error
food_storage	never	Mean		4.6818	.11156
		95% Confidence Interval for Mean	Lower Bound	4.4568	
			Upper Bound	4.9068	
		5% Trimmed Mean		4.7828	
		Median		5.0000	
		Variance		.548	
		Std. Deviation		.73998	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		.00	
		Skewness		-2.291	.357
		Kurtosis		4.337	.702
	rarely	Mean		4.5969	.04720
		95% Confidence Interval for Mean	Lower Bound	4.5038	
			Upper Bound	4.6900	
		5% Trimmed Mean		4.6689	
		Median		5.0000	
		Variance		.437	
		Std. Deviation		.66084	
		Minimum		2.00	
		Maximum		6.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-1.494	.174
		Kurtosis		2.019	.346
	sometimes	Mean		4.2830	.06504
		95% Confidence Interval for Mean	Lower Bound	4.1546	
			Upper Bound	4.4115	
		5% Trimmed Mean		4.3634	
		Median		4.0000	
		Variance		.673	
		Std. Deviation		.82010	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		1.00	
		Skewness		-1.056	.192
		Kurtosis		.630	.383
	often	Mean		4.1452	.09154
		95% Confidence Interval for Mean	Lower Bound	3.9621	
			Upper Bound	4.3282	
		5% Trimmed Mean		4.1613	
		Median		4.0000	
		Variance		.520	
		Std. Deviation		.72081	
		Minimum		3.00	
		Maximum		5.00	
		Range		2.00	
		Interquartile Range		1.00	
		Skewness		-.226	.304
		Kurtosis		-1.018	.599
	daily	Mean		3.3333	.88192
		95% Confidence Interval for Mean	Lower Bound	-.4612	
			Upper Bound	7.1279	
		5% Trimmed Mean		.	
		Median		3.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		.935	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.6667	.33333
		95% Confidence Interval for Mean	Lower Bound	3.2324	
			Upper Bound	6.1009	
		5% Trimmed Mean		.	
		Median		5.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		4.00	
		Maximum		5.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.

Figure 52 Descriptive test hypothesis 1 at the stage of food consumption and management

Hypothesis 2: "Respondents who place food approaching its expiry date at the front of their fridge or pantry generate food waste less frequently."

To test **Hypothesis 2**, an x^2 statistical test was performed between the variables "fridge_pantry" which refers to the question "Do you place food approaching its expiry date in the front of your fridge or pantry?" and the variable "food_waste" which refers to the questions "How often do you throw edible food away?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Respondents who place food approaching its expiry date at the front of their fridge or pantry do not generate food waste less frequently."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	84.407	25	<.001
Likelihood Ratio	43.479	25	.012
Linear-by-Linear Association	6.965	1	.008
N of Valid Cases	467		

Figure 53 Statistical test x^2 hypothesis 2 at the stage of food consumption and management

To test whether our research **hypothesis 2** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food and participants that "rarely" throw away edible food, stated that they would "often" place food approaching its expiry date at the front of their fridge or pantry, with a mean of 3,63 (standard deviation 1,541) and 3,77 (standard deviation 1,312). Also, participants who "sometimes" create food waste said that they "often" place food approaching its expiry date at the front of their fridge or pantry, with a mean value of 3,52 (standard deviation 1,372). On the other hand, participants that "often" throw away edible food and participants that "daily" create food waste, stated that "sometimes" place food approaching its expiry date at the front of their fridge or pantry, with a mean value of 3,04 (standard deviation 1,508) and 2,66 (standard deviation 2,081). All above observations lead to the acceptance of **hypothesis 2**.

Descriptives

	food_waste			Statistic	Std. Error
fridge_pantry	never	Mean		3.6364	.23239
		95% Confidence Interval for Mean	Lower Bound	3.1677	
			Upper Bound	4.1050	
		5% Trimmed Mean		3.7071	
		Median		4.0000	
		Variance		2.376	
		Std. Deviation		1.54153	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		3.00	
		Skewness		-.668	.357
		Kurtosis		-1.118	.702
	rarely	Mean		3.7755	.09378
		95% Confidence Interval for Mean	Lower Bound	3.5906	
			Upper Bound	3.9605	
		5% Trimmed Mean		3.8617	
		Median		4.0000	
		Variance		1.724	
		Std. Deviation		1.31290	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.786	.174
		Kurtosis		-.556	.346
	sometimes	Mean		3.5220	.10885
		95% Confidence Interval for Mean	Lower Bound	3.3070	
			Upper Bound	3.7370	
		5% Trimmed Mean		3.5660	
		Median		4.0000	
		Variance		1.884	
		Std. Deviation		1.37259	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		-.530	.192
		Kurtosis		-.834	.383
	often	Mean		3.0484	.19161
		95% Confidence Interval for Mean	Lower Bound	2.6652	
			Upper Bound	3.4315	
		5% Trimmed Mean		3.0538	
		Median		3.0000	
		Variance		2.276	
		Std. Deviation		1.50874	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.50	
		Skewness		-.085	.304
		Kurtosis		-1.407	.599
	daily	Mean		2.6667	1.20185
		95% Confidence Interval for Mean	Lower Bound	-2.5045	
			Upper Bound	7.8378	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		4.333	
		Std. Deviation		2.08167	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		.	
		Skewness		1.293	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.6667	.66667
		95% Confidence Interval for Mean	Lower Bound	1.7982	
			Upper Bound	7.5351	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		1.333	
		Std. Deviation		1.15470	
		Minimum		4.00	
		Maximum		6.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 54 Descriptive test x^2 hypothesis 2 at the stage of food consumption and management

Hypothesis 3: "Participants that pre-wash or prepare their food in advance for cooking or immediate consumption waste food less often."

To test **Hypothesis 3**, an x^2 statistical test was performed between the variables "food_prepearation" which refers to the question "Do you pre-wash or prepare your food in advance, so it is ready for cooking or immediate consumption?" and the variable "food_waste" which refers to the questions "How often do you throw edible food away?". The value of Pearson's x^2 index was found to be $\alpha>0,05$, therefore at the statistical level 5% significance level, we cannot reject the null hypothesis: Ho= "Participants that pre-wash or prepare their food in advance for cooking or immediate consumption do not waste food less often."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.100	25	.155
Likelihood Ratio	36.724	25	.061
Linear-by-Linear Association	.728	1	.393
N of Valid Cases	467		

Figure 55 Statistical test x^2 hypothesis 3 at the stage of food consumption and management

To test whether our research **hypothesis 3** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never", "rarely", "sometimes" and "often" throw away edible food, stated that they "sometimes" pre-wash or prepare their food in advance for cooking or immediate consumption, with a mean of 3,04 (standard deviation 1,311), 3,04 (standard deviation 1,363), 3,09 (standard deviation 1,178) and 2,75 (standard deviation 1,140) respectively. On the other hand, participants that "daily" throw away edible food said that "rarely" pre-wash or prepare their food in advance for cooking or immediate consumption, with a mean value of 2,33 (standard deviation 0,577). All the above observations lead to the acceptance of **hypothesis 3.**

Descriptives

	food_waste			Statistic	Std. Error
food_preparation	never	Mean		3.0455	.19765
		95% Confidence Interval for Mean	Lower Bound	2.6469	
			Upper Bound	3.4440	
		5% Trimmed Mean		3.0505	
		Median		3.0000	
		Variance		1.719	
		Std. Deviation		1.31104	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.237	.357
		Kurtosis		-.967	.702
	rarely	Mean		3.0459	.09740
		95% Confidence Interval for Mean	Lower Bound	2.8538	
			Upper Bound	3.2380	
		5% Trimmed Mean		3.0340	
		Median		3.0000	
		Variance		1.859	
		Std. Deviation		1.36361	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.088	.174
		Kurtosis		-1.079	.346
	sometimes	Mean		3.0943	.09349
		95% Confidence Interval for Mean	Lower Bound	2.9097	
			Upper Bound	3.2790	
		5% Trimmed Mean		3.1048	
		Median		3.0000	
		Variance		1.390	
		Std. Deviation		1.17889	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.115	.192
		Kurtosis		-.797	.383
	often	Mean		2.7581	.14487
		95% Confidence Interval for Mean	Lower Bound	2.4684	
			Upper Bound	3.0477	
		5% Trimmed Mean		2.7312	
		Median		3.0000	
		Variance		1.301	
		Std. Deviation		1.14069	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.25	
		Skewness		.222	.304
		Kurtosis		-.570	.599
	daily	Mean		2.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	.8991	
			Upper Bound	3.7676	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		2.00	
		Maximum		3.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		3.6667	.88192
		95% Confidence Interval for Mean	Lower Bound	-.1279	
			Upper Bound	7.4612	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		-.935	1.225
		Kurtosis		.	.

