Plan, Prepare and Practice –

Developing a Handbook on

Sustainable Food Waste Management

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Abstract

Claire Agius

Household food waste is a significant problem that contributes to environmental, economic, and societal issues. According to the National Statistics Office (NSO), in 2017, 22%, or nearly a quarter, of the food bought in Malta ended up being wasted or thrown away. This dissertation aims to provide an overview of the causes and impacts of household food waste in Malta through a review of existing literature and exploratory baseline study. Using Bronfenbrenner's socio-ecological theory, developed in 1979, the dissertation examines the microsystem influences on household food waste behaviour, with their potential positive, negative, and trans-generational impacts. Data was collected anonymously from 52 adults who were the main household food managers, to identify the perceptions, challenges experienced, and practises implemented by Maltese households regarding food waste management. The results showed that a lack of awareness and knowledge about food waste was a significant issue, with many surveyees not fully understanding the negative impact of their behaviour on the environment and society. The key findings were analysed and used to inform the development and design of an original educational handbook to help households improve their food waste management practices. The handbook adopts a motivational tone and is divided into various chapters where practical guidance on food shopping, storage, preservation, and maximisation, as well as meal planning and seasonal recipes are provided. The book adheres to basic principles of andragogy since the target audience is adults. The approach is learner-centred, as the book content and features were chosen with the target audience in mind, considering their specific needs and interests. Active learning is promoted through the inclusion of reflective questions to engage users and promote critical thinking. In line with national policy and Home Economics goals, this dissertation and Handbook seek to contribute to the development of sustainable solutions to address household food waste in Malta.

Keywords:

Food Waste Management, Sustainable Practices, Household Experiences, Handbook Development, Adult Readers, Food Waste Education

Dedication

To my beloved mother. Her love, encouragement, and sacrifices have shaped me into the person I am today.

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To my family, I express my deepest gratitude for their love, encouragement, and understanding. Their constant support and belief in me have been a driving force behind my academic pursuits, and I am immensely grateful for their sacrifices and patience.

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Acronyms

CO2: Carbon Dioxide

EU: European Union

FAO: Food and Agriculture Organisation

FSC: Food Supply Chain

SDG: Sustainable Development Goals

UK: United Kingdom

UN: United Nations

UNEP: United Nations Environmental Programme

US: United States

WFP: World Food Programme

WHO: World Health Organisation

WRAP: Waste and Resources Action Programme

Accompanying Material

Educational Handbook – Sustainable Food Waste Management

Throwing away food is like stealing from the table of those who are poor and hungry.

- *Pope Francis*

Chapter 1

Introduction

1.0 Introduction

A healthy, balanced diet is one of every individual's fundamental human rights (United Nations Human Rights, 2019). Consuming various foods is crucial to acquiring the necessary nutrients for our bodies to function and perform daily activities efficiently (Clark, 1998). Unfortunately, according to the World Food Programme's latest report (2022), an estimated 690 million people worldwide will experience food insecurity and go to bed hungry each day, thus making a solution to this issue a collective responsibility.

In relation to ecological and sociological issues, such as climate change and global food availability, food waste has garnered significant attention in recent decades, particularly as food insecurity and hunger rates continue to rise (Parfitt, Barthel & Macnaughton, 2015). The world faces the challenge of having to increase global food production by 60% by 2050 to accommodate the growing population (FAO, 2013). Shockingly, in 2011, approximately one-third of all food produced for human consumption was lost or wasted, amounting to a staggering 1.3 billion tonnes annually (Gustavsson & Cederberg, 2011). This amount of food waste was projected to be enough to feed approximately nine billion people by 2050 (Parfitt, Barthel & McNaughton, 2015). Notably, Malta alone generated about 33,213 tonnes of animal and mixed food waste in 2020 (European Environment Agency, 2021). As of 2022, global food waste had reached an alarming 40% (Pearson & Cappa, 2022).

Of the tonnes of food wasted annually, a large proportion is perfectly edible and nutritious (Food Print, 2018). Sadly, food waste occurs at all stages of the food supply chain, from harvesting crops, fishing boats, processing, distribution, stores, restaurants, and even at home (Food Print, 2018). In Europe, private households have

been named a critical element in food waste production, as 53% of food waste is generated in the home (Racz, Marchesi & Crnković, 2018). Unfortunately, the problem does not end there, as more than 95% of wasted food ends up in landfills (Gustavsson & Cederberg, 2011), where methane, carbon dioxide and other greenhouse gases are emitted, causing more concerns about global warming and climate change (Melikoglu, Lin & Webb, 2013). Notably, a global survey by Oxfam in 2012 highlighted that individuals want to know what modifications they can make when purchasing, storing, and preparing food to minimise their impact on the environment and end world hunger.

1.1 What exactly is Food Waste?

There are various definitions of "Food Waste" in the literature. According to the United Nations Environment Programme (UNEP), it refers to unconsumed food that has gone through the entire food chain but is not consumed by consumers due to spoilage, expiration, or disposal (Zellner et al., (2014). On the other hand, the Food and Agricultural Organisation (FAO, 2013), defines food waste as the disposal of edible food products at the retail and consumer stages, mainly in developed nations.

Different countries and cultures may analyse the term "food waste" from different perspectives. What is considered waste in an area may not be to others. For instance, in certain countries, by-products of animals like organs and intestines may be considered waste, while in others, they are not (Gjerris & Gaiani, 2013).

A recent study conducted in Malta by Attard in 2016 identified that individuals lack the information, skills, and experience to employ sense perception to establish a dish's safe edibility. They fear food poisoning and discard food that has expired or lost its freshness. Also, there might be an element of disgust. While most think that taste is

an essential sense for food, the flavour comes after the other senses (Zellner et al., (2014). Appearance and smell play a crucial role in food consumption. If there is an element of disgust, one will not be encouraged to consume the food and will therefore opt to throw it out (Zellner et al., (2014).

Food waste is also defined as any food that is not consumed and is instead repurposed as animal feed, composted, or disposed of in landfills, resulting in the loss of a valuable resource that necessitated the use of other resources (Gjerris & Gaiani, 2013).

1.2 Where does food waste happen?

Food waste occurs throughout the entirety of the food supply chain in all nations, as reported by the FAO in 2013. According to SPORE (2019), the retail and consumer levels account for over 40% of food waste in developed countries, while in developing countries, the post-harvest and processing stages account for 40% of food waste.

In other words, wastage and loss of food in developed nations occur predominantly during the latter phases of the supply chain (Himmelheber, 2013). Thus, in contrast to developing nations, consumer behaviour is of paramount importance. The European Parliament asserted in 2017 that households have a considerate impact on the issue of food waste. According to their estimates, households, restaurants, food services, retail, and distribution account for 84% of all food waste in the EU (European Parliament, 2017). Each year, households in Malta produce 135 kilograms of food waste (Caldeira et al., 2019). Unfortunately, fresh produce like fruit and vegetables accounts for the most significant loss at the consumer level. In the US, it is estimated that restaurants waste approximately 22 to 33 billion pounds of food each year (Gunders & Bloom, 2017). A significant portion, ranging from 4% to 10% of the food purchased by restaurants, ends up being lost or wasted before it is consumed by the

customers it was intended for. Himmelheber (2013) identifies several factors contributing to this problem in the restaurant industry, including the prevalence of oversized portions, strict management practices in chain stores, and a wide variety of menu options.

1.3 Sustainable Development Goals

In 2015, the United Nations introduced the Sustainable Development Goals (SDGs), the "Global Goals." These goals aim to protect the environment, eradicate poverty, and promote peace and prosperity for all by 2030 (UNDP, 2020). One specific goal, SDG 12, as stated by Hagedorn and Wilts (2019), targets a 50% reduction in global food waste per capita by 2030. This includes minimising food losses throughout the production and supply chains, including post-harvest losses, at the retail and consumer levels. To achieve this goal, developing policies that encourage widespread implementation of specific practices across the food supply chain is required (UNDP, 2020).

The WHO (2022) reports that a significant part of the global population still faces inadequate access to sufficient food to meet their basic needs. Therefore, reducing food waste per capita globally, particularly at the consumer and merchant levels, is essential to improving the efficiency of supply and production chains. The United Nations Development Programme (UNDP, 2020) states that this reduction has the potential to optimise resource utilisation in our economy and enhance food security.

1.4 Aims of the Study

1.4.1 Food Safety versus Food Waste

Different logical arguments can make us think twice about throwing food out, whether due to worries about the environment, household finances, or a moral need to be frugal

and prevent waste. Additionally, worries about possible food safety emerge, whether as a result of well-founded fears regarding Salmonella or E. coli or because it is difficult to find space in the fridge and a recipe for safely using up leftovers (Watson & Maeh, 2012).

The above-mentioned study highlights two differing perspectives on food waste. One point of view depicts an individual's need to prevent food waste, while the other expresses concern regarding food safety. While both arguments have their merits, this project-based dissertation will aim to provide household users mainly in charge of food shopping/food provision/food storage, and menu planning with the knowledge and skills to form a balance between appropriate food safety techniques, including adequate food storage conditions and adherence to 'use by' guidelines, and left-over food management, such as through innovative recipes and alternative uses, as well as multiple preservation strategies to take advantage of retail offers and food gluts.

1.4.2 Appearance of Food

Naturally, human beings tend to be attracted to visually pleasing stimuli (Zellner et al., 2011). Hutchings (2011) highlights that the appearance of a meal is one of the factors influencing an individual's appetite. We can hence postulate that an aesthetically pleasing dish is far less likely to result in an overall waste of food. Hence, to minimise the volume of food waste based solely on visual appeal, this study will aim to convey basic food plating techniques that are more likely to entice an individual to finish their meal. Additionally, the food storage practises mentioned previously will be crucial in preserving and prolonging the visual appeal of a food product.

1.4.3 Recipe Innovation

Two daily factors that contribute to substantial food waste in the household are a lack of imagination in repurposing leftover food products and a lack of time to execute such a recipe. Koppel et al. (2016) highlight that the struggle to balance work, family, and extracurricular activities makes life increasingly hectic, leaving little time to consider and prepare how you will disseminate the food. Food waste may result from this factor. In addition, it is important to have a basic understanding of how to create something new from leftover food.

Considering these factors, this study will aim to gather data on current food waste related perceptions, experiences and practices via an anonymous study and the utilise the key findings to design an educational, motivational handbook that addresses these issues. It will consist of awareness raising information, practical food acquisition, storage and preservation tips, together with traditional and innovative recipes to encourage users with a limited period to try them out with fresh or leftover ingredients. It will also include hints and tips on how to make recipes healthier and other food presentation ideas.

1.4 Research Questions

This study aims to address the following research questions.

- What are common perceptions, challenges and good practises in Maltese households with respect to food waste reduction?
- What information and practical tips would adults who are the main food managers in their household find useful in an educational handbook on sustainable food waste management?

1.5 Objectives

To answer the Research questions, the following set of objectives and related methodology were devised.

I. An anonymous survey will be conducted in Maltese and English. This will be used to help determine how food waste occurs inside the household and why, and how much knowledge and competency there is related to food waste and its prevention. The target audience participating in this survey will be those in charge of food shopping, food provision, food storage, and menu planning in the household.

II. The data from the survey will be properly analysed and used to develop the sections, content, and design of an educational and motivational handbook, based on andragogy and active learning principles, with the purpose of helping households minimise food waste.

1.6 Development of the study

This project-based dissertation report is divided in six chapters. The upcoming chapter will provide an overview of the literature on household food waste, comparing local and foreign sources to identify knowledge gaps and related practices, interventions, and policies. Chapter 3 will focus on the research methodology, highlighting the chosen approach for the exploratory survey. Chapter 4 will analyse and discuss the results of the survey, offering insights into the current state of household food waste. In Chapter 5, the development and implementation of the educational handbook will be described. Finally, the dissertation will conclude with the last chapter summarising key findings and providing recommendations for future research and initiatives to

address household food waste in Malta. The main Appendix will be the original Handbook produced as the major component of this project-based study.

Chapter 2

Literature Review

2.0 Introduction

To elucidate the topic of food waste as thoroughly as possible, this research draws on various disciplines, primarily behaviourism, biology, and social perspectives relating to food choice and household consumption.