Figure 56 Descriptive test hypothesis 3 at the stage of food consumption and management

Hypothesis 4: "Participants who use their freezer to preserve their leftover food have food wasted less frequently."

To test **Hypothesis 4**, an x^2 statistical test was performed between the variables "freezer" which refers to the question "Do you use your freezer to preserve your leftovers and meals?" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson,s x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants who use their freezer to preserve their leftover food have not food wasted less frequently."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	46.102	25	.006
Likelihood Ratio	44.220	25	.010
Linear-by-Linear Association	9.914	1	.002
N of Valid Cases	467		

Figure 57 Statistical test x^2 hypothesis 4 at the stage of food consumption and management

To test whether our research **hypothesis 4** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food stated that they would "often" freeze their leftover food, with a mean of 3,61 (standard deviation 1,367). Furthermore, participants who "rarely" create food waste, said that "sometimes" freeze their leftover food, as well as participants that "sometimes" throw away edible food, and the participants that "often" throw away edible food with a mean value of 3,41 (standard deviation 1,335), 3,11 (standard deviation 1,169) and 3,00 (1,367) respectively. Also, participants that "daily" throw away edible food stated that "rarely" put their leftover food in the freezer, with a mean value of 2,00 (standard deviation 1,732). All the above observations lead to the acceptance of **hypothesis 4**.

Descriptives

	food_waste			Statistic	Std. Error
freezer	never	Mean		3.6136	.20618
		95% Confidence Interval for Mean	Lower Bound	3.1978	
			Upper Bound	4.0294	
		5% Trimmed Mean		3.6818	
		Median		4.0000	
		Variance		1.871	
		Std. Deviation		1.36766	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.678	.357
		Kurtosis		-.746	.702
	rarely	Mean		3.4184	.09538
		95% Confidence Interval for Mean	Lower Bound	3.2303	
			Upper Bound	3.6065	
		5% Trimmed Mean		3.4649	
		Median		4.0000	
		Variance		1.783	
		Std. Deviation		1.33531	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.489	.174
		Kurtosis		-.966	.346
	sometimes	Mean		3.1132	.09272
		95% Confidence Interval for Mean	Lower Bound	2.9301	
			Upper Bound	3.2963	
		5% Trimmed Mean		3.1188	
		Median		3.0000	
		Variance		1.367	
		Std. Deviation		1.16912	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		-.030	.192
		Kurtosis		-.648	.383
	often	Mean		3.0000	.17362
		95% Confidence Interval for Mean	Lower Bound	2.6528	
			Upper Bound	3.3472	
		5% Trimmed Mean		3.0000	
		Median		3.0000	
		Variance		1.869	
		Std. Deviation		1.36706	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.119	.304
		Kurtosis		-1.258	.599
	daily	Mean		2.0000	1.00000
		95% Confidence Interval for Mean	Lower Bound	-2.3027	
			Upper Bound	6.3027	
		5% Trimmed Mean		.	
		Median		1.0000	
		Variance		3.000	
		Std. Deviation		1.73205	
		Minimum		1.00	
		Maximum		4.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		3.6667	.88192
		95% Confidence Interval for Mean	Lower Bound	-.1279	
			Upper Bound	7.4612	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		-.935	1.225
		Kurtosis		.	.

Figure 58 Descriptive test hypothesis 4 at the stage of food consumption and management

Hypothesis 5: "Participants that use cooking methods to reuse their leftover food generate food waste less frequently."

To test **Hypothesis 5**, an x^2 statistical test was performed between the variables "pickle_jam" which refers to the question "Do you make jams, pickles, or sauce when your fruits and vegetables are about to spoil?" and the variable "food_waste" which refers to the questions "How often do you throw edible food away?". The value of Pearson,s x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants that use cooking methods to reuse their leftover food do not generate food waste less frequently"

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	93.914	25	<.001
Likelihood Ratio	100.553	25	<.001
Linear-by-Linear Association	27.558	1	<.001
N of Valid Cases	467		

Figure 59 Statistical test x^2 hypothesis 5 at the stage of food consumption and management

To test whether our research **hypothesis 5** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" and "rarely" throw away edible food, stated that they "sometimes" use cooking methods to reuse their leftover food, with a mean of 2,81 (standard deviation 1,467), and 2,59 (standard deviation 1,368), respectively. On the other hand, participants that "daily" throw away edible food said that they "rarely" use cooking methods to reuse their leftover food, with a mean value of 1,66 (standard deviation 1,154). All the above observations lead to the acceptance of **hypothesis 5.**

Descriptives

	food_waste			Statistic	Std. Error
pickle_jam	never	Mean		2.8182	.22117
		95% Confidence Interval for Mean	Lower Bound	2.3722	
			Upper Bound	3.2642	
		5% Trimmed Mean		2.7980	
		Median		3.0000	
		Variance		2.152	
		Std. Deviation		1.46704	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		3.00	
		Skewness		.006	.357
		Kurtosis		-1.466	.702
	rarely	Mean		2.5918	.09777
		95% Confidence Interval for Mean	Lower Bound	2.3990	
			Upper Bound	2.7847	
		5% Trimmed Mean		2.5408	
		Median		3.0000	
		Variance		1.874	
		Std. Deviation		1.36879	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		3.00	
		Skewness		.248	.174
		Kurtosis		-1.203	.346
	sometimes	Mean		2.2327	.08089
		95% Confidence Interval for Mean	Lower Bound	2.0729	
			Upper Bound	2.3925	
		5% Trimmed Mean		2.1960	
		Median		2.0000	
		Variance		1.040	
		Std. Deviation		1.02002	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.424	.192
		Kurtosis		-.764	.383
	often	Mean		1.4677	.10467
		95% Confidence Interval for Mean	Lower Bound	1.2584	
			Upper Bound	1.6770	
		5% Trimmed Mean		1.3728	
		Median		1.0000	
		Variance		.679	
		Std. Deviation		.82418	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		2.013	.304
		Kurtosis		4.577	.599
	daily	Mean		1.6667	.66667
		95% Confidence Interval for Mean	Lower Bound	-1.2018	
			Upper Bound	4.5351	
		5% Trimmed Mean		.	
		Median		1.0000	
		Variance		1.333	
		Std. Deviation		1.15470	
		Minimum		1.00	
		Maximum		3.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	2.8991	
			Upper Bound	5.7676	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		4.00	
		Maximum		5.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 60 Descriptive test hypothesis 5 at the stage of food consumption and management

Hypothesis 6: "Participants that share food with others have less food waste."

To test **Hypothesis 6**, an x^2 statistical test was performed between the variables "share_food" which refers to the question "Do you share leftover food with people outside your home? (e.g., relatives, friends, people in need, etc.)" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants that share food with others have not less food waste".

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	39.958	25	.029
Likelihood Ratio	45.227	25	.008
Linear-by-Linear Association	6.073	1	.014
N of Valid Cases	467		

Figure 61 Statistical test x^2 hypothesis 6 at the stage of food consumption and management

To test whether our research **hypothesis 6** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food, stated that they "sometimes" share their food, with a mean of 2,68 (standard deviation 1,271). Furthermore, participants who "rarely" create food waste, also, said that "sometimes" share their food, with a mean value of 2,84 (standard deviation 1,263). On the other hand, participants that "often" and "daily" throw away still edible food stated that "rarely" share food with others, with a mean value of 2,45 (standard deviation 0,881) and 1,66 (standard deviation 0,577) respectively. All the above observations lead to the acceptance of **hypothesis 6**.

Descriptives

	food_waste			Statistic	Std. Error
shared_food	never	Mean		2.6818	.19172
		95% Confidence Interval for Mean	Lower Bound	2.2952	
			Upper Bound	3.0685	
		5% Trimmed Mean		2.6465	
		Median		3.0000	
		Variance		1.617	
		Std. Deviation		1.27175	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.50	
		Skewness		.140	.357
		Kurtosis		-.908	.702
	rarely	Mean		2.8469	.09027
		95% Confidence Interval for Mean	Lower Bound	2.6689	
			Upper Bound	3.0250	
		5% Trimmed Mean		2.8186	
		Median		3.0000	
		Variance		1.597	
		Std. Deviation		1.26371	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.169	.174
		Kurtosis		-.806	.346
	sometimes	Mean		2.6541	.08030
		95% Confidence Interval for Mean	Lower Bound	2.4955	
			Upper Bound	2.8127	
		5% Trimmed Mean		2.6433	
		Median		3.0000	
		Variance		1.025	
		Std. Deviation		1.01250	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		.109	.192
		Kurtosis		-.638	.383
	often	Mean		2.4516	.11190
		95% Confidence Interval for Mean	Lower Bound	2.2279	
			Upper Bound	2.6754	
		5% Trimmed Mean		2.4462	
		Median		2.0000	
		Variance		.776	
		Std. Deviation		.88108	
		Minimum		1.00	
		Maximum		4.00	
		Range		3.00	
		Interquartile Range		1.00	
		Skewness		.003	.304
		Kurtosis		-.655	.599
	daily	Mean		1.6667	.33333
		95% Confidence Interval for Mean	Lower Bound	.2324	
			Upper Bound	3.1009	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		2.0000	1.00000
		95% Confidence Interval for Mean	Lower Bound	-2.3027	
			Upper Bound	6.3027	
		5% Trimmed Mean		.	
		Median		1.0000	
		Variance		3.000	
		Std. Deviation		1.73205	
		Minimum		1.00	
		Maximum		4.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 62 Descriptive test hypothesis 6 at the stage of food consumption and management

3.4.3 Research hypotheses on consumer attitudes and behaviours toward food waste

Hypothesis 1: "Participants who are likely to throw away suboptimal food tend to waste food more often."

To test **Hypothesis 1**, an x^2 statistical test was performed between the variables "appearance" which refers to the question "How likely are you to throw away food for the following reason: I don't like the appearance of the food" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants who are likely to throw away suboptimal food do not tend to waste food more often."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	124.928	25	<.001
Likelihood Ratio	58.617	25	<.001
Linear-by-Linear Association	25.955	1	<.001
N of Valid Cases	467		

Figure 63 Statistical test x^2 hypothesis 1 food waste

To test whether our research **hypothesis 1** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food, as well as the one that said they "rarely" throw away food waste, stated that it was "unlikely" to throw away food because of its appearance, with a mean of 2,09 (standard deviation 1,326) and 2,20 (standard deviation 1,244). Furthermore, participants who "sometimes", "often" and "daily" create food waste, said that was "neither likely, nor unlikely" to throw away food because of its appearance, with a mean value of 2,75 (standard deviation 1,276), 2,82 (standard deviation 1,248) and 3,00 (standard deviation 1,732) respectively. All the above observations lead to the acceptance of **hypothesis 1**.

Descriptives

	food_waste			Statistic	Std. Error
appearance	never	Mean		2.0909	.19994
		95% Confidence Interval for Mean	Lower Bound	1.6877	
			Upper Bound	2.4941	
		5% Trimmed Mean		1.9899	
		Median		2.0000	
		Variance		1.759	
		Std. Deviation		1.32627	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		1.017	.357
		Kurtosis		-.103	.702
	rarely	Mean		2.2041	.08887
		95% Confidence Interval for Mean	Lower Bound	2.0288	
			Upper Bound	2.3793	
		5% Trimmed Mean		2.1100	
		Median		2.0000	
		Variance		1.548	
		Std. Deviation		1.24414	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.833	.174
		Kurtosis		-.174	.346
	sometimes	Mean		2.7547	.10123
		95% Confidence Interval for Mean	Lower Bound	2.5548	
			Upper Bound	2.9547	
		5% Trimmed Mean		2.7275	
		Median		3.0000	
		Variance		1.629	
		Std. Deviation		1.27645	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.010	.192
		Kurtosis		-1.150	.383
	often	Mean		2.8226	.15853
		95% Confidence Interval for Mean	Lower Bound	2.5056	
			Upper Bound	3.1396	
		5% Trimmed Mean		2.8029	
		Median		3.0000	
		Variance		1.558	
		Std. Deviation		1.24827	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.139	.304
		Kurtosis		-.871	.599
	daily	Mean		3.0000	1.00000
		95% Confidence Interval for Mean	Lower Bound	-1.3027	
			Upper Bound	7.3027	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		3.000	
		Std. Deviation		1.73205	
		Minimum		1.00	
		Maximum		4.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.3333	.88192
		95% Confidence Interval for Mean	Lower Bound	.5388	
			Upper Bound	8.1279	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		3.00	
		Maximum		6.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		.935	1.225
		Kurtosis		.	.

Figure 64 Descriptive test hypothesis 1 food waste

Hypothesis 2: "The participants who are likely to throw away food or a meal that is not tasty have more frequent food waste than other participants."

To test **Hypothesis 2**, an x^2 statistical test was performed between the variables "taste" which refers to the question "How likely are you to throw away food for the following reason: The food or meal is not tasty" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "The participants who are likely to throw away food or a meal that is not tasty have not more frequent food waste than other participants."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	116.419	25	<.001
Likelihood Ratio	69.496	25	<.001
Linear-by-Linear Association	34.855	1	<.001
N of Valid Cases	467		

Figure 65 Statistical test x^2 hypothesis 2 food waste

To test whether our research **hypothesis 2** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never", "rarely" and "sometimes" throw away edible food, stated that it was "neither likely nor unlikely" to throw away food or meal that was not tasty, with a mean of 2,52 (standard deviation 1,337), 3,03 (standard deviation 1,167) and 3,42 (standard deviation 1,203) respectively. The participants that "often" throw away edible food stated that they were "likely" to discard food or meal that is not tasty, with a mean value of 3,61 (standard deviation 1,334). Furthermore, participants who "daily" create food waste said that it was "very likely" to throw away food or meal that is not tasty, with a mean value of 5,00 (standard deviation 0,000). All the above observations lead to the acceptance of **hypothesis 2.**

Descriptives

	food_waste			Statistic	Std. Error
taste	never	Mean		2.5227	.20171
		95% Confidence Interval for Mean	Lower Bound	2.1159	
			Upper Bound	2.9295	
		5% Trimmed Mean		2.4444	
		Median		2.0000	
		Variance		1.790	
		Std. Deviation		1.33797	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.50	
		Skewness		.712	.357
		Kurtosis		-.275	.702
	rarely	Mean		3.0306	.08340
		95% Confidence Interval for Mean	Lower Bound	2.8661	
			Upper Bound	3.1951	
		5% Trimmed Mean		3.0340	
		Median		3.0000	
		Variance		1.363	
		Std. Deviation		1.16754	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		-.119	.174
		Kurtosis		-.813	.346
	sometimes	Mean		3.4214	.09543
		95% Confidence Interval for Mean	Lower Bound	3.2329	
			Upper Bound	3.6099	
		5% Trimmed Mean		3.4612	
		Median		3.0000	
		Variance		1.448	
		Std. Deviation		1.20328	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		1.00	
		Skewness		-.309	.192
		Kurtosis		-.668	.383
	often	Mean		3.6129	.16954
		95% Confidence Interval for Mean	Lower Bound	3.2739	
			Upper Bound	3.9519	
		5% Trimmed Mean		3.6810	
		Median		4.0000	
		Variance		1.782	
		Std. Deviation		1.33496	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		3.00	
		Skewness		-.571	.304
		Kurtosis		-.951	.599
	daily	Mean		5.0000	.00000
		95% Confidence Interval for Mean	Lower Bound	5.0000	
			Upper Bound	5.0000	
		5% Trimmed Mean		5.0000	
		Median		5.0000	
		Variance		.000	
		Std. Deviation		.00000	
		Minimum		5.00	
		Maximum		5.00	
		Range		.00	
		Interquartile Range		.00	
		Skewness		.	.
		Kurtosis		.	.
	I do not wish to answer	Mean		4.6667	.88192
		95% Confidence Interval for Mean	Lower Bound	.8721	
			Upper Bound	8.4612	
		5% Trimmed Mean		.	
		Median		5.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		3.00	
		Maximum		6.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		-.935	1.225
		Kurtosis		.	.

Figure 66 Descriptive test hypothesis 2 food waste

Hypothesis 3: "Participants who have excessive portions of food on their plates throw away food more often than other participants."

To test **Hypothesis 3**, an x^2 statistical test was performed between the variables "amount" which refers to the question "How likely are you to throw away food for the following reason: I fill my plate with more food than I need." and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants who have excessive portions of food on their plates do not throw away food more often than other participants."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	116.115	25	<.001
Likelihood Ratio	73.420	25	<.001
Linear-by-Linear Association	39.761	1	<.001
N of Valid Cases	467		

Figure 67 Statistical test x^2 hypothesis 3 food waste

To test whether our research **hypothesis 3** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never", "rarely" and "sometimes" throw away edible food, stated that it was "unlikely" to have excessive food portions on their plates, with a mean of 1,72 (standard deviation 1,042), 2,20 (standard deviation 1,122) and 2,32 (standard deviation 1,149). The participants that "often" throw away edible food stated that they were "neither likely nor unlikely" to have excessive food portions on their plates, with a mean value of 3,11 (standard deviation 1,281). Furthermore, participants who "daily" create food waste said that it was "likely" to have excessive food portions on their plates, with a mean value of 4,33 (standard deviation 0,577). All the above observations lead to the acceptance of **hypothesis 3.**