2.1 Types of food waste and where they occur

According to Graham-Rowe, Jessop, and Sparks (2015), households are responsible for a larger proportion (61%) of food waste compared to food services (26%). Stenmarck, Jensen, Quested, and Moates (2016) found that the EU generates approximately 88 million metric tonnes of food waste each year, costing 143 billion euros. ReFED (2021) reports that households in the US discard a total of 76 billion pounds of food annually. The UN Environment (2014) highlights that fruits and vegetables, roots, and tubers are the types of food that contribute the most to food waste.

Several factors contribute to household food waste, with food spoilage being identified as the main cause (Raak et al., 2017). The study also reveals that about 66% of household food waste is due to delayed consumption. Kiely (2017) explains that inadequate storage, limited access to refrigeration, using partially consumed ingredients, and inaccurate estimation of food needs can lead to food spoilage at home. Excessive food preparation is another factor, where larger amounts of food are cooked or served, exceeding the consumption capacity. Over time, the trend of preparing larger dinners has become common. Additionally, many people discard leftovers due to forgetfulness or a lack of knowledge on how to repurpose them (Gunders & Bloom, 2017).

Statistical estimates indicate that a significant portion (around 80%) of the American population discards food prematurely because they do not fully understand the meaning of date labels like "use by" and "best before" (Food Waste in America in 2021: Statistics and Facts, 2022). A study conducted in the UK on date labelling found that clarifying and improving the understanding of these labels could reduce household food waste by up to 20% (WRAP, 2017).

Consumers are often tempted by sales and food marketing strategies that encourage impulsive and large-scale food purchases at retail stores, as noted by Gunders and Bloom (2017). It is common for people to buy items that do not align with their usual dietary habits, resulting in excess food that ends up spoiling before it can be consumed. Inadequate planning is a major contributor to food waste. Without proper meal planning and shopping lists, consumers often underestimate or miscalculate the types and quantities of ingredients they will need throughout the week. According to Ringland (2022), buying more of a product than necessary can lead to food spoilage before it can be used.

2.2 Bronfenbrenner's Ecological Systems Theory Applied to Food Waste

Bronfenbrenner's Ecological Systems Theory (1979) could be a useful framework to understand different factors linked to food waste management. Bronfenbrenner's theory suggests that individuals can influence behaviour positively and negatively through reciprocal interactions between individuals and the four elements of their environment that he identified – Microsystem, Mesosystem, Exosystem and Macrosystem, as depicted in Figure 1 (Boulet et al., 2021). Figure 1 also proposes some of the key factors related to household food waste as they would likely feature in Bronfenbrenner's different levels of the environment.

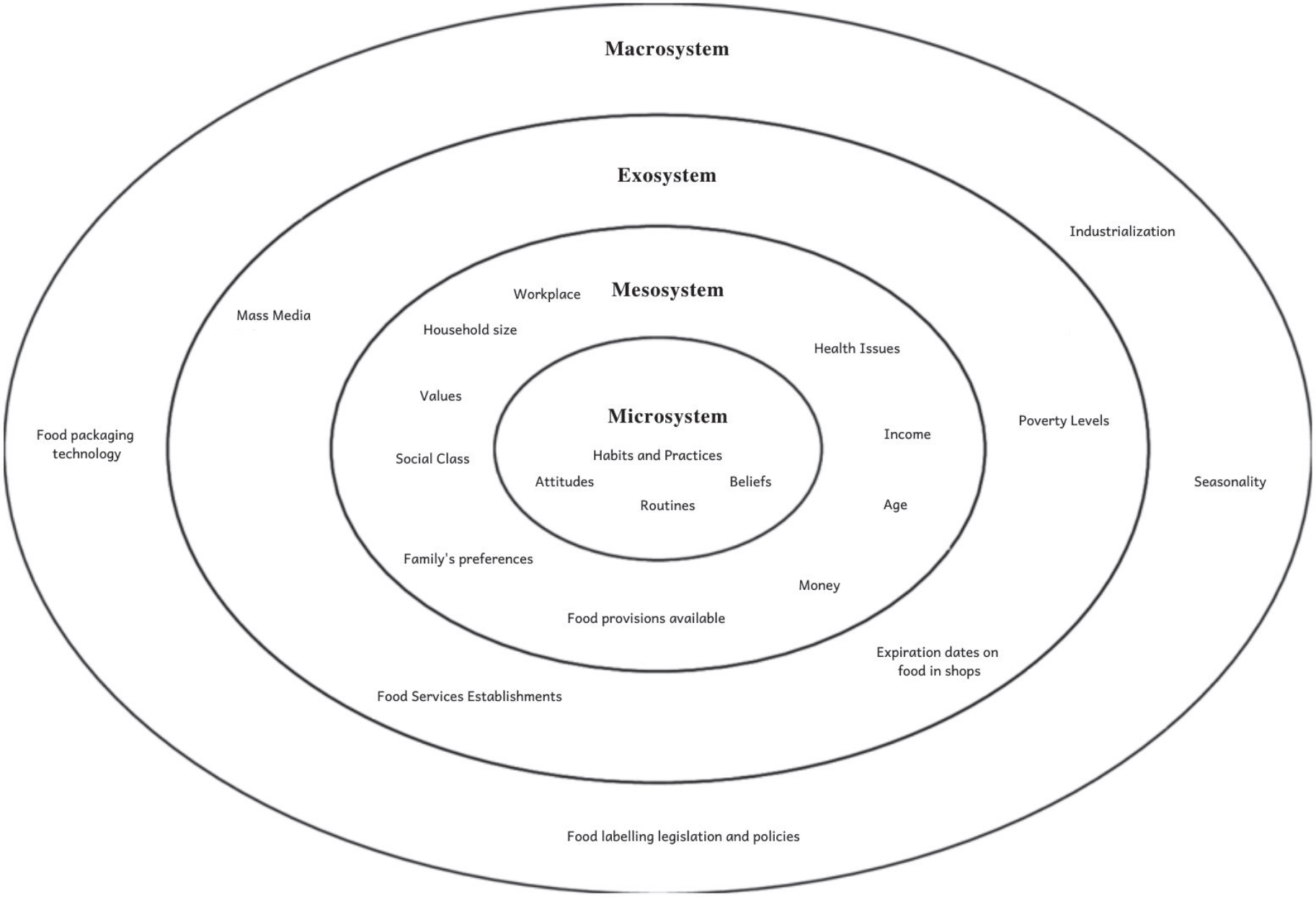


Figure 1: A Rudimentary Application of Bronfenbrenner's Ecological Theory to Food Waste

According to Bronfenbrenner's ecological systems theory, humans and their behaviour are influenced by numerous systems, including the microsystem, which includes a person's immediate environment and interactions with others. The family's meal preparation, grocery shopping, and food storage behaviours could be considered a food waste microsystem. If a family does not plan their meals, they may buy more than they can eat, wasting food. Another food waste microsystem is the family's food values, such as frugality and resource conservation. Composting food scraps and reusing leftovers may reduce food waste (Robinson, 2018).

Bronfenbrenner's ecological systems theory defines the mesosystem as a microsystem interaction with other levels of the environment. It refers to an individual's relationships with their diverse environments (Boulet et al., 2021). Food waste mesosystems go beyond residential microsystems to local communities. Neighbourhoods and towns or villages practising sustainable living, such as composting, may have greater resources and help reduce domestic food waste. The home microsystem interacting with the family members' workplace is another food waste-related mesosystem. Employees may waste less food at home if a company provides healthy, affordable lunches or the facilities to store and heat packed foods/meals brought from home (Peng et al., 2018).

The exosystem, according to Bronfenbrenner's ecological systems theory, is the level of interactions and settings in which a person does not directly engage but is still influenced by them (Boulet et al., 2021). Food waste exosystems include government and food industry laws. For example, food labelling and expiration date laws may improve food safety perceptions and reduce household food waste (Carrus et al., 2019). The economic conditions in a region or country, such as high unemployment or

poverty, may cause households to have unsuitable equipment to store food appropriately, increasing food waste (Robinson, 2018).

Finally, Bronfenbrenner's ecological systems theory defines the macrosystem as cultural and societal values, beliefs, and conventions that influence the other systems. Food waste macrosystems include cultural food consumption norms. In some cultures, wasting food is insulting, but in others, it is a symbol of wealth (Boulet et al., 2021). Social media platforms have become powerful tools for disseminating information and shaping social norms. These platforms can be utilised to raise awareness about food waste and engage individuals in discussions and activities related to reducing waste. Social media influencers, organisations, and campaigns can share tips, recipes, and creative ideas for utilising leftovers, reducing portion sizes, and minimising food waste at various stages of the food system (Carrus et al., 2019).

Another food waste macrosystem is the larger natural, social and economic processes that affect food production and distribution. Appreciation and maximisation of food seasonality by consumers could lead to less food waste (Carrus et al., 2019); whereas modern agriculture and technology and the global food trade can lead to overproduction and food waste (Peng et al., 2018).

Furthermore, innovative packaging designs can enhance portion control, allowing consumers to purchase and use only the amount of food they need, thereby reducing the likelihood of excess food ending up as waste. Clear and informative labelling on packaging can also contribute to reducing food waste by providing consumers with accurate information about storage guidelines, expiration dates, and proper usage instructions (Boulet et al., 2021).

2.2.1 How lifestyle impacts the amount of food waste

Lifestyle changes occupy a crucial role in food waste, especially with the culture of consumerism and an increase in the availability of convenience foods (von Massow et al., 2019). Households' cooking practises and food preferences have all changed significantly over time, even in Malta, which also has repercussions on how emotionally connected people are to food (Caruana et al., (2018).

Many people discard food without hesitation since it has no emotional meaning to them Ringland (2022). They are too detached from the food producers for the food to have a significant ‘human identity’ link.

In other cases, people may not always pay close attention to the ingredients in food and may not know enough about the meal's origin at the time of purchase. These features may emerge as offensive to them and their culture, leading to food waste (Raak, et al., 2017).

In a survey conducted among Maltese adults by Attard in 2016, busy lifestyles were highlighted by only about one-tenth (8.8%) of survey respondents as a deterrent to waste reduction. However, according to specific focus group comments, individuals said that leading hectic lives made it difficult to think clearly and act in ways that would reduce food waste. They replied that there was little time to think of creative ways to prepare leftovers for later meals. As a result, individuals frequently put off and substitute the cooking of fresh meals. When leftovers were kept in the refrigerator for an extended period, this eventually led to waste (Attard, 2016). A report from the UK has suggested that a demanding lifestyle can hinder individuals from participating in activities aimed at minimising food waste, thereby serving as an indirect contributor to

the issue. Adopting active lifestyles poses greater difficulty in preparing and utilising shopping lists, managing leftovers, and properly portioning food (WRAP, 2017).

2.2.2 The Main Nutritional Gatekeeper

Parizeau, von Massow, and Martin (2015) found a link between consumer attitudes, behaviours, beliefs, and food waste. The study revealed that consumers who frequently seek out deals often have lower incomes and are more attentive and discerning when grocery shopping. However, buying reduced-price items has also been associated with impulsive buying tendencies, leading to higher levels of food waste in households (Giordano et al., 2018).

According to von Massow et al. (2019), adopting smart strategies for utilising leftovers is beneficial for both saving money and reducing the environmental impact. Shapiro, a nutrition professional, points out that a common mistake individuals make with leftovers is leaving them unrefrigerated for too long. It is recommended not to keep leftovers at room temperature for more than two hours to prevent bacterial growth, a significant cause of foodborne illnesses (Shapiro, as cited in Manning-Schaffel, 2019).

According to Murad, a wellness dietitian (cited in Manning-Schaffel, 2019), common ways to ruin leftover food include:

- Not labelling and date them before putting them in the fridge.
- Not remembering how long the item has been in the refrigerator.
- Not having a purpose for them and not cleaning the refrigerator daily.