Descriptives

	food_waste			Statistic	Std. Error
amount	never	Mean		1.7273	.15715
		95% Confidence Interval for Mean	Lower Bound	1.4103	
			Upper Bound	2.0442	
		5% Trimmed Mean		1.5909	
		Median		1.0000	
		Variance		1.087	
		Std. Deviation		1.04244	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		1.874	.357
		Kurtosis		3.390	.702
	rarely	Mean		2.2041	.08020
		95% Confidence Interval for Mean	Lower Bound	2.0459	
			Upper Bound	2.3623	
		5% Trimmed Mean		2.1315	
		Median		2.0000	
		Variance		1.261	
		Std. Deviation		1.12281	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.731	.174
		Kurtosis		-.075	.346
	sometimes	Mean		2.3208	.09113
		95% Confidence Interval for Mean	Lower Bound	2.1408	
			Upper Bound	2.5007	
		5% Trimmed Mean		2.2519	
		Median		2.0000	
		Variance		1.321	
		Std. Deviation		1.14914	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.562	.192
		Kurtosis		-.540	.383
	often	Mean		3.1129	.16278
		95% Confidence Interval for Mean	Lower Bound	2.7874	
			Upper Bound	3.4384	
		5% Trimmed Mean		3.1075	
		Median		3.0000	
		Variance		1.643	
		Std. Deviation		1.28171	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.024	.304
		Kurtosis		-.687	.599
	daily	Mean		4.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	2.8991	
			Upper Bound	5.7676	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		4.00	
		Maximum		5.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		3.3333	1.45297
		95% Confidence Interval for Mean	Lower Bound	-2.9183	
			Upper Bound	9.5849	
		5% Trimmed Mean		.	
		Median		3.0000	
		Variance		6.333	
		Std. Deviation		2.51661	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		.	
		Skewness		.586	1.225
		Kurtosis		.	.

Figure 68 Descriptive test hypothesis 3 food waste

Hypothesis 4: "Participants that buy large quantities of food products have more frequent food waste."

To test **Hypothesis 4**, an x^2 statistical test was performed between the variables "overbuy" which refers to the question "How likely are you to throw away food for the following reason: I purchased a large quantity of a product that I did not need." and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants that buy large quantities of food products have not more frequent food waste than other participants."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	154.932	25	<.001
Likelihood Ratio	86.209	25	<.001
Linear-by-Linear Association	57.753	1	<.001
N of Valid Cases	467		

Figure 69 Statistical test x^2 hypothesis 4 food waste

To test whether our research **hypothesis 4 is** accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" and "rarely" throw away edible food, stated that it was "unlikely" to buy large quantities of food products, with a mean of 1,84 (standard deviation 1,010) and 2,19 (standard deviation 1,079). The participants that "sometimes" and "often" throw away edible food stated that they were "neither likely nor unlikely" to buy large quantities of food products, with a mean value of 2,54 (standard deviation 1,194) and 3,41 (standard deviation 1,138). Furthermore, participants who "daily" create food waste said that it was "likely" to buy large quantities of food products, with a mean value of 3,66 (standard deviation 1,527). All the above observations lead to the acceptance of **hypothesis 4.**

Descriptives

	food_waste			Statistic	Std. Error
overbuy	never	Mean		1.8409	.15230
		95% Confidence Interval for Mean	Lower Bound	1.5338	
			Upper Bound	2.1481	
		5% Trimmed Mean		1.7424	
		Median		2.0000	
		Variance		1.021	
		Std. Deviation		1.01025	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		1.326	.357
		Kurtosis		1.451	.702
	rarely	Mean		2.1990	.07711
		95% Confidence Interval for Mean	Lower Bound	2.0469	
			Upper Bound	2.3511	
		5% Trimmed Mean		2.1315	
		Median		2.0000	
		Variance		1.165	
		Std. Deviation		1.07951	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.782	.174
		Kurtosis		.153	.346
	sometimes	Mean		2.5409	.09474
		95% Confidence Interval for Mean	Lower Bound	2.3538	
			Upper Bound	2.7280	
		5% Trimmed Mean		2.4899	
		Median		2.0000	
		Variance		1.427	
		Std. Deviation		1.19462	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		.365	.192
		Kurtosis		-.809	.383
	often	Mean		3.4194	.14462
		95% Confidence Interval for Mean	Lower Bound	3.1302	
			Upper Bound	3.7085	
		5% Trimmed Mean		3.4659	
		Median		4.0000	
		Variance		1.297	
		Std. Deviation		1.13871	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-.414	.304
		Kurtosis		-.516	.599
	daily	Mean		3.6667	.88192
		95% Confidence Interval for Mean	Lower Bound	-.1279	
			Upper Bound	7.4612	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		-.935	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		3.3333	1.45297
		95% Confidence Interval for Mean	Lower Bound	-2.9183	
			Upper Bound	9.5849	
		5% Trimmed Mean		.	
		Median		3.0000	
		Variance		6.333	
		Std. Deviation		2.51661	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		.	
		Skewness		.586	1.225
		Kurtosis		.	.

Figure 70 Descriptive test hypothesis 4 food waste

3.4.4 Research hypotheses on consumer attitudes and behaviours toward sustainability awareness

Hypothesis 1: "Participants concerned about the environment and sustainability have less frequent food waste."

To test **Hypothesis 1**, an x^2 statistical test was performed between the variables "sustainability" which refers to the question "Select the extent to which you agree or disagree with the following sentence: "I am interested in issues related to the sustainability of the planet." and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Participants concerned about the environment and sustainability have not less frequently food waste."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	44.173	25	.010
Likelihood Ratio	39.562	25	.032
Linear-by-Linear Association	4.893	1	.027
N of Valid Cases	467		

Figure 71 Statistical test x^2 hypothesis 1 sustainability awareness

To test whether our research **hypothesis 1** is accurate, we will proceed to descriptive testing (means testing). The groups of respondents who said they "never", "rarely", "sometimes", "often" and "daily" throw away edible food, all stated that they "agree" with the following sentence: "I am interested in issues related to the sustainability of the planet.", with a mean of 3,95 (standard deviation 1,077), 4,31 (standard deviation 0,731), 4,08 (standard deviation 0,841), 3,83 (standard deviation 0,908) and 4,00 (standard deviation 1,000) respectively. All the above observations lead to the rejection of **hypothesis 1.**

Descriptives

	food_waste			Statistic	Std. Error
sustainability	never	Mean		3.9545	.16242
		95% Confidence Interval for Mean	Lower Bound	3.6270	
			Upper Bound	4.2821	
		5% Trimmed Mean		4.0303	
		Median		4.0000	
		Variance		1.161	
		Std. Deviation		1.07735	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		-.841	.357
		Kurtosis		.938	.702
	rarely	Mean		4.3163	.05226
		95% Confidence Interval for Mean	Lower Bound	4.2133	
			Upper Bound	4.4194	
		5% Trimmed Mean		4.3741	
		Median		4.0000	
		Variance		.535	
		Std. Deviation		.73166	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-1.049	.174
		Kurtosis		1.671	.346
	sometimes	Mean		4.0818	.06675
		95% Confidence Interval for Mean	Lower Bound	3.9499	
			Upper Bound	4.2136	
		5% Trimmed Mean		4.1537	
		Median		4.0000	
		Variance		.708	
		Std. Deviation		.84170	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-1.253	.192
		Kurtosis		2.792	.383
	often	Mean		3.8387	.11542
		95% Confidence Interval for Mean	Lower Bound	3.6079	
			Upper Bound	4.0695	
		5% Trimmed Mean		3.8925	
		Median		4.0000	
		Variance		.826	
		Std. Deviation		.90886	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.25	
		Skewness		-.753	.304
		Kurtosis		1.263	.599
	daily	Mean		4.0000	.57735
		95% Confidence Interval for Mean	Lower Bound	1.5159	
			Upper Bound	6.4841	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		1.000	
		Std. Deviation		1.00000	
		Minimum		3.00	
		Maximum		5.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		.000	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.3333	.66667
		95% Confidence Interval for Mean	Lower Bound	1.4649	
			Upper Bound	7.2018	
		5% Trimmed Mean		.	
		Median		5.0000	
		Variance		1.333	
		Std. Deviation		1.15470	
		Minimum		3.00	
		Maximum		5.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.

Figure 72 Descriptive test hypothesis 1 sustainability awareness

Hypothesis 2: "**Food insecure participants generate food waste less frequently."**

To test **Hypothesis 2,** an x^2 statistical test was performed between the variables "food_security" which refers to the question "Select the extent to which you agree or disagree with the following sentence: "I am worried about my food supply." and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Food insecure participants do not generate food waste less frequently."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	63.423	25	<.001
Likelihood Ratio	21.760	25	.650
Linear-by-Linear Association	.006	1	.940
N of Valid Cases	467		

Figure 73 Statistical test x^2 hypothesis 2 sustainability awareness

To test whether our research **hypothesis 2** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food, stated that they "agree" with the following sentence: "I am worried about my food supply", with a mean of 3,54 (standard deviation 1,021). The groups of participants that said "rarely", "sometimes", "often" and "daily" throw away edible food, also, stated that they were "neither agree nor disagree" about the statement "I am worried about my food supply", with a mean value of 3,37 (standard deviation 0,966), 3,42 (standard deviation 0,964), 3,40 (standard deviation 1,031) and 3,00 (standard deviation 1,000) respectively. All the above observations lead to the acceptance of **hypothesis 2.**

Descriptives

	food_waste			Statistic	Std. Error
food_security	never	Mean		3.5455	.15407
		95% Confidence Interval for Mean	Lower Bound	3.2348	
			Upper Bound	3.8562	
		5% Trimmed Mean		3.5758	
		Median		3.5000	
		Variance		1.044	
		Std. Deviation		1.02196	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-.197	.357
		Kurtosis		-.457	.702
	rarely	Mean		3.3776	.06902
		95% Confidence Interval for Mean	Lower Bound	3.2414	
			Upper Bound	3.5137	
		5% Trimmed Mean		3.3980	
		Median		3.0000	
		Variance		.934	
		Std. Deviation		.96625	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-.200	.174
		Kurtosis		-.239	.346
	sometimes	Mean		3.4277	.07647
		95% Confidence Interval for Mean	Lower Bound	3.2766	
			Upper Bound	3.5787	
		5% Trimmed Mean		3.4406	
		Median		3.0000	
		Variance		.930	
		Std. Deviation		.96429	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		1.00	
		Skewness		-.178	.192
		Kurtosis		.258	.383
	often	Mean		3.4032	.13102
		95% Confidence Interval for Mean	Lower Bound	3.1412	
			Upper Bound	3.6652	
		5% Trimmed Mean		3.4462	
		Median		4.0000	
		Variance		1.064	
		Std. Deviation		1.03163	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		1.00	
		Skewness		-.518	.304
		Kurtosis		-.211	.599
	daily	Mean		3.0000	.57735
		95% Confidence Interval for Mean	Lower Bound	.5159	
			Upper Bound	5.4841	
		5% Trimmed Mean		.	
		Median		3.0000	
		Variance		1.000	
		Std. Deviation		1.00000	
		Minimum		2.00	
		Maximum		4.00	
		Range		2.00	
		Interquartile Range		.	
		Skewness		.000	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		4.3333	.88192
		95% Confidence Interval for Mean	Lower Bound	.5388	
			Upper Bound	8.1279	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		3.00	
		Maximum		6.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		.935	1.225
		Kurtosis		.	.

Figure 74 Descriptive test hypothesis 2 sustainability awareness

3.4.5 Research hypotheses on consumer demographic characteristics

Hypothesis 1: "Respondents' gender affects the frequency with which they throw away food waste."

To test **Hypothesis 1**, an x^2 statistical test was performed between the variables "gender" which refers to the question "Please select your gender:" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha>0.05$, therefore at the statistical level 5% significance level, we cannot reject the null hypothesis: Ho= "Respondents' gender does not affect the frequency with which they throw away food waste."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.250	10	.509
Likelihood Ratio	9.553	10	.481
Linear-by-Linear Association	2.611	1	.106
N of Valid Cases	467		

Figure 75 Statistical test x^2 hypothesis 1 demographic characteristics

To test whether our research **hypothesis 1** is accurate, we will proceed to descriptive testing (means testing). The groups of respondents who said they "never", "rarely", "sometimes", "often" and "daily" throw away edible food, most of them stated that they were "female" with a mean of 1,79 (standard deviation 0,408), 1,77 (standard deviation 0,433), 1,77 (standard deviation 0,415), 1,66 (standard deviation 0,477) and 2,00 (standard deviation 0,000) respectively. On the other hand, most participants that did not wish to answer about the frequency of their food waste, were "males", with a mean value of 1,33 (standard deviation 0,577). All the above observations lead to the rejection of **hypothesis 1.**

Descriptives

	food_waste			Statistic	Std. Error
gender	never	Mean		1.7955	.06151
		95% Confidence Interval for Mean	Lower Bound	1.6714	
			Upper Bound	1.9195	
		5% Trimmed Mean		1.8283	
		Median		2.0000	
		Variance		.166	
		Std. Deviation		.40803	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.00	
		Skewness		-1.517	.357
		Kurtosis		.314	.702
	rarely	Mean		1.7704	.03097
		95% Confidence Interval for Mean	Lower Bound	1.7093	
			Upper Bound	1.8315	
		5% Trimmed Mean		1.7948	
		Median		2.0000	
		Variance		.188	
		Std. Deviation		.43364	
		Minimum		1.00	
		Maximum		3.00	
		Range		2.00	
		Interquartile Range		.00	
		Skewness		-1.104	.174
		Kurtosis		-.219	.346
	sometimes	Mean		1.7799	.03296
		95% Confidence Interval for Mean	Lower Bound	1.7148	
			Upper Bound	1.8450	
		5% Trimmed Mean		1.8110	
		Median		2.0000	
		Variance		.173	
		Std. Deviation		.41564	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.00	
		Skewness		-1.364	.192
		Kurtosis		-.142	.383
	often	Mean		1.6613	.06060
		95% Confidence Interval for Mean	Lower Bound	1.5401	
			Upper Bound	1.7825	
		5% Trimmed Mean		1.6792	
		Median		2.0000	
		Variance		.228	
		Std. Deviation		.47713	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		1.00	
		Skewness		-.699	.304
		Kurtosis		-1.563	.599
	daily	Mean		2.0000	.00000
		95% Confidence Interval for Mean	Lower Bound	2.0000	
			Upper Bound	2.0000	
		5% Trimmed Mean		2.0000	
		Median		2.0000	
		Variance		.000	
		Std. Deviation		.00000	
		Minimum		2.00	
		Maximum		2.00	
		Range		.00	
		Interquartile Range		.00	
		Skewness		.	.
		Kurtosis		.	.
	I do not wish to answer	Mean		1.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	-.1009	
			Upper Bound	2.7676	
		5% Trimmed Mean		.	
		Median		1.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 76 Descriptive test hypothesis 1 demographic characteristics

Hypothesis 2: "Younger respondents generate food waste more often."

To test **Hypothesis 2**, an x^2 statistical test was performed between the variables "age" which refers to the question "Please select your group age" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha<0,05$, therefore at the statistical level 5% significance level, we can reject the null hypothesis: Ho= "Younger respondents do not generate food waste more frequently."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	55.794	25	<.001
Likelihood Ratio	53.561	25	<.001
Linear-by-Linear Association	8.952	1	.003
N of Valid Cases	467		

Figure 77 Statistical test x^2 hypothesis 2 demographic characteristics

To test whether our research **hypothesis 2** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never" throw away edible food, stated that they were "46-55" years old with a mean of 3,54 (standard deviation 1,454). The groups of participants that "rarely", "sometimes", "often" and "daily" throw away edible food stated that they were 36-45" years old, with a mean value of 3,00 (standard deviation 1,441), 2,81 (standard deviation 1,252), 2,58 (standard deviation 1,033) and 3,33 (standard deviation 2,081). All the above observations lead to the acceptance of **hypothesis 2.**

Descriptives

	food_waste			Statistic	Std. Error
age	never	Mean		3.5455	.21920
		95% Confidence Interval for Mean	Lower Bound	3.1034	
			Upper Bound	3.9875	
		5% Trimmed Mean		3.5253	
		Median		4.0000	
		Variance		2.114	
		Std. Deviation		1.45402	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		3.00	
		Skewness		.001	.357
		Kurtosis		-1.584	.702
	rarely	Mean		3.0051	.10294
		95% Confidence Interval for Mean	Lower Bound	2.8021	
			Upper Bound	3.2081	
		5% Trimmed Mean		2.9501	
		Median		3.0000	
		Variance		2.077	
		Std. Deviation		1.44114	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.562	.174
		Kurtosis		-.602	.346
	sometimes	Mean		2.8176	.09930
		95% Confidence Interval for Mean	Lower Bound	2.6215	
			Upper Bound	3.0137	
		5% Trimmed Mean		2.7764	
		Median		3.0000	
		Variance		1.568	
		Std. Deviation		1.25211	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.449	.192
		Kurtosis		-.609	.383
	often	Mean		2.5806	.13120
		95% Confidence Interval for Mean	Lower Bound	2.3183	
			Upper Bound	2.8430	
		5% Trimmed Mean		2.5358	
		Median		2.0000	
		Variance		1.067	
		Std. Deviation		1.03303	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		1.00	
		Skewness		.837	.304
		Kurtosis		.861	.599
	daily	Mean		3.3333	1.20185
		95% Confidence Interval for Mean	Lower Bound	-1.8378	
			Upper Bound	8.5045	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		4.333	
		Std. Deviation		2.08167	
		Minimum		1.00	
		Maximum		5.00	
		Range		4.00	
		Interquartile Range		.	
		Skewness		-1.293	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		3.6667	.88192
		95% Confidence Interval for Mean	Lower Bound	-.1279	
			Upper Bound	7.4612	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		2.00	
		Maximum		5.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		-.935	1.225
		Kurtosis		.	.