2.2.3 Day-to-day diets

A study in Sri Lanka analysed that convenience food has become more popular, particularly among university students and those who lead hectic lives (Jayasinghe & De Silva, 2014). Another study highlights that individuals who spend most of their time away from home tend to prioritise convenience and accessibility (Lusk & Ellison, 2016). As previously mentioned, lifestyle impacts the amount of food wasted. Most supermarkets keep open for an extended period to cater to all individuals. In turn, individuals are free to do their shopping anytime they please. Opening times are flexible, so one can go and shop after running some errands or go for an impromptu visit. Food waste is the result of buying excess food without proper planning, as seen in Figure 2. Thus, one should be careful and only buy what is needed, as extra food can quickly go to waste (Evans, 2011).

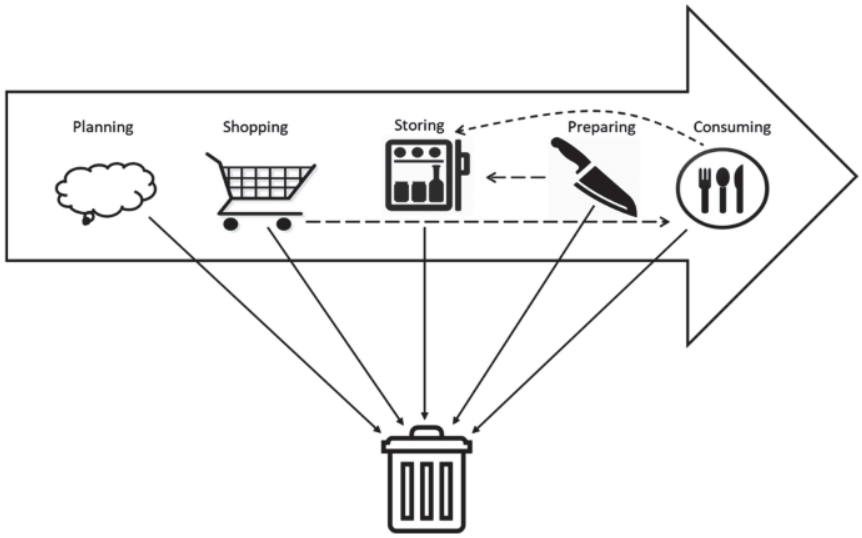


Figure 2: Behaviour in Household Management from van Geffen et. Al (2019)

Proper planning is crucial, and it needs to be constant when planning groceries, meals, events, and even when buying convenient foods. On special occasions, like when preparing a Christmas lunch or a summer barbeque, people tend to over plan and buy

food, which unfortunately ends up being defrosted or cooked without any knowledge of or space to store leftovers (Parizeau, von Massow, & Martin, 2015).

According to Stefan, et al (2013), the primary factors contributing to the variation in food waste are planning and buying habits, with the latter exerting a more substantial influence. According to Evans (2011), consumers often acknowledge their tendency to purchase excessive amounts of food or unused products during the buying process, and rely on established shopping patterns, thereby increasing food waste. Contrarily, planning practises, including inventory checks, shopping lists, and meal preparation in advance, assist customers in reducing food waste (Bell, Corsten, & Knox, 2011).

In addition, a survey on takeout by JustEat and The Sustainable Restaurant Association found that households throw away more than one-tenth of the food they order (Mellon, 2020). Furthermore, 25% of clients said they would throw away more than half of the leftovers from takeaway orders. This might result in certain restaurants mandating a minimum delivery charge, forcing customers to buy more food to meet the pricing requirement (Mellon, 2020).

2.3 The impact of food waste on the family itself, community and global level

The amount of food wasted varies depending on various socio-demographic (such as the number of children and household size), behavioural (like better meal planning, developing cooking skills, and more efficient stocking), socio-economic (such as income), psychological (for example, fear and stress), situational (for instance, people's availability), and cultural (such as dining out) factors (Ishangulyyev, Kim, & Lee, 2019).

The act of wasting food has significant negative impacts on the environment, economy, and overall societal well-being, as highlighted by Ishangulyyev, Kim, and Lee (2019). Rather than solely focusing on increasing food production to meet the growing global population, the primary goal should be to improve the efficiency of food distribution and minimise food waste from existing production WRAP (2022). As mentioned earlier, the FAO of the UN reports that an alarming 320 million people worldwide do not have adequate access to food for a healthy lifestyle (FAO, 2021).

2.3.1 How food waste impacts small scale

The term "small scale" refers to small-scale domestic composters and the community.

Research conducted by Koivupuro et al. (2012) shows that the amount of food waste produced is positively correlated with the number of residents in a household. This is unsurprising since larger households purchase and consume more food. However, compared to a typical single-occupancy household, a typical four-person family wastes less than four times as much food, resulting in 33-40% less food waste (OECD, 2008). Similarly, WRAP (2022) highlights that larger households waste less food than smaller households.

Furthermore, Koivupuro et al. (2012) found that single women generate more food waste than single men, families, and adult households. Gender seems to play a significant role in food waste, as households, where women are primarily responsible for grocery shopping, have significantly higher amounts of avoidable food waste than households where only men or spouses are in charge (Koivupuro et al., 2012). Income also influences food waste patterns, with lower-income households wasting more food due to impulsive food-buying habits and a lack of grocery planning (WRAP, 2022).

A key conclusion of numerous types of research is that households with pensioners waste the least overall, while younger people discard more than older people. People over 60 (the post-war generation) may waste less due to their unique experiences, such as food rationing during the Second World War (Vella, 2016). Due to budgetary restrictions and a tendency to recycle food, (Koivupuro et al., 2012) discovered that customers, after retirement, waste less food. Younger customers, in contrast, are less concerned about food waste due to their way of life. As mentioned, buying groceries for the family is not always a scheduled activity, leading to food waste due to overbuying and overstocking WRAP (2022).

Food waste is a substantial cultural component (Ishangulyyev, Kim, & Lee, 2019). For instance, because they utilise fewer essential ingredients mixed in creative ways to cook the dishes, Mexican homes waste less food than Northern European ones (de Hooge et al., (2017). On the other hand, 40% of household food waste in the UK is attributable to cooking food in excess (Thyberg & Tonjes, 2016). Interestingly, because of the stress and value placed in Chinese culture on hospitality and providing guests with entertainment, if there are no leftovers after a meal, it is assumed that the host did not provide enough food for their guests. Chinese families overindulge in food, which frequently leads to waste (Wang et al., (2017).

The Waste and Resources Action Programme (WRAP) in the UK conducted a qualitative study that revealed a lack of household awareness of the environmental effects of food waste. Aschemann-Witzel et al. (2015) found that individuals facing food insecurity, limited financial resources, or being elderly were more likely to support the idea of reducing food waste. There are two primary motivations for reducing food waste: economic savings and ethical values. Graham-Rowe et al., (2014) suggest that

the financial costs associated with impulsive food purchases can be a potential incentive to prevent food waste.

Graham-Rowe et al., (2014) explain that the financial implications of food waste represent missed opportunities for households to invest and impact their overall well-being. Implementing effective food waste management systems at home can reduce economic losses, enabling households to make more informed investment decisions. Aschemann-Witzel et al. (2015) indicate that concerns about humanitarian issues like hunger and poverty and concerns about the environmental impact of food waste appear to be less influential drivers for reducing food waste.

2.3.2 How food waste impacts large scale

The term "large scale" refers to the significant environmental impact of food waste, including greenhouse gas emissions during agricultural production and transportation, as well as the wastage of energy and water resources (van der Werf, Seabrook, & Gilliland, 2019).

To assess the environmental impact of food waste, it is necessary to consider its carbon, ecological, and water footprints throughout the entire life cycle, from farm to fork (Vella, 2016). In households, food waste contributes to an annual water footprint of 6,262 million cubic metres, with 5,368 million attributed to food waste and 894 million to avoidable waste (resulting in a daily water waste per person of approximately 284 litres) (Vella, 2016). The energy and pesticide inputs used in producing and distributing food that ultimately go to waste are also significant (European Court of Auditors, 2016). Notably, animal products such as milk, pork, cattle, and poultry have the most

substantial adverse environmental effects due to their high carbon footprints (Shi et al., 2022).

Certain food items, such as cereals, beef, rice, cocoa beans, and chicken, have a notable negative environmental impact due to their high-water consumption during production (Afrane & Ntiamoah, 2011). Proper disposal of biodegradable waste, including household food waste, results in significant gas emissions, particularly CH4, which has 34 times the global warming potential of CO2 over 100 years (Geislar, 2019). McCarthy (2021) asserts that food waste could be the third-largest source of greenhouse gas emissions worldwide, following the US and China. With the global population projected to increase significantly, addressing this issue becomes even more challenging (United Nations, 2022).

Food waste also has substantial economic implications, with an annual economic impact of $197.7 billion in the United States (USDA, 2015). Additionally, food loss and waste have significant social consequences. According to a study by the FAO, the amount of food wasted in industrialised countries is equivalent to the amount of food that could be produced in sub-Saharan Africa.

2.3.3 Practical Everyday Tips to Avoid Food Waste -- Education at the Heart of Food Waste Reduction

Changing consumer attitudes towards imperfect fruits and vegetables is crucial to tackling food waste. Recognising the value and benefits of consuming "ugly" produce can significantly reduce waste and promote sustainability in the food system (de Hooge et al., 2017). Education plays a vital role in shifting consumer perceptions. Many consumers have been conditioned to expect flawless produce due to advertising, societal norms, and grocery store standards. However, educating

consumers about the reasons behind the appearance of "ugly" produce and its nutritional equivalence can help change their views (Godoy, 2016).

Individuals frequently overbuy food, resulting in increased food waste (Schanes, Dobernig, & Gözet, 2018). While buying in bulk may appear to be a cost-effective option, research have shown that it can contribute to increased levels of waste (Ligon, 2014). Food, money, and resource waste may all be avoided with careful planning (FAO, 2020). Maintaining a well-organised refrigerator and food cupboard can help prevent excessive food waste. Individuals can reduce waste by keeping track of what is in stock and avoiding spoilage (FAO, 2020). Following the first-in-first-out rule when shopping and preserving food, such as pickling and freezing, can extend its shelf life. These practices reduce carbon footprints and save money (FAO, 2020).

2.3.3.1 Food Preservation

The importance of preservation rests in its capacity to increase the shelf life of food and other perishable commodities, hence minimising waste and enabling more effective resource utilisation. Literature indicates that preservation techniques, such as canning and pickling, have declined in recent years, whereas freezing has gained prominence. This is likely attributable in part to the accessibility and convenience of frozen foods. However, freezing food can also be an efficient method for reducing food waste, as it enables the long-term storage of perishable products and helps avoid rotting. In addition, freezing protects a food's nutritional content, allowing it to be consumed later.

Method	Description
Salt	Food that contains salt becomes dehydrated as it loses water. This dehydration inhibits the growth of microorganisms, including those that can cause food poisoning, as they require water to thrive (Tournas, et al. 2001).
Pickling	Pickling is a common method of food preservation that involves immersing food in an acidic solution such as vinegar or brine, a saltwater solution. This technique is often used for preserving vegetables, although it can also be applied to fish and eggs (Barrett, 2016).
Blanching	Blanching is a culinary technique where food is briefly submerged in boiling water. The purpose of this process is to enhance the visual appeal of the food and minimise the loss of vitamins (Ellis, 2015).
Canning	Canning is a preservation method commonly used for foods like jams. It involves packaging the food in a container and subjecting it to heat treatment, which eliminates harmful microorganisms that could cause spoilage or pose health risks. The heating process creates a vacuum seal when the container cools, preventing the re-entry of air and effectively decontaminating the food (Webb, 2013).

Table 1: Other Preservation Methods

2.4 Policies

Addressing the global issue of food waste requires tailored municipal solutions that consider each region's unique cultures, opportunities, infrastructures, and challenges (URBACT, 2022). To combat this problem effectively, every nation, state, city, and household must contribute to reducing waste (URBACT, 2022).

France implemented a successful measure in 2016 to tackle food waste within supermarkets (Lemos, 2019). In response to increasing homelessness and unemployment rates, a regulation was introduced mandating grocery retailers donate edible food instead of discarding it, thereby meeting the heightened demand at food banks and charitable organisations. Previously, food nearing or surpassing its best-before date but still consumable would be disposed of and often deliberately contaminated to deter "dumpster diving." Strict penalties, including heavy fines and imprisonment, for violating these regulations significantly reduced food waste (Chrisafis, 2015).