Figure 78 Descriptive test hypothesis 2 demographic characteristics

Hypothesis 3: "Families with children tend to waste more frequently food than families without children"

To test **Hypothesis 3**, an x^2 statistical test was performed between the variables "kids" which refers to the question "Please select whether you have kids in your family or not" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha>0,05$, therefore at the statistical level 5% significance level, we cannot reject the null hypothesis: Ho= "Families with children do not tend to waste more frequently food than families without children"

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.202	10	.976
Likelihood Ratio	3.888	10	.952
Linear-by-Linear Association	.246	1	.620
N of Valid Cases	467		

Figure 79 Statistical test x^2 hypothesis 3 demographic characteristics

To test whether our research **hypothesis 3** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never", "rarely", "sometimes" and "often", also, stated that most of them do not have children, with a mean of 1,56 (standard deviation 0,501), 1,63 (standard deviation 0,524), 1,61 (standard deviation 0,514), and 1,67 (standard deviation 0,504). On the other hand, participants that throw away "daily" food waste, said that they do have children, with a mean value of 1,33 (standard deviation 0,577). All the above observations lead to the acceptance of **hypothesis 3.**

Descriptives

	food_waste			Statistic	Std. Error
kids	never	Mean		1.5682	.07554
		95% Confidence Interval for Mean	Lower Bound	1.4158	
			Upper Bound	1.7205	
		5% Trimmed Mean		1.5758	
		Median		2.0000	
		Variance		.251	
		Std. Deviation		.50106	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		1.00	
		Skewness		-.285	.357
		Kurtosis		-2.012	.702
	rarely	Mean		1.6327	.03743
		95% Confidence Interval for Mean	Lower Bound	1.5588	
			Upper Bound	1.7065	
		5% Trimmed Mean		1.6247	
		Median		2.0000	
		Variance		.275	
		Std. Deviation		.52404	
		Minimum		1.00	
		Maximum		3.00	
		Range		2.00	
		Interquartile Range		1.00	
		Skewness		-.118	.174
		Kurtosis		-1.064	.346
	sometimes	Mean		1.6101	.04080
		95% Confidence Interval for Mean	Lower Bound	1.5295	
			Upper Bound	1.6907	
		5% Trimmed Mean		1.6083	
		Median		2.0000	
		Variance		.265	
		Std. Deviation		.51450	
		Minimum		1.00	
		Maximum		3.00	
		Range		2.00	
		Interquartile Range		1.00	
		Skewness		-.172	.192
		Kurtosis		-1.324	.383
	often	Mean		1.6774	.06412
		95% Confidence Interval for Mean	Lower Bound	1.5492	
			Upper Bound	1.8056	
		5% Trimmed Mean		1.6792	
		Median		2.0000	
		Variance		.255	
		Std. Deviation		.50487	
		Minimum		1.00	
		Maximum		3.00	
		Range		2.00	
		Interquartile Range		1.00	
		Skewness		-.378	.304
		Kurtosis		-.950	.599
	daily	Mean		1.3333	.33333
		95% Confidence Interval for Mean	Lower Bound	-.1009	
			Upper Bound	2.7676	
		5% Trimmed Mean		.	
		Median		1.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		1.6667	.33333
		95% Confidence Interval for Mean	Lower Bound	.2324	
			Upper Bound	3.1009	
		5% Trimmed Mean		.	
		Median		2.0000	
		Variance		.333	
		Std. Deviation		.57735	
		Minimum		1.00	
		Maximum		2.00	
		Range		1.00	
		Interquartile Range		.	
		Skewness		-1.732	1.225
		Kurtosis		.	.

Figure 80 Descriptive test hypothesis 3 demographic characteristics

Hypothesis 4: "Respondents' annual income affects the frequency with which they throw away food waste."

To test **Hypothesis 4**, an x^2 statistical test was performed between the variables "income" which refers to the question "Please select your annual income" and the variable "food_waste" which refers to the questions "How often do you throw away edible food?". The value of Pearson's x^2 index was found to be $\alpha>0,05$, therefore at the statistical level 5% significance level, we cannot reject the null hypothesis: Ho= "Respondents' annual income does not affect the frequency with which they throw away food waste."

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	37.594	35	.351
Likelihood Ratio	41.433	35	.210
Linear-by-Linear Association	.019	1	.891
N of Valid Cases	467		

Figure 81 Statistical test x^2 hypothesis 4 demographic characteristics

To test whether our research **hypothesis 4** is accurate, we will proceed to descriptive testing (means testing). The respondents who said they "never", "sometimes" and "daily" throw away edible food, also, stated that they have an annual income between "10.000-18.000 €", with a mean of 3,43 (standard deviation 2,255), 3,42 (standard deviation 2,191) and 2,66 (standard deviation 1,527), respectively. Furthermore, participants that throw away "rarely" and "often" food waste, said that they have an annual income between 18.001-25.000€ with a mean value of 3,72 (standard deviation 2,214) and 3,58 (2,084) respectively. All the above observations lead to the rejection of **hypothesis 4.**

Descriptives

	food_waste			Statistic	Std. Error
income	never	Mean		3.4318	.34006
		95% Confidence Interval for Mean	Lower Bound	2.7460	
			Upper Bound	4.1176	
		5% Trimmed Mean		3.3131	
		Median		3.0000	
		Variance		5.088	
		Std. Deviation		2.25572	
		Minimum		1.00	
		Maximum		8.00	
		Range		7.00	
		Interquartile Range		2.00	
		Skewness		1.112	.357
		Kurtosis		.137	.702
	rarely	Mean		3.7296	.15821
		95% Confidence Interval for Mean	Lower Bound	3.4176	
			Upper Bound	4.0416	
		5% Trimmed Mean		3.6440	
		Median		3.0000	
		Variance		4.906	
		Std. Deviation		2.21495	
		Minimum		1.00	
		Maximum		8.00	
		Range		7.00	
		Interquartile Range		3.00	
		Skewness		.790	.174
		Kurtosis		-.515	.346
	sometimes	Mean		3.4214	.17379
		95% Confidence Interval for Mean	Lower Bound	3.0781	
			Upper Bound	3.7646	
		5% Trimmed Mean		3.3015	
		Median		3.0000	
		Variance		4.802	
		Std. Deviation		2.19142	
		Minimum		1.00	
		Maximum		8.00	
		Range		7.00	
		Interquartile Range		3.00	
		Skewness		.911	.192
		Kurtosis		-.227	.383
	often	Mean		3.5806	.26475
		95% Confidence Interval for Mean	Lower Bound	3.0512	
			Upper Bound	4.1101	
		5% Trimmed Mean		3.4785	
		Median		3.0000	
		Variance		4.346	
		Std. Deviation		2.08467	
		Minimum		1.00	
		Maximum		8.00	
		Range		7.00	
		Interquartile Range		3.00	
		Skewness		.685	.304
		Kurtosis		-.238	.599
	daily	Mean		2.6667	.88192
		95% Confidence Interval for Mean	Lower Bound	-1.1279	
			Upper Bound	6.4612	
		5% Trimmed Mean		.	
		Median		3.0000	
		Variance		2.333	
		Std. Deviation		1.52753	
		Minimum		1.00	
		Maximum		4.00	
		Range		3.00	
		Interquartile Range		.	
		Skewness		-.935	1.225
		Kurtosis		.	.
	I do not wish to answer	Mean		5.3333	1.33333
		95% Confidence Interval for Mean	Lower Bound	-.4035	
			Upper Bound	11.0702	
		5% Trimmed Mean		.	
		Median		4.0000	
		Variance		5.333	
		Std. Deviation		2.30940	
		Minimum		4.00	
		Maximum		8.00	
		Range		4.00	
		Interquartile Range		.	
		Skewness		1.732	1.225
		Kurtosis		.	.

Figure 82 Descriptive test hypothesis 4 demographic characteristics

Chapter 4

4.1 Limitations

Although we had some interesting findings, there were still some limitations. One of these limitations was the collection of the questionnaires via the internet. This way of collecting the questionnaires attracted more women than men to respond to the questionnaire. In addition, the distribution of respondents by age, although satisfactory, the most significant proportion of all respondents is between 26 and 35 years old (36,6%). In comparison, the minor proportion of respondents is 66 years old and over (4,5%). Again, this is due to the collection of the questionnaires via the internet, as the younger population is more likely to use the internet and social media to communicate. However, this has a negligible impact on the overall results. In addition, another limitation was the population distribution of respondents across all municipalities in the Attica region, which was sufficient. However, in some municipalities, the percentage of respondents could have been more representative of their population.

4.2 Discussions

4.2.1 Discussions about consumer attitudes and behaviours at the stage of food purchase

The first group of research hypotheses concerns the respondents' attitudes and behaviors at the food purchase stage. For the first research hypothesis on whether the frequency with which respondents buy groceries affects the frequency with which food is thrown away based on our analysis is accepted. The literature findings are contradictory. A previous study by Ananda et al. (2021) which found that consumers who shop less than once a week have less food waste. However, the study by Di Talia et al. (2019) reported that consumers who shopped less frequently increased the tendency to generate household food waste because they lead to buying the stock of products that are not needed at that time and may not be consumed.

The second research hypothesis concerns whether participants who use shopping lists more often have less food waste. The results show that this hypothesis cannot be confirmed and

was rejected. Evans (2011), found that families using shopping lists tend to buy the same foods on a weekly basis, store produce, and ignore old food. Moreover, Pearson & Perera, (2018) cited that the shopping list will only be effective if customers have high self-regulation and control by ensuring that they do not deviate from the list or make impulsive and unnecessary purchases.

The third research hypothesis concerns whether participants who purchase food under a meal plan have less food waste. The results of the hypothesis testing show that this hypothesis is rejected and is not consistent with the research of Gustavsson et al. (2011), Stefan et al. (2013), Quested et al. (2013) and Parizeau et al. (2015), which suggests that purchasing food within a meal plan helps to reduce food waste, as individuals who plan their weekly menu are less likely to make excessive purchases, as per the studies of Chandon & Wansink (2006) and Quested et al. (2013). According to Van Geffen et al. (2019), planning the shopping list and the amount of food a consumer will need can avoid overbuying and over-cooking, but only when the consumer accurately estimates how much is required. Accurate meal planning is complex, as it involves integrating many different factors, such as who will be joining the meals, what serving sizes are suitable, what products will be eaten, what foods are in storage, and what is the current shelf-life status of the food. As per Pearson & Perera (2018), since consumers are easily affected during shopping, supermarkets often have discounts for bulk product purchases, leading to unplanned food purchases.

The fourth research hypothesis concerns participants who follow plant-based diets and whether they have less food waste. The results of the statistical analysis rejected the hypothesis. Kim et al. (2019) found that being vegetarian means less food waste while in other studies of Frederiks et al. (2015), Cecere et al. (2014) and McCarthy & Liu (2017), there were no significant differences between vegetarians and non-vegetarians were reported.

The fifth research hypothesis relates to whether respondents who buy supermarket offers also have more frequent food waste. The hypothesis after statistical analysis was rejected. Van Lin et al. (2023) found that households that purchased with multiple offers wasted less than households that bought at regular prices. On the other hand, Graham-Rowe et al. (2014), Ponis et al. (2017), Pearson & Perera (2018) and Liao et al. (2022) suggest that the purchase of food offers increases the food waste in household.

The sixth research hypothesis states that participants who better understand date marking on food products have less food waste. This hypothesis was accepted after the statistical analysis and conforms with the research of Wansink & Wright, (2006) Aschemann-Witzel et al. (2015) and Wilson et al. (2017) in which it is confirmed that better understanding of markings on food can prevent food that can still be safely consumed from being discarded.

The seventh research hypothesis states that respondents who buy environmentally friendly products waste less often. This hypothesis was accepted after hypotheses testing and is consistent with the research of Visschers et al. (2016), Schmidt (2016), Melbye et al. (2016) and Kim et al. (2019) in the literature that environmental awareness of consumers positively influences attitudes toward waste reduction. On the other hand, McCarthy & Liu (2017) argue that there is no significant difference in waste between environmentally aware consumers and consumers not concerned with environmental issues when shopping.

The eighth research hypothesis that participants who eat out or order in food have more frequent food waste was accepted after hypotheses testing. The eighth hypothesis is also consistent with the research literature. Evans (2011) suggests that consumers with modern lifestyles and careers are settling for unplanned but convenient last-minute options such as eating out, ordering takeaway, or home delivery. Such a practice leads to food waste as it ignores shopping that has already been planned and purchased as per the research of Graham-Rowe et al. (2014), Graham-Rowe et al. (2015), Schmidt (2016) and Gaiani et al. (2018).

The ninth hypothesis, which states that environmentally aware respondents tend to take restaurant leftovers home more often after hypothesis testing, was rejected. The rejection of this hypothesis is inconsistent with research by Hamerman et al. (2017), which argues that consumers' greater concern for the environment increases their willingness to take home leftovers.

4.2.2 Discussions about consumer attitudes and behaviours at the stage of food consumption and food management

The second group of research hypotheses concerns the attitudes and behaviors of respondents at the food consumption and management stage. The first research hypothesis in this group

reports that participants who store leftovers tend to waste food less often than other participants. This hypothesis was accepted and is consistent with our research literature. According to Stefan et al. (2013) and Stancu et al. (2016), reusing leftovers seems to be one of the best practices for avoiding food waste within the household. People who regularly eat leftovers produce less food waste. However, Evans (2012) argues that consumers often throw away leftovers, that are forgotten in refrigerators.

The second research hypothesis states that respondents who place food nearing its expiration date in the front of their refrigerator or pantry are less likely to create food waste. The hypothesis after the hypothesis testing was accepted and consistent with the literature. Farr-Wharton et al. (2014) found that household food preservation practices are a critical factor in food waste generation. As per the same research, finding space in the refrigerator and freezer and not having visibility of the stored food results in the creation of food waste.

The third hypothesis states that participants who pre-wash or prepare their food in advance for cooking or immediate consumption waste food less often. After testing the hypotheses, this hypothesis was accepted. According to Cox & Downing (2007), Van Geffen et al. (2016) and Principato et al. (2018), food waste can be reduced by improving food preparation skills. In addition, the Hellenic Food Bank (2021) advises reducing food waste by washing and preparing ingredients before placing them in the refrigerator to ensure faster consumption.

The fourth research hypothesis states that participants, who use their freezer to store leftovers waste food less often. After testing the hypotheses, the research hypothesis was accepted and conformed with the researches of Koivupuro et al. (2012), Stefan et al. (2013), and Graham-Rowe et al. (2014), according to which using the freezer to preserve food and leftover meals reduces the likelihood of food waste.

The fifth research hypothesis states that participants who use cooking methods to reuse leftover food produce food waste less frequently. The hypothesis was accepted after hypothesis testing and is consistent with the researches of Lyndhurst (2007), Evans, (2011) and Williams et al. (2012), which support that food waste can also be reduced by improving one's ability to turn leftovers into new meals

The sixth research hypothesis states that participants sharing food with others have less food waste. The research hypothesis after hypothesis testing was accepted and is in line with the literature. Misiak et al. (2021) suggests preventing food waste through sharing food with others.

4.2.3 Discussions about consumer attitudes and behaviours toward food waste

The first research hypothesis states that participants who are likely to throw away suboptimal food tend to waste food more often. After testing the hypotheses, the research hypothesis was accepted and is consistent with the studies of Quested et al. (2013), Aschemann-Witzel et al, (2015), Block et al, (2016), De Hooge et al. (2017), Wilson et al. (2017) and Aschemann-Witzel (2018) that suggest, that a significant amount of food waste which could have been avoided comes from the misconception that a suboptimal food is not as fresh and edible as a corresponding optimal food. However, the studies of Grewal et al. (2018) and Hingston & Noseworthy (2020) supported that consumers tend to correspond much better to visual imperfections given certain conditions. Helmert et al. (2017) found that the preference for fruits and vegetables of divergent size or shape has been associated with the location of the decision as some customers were more willing to choose a suboptimal food at home than in a supermarket. Moreover, Helmert et al. (2017) suggests that the preference for fruits and vegetable has also, been associated with the design of price signs and also with the personal characteristics of customers according to the studies of De Hooge et al. (2017), Symmank et al. (2018), Aschemann-Witzel et al. (2019) and Gracia & Gómez (2020).

The second research hypothesis states that participants who are likely to throw away food or a meal that is not tasty are more likely to waste food than other participants. This hypothesis was accepted after hypothesis testing and is consistent with the research literature. Aschemann-Witzel et al. (2015) found that a significant portion of food waste comes from individual preferences and tastes, especially perceptions of edibility. According to Porpino et al. (2016) and Watson & Meah, (2012) due to these individual's preferences, households have to buy more food to satisfy all household members.

The third research hypothesis states that participants who put excessive portions of food on their plate throw food away more often than other participants. After testing the hypotheses, the third research hypothesis was accepted and is consistent with the research literature. Porpino et al. (2016) suggest that food waste occurs during the consumption phase when people leave food leftovers on plates that are not finished later.

The fourth research hypothesis states that participants who buy large quantities of food have more frequent food waste. After testing the hypotheses, this hypothesis was accepted and is consistent with the researches of Park et al. (2012), Ponis et al. (2017), Pearson & Perera (2018), Lahath et al. (2021) and Liao et al. (2022).