Japan also faces significant concerns regarding food waste and has implemented various initiatives since the early 2000s to address the issue. The country has a nationwide organisation called Second Harvest dedicated to swiftly retrieving consumable food from retail establishments and redistributing it to individuals experiencing food insecurity (URBACT, 2022). Additionally, certain programmes offer loyalty points for purchasing food items nearing their expiration date. The recently enacted Food Recycling Act aims to redirect food waste to facilities that convert it into compost, animal feed, and energy. The government places importance on education at all levels to change societal perceptions and equip the younger generation with skills to further reduce food waste (FAO, 2017).

2.4.1 Foreign Campaigns to Reduce Food Waste

Numerous global initiatives are being implemented to address the issue of food waste, aligning with the SDGs, and aiming to reduce the amount of discarded food (United Nations Environment Programme, 2021). China and India ranked as the top two

countries in food waste in 2021, with approximately 91.6 million metric tonnes and 68.8 million metric tonnes wasted annually, respectively (McCarthy, 2021).

The United Nations Environment Programme (UNEP), the FAO, and the UN Secretary General's Zero Hunger Challenge lead the "Think. Eat. Save. Reduce Your Footprint" campaign, which promotes proactive measures and a comprehensive approach to food waste reduction. The campaign raises awareness about the significant amount of food that is fit for human consumption but fails to reach consumers (UNEP, 2021).

The UN's World Food Programme (WFP) has launched the Stop the Waste initiative, aiming to raise global awareness about the substantial quantities of edible food regularly discarded and the need to address them to combat world hunger (Taravella, 2019). Despite having enough food to feed everyone, approximately one-third of the 4 billion tonnes produced yearly are wasted, costing the global economy around US$1 trillion (World Food Programme, 2020). Conflict and instability exacerbate the challenges, displacing more people from their homes than at any time since World War II (Taravella, 2019). Reducing food loss and waste by half is a key strategy to achieve sustainable food production and meet the goals of the Paris Climate Agreement and the UN SDGs (Ranganathan et al., 2018). The WFP aims for zero hunger globally and supports smallholder farmers by providing storage and transportation technology to prevent harvest decay and connecting them with markets (Flanagan et al., (2019).

Governments play a crucial role in establishing objectives, ensuring accountability, and providing incentives and support to businesses and consumers for avoiding, reducing, and managing food waste. Regulations, market-based tools, waste-management infrastructure, and capacity assistance are among the strategies that

can be employed (United Nations Environment Programme, 2022). It is essential to combine long-term goals and roadmaps with immediate targets and practical local solutions. Additionally, incentives that unintentionally hinder or discourage food waste reduction activities should be eliminated (European Commission, 2020).

Several countries, including the UK and the Netherlands, have made significant progress in reducing household food waste. For example, the United Kingdom achieved an 18% reduction in food waste between 2007 and 2018 (UNEP, n.d.). Comprehensive studies, national strategies, and behavioural change programmes are needed to monitor and track household food waste production and address regional factors (United Nations Environment Programme, 2022).

Zero Waste Europe (2020) supports the European Commission's intention to establish legally binding targets for reducing food waste across the EU. Laws in Lithuania and Italy facilitate charitable donations and provide tax incentives for organisations that donate food items (Zero Waste Europe, 2020). The city of Bruges has launched the Zero Food Waste campaign, successfully preventing 43% of food waste in the healthcare industry (Rosa & FoodWIN, 2018). France has implemented regulations requiring stores to donate unsold food instead of discarding it, and these regulations have expanded over time (Zero Waste Europe, 2020). France's strict policies and sustainable practices contribute to its top ranking in the Food Sustainability Index (Food Sustainability Index, 2021).

2.4.2 Local Campaigns on how to reduce food waste

Food waste in Malta is a significant but often overlooked problem, with high rates of garbage generation per capita and low recycling rates (Bahceci et al., 2020; Friends for the Earth Malta, 2020). Most of the food waste ends up in landfills, putting additional

pressure on the limited surface area of the island nation (Minister for Sustainable Development, the Environment, and Climate Change, 2014). This situation raises concerns about social justice, the environment, and the economy, as much of the discarded food could still be suitable for donation or other beneficial uses (Giovanni, 2020).

To address this issue, the Ministry for Sustainable Development, the Environment, and Climate Change has proposed various strategies in Malta. These include making organic waste separation mandatory, imposing fines on non-compliant households, and encouraging eateries to offer half-portion meals to reduce waste (MEAE, 2014). Customised menus in nursing homes and hospitals are also suggested to ensure that meals meet individuals' dietary needs, reducing uneaten food (MSDEC, 2014).

In collaboration with Wasteserv and with support from the Environment and Resources Authority, the Ministry for the Environment, Sustainable Development, and Climate Change has launched the "Don't Trash Waste" campaign to raise awareness and educate the public about waste management (EkoSkola Malta, n.d.). The campaign aims to promote sustainable and green business initiatives by sharing best practises and encouraging businesses to adopt innovative and environmentally friendly approaches (European Environment Agency, 2021).

2.4.3 Food Waste in relation to Education

Sometimes, the importance of minimising food waste may not be understood by children and teenagers who have grown up in stable food settings and may not be old enough to take responsibility for it (Schanes, Dobernig & Gözet, 2018). However, time flies, and before we know it, the current generation of schoolchildren will be moving

on and becoming independent. Therefore, it would be beneficial to learn how human behaviour affects the environment now (Quested et al., 2013).

Discussing these causes and effects of food loss and waste with students from a pedagogical perspective reinforces important educational principles (Food and Agriculture Organisation of the United Nations, 2018). It encourages youth to think about their place in the social, political, and ecological sectors and how they interact with the environment. Students have the possibility of understanding their role as global citizens and change agents. It can increase students' self-assurance and self-esteem by allowing them to serve as educators and experts on reducing food waste in their homes, local communities, and school settings (Schanes, Dobernig & Gözet, 2018).

2.5 Changing Behaviour

Awareness-raising efforts like *Love Food, Hate Waste* are remarkable in scope and complexity, and several have successfully promoted food waste reduction at home (Stöckli, Niklaus & Dorn, 2018). However, these programmes usually lack a theoretical basis, sufficient monitoring, and effectiveness evaluations, making it impossible to pinpoint the exact causes of behaviour change (Stöckli, Niklaus & Dorn, 2018). Unfortunately, we are living in the 21st century, and there are many campaigns about the consequences of food waste, and its concern is still on the rise.

People are internally or externally driven to change their behaviour and go through a multiphase process called behavioural transformation (Bamberg, 2013). Goal setting and goal striving are the first two phases of goal-directed behavioural change (Nielsen, 2017). On the other hand, goal establishing is the process of putting intentions to

change into action, and goal striving understands why some people are motivated to prevent food waste while others are not (Bamberg, 2013).

People have different goals regarding their food-related behaviours, such as supplying enough food for their family, consuming safe and healthy meals, and enjoying the eating experience. While individuals may intend to change their behaviour, simply having the intention does not guarantee that they will follow through (Sheeran & Webb, 2016). It becomes necessary for people to prioritise their goals since they have limited time, money, and cognitive capacity to allocate towards their food choices (Mann, de Ridder, & Fujita, 2013).

2.5.1 How to empower adults to make a change; Andragogy

One of the most straightforward and efficient actions to save money, lessen the impact of climate change, and save natural resources is to ensure that food does not go to waste (Gunders, 2012). Various forms of interventions can be used to help implement a desire to decrease food waste (Matthies, 2012). Such interventions emphasise reminding people of their goal to reduce food waste levels and making this purpose simpler to act upon rather than raising their motivation. The strategies used by the interventions vary; some are ways to reinforce intentions, while others are ways to make intentions more precise. Other interventions are more procedural and advise individuals on how to minimise food waste (instructions) effectively, track the impact of their behaviours (feedback), or assist them by making the behaviours easier to conduct (making it easy).

In any educational intervention with adults, knowing what works best with adults as ‘teaching’ and "learning" processes is important. According to Malcolm Knowles' theory, andragogy comprises four guiding principles and five critical assumptions

regarding how adult learners process information differently from children. Assumptions underlying adult learning include Adult learner experience, self-concept, readiness to learn, learning orientation, and learning motivation (Kotinsky, 2006). These recommendations can be used with the aforementioned assumptions to create effective training programmes. First and foremost, learning must be based on experience. Adults gain more from taking note of their prior experiences, even their shortcomings. Secondly, adults must be actively involved in developing, delivering, and evaluating the training content. Additionally, adult education is problem-focused rather than content-focused. Finally, adults are interested in acquiring knowledge or skills to enhance their quality of life, careers, or social relationships (Kotinsky, 2006; Yap, 2009).

2.6 Conclusion

This section supplies an overview of the research on food waste, focusing on household food waste. As outlined in the research goals of this dissertation, the common challenges and good practises in Maltese households regarding food waste reduction, as well as information and practical tips that would be useful to adults who are the main food managers in their household, were explored. It is essential to educate users on this issue to eventually eradicate it. To build on existing knowledge, a constructivist approach will be used, and a baseline study will be conducted to analyse household users' behaviour. In the following chapters, an educational handbook will be designed exclusively for adults who oversee food provision, providing advice on how to reduce home food waste and raise awareness. This approach will be more effective by basing food waste prevention education activities on consumers' existing patterns of behaviour and promoting more desirable patterns of behaviour.

Chapter 3

Methodology

3.0 Introduction

This chapter presents the design of the study, focusing on the methodology used to answer the first research question. First, a thorough explanation of the study's philosophical basis is given, followed by a summary of the design and methods used to gather the necessary data and analyse it in preparation for producing the educational resource. The data collection will be discussed in this chapter.

3.1 Framework Chosen for the Research

The following section will outline the chosen research paradigm, the theoretical lens, the methodological approach, and the technique for gathering data.

3.1.1 Research Paradigm

The word "paradigm" in the social sciences has four crucial meanings. All of them have to do with the idea of a set of deeply held beliefs that shape knowledge (Morgan, 2007). Creswell (2017) states that a researcher's research paradigm is made up of their basic assumptions, attitudes, and thoughts, which are shaped by their field of study and their past research experiences. The research paradigm is a framework for doing research, and it affects how the research is done and any arguments that are given. A paradigm considers a person's worldview and experiences (Teddlie & Tashakkori, 2008). Depending on their worldview, some researchers use specific approaches to focus on different areas of their studies. Greene (2007) refers to this as a "mental model". For example, epistemological perspectives focus on how a person sees the world, they take a more limited approach to problems in the philosophy of knowledge.

Since positivism was built on quantitative research only in the past, this study took on a Post Positivist worldview (Leavy, 2017). The Post Positivism tradition comes from 19th-century writers and has been evaluated by Phillips and Burbules in the 21st century (Leavy, 2017). Phillips and Burbules (2000) say that knowledge is hypothetical because the absolute truth can never be found. With this in mind, the main goal of this research study was to challenge and test the following research question:

What are the common challenges and good practices concerning food waste reduction in Maltese households?

Post Positivists do their research using the scientific method, which is a recognised methodology. Beginning with a theory, a researcher accumulates information that either confirms or refutes the research question (Davies & Hughes, 2014). Even though this philosophy is based on the researcher's objectivity and neutrality, it also recognises that researchers are "knowing subjects" who use heuristics to guide their work (Haig, 2018; Leavy, 2017).

Quantitative data collection approaches are commonly connected to the Post Positivist movement. Researchers base their claims of knowledge on four things: determinism, which means thinking in terms of causes and effects; reductionism, which means focusing on a small number of interconnected variables; careful observations and measurements of variables; and testing of continually improved hypotheses (Creswell & Plano Clark, 2018).

This study's goal to find out how people deal with food waste at home seemed to align with the Post Positivist worldview core ideas. According to Creswell's (2017) assertion, Post Positivism tends to prioritise quantitative research methods, and the choice of a research method should be based on its ability to address the research questions and issues at hand effectively (Greene, 2007).

Attard (2016) used this Post Positive and pragmatist theory in another study about food waste to give a framework to the first part of her research: a survey-based line questionnaire. Therefore, for this study, the researcher also chose this theory to test the research question in a suitable way.

3.1.2 Theoretical Lens

Creswell and Plano Clark (2018) say that the theoretical lens allows the researcher to think about the study's research questions. The "hypo-deductive approach" is used to test the hypothesis against the collected data to determine whether it is accepted or disproved (Hesse-Biber et al., 2016).

Kuczynski (2012) suggests that empiricism is a philosophy that says we learn things by directly or almost directly observing them. For this study, the researcher chose David Hume's theory because it fits with the Post Positivist view of the world and the need for the quantitative component of the study design. The “empiricism” theory is further empowered by Kant’s statement "that all knowledge not only begins with experience but also is derived from or arises out of experience” page 123 (Leiden, 2012). This study used the empiricism theory to create the research method and tools.

For instance, the right questions to obtain the required data were chosen to ask Maltese households about their food waste experiences and knowledge.

3.2 Research Design

The exploratory purpose of this study was to examine household challenges and strategies practised for reducing food waste in Malta. To find trends within the segment, quantitative research was employed. This was done with the help of a structured questionnaire, which would ensure that important information was collected in a structured way to be analysed further. The key steps from research focus, to data collection, to analysis, and product design are shown in the diagram below (Figure 3). A baseline study is typically conducted before starting a project to identify any areas that require attention during the project's development (M&E, 2013). A baseline survey is crucial for any project for the following reasons: It serves as the project's starting point, establishes the planning priorities, determines how the project will impact various factors, and establishes the criteria for evaluating the project (Davies & Hughes, 2014).

Research Purpose

The research aims to investigate common challenges and identify good practices in Maltese households regarding food waste reduction. Furthermore, the research seeks to determine the information and practical tips that would be valuable to adults who are the primary food managers in their households, with the goal of developing an educational handbook on sustainable food waste management.

Research Questions

1. What are common challenges and good practices in Maltese households with respect to food waste reduction?
2. What information and practical tips would adults who are the main food managers in their household find useful in an educational handbook on sustainable food waste management?

Literature Review

Draws on various disciplines, primarily behaviourism, and biological and social perspectives relating to food choice and household consumption to help inform the questionnaire design

Data Collection Technique

Quantitative Approach

Online Survey

Phase 1:
Questionnaire

Aim

To determine how much food waste is practised inside the household and how much knowledge there is about it.

Recruitment: Target 50 participants

Analysis

- Responses were categorised into tables by the researcher
- The analysis aimed to identify areas or aspects that could be improved.

Phase 2:
Developing a Handbook on Sustainable Food Waste Management in the Home

Aim

To facilitate the reduction of food waste in households

Process

- Gather relevant information.
- Drafted and refined the content of the handbook

Figure 3: Research Design

3.2.1 The Methodological Approach: A Quantitative Approach

A quantitative method was chosen for this research. Quantitative research seeks to test a theory and decide whether to accept it (Yilmaz, 2013). Designs often use longitudinal data collection (Leavy, 2017) to examine how ideas and trends change over time. Cross-sectional designs, on the other hand, aim to gather data from a sample at a single point in time (Leavy, 2017).

Survey research looks at a small population sample to get a number-based picture of its trends, attitudes, or opinions. Cross-sectional studies often use questionnaires to gather data to extrapolate findings from a sample to the general population (Leavy, 2017). Surveys are often used to determine people's attitudes, beliefs, and opinions or to report their behaviours and/or experiences (Leavy, 2017). The researcher used cross-sectional to examine the prevalence of specific attitudes, beliefs, or behaviours in a population at a point in time.

3.2.2 Sampling

To obtain insights into people's behaviour at home, the researcher opted for an online exploratory questionnaire as the data collection method. While qualitative data could provide in-depth information, quantitative data was deemed more practical for reaching busy and hard-to-reach individuals (Leavy, 2017). Snowball sampling was employed to gather information from participants and their acquaintances, a non-probability sampling method where the samples share similar characteristics, as noted by Creswell and Plano Clark (2018). The online questionnaire allowed respondents to complete it at their convenience, enabling the collection of a substantial amount of

data points (Davies & Hughes, 2014). Furthermore, using online questionnaires is more environmentally friendly than distributing physical survey forms.

As was previously stated, household food waste is a major problem on a global scale. Thus, designing an engaging project requires the researcher to deeply understand the current state of the knowledge and requirements of the target audience.

The primary person in charge of the household's grocery shopping, food provision, food storage and menu planning is the target audience for this study.

3.2.3 Tool for Data Collection

A questionnaire is a research tool comprising a list of questions designed to get information from respondents for a survey or statistical study (Creswell, 2017). To test the research question, an online questionnaire was used to measure a concept in which the researcher is interested (Leavy, 2017).

> *What are the common challenges and good practices concerning food waste reduction in Maltese households?*

Fixed-choice questions provided respondents with a range of potential responses. According to Bergin (2018), this type of question structure makes it simple for the researcher to obtain a variety of straightforward data points that are also very generalisable when using large samples. Multiple-choice and checklists are a few of the different formats of forced-choice questions (Ruel et al., 2016). Furthermore, the researcher added a few qualitative questions by inputting open-ended questions for a detailed response.

While online surveys offer cost advantages, they do have limitations, including a reduced ability to capture emotional responses as researchers cannot observe nonverbal cues like eye contact and body language. However, in the context of this study, emotional responses were not a primary focus, so this limitation was deemed relatively minor. Instead, the questionnaire aimed to gather specific responses to test the research questions. To ensure data security, all information was stored both electronically and in hard copy to prevent any loss. It's important to note that all data collected remained anonymous.

As stated in section 3.2.2, the tool for data collection is an online questionnaire. This will be distributed to online platforms. Online questionnaires that are done over the Internet are becoming more common because of benefits like lower costs (Survey Planet, 2022). When a questionnaire is posted on a website and all site visitors are encouraged to participate, this is known as "convenience sampling." Here, respondents self-select. In this study, respondents needed to be aware that they should be the primary food purchaser in their households before answering the questionnaire.

In order to gather high-quality data that most respondents would understand, the researcher followed Ruel et al. (2016) recommendations and kept the survey straightforward. The areas outlined in Table 2 were used as sections for this survey. Given the structural purpose of this questionnaire, which was to make data analysis more practical, it consisted primarily of multiple-choice and brief questions designed to elicit respondents' attitudes, beliefs, practices and views. Contributing to a valid outcome, short-answer questions were highly appropriate. The questionnaire was written neutrally so people would be honest and give realistic answers.

3.2.4 Objectives

The questionnaire aims to achieve multiple objectives related to food management awareness, as outlined in Table 2.

Main Objective	
• To assess the level of awareness, individuals have regarding food management, from purchasing and planning meals to food preservation, in order to develop a handbook that will cultivate a sense of sustainable practices in the home.	
Specific Objectives	
Section 1: Buying groceries and essential knowledge regarding food	• To investigate respondents' food purchasing patterns and choices.
Section 2: Meal planning	• To examine respondents' behavioural attitudes and practices in respect of meal planning.
Section 3: Preservation Methods	• To identify respondents' awareness of the value of food preservation. • To determine respondents' awareness of various preservation techniques. • To investigate respondents' attitude toward food waste • To identify any strategies implemented to reduce food waste.

Table 2: Questionnaire Objectives

To ensure a well-structured and engaging document, the questionnaire is divided into five sections, each focusing on a specific topic (Bell, 2005). The modified sections for the questionnaire are summarised as follows:

Questionnaire Design	
Section 1: Buying groceries and essential knowledge regarding food	The emphasis of this section is on various shopping habits and different terminology.
Section 2: Meal planning, food preferences and leftovers	Planning meals and participants' behaviour are the main topics of this section.
Section 3: Food preservation and reheating	The two main topics in this section are various food preservation techniques and the different ways leftover food may be consumed.
Section 4: Some final questions	It focuses on a few elements of individual behaviour related to food waste.
Section 5: Personal Details	The personal information of each respondent is covered in this section.

Table 3: Questionnaire Objectives

3.3 Pilot Testing

The questionnaire was piloted with two users similar in profile to the intended audience. Pilot participants' verbal suggestions led to adjustments. The length of the

questionnaire was a common critique. Minor adjustments, such as grammatical errors and required questions, were also considered to improve the final version.

Question Number	Amendments
9 and 10	This question was amended to a multiple choice rather than an open-ended question to gather a more focus answer.
11d	The question was eliminated as it was irrelevant.
15b	This question was added as an open-ended answer to gather participants behaviour.
19b	This question was amended to long answer to let participants further elaborate.
24	Pictures were included

Table 4: Amendments to the questionnaire

3.4 Implementing the Survey

As a data collection instrument, a questionnaire with 34 questions was implemented via Google Forms. To improve validity through providing clarity, individuals could complete the questionnaire in either English or Maltese.

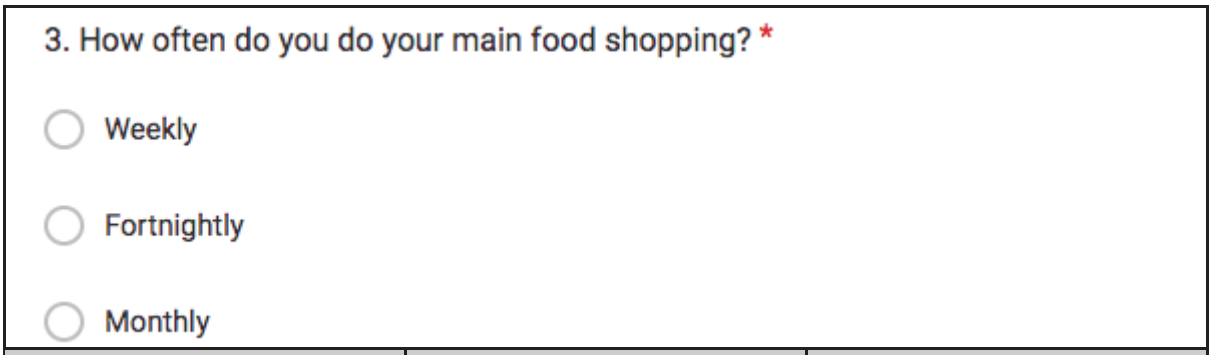
A web-based questionnaire was made available to participants from August 8, 2022, through November 8, 2022, via an online platform. The invitation link was posted online and shared through social media channels.

3.4.1 Analysis of Data

Procedures for data analysis enable researchers to determine their findings to answer their research questions (Fowler, 2009). In quantitative research, the analysis process leads to a statistical representation of the data, usually in the form of tables or graphs

and a discussion (Leavy, 2017). Manual data analysis may be conducted where there are modest sample sizes (FAO, 2013).

Since the present instrument consisted of 52 valid surveys, a percentage in English and a percentage in Maltese, Microsoft Excel was used for the analysis of the questionnaire data after gathering the results. Pallant (2020) made a list of suggestions that the researcher would use to code the results. Each question was assigned a unique variable name. Due to the many question types included in this survey, multiple coding approaches was utilised. When participants were instructed to select only one answer from a list of possibilities, one variable label was selected, and a number code was assigned to each answer.



Variable	*Label*	*Value*
Main Food Shopping	Periodic	1 = Weekly 2 = Fortnightly 3 = Monthly

Table 5: Coding Questions - Tick One Only

Furthermore, in cases where participants were able to choose multiple responses, each selected answer was assigned a variable label with a value of 1, while non-selected answers were assigned a value of 2.

12. If you have any leftovers, what would you do? *

- [ ] Save it for the next day
- [ ] Freeze it
- [ ] Throw it away
- [ ] Give it to animals
- [ ] Other...

Variable	*Label*	*Value*
Behaviour	Save it for the next day	1 = marked
	Freeze it	2 = marked
	Throw it away	3 = marked
	Give it to animals	4 = marked
	Other	5 = marked

Table 6: Coding Questions - Multiple Choice

This questionnaire had several open-ended questions that needed detailed answers. As a result, the questions were coded differently. First, it was necessary to review them to identify similar themes; next, all responses were entered into a separate Word document.

Question	*Analysis*
20. Can you mention 2 types of food preservation? For example, pickling * Short-answer text	Food preservation techniques will be grouped to form a pie chart to analyse the most common answer
22. c) What type of food preservation have you tried or would be willing to try? Short-answer text	To analyse the participants' behaviour towards food preservation techniques.

Table 7: Analysing Open-Ended Questions

After the responses had been appropriately coded and categorised, the data would be entered into an Excel file codebook for analysis. (Njeri-Otieno, 2021).

Excel is a valuable instrument for data visualisation and early analysis. Furthermore, percentages would be recorded in a table, and infographics would be made.

3.4.2 Validity and Reliability

The two essential principles for evaluating quantitative data are validity and reliability. Validity refers to how successfully a method measures what it is intended to measure (Leavy, 2017). When the conclusions of a study are extremely valid, they accurately reflect the true characteristics, attributes, and variations in reality. Ensuring that the chosen method and tool for measuring are accurate and of high quality requires that they should be based on considerable research and prior knowledge (Leavy, 2017). For this dissertation, face validity would be employed, as the pilot study ascertained which questions were not clear and understandable by the target audience and thus revisions were made. The research Supervisor, a professional Home Economist, also reviewed the tool.

On the other hand, the constancy of outcomes is known as reliability. A dependable metric will generate consistent results. A good measurement should be valid and trustworthy (Pallant, 2020). However, since this study was based on a small sample to determine needs, its results cannot be generalised; any reliability test may not be accurate (Leavy, 2017).

3.4.3 Limitations

Several limitations can be outlined, mainly with respect to the data collection tool. Since the questionnaire was shared on social media, people who did not have access to the internet or were not computer literate, such as some elderly, could not fill it out or needed help from family members.

Using a questionnaire that primarily consists of multiple-choice questions ignores any thoughts and opinions that respondents may have about the subject being investigated, as pointed out by Cohen et al. (2007). In addition, although participants were allowed to respond at their convenience, the questionnaire was quite time-consuming, so individuals may have chosen to fill it out without much thought or attention to understanding the questions well; or merely started responding without so much precision due to respondent fatigue.

3.4.4 Ethical Considerations

Since data was collected anonymously, participants' data is unknown. All data collected was solely used for this dissertation. Data was stored in a secure space only accessible to the researcher as a hard copy as well as a soft copy. The soft copy was password protected, and only the researcher would have access to it. Once the

research study is completed and approved, the data will be discarded within 24 months.

3.5 Conclusion

This chapter provided a comprehensive overview of the research methods employed in this study, including data collection and analysis procedures. The subsequent chapter will focus on presenting and discussing the findings and analyses derived from the survey. Following that, the subsequent chapter will delve into the development and design of the handbook, drawing upon the outcomes obtained during Phase 1.

Chapter 4

Analysis and Discussion

4.0 Introduction

The purpose of this chapter is to present the results and analyses of the online-based survey via questionnaire which was conducted to investigate household food waste. The questionnaire was designed to gather information on the types and amounts of food waste generated in households, as well as the reasons for food waste and the strategies used to reduce it.

4.1 Demographic Characteristics of Respondents

The survey received responses from 52 participants, with 53.8% answering in English and 46.2% in Maltese. Table 8 displays the participants' basic demographic information. Most respondents were women (96%), and almost half of them (??%) resided in the south of Malta. Despite the researcher's inability to maintain a gender balance among respondents, the study was able to collect information from participants of diverse ages, with the majority being between 31 and 45 years old (33%) and the majority holding full-time employment (52%). All respondents were responsible for grocery shopping, food provision, food storage, and meal planning in their households as this was a criterion for participation in order to increase the validity of the research.

Demographic Variable	Characteristics	Respondents	
		Count	*Percentages (N=52)*
Gender	Male	2	4%
	Female	50	96%
Age	18-30	13	25%
	31-45	17	33%
	46-60	15	29%
	61+	7	13%
Employment Status	Student	7	13%
	Employed Full Time	27	52%
	Employed Part-time	5	10%
	Unemployed	1	2%
	Staying at home by choice	7	13%
	Retired	3	6%
	Pensioner	2	4%
District	South Eastern	22	42%
	Western	10	20%
	Northern	20	38%

Table 8: Demographic Characteristics of Sample

4.2 Food Shopping Practices and Knowledge

The first part of the questionnaire was about shopping habits. Most respondents (58%) did their main food shopping weekly (see Table 9), with the most common items mentioned being milk (23%), bread (23%), delicatessen foods (19%) and vegetables (17%).

Behaviour	Frequency	Respondents	
		Count	*Percentages (N=52)*
Frequency of Grocery Shopping	Weekly	30	58%
	Fortnightly	10	19%
	Monthly	12	23%

Table 9: Grocery Habits

Most respondents (90%) drew up a shopping list to ensure they only bought what they needed (see Table 10). This indicates that people are conscious of their shopping habits and want to avoid overspending or wasting food. In the context of shopping habits, the use of a shopping list can be linked to the microsystem, which refers to the immediate environment in which an individual interacts and is influenced, such as family, friends, and other close relationships. Using a shopping list is a learned behaviour that is shaped by the individual's interactions and experiences within their microsystem. For example, if a person grew up in a household where meal planning and grocery lists were regularly used, they are more likely to adopt these practices themselves.

Nearly all respondents (46%) checked what they had in their refrigerators, drawers, or cupboards before drawing up their shopping list or going shopping (see Table 10). This suggests that people are aware of the importance of avoiding food waste and want to ensure they use what they already have before buying more, or only buy what is necessary. This trend may be influenced by international and national campaigns focused on addressing food waste. These campaigns aim to increase awareness about the detrimental environmental and economic effects of food waste, thereby inspiring individuals to minimise waste and adopt more sustainable behaviours (WRAP, 2022).

Variable	**Practice and Frequency**	**Respondents**	
		Count	*Percentages (N=52)*
Using a shopping list	Yes	47	90%
	No	5	10%
Check what you have at home	Always	24	46%
	Nearly Always	21	40%
	Sometimes	7	13%
	Hardly Ever	0	0
	Never	0	0

Table 10: Shopping List Practices

According to the data (see Table 11), almost half of the respondents (46%) tended to buy non-perishable groceries in bulk, while only 25% purchased fresh produce in bulk when it was in season and locally available. This trend suggests that people prefer to

stock up on non-perishable items as they have a longer shelf life and can be stored for an extended period without spoiling. Research conducted by Gunders and Bloom (2017) suggests that consumers may fall into the trap of sales and food marketing, which encourage impulse and bulk food purchases at retail establishments. This factor could also contribute to the finding that consumers tend to buy non-perishable items in bulk. Additionally, the lower percentage of people buying fresh produce in bulk may be attributed to several factors. For example, some people may be unaware of what produce is in season, or they may not know how to use certain fruits and vegetables. This lack of familiarity could make people hesitant to buy produce in bulk, even when the prices are lower. For instance, if someone is not used to eating cabbage or beetroot, they may not know how to incorporate these items into their meals when they are in season.

Buying in Bulk	**Practice**	**Respondents**	
		Count	*Percentages (N=52)*
Non-Perishable Produce	Yes	24	46%
	No	28	54%
Fresh Produce	Yes	13	25%
	No	39	75%

Table 11: Buying in Bulk

The EU has implemented regulations mandating that food labels be directly applied to products by retailers (“Food Labelling Rules,” 2022). However, studies indicate that date labelling issues may be responsible for up to 10% of the 88 million tonnes of food

waste generated annually in the EU ("Date Marking and Food Waste Prevention," 2018). These issues encompass challenges such as poor legibility and misinterpretation of the meaning behind "use by" and "best before" dates. Notably, the survey results demonstrated that people are becoming increasingly aware of the significance of consuming perishable food items before they spoil and pose a health risk. Nearly all respondents (92%) comprehended that "best before" signifies that the food will be at its peak flavour and quality if consumed prior to the indicated date, but it can still be safely consumed after the expiry date if it appears and smells fine. Similarly, the majority of respondents (85%) recognised that "use by" indicates that perishable food items should not be consumed after the specified date.

Practice and knowledge on Expiration Dates	**Frequency**	**Respondents**	
		Count	*Percentages (N=52)*
Checking for expiry dates / best before / use-by	Always	26	50%
	Nearly Always	16	31%
	Sometimes	7	13%
	Hardly Ever	2	4%
	Never	1	2%
Definition of Best Before	The food will be at its best flavour and quality if eaten before this date	48	92%
	Food automatically spoils after the 'best before', so throw it out	4	8%
Definition of Use-By	Indicates the date the item will begin to lose its freshness and appear 'old'	8	15%
	It is found on perishable food items and the food should not be consumed after this date	44	85%

Table 12: Participants perception on expiration dates

4.3 Meal planning, food preferences and leftovers

Table 13 shows that a majority of respondents engaged in meal planning nearly always or always (31%). This implies that family preferences may have a mesosystem impact on food waste. Meal planning serves as a strategic approach to mitigate food waste by ensuring that families purchase and prepare only the required quantity of food. (Boulet et al., 2021)

Meal Planning Practice	**Frequency**	**Respondents**	
		Count	*Percentages (N=52)*
Meal Planning	Always	15	29%
	Nearly Always	16	31%
	Sometimes	12	23%
	Hardly Ever	6	12%
	Never	3	5%
Forward duration	For the next day	33	65%
	For the next week	16	31%
	For the next month	2	4%

Table 13: Meal Planning

However, the fact that the primary reason given for not planning meals is a lack of time (38%) implies that there may be competing demands on family members' time and resources that hinder their ability to effectively plan meals. Furthermore, the finding that a portion of respondents who did not engage in meal planning preferred to make daily food selections (68%) shows that family preferences may have a mesosystem

effect on food waste. When family members have different food preferences or tastes, they may be tempted to buy or cook more food to meet these variances, resulting in greater food waste (WRAP, 2022).

Reasons for not opting for meal planning	Respondents	
	Count	*Percentages (N=52)*
Lack of Time	10	38%
I/My family like to decide what to eat on the day	16	62%

Table 14: Reasons

Table 15 shows that most respondents (67%) saved their leftover food for the next day, indicating that people are aware of the advantages of using leftover food to save money and resources. Saving leftover food is a simple and effective way to reduce food waste and promote sustainable consumption habits. However, only a relatively small percentage of respondents (19%) chose to freeze their leftovers, which suggested that more education is needed on the benefits of freezing leftovers. Freezing leftovers can increase their shelf life, making it easier to use them in future meals and reducing the likelihood of them being wasted. In fact, most respondents (46%) hardly ever waste them, with the main reason being that they have a longer shelf life; “It remains good for a long period of time” (Female, age 31-45), “frozen foods have a longer shelf life” (Female, age 31-45) and “I keep the freezer well stocked with items I regularly use” (Female, age 46-60). Additionally, it is encouraging to note that only a small percentage of respondents (4%) threw away their leftover food. This indicates that people are taking steps to minimise their food waste. However, there is

still room for improvement in further reducing the percentage of people who throw away their leftover food.

Excess Food	Behaviour	Respondents	
		Count	*Percentages (N=52)*
Leftovers	Save it for the next day	47	67%
	Freeze it	13	19%
	Throw it away	3	4%
	Give it to animals	7	10%
Rework of Food	Yes	27	52%
	No	25	48%

Table 15: Practices Related to Leftovers

Table 16 presents the findings that about half (52%) of the respondents have tried reworking food, with the most popular methods being bread pudding, croutons, and pies, is a positive indication that individuals are open to being innovative and resourceful when it comes to utilising their leftover food. However, there may be an opportunity to educate individuals about additional ways to rework food, such as using leftover vegetables in soups or stews or incorporating leftover grains into salads.

In Chapter 2, it was highlighted that despite the world producing enough food to feed the global population, approximately one-third of the four billion tonnes produced each year is wasted or lost. This results in a cost of around US$1 trillion to the global economy (World Food Programme, 2020).

Regarding food scraps, most respondents (92%) threw them away, and only a small percentage (10%) used them to make vegetable stock. This indicates that most probably, the respondents had never been made aware of this possibility and that such practice of throwing away scraps had been the norm ever since their childhood. There is an increasing trend for maximising all parts of vegetables and fruit in particular by sustainability activists and NGOs, and the internet abounds with videos and blogs regarding this (Taylor, 2021).

Food Scraps	**Respondents**			
	Yes		**No**	
	Count	*Percentages (N=52)*	*Count*	*Percentages (N=52)*
Throwing away food scraps	48	92%	5	10%
Homemade vegetable stock	4	8%	47	90%

Table 16: Food Scraps

Additionally, Table 17 presents that most respondents (83%) chose to discard mouldy items entirely, while a smaller percentage (17%) remove the mouldy part and still consume the food. For slightly squashed items, 67% removed the squashed part and still consumed the food. However, more innovative recipes can utilise such food items before they become mouldy or squashed.

Variable	Sub-Category	Respondents	
		Count	*Percentages (N=52)*
Mouldy items	Discard it completely	43	83%
	Remove the mouldy part and still consume it	9	17%
Squashed Items	Discard it completely	17	33%
	Remove the squashed part and still consume the food	35	67%

Table 17: Participants Behaviour on mouldy/squashed items

4.4 Food Preservation

Based on the survey data, food preservation is not widely practised among the respondents' households (see Table 18), with only 40% having tried it before, mainly pickled onions (50%) and capers (40%). As mentioned in the literature, most preservation methods, such as canning and drying, have declined in recent years (Barrett, 2016). The reason may be that they are time-consuming; in fact, it was one of the reasons why participants chose not to try food preservation at home (60%). A preference for purchasing fresh food (45%) and lack of knowledge (50%) were cited as additional reasons for not attempting food preservation. The most common methods of food preservation mentioned were freezing (32%), pickling (29%) and jams (22%). However, when asked about blanching, only a few respondents were aware of the process, indicating a possible lack of knowledge regarding correct and most effective food preservation techniques.

Interestingly, 79% of respondents reported purchasing pickled items, jams, or marmalades on an annual basis, with much fewer (11%) purchasing them monthly, perhaps reflecting a non-interest.

Food Preservation	Sub-Category	Respondents	
		Count	*Percentages (N=52)*
Types of preservation	Drying	3	3%
	Freezing	32	31%
	Jams	22	21%
	Pickling	29	28%
	Salt	5	5%
	No Idea	13	13%
Preservation in the household	Yes	21	40%
	No	31	60%
Buying jams / pickled items / marmalades	Every Week	0	0
	Monthly	11	21%
	Yearly	41	79%

Table 18: Food Preservation

Participants were shown photos of tough broad beans, ripe tomatoes, leftover Christmas turkey and date seeds to suggest what they could do with such produce. Respondents suggested various options, such as making dips or freezing broad beans, making tomato sauce or balbujata with ripe tomatoes, and using leftover turkey to make patties, stews, wraps, or pies. However, nobody suggested anything about date seeds.

The survey data reveals that although many respondents were willing to freeze certain food items such as beef stew, pasta sauce, and bread rolls, a notable percentage of participants (21%) were unsure about freezing these items (see Table 19). Additionally, (60%) of the respondents had ever frozen beef stew, whereas a higher proportion had frozen pasta sauce (88%) and bread rolls (92%). To further understand these findings, we may apply Bronfenbrenner's ecological systems theory (Peng et al., 2018), which recognises that an individual's attitudes and behaviours regarding food preservation are impacted by several interrelated systems. These systems include cultural food consumption norms, the accessibility and convenience of preservation methods, and the overall societal attitude towards preserving food. By understanding the complex interplay of these factors, we can promote more sustainable food practices.

Leftovers	**Respondents**					
	Yes		**No**		**I Don't Know**	
	Count	*Percentages (N=52)*	*Count*	*Percentages (N=52)*	*Count*	*Percentages (N=52)*
Beef Stew	31	60%	10	19%	11	21%
Pasta Sauce	46	88%	4	8%	2	4%
Bread Rolls	48	92%	2	4%	2	4%

Table 19: Freezing Food Items

4.5 Reheating Meals

The data provided in Table 20 is related to food habits and waste management. The majority of the respondents (94%) tend to reheat meals, as it is convenient and time-

efficient, especially on busy days. Additionally, 46% of respondents believe frozen meat can be cooked, chilled and then frozen again. Most respondents (88%) would reheat lasagne, 94% would reheat pizza, and 96% would reheat pie.

Leftovers	Respondents					
	Yes		No		I Don't Know	
	Count	*Percentages (N=52)*	*Count*	*Percentages (N=52)*	*Count*	*Percentages (N=52)*
Lasagne	51	88%	6	10%	1	2%
Slice of Pizza	49	94%	3	6%	0	0%
Pie	50	96%	1	2%	1	2%

Table 20: Reheating Food Items

Regarding food waste, vegetables were the most common food item to be thrown away (29%), followed by fruit (23%), cereal products (22%) and dairy products (21%) (see Table 21). The reasons for throwing away food varied, with common answers being that the food spoils quickly (27%) and is dangerous to consume past the expiration date (33%). Other reasons include not consuming the same amount of a product every week (15%) and concerns over the packaging being too large for those living alone (6%).

Common Food Items	Respondents	
	Count	*Percentages (N=52)*
Vegetables	26	29%
Fruit	21	23%
Cereal Products	21	22%
Dairy Products	19	21%
Pantry Items	3	3%
Meat Products	2	2%

Table 21: Common Items Thrown Away

4.5 Conclusion

The study's results and analyses of household food waste can be linked to andragogy. The study collected information from participants who handled grocery shopping, food provision, food storage, and meal planning. These are all activities that require adult skills, knowledge, and experience. Hence, the study provides insights into how adults can be empowered to reduce food waste in their households by highlighting the importance of self-directed learning and taking personal responsibility. These are the key principles of andragogy.

The online survey was instrumental in identifying and analysing the food waste practices within participants' households, yielding valuable insights into the types and reasons behind such waste. These findings were then used to guide the development of a handbook aimed at educating users and encouraging food waste reduction. The various decisions on content and format of the intended user-friendly handbook will be detailed further in the following chapter.

Chapter 5

Quality and Originality of the Handbook

5.0 Introduction

The purpose of this chapter is to address the issue of household food waste and propose a solution in the form of an educational handbook. Specifically, the handbook aims to provide practical tips and guidance for reducing food waste at home, with a focus on adult food managers in households, mainly to tackle this research question.

> *What information and practical tips would adults who are the main food managers in their household find useful in an educational handbook on sustainable food waste management?*

5.1 Reasons for Choosing a Handbook

To effectively communicate practical information, an educational handbook is an ideal format. Handbooks are convenient and accessible, as they can be either a soft or hard copy and can be referred to multiple times (Smith, 2021). They also provide a structured and organised approach to presenting information, which is particularly helpful for those new to a topic, in this case sustainable food waste management (Smith, 2021).

While other resources, such as online guides or workshops, can also effectively communicate information on reducing food waste, they may not be as accessible to all households. Some households may not have reliable internet access or cannot attend in-person workshops. Additionally, handbooks offer a long-term reference for households, unlike other resources that may be less permanent and harder to access over time.

Overall, developing an educational handbook is a practical and effective way to provide households with guidance and tips on reducing food waste.

5.2 Theoretical Background

An educational handbook on sustainable food waste management could help Maltese households contribute to SDG 12, through promoting responsible consumption and production patterns and encouraging households to reduce food waste. The handbook can provide motivational advice and practical direction to help households manage their food more sustainably and reduce their environmental impact and monetary mismanagement.

For this resource to be more effective, the researcher sought to adopt a framework to help in altering behaviour, as this is a crucial component of sustainable food waste management (Redman & Redman, 2014). Acknowledging that a well-developed framework facilitates education delivery by addressing a variety of learning styles (Meyer, 2017), the handbook comprises various 'educational' messaging formats and tasks. As stated in the literature review, andragogy emphasises the significance of building upon adults' prior experiences and knowledge (Matthies, 2012). Adults learn best when the material is relevant to their everyday interests and objectives (Graham, 2017). In addition, they must be able to connect their learning to real-world experiences and be provided with opportunities to put their knowledge into practice. In this regard, any handbook needs to clearly articulate why the topic is beneficial and how the users --learners -- will benefit. This could involve incorporating practical tips and real examples that are relevant to them, encouraging them to try new skills.

5.3 Application of the Baseline Study

The baseline survey proved valuable in developing an educational handbook on sustainable food waste management. Table 22 shows how the data was used to categorise and determine which information should be included in the handbook.

Main Areas of Concern	
Outcomes from the baseline study	**Information/Tasks to include in the handbook**
40% regularly check what they have at home.	Check what they have in pantry, cupboards, fridge, and freezer and avoid unnecessary purchases.
25% of the target audience tends to purchase fresh produce in bulk during its seasonal availability.	Emphasise the value of using seasonal items in meal preparation and food preservation practices, giving examples and outlining processes.
50% of the participants checked for expiration dates.	Emphasise the importance of date labelling as it contributes to food waste generation
29% of the target audience always practises meal planning, due to a lack of time, which was the primary reason cited by 39% of the participants.	Provide tips on the proper storage of food items in the fridge or freezer, which can help save time and reduce food waste.
67% of the target audience uses leftovers the next day.	Provide practical tips on proper food storage to maximise the shelf life of leftovers.
92% of the target audience throws away food scraps.	Educate users on the concept of food scraping and how food scraps can be repurposed into completely new food items.
60% of the target audience does not practise food preservation at home.	To highlight different food preservation methods that can be easily implemented
Some users are not aware of the importance of reheating food items to eliminate bacteria	Emphasise the importance of proper reheating practises in the handbook. This can help alleviate concerns and aid those who may be afraid of this issue.
The baseline study identified vegetables (29%), fruit (23%), and cereal products (22%), as the most commonly thrown-away food items.	Plan a seasonal meal plan to minimise food waste.

Table 22: Suggestions to be implemented in the Educational Handbook

5.4 Development of the Educational Handbook

The overall purpose of developing this educational handbook was to provide practical guidance and useful information for individuals responsible for household food shopping, provision, storage and menu planning. The goal was to create an engaging resource that readers would refer to regularly. To achieve this, the handbook had to be well-structured and organised to effectively deliver its content, enabling readers to understand and implement the strategies and tips provided (Allen, 2017). The target audience of this handbook is primarily households and individuals interested in reducing their environmental impact and consequently also make better use of their income. The pedagogical approach used is learner-centred, as the researcher designed it with the needs and interests of the target audience in mind. This approach promotes active learning, as reflective questions are included to engage users and encourage critical thinking.

5.4.1 Aims and Objectives

Based on the key findings of the baseline study (Table 22), and the ultimate objective of nurturing sustainable and healthy food behaviours, the aims and objectives of the educational handbook are listed in Table 23.

Aim
● To increase awareness among individuals and families about the impacts of household food waste on the environment, society, and economy. ● To engage and empower household users to act towards reducing food waste.
Objectives
● To define household food waste and its environmental, social, and economic impacts. ● To provide information on the causes of household food waste, including factors such as food storage, meal planning, and food shopping habits. ● To offer practical guidance on how to reduce household food waste, including tips on food preservation.

Table 23: Aims and Objectives of the Educational Handbook

5.4.2 Planning the Educational Handbook

Considering the multiple implications for learning emerging from the baseline study (Table 22), while also keeping andragogy in mind, the researcher constructed a mind map (Figure 4) to facilitate the creation of an original and effective product. This specifically enabled the researcher to pinpoint the key subjects that would be the primary chapters of the handbook.

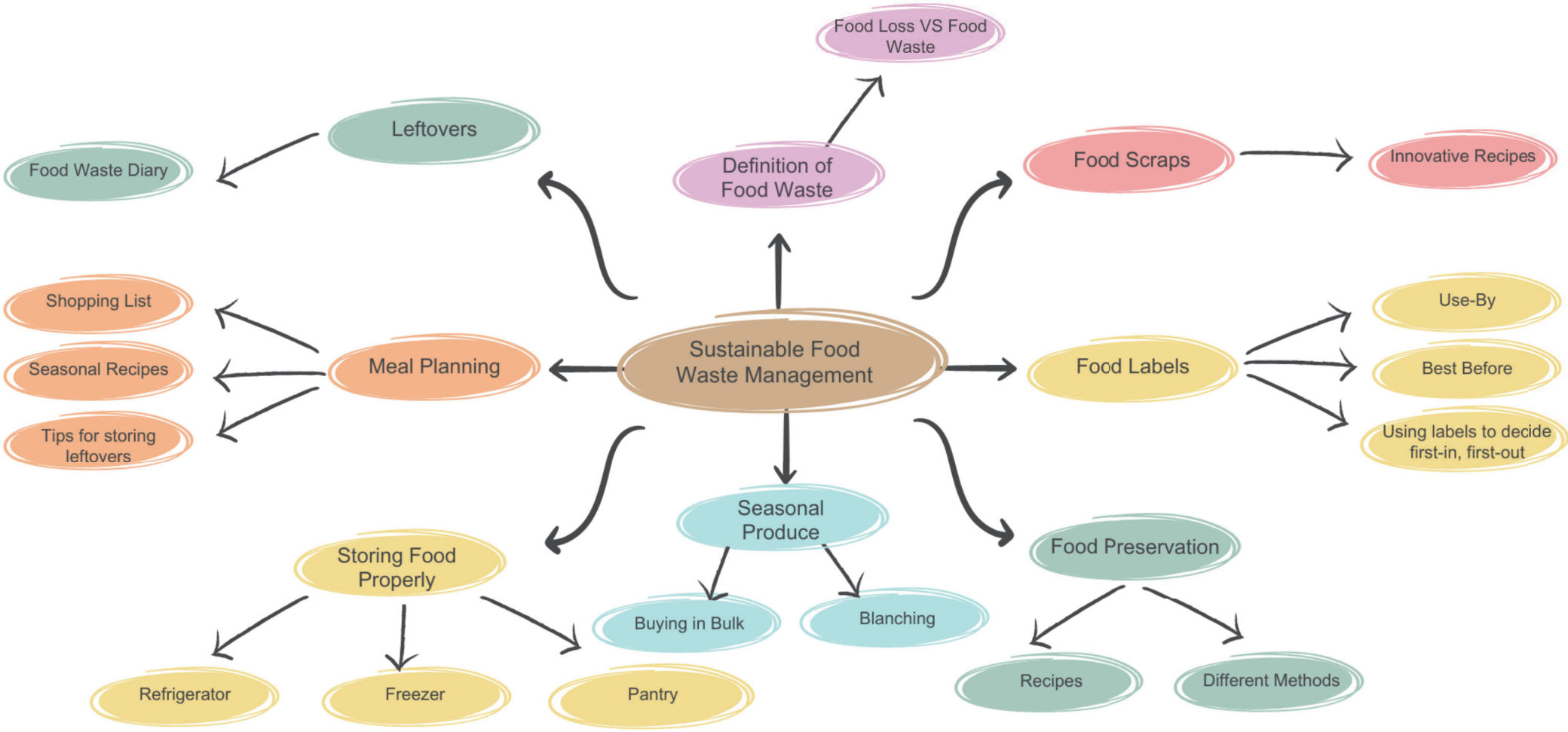


Figure 4: Mind Map

5.4.2.1 Selecting the Content

As previously stated, the educational handbook will be divided into various topics. Once the mind map was developed (Figure 4), the researcher planned the content to build in a sequential and structured way.

Introduction
Chapter 1: Grocery Shopping Tips
Chapter 2: Food Waste at Home
Chapter 3: Food Scraps… or Not
Chapter 4: Food Preservation
Chapter 5: Seasonal and Reworked Meal Plans

Figure 5: Sections of the Educational Handbook

The content chosen was relevant to the local context, particularly with regards to seasonal produce and traditional Maltese recipes. Providing relatable advice that people can easily implement in their daily lives was another crucial aspect of the content. It was also essential to ensure that any information presented was based on reliable and credible sources which the users would perceive as trustworthy. The researcher also cited the sources of all images and information used to allow users to access additional information

5.4.3 Designing the Handbook

When developing the design for the educational handbook on household food waste, several key factors were considered. First, the content was tailored to the target audience to ensure it was engaging and easy to understand. The researcher also ensured that all pertinent material was arranged in a logical and organised fashion.

Additionally, visual aids such as images were used to make the content more accessible and cater to users with different learning abilities.

After planning the chapters and determining the appropriate content and design, the researcher drafted each chapter and created a table of contents to enhance readability and facilitate ease of use for the reader. Details on each Chapter are presented below.

5.4.3.1 Introduction of the Educational Handbook

The researcher designed the handbook with the principles of andragogy in mind, recognising the target audience as adult learners. In the introduction page, the researcher provided a brief description of the handbook's five chapters. On the following page, six points were included, aimed at capturing the readers' attention and interest. By placing these points at the beginning of the handbook, the researcher aimed to highlight the urgency of reducing household food waste, as the baseline study showed that some users were not aware of its impact. The researcher also included statistics to raise awareness about the issue while keeping SDG 12 in mind to ensure the handbook is a credible source.

The introduction also includes three statements on common attitudes towards food waste, with a question aimed at encouraging readers to reflect on their own food waste habits. The use of reflective questions promotes active learning by encouraging users to think critically about the content (Chen et al., 2019). Active learning has been shown to increase knowledge retention and promote a deeper understanding of the material (Chen et al., 2019).

Furthermore, the inclusion of a quote from Pope Francis (Siers, 2017) emphasises the ethical implications of food waste and how it is linked to social inequality. These elements of the introduction are designed to create a sense of importance and urgency around reducing food waste while also appealing to readers' emotions and values.

5.4.3.2 Chapter 1: Grocery Shopping Tips

The first chapter of the educational handbook focuses on four main points: meal planning, planning a shopping list, local seasonal produce and food labels. The baseline study revealed that only 40% of people check what they have at home prior to conducting their main food shopping. To aid comprehension, the researcher divided the content into text boxes and included templates for a weekly meal plan and a shopping list to encourage users to utilise leftovers and create a logical shopping list. These would serve as a guide for those who struggle with time, as apart from food waste, planning leftovers can save time.

To ensure a comprehensive understanding, the researcher balanced clear text with inclusive photos, such as the local seasonal wheel, when discussing the importance of choosing local seasonal produce. Additionally, since 75% of people did not buy fresh produce in bulk, the researcher provided tips on the advantages of buying produce in bulk and then zoomed in on the process of blanching.

Furthermore, the researcher decided to focus on expiration dates. To engage readers and stimulate their thinking, a percentage was included, along with a description of both "best-before" and "use-by" dates. Additionally, a tip was provided to caution the

target audience against falling into the trap of buying food simply because it is on offer. Since the target audience are adults, the researcher decided to include some reflective questions to make the audience think about and critically assess their own behaviour. As stated in the literature, individuals' behaviour plays a crucial role in managing food waste (Russell et al., 2017). With respect to the microsystem, if family members have a habit of wasting food, there is a tendency for others to develop the same behaviour.

To conclude this chapter, the researcher decided to present a list of important points to consider regarding the safe storage of food. Proper storage is vital in preventing the growth of bacteria that can spoil food or contribute to food poisoning. The researcher included a photo that highlights how one should store food in the refrigerator and points out the need to label food to monitor what one has and not end up buying more than needed.

5.4.3.3 Chapter 2: Food Waste at Home

The chapter begins with a description of the difference between food loss and food waste. The researcher noted that 48% of participants from the baseline study did not rework their food; therefore, decided to include a food waste diary template with two examples. The first example focuses on over-preparation, while the second highlights the importance of communication during parties and picnics to avoid unused food. The chapter also covers leftover foods, including a diagram with a thermometer to emphasise the proper reheating temperature and a table outlining the advantages of using leftovers. While the majority of respondents (67%) saved leftovers for the next day, 4% of the respondents, unfortunately, threw them away.

5.4.3.4 Chapter 3: Food Scraps… or Not

This chapter focuses on the utilisation of food scraps, which are often neglected and thrown away. Based on the baseline study, 92% of participants reported discarding their scraps. To encourage the target audience to use these otherwise wasted resources, the researcher included innovative and easy-to-follow recipes that require only one pot or a blender and can be prepared in less than an hour. Additionally, alternative recipes are listed for readers to explore. The researcher has particularly focused on utilising bread and vegetables, which were found to be the most commonly wasted food items.

5.4.3.5 Chapter 4: Food Preservation

This chapter focuses on food preservation, beginning with an explanation of why it can help reduce food waste and how it can be achieved using methods such as heat, acids, freezing and drying. Before introducing recipes, the researcher provided instructions on how to sterilise jars to prevent contamination that could spoil the preserved food. The baseline study revealed that 40% of users had tried food preservation at home, with freezing being the most common method (31%), followed by pickling (28%). Pickling may still be popular since it was widely practised in Maltese households, mainly for preserving capers, pickled eggs, and ‘basal tal-pickles’. Given that freezing may be the preferred method because it is quick and convenient since most households have a freezer, the researcher intentionally presented new food preservation recipes to engage the audience and demonstrate the diverse range of techniques available. To reinforce the learning objectives, a crossword puzzle on food preservation techniques is included at the end of the chapter.

5.4.3.6 Chapter 5: Seasonal and Reworked Meal Plans

In the final chapter, the researcher proposed four meal plans, one for each season, focusing on the produce available, including vegetables, fruit and fish. Before each meal plan, there is a shopping list template that lists seasonal produce and allows users to check what items they already have at home. The researcher included only seasonal items on the list and left the other section blank for users to fill in the necessary items to buy.

In the meal plan, the researcher tried to include leftover meals, highlighted with the colour blue, and reworked meals, which are colour-coded purple. The researcher created a page for each recipe, listing the number of servings, preparation time, required ingredients, and method of preparation. Additionally, a note was included on how the prepared recipe could be stored, altered and/or frozen. Furthermore, the researcher categorised the recipes into different categories, namely breakfast, soups and pasta.

The aim of this chapter was to encourage the target audience to try these healthy, budget-friendly recipes, as well as try batch cooking, which could help them save time, resources and reduce the amount of food waste in the household.

5.5 Format and Style

To ensure the accessibility of the handbook to all users, the researcher considered various factors in the format and style. Andika size 13, was chosen for the font to ensure readability and legibility for all users (Lanfranco & Vella, 2017). The background colour was also chosen to be suitable and distinguishable for users with

dyslexia. Furthermore, the researcher also considered other factors, such as adequate line spacing, that makes the content more legible, particularly for users who struggle with tracking the text across lines. Additionally, bullet points and numbered lists were used to break up dense text and make the content more readable (Peters, 2022).

The language used in an educational handbook plays a crucial role in ensuring that readers comprehend the content. In this case, the language used was easy to understand and jargon was avoided. This is important because using complex language and jargon can make the content difficult to understand and readers may lose interest or become frustrated (Peters, 2022). In addition, a glossary of terms was included at the end of the handbook. This is a useful tool for readers who may encounter unfamiliar terms throughout the text. By providing definitions of these terms, readers can better understand the content and the context in which these terms are used. This approach can also help improve the reading experience and promote comprehension.

The use of images and diagrams helped illustrate concepts and made the content more engaging and memorable. The chosen colour scheme features green and pastel colours, which were selected for their calming effects on learners. Green is known to promote positive emotions, which can enhance both cognitive and emotional performance (Juviler, 2022). Meanwhile, pastel colours are less saturated and often associated with peaceful and calming vibes. The soft look of pastels helps reduce eye strain and creates a more relaxing learning environment, which will help retain information. Moreover, the use of colour highlighted important information, broke up content, and made it visually appealing. However, it was crucial to ensure that colour

was not the only means of conveying information, as some users may have colour blindness or other visual impairments (Rubio, 2020).

5.5.1 Cover Page

The cover page of an educational handbook is a key element that can make a lasting impression on readers. It serves as the first point of contact and can significantly influence their decision to engage with the content (Payne, 2021). A well-designed cover page can convey important information about the title and author. Additionally, it can visually represent the content, theme and purpose of the handbook, which can attract the target audience. The cover page's design can establish the document's credibility and professionalism, which is particularly important in educational settings. Furthermore, the images selected for the cover page will generate interest and give the reader an idea of what to expect. This approach can help make the content more engaging, memorable and effective in achieving its educational goals.

5.6 Informal Pilot Testing

The handbook was informally pilot tested with two household users to evaluate its effectiveness and ease of use. The verbal feedback received was positive, with both users finding the content easy