4.2.4 Discussions about consumer attitudes and behaviors toward sustainability awareness

The first research hypothesis suggests that participants concerned about the environment and sustainability have less frequent food waste, and it was accepted after hypotheses testing. This hypothesis contradicts the researches of Cecere et al. (2014), Frederiks et al. (2015) and McCarthy & Liu (2017), Visschers et al. (2016), Schmidt (2016), Melbye et al. (2016) and Kim et al. (2019), which argue that consumers interested in sustainability issues contribute positively to their willingness to reduce food waste.

The second research hypothesis states that food insecure participants are less likely to produce food waste, and it was accepted after hypotheses testing. This result is consistent with the researches of Baker et al. (2009), Stancu et al. (2016), Ilakovac et al. (2020) and Kubíčková et al. (2021)

4.2.5 Discussions about consumer demographic characteristics of the participants and their food waste

The first research hypothesis states that respondents' gender influences the frequency with which they throw away food waste. After testing the hypotheses, the hypothesis was rejected. The literature gives contradictory findings. In particular, the survey results conducted by Visschers et al. (2016) found that female respondents threw away more food than male

respondents. The vital role of gender in food waste is also demonstrated in the survey conducted by Koivupuro et al. (2012), which found that the amount of food waste was significantly higher in households where women were predominantly responsible for purchasing food. However, Secondi et al. (2015) reported that men wasted more than women.

The second research hypothesis states that younger respondents produce food waste more often. The research hypothesis was accepted after hypothesis testing and is consistent with the research literature. Specifically, according to Parfitt et al. (2010) and Richter & Bokelmann (2017), a factor of food waste is the age of household members, younger family members waste more than older family members. In addition, Stancu et al. (2016), Ilakovac et al. (2020) and Przezbórska-Skobiej & Wiza (2021), Cox & Downing (2007), Koivupuro et al. (2012) and Quested & Johnson (2009), this happens since younger consumers are more wasteful than older consumers. According to Hebrok & Boks (2017), younger consumers give more importance to the taste of food in contrast to older consumers, who consider the health and economic value of food more important.

The third research hypothesis states that families with children waste food more often than families without children. After hypotheses testing, the hypothesis was accepted and is consistent with the research literature. In particular, according to Parfitt et al. (2010), families with children tend to waste more than families without children. According to Jörissen et al. (2015), this is due to children's preferences. In addition, according to Cox & Downing (2007) and Parizeau et al. (2015), households with children tend to produce more food waste to accommodate the unpredictable nature of family members' food preferences. Regarding children's behaviour, Evans (2011) and Visschers et al. (2016) reported that parents face difficulties estimating the portions that younger children would eat, as their appetites and food preferences often vary, leading to poor portion management. As per Campbell et al. (2007) and Chen et al. (2021), parents make excessive purchases, have more frequent supplementary shopping in response to children's impulsive purchase requests, or allocate food just in case. Moreover, research of Graham-Rowe et al. (2014) has shown that some parents often overspend on dinner for children to discourage the consumption of unhealthy snacks, which could lead to more significant food waste . Another reason for children's food waste may be related to older children deciding at the last minute to eat out and wasting food prepared at home, as Visschers et al. (2016) reported.

The fourth research hypothesis states that respondents' personal annual income affects the frequency with which they throw away food waste. After testing the hypotheses, this hypothesis was rejected. Our research literature seems contradictory, as while Baker et al. (2009), Stancu et al. (2016) and Ilakovac et al. (2020), suggest that ed that consumers with lower income usually have more food waste. One the other hand, Koivupuro et al., (2012) found that low-income and price-conscious consumers are less likely to waste food due to budget constraints and financial reasons. However, the relationship between income and food waste is complex. Setti et al. (2016) found that middle and low-income consumers buy larger quantities of lower-quality food and waste more food. Moreover, according to Parfitt et al. (2010), consumers with higher incomes often have diversified diets for which they increase demand for non-seasonal and non-local produce. Through these eating habits, Gustavsson et al. (2011) and Stefan, et al. (2013) stated that high-income consumers have high rates of food waste. Therefore, there is no consensus on the effect of household income on food waste.

4.2.6 Discussions about most frequent types of food waste

The results of the descriptive analysis show that fruits and vegetables are the food category most frequently thrown away by respondents. The second most frequently thrown-away food category is dairy products, the third is bakery products and farinaceous (confectionery and pastries). The fourth category is vegetable and animal oils and fats, the fifth is poultry, meat and their by-products, the sixth is starch products (cereals, rice, pulses, pasta, etc.), and the seventh is fish and seafood. These results are consistent with the research of Parfitt et al. (2010), Buzby & Hyman (2012), Fernqvist & Ekelund (2014) and Conrad (2020) fruits, vegetables and dairy products are most often diverted to food waste. However, in several studies, perishables included meat and seafood, which in our study were in the categories with the least frequent food waste. Our survey results are probably also due to the respondents' diets. 271 (58%) respondents answered that they follow a Mediterranean or non-vegetarian diet. According to Lăcătușu et al. (2019), the Mediterranean diet is a plant-enriched diet that uses fruits, grains, vegetables, fruits, nuts, and legumes, most of them cooked with the addition of significant amount of extra virgin olive oil, with modest use of seafood or dairy products and limited meat and alcohol consumption. Moreover, according to a study of IELKA (2021), Greek consumers waste less meat and fish products due to the higher value/kg of the products.

4.3 Conclusions

The main objective of our research is to investigate consumers' attitudes and behaviour toward food waste. Our descriptive analysis found that the average participant goes twice a week for grocery shopping, shops frequently with a shopping list, and does not follow a diet plan based on which they shop. In addition, the average respondent follows a flexitarian diet, i.e., a vegetarian diet in which meat is occasionally consumed, as per the studies of Rosenfeld (2018) and Rosenfeld et al. (2020). In other words, a diet quite close to the Mediterranean diet. Furthermore, the average respondent often shops for food based on store offers notices the expiry date of products, and knows that the phrase "use by" on a food label refers to the safety of the food, while, the phrase "best before" refers to the taste and texture of the food, but it is still safe to eat. Furthermore, the average respondent is likely to buy environmentally friendly products than other products of the same type, sometimes eats out or orders in and sometimes when in a restaurant asks the waiter to pack the leftover meal.

Furthermore, at the food consumption and management stage, the average respondent often stores leftover food, often puts the food that is approaching its expiry date in the front of the fridge or cupboard and sometimes washes or prepares food in advance so that it is ready for cooking or immediate consumption. Further, the average respondent sometimes uses the freezer to preserve leftover food and meals. When fruits and vegetables are about to spoil, the average participant rarely find alternative ways to consume them. In addition, the average respondent sometimes shares leftover food with people outside his household.

In the food waste stage, the average participant sometimes throws away edible. They also often throw away fruits, vegetables and sometimes dairy and bakery products. They rarely throw away vegetable and animal oils and fats, meat, and poultry, starchy products, and seafood. In addition, the average participant is unlikely to throw away food because of its suboptimal appearance, because of the large amount of food they put on their plate, or because of buying a large quantity of food. In addition, it is neither likely nor unlikely that for the average participant to throw away food because it does not have the same texture as when originally purchased, has wilted, or is not tasty.

In the questions on sustainable consciousness, the average respondent answered that they often recycles them waste, agrees with the phrase "I am interested in issues related to the

sustainability of the planet,". Moreover, the average participant is neither agreeing nor disagreeing with the phrase "I am concerned about the availability of my food."

Given the above, the state could implement measures to better inform citizens about sustainability issues and the impact of food waste on the environment and society. It should include measures to prevent waste production, with a focus on families with children and young people, who, according to the results of the research hypotheses, are the groups of people who produce food waste most frequently. This information could be provided to citizens and children through campaigns by municipalities and schools. Campaigns could include food management classes, what temperatures to keep food at, where in the pantry or fridge to put food, how to freeze food and leftover meals, and how to extend the shelf life of the most perishable foods, such as fruits and vegetables, meats and dairy products. In addition, campaigns could include workshops with cooking classes using recipes from leftover meals. Moreover, in cooperation with NGOs, the state can promote the redistribution by households of surplus food and meals that are still safe for consumption. Laws could also be enacted to provide households that share their food with some kind of reward from the state, such as a tax reduction or a state subsidy that would encourage promoting this practice.

4.4 Proposal for further future research

According to Papamonioudis & Zabaniotou (2022), Greece has the highest annual per capita food waste produced in Europe, an issue the government and society should be aware of. The survey we conducted could be applied at the country level by distributing the questionnaire to a justified sample that matches the distribution of the population of all municipalities in Greece. A larger sample size would allow for a more extensive survey that would provide valuable results on the attitudes and behaviors of Greek consumers toward food waste.

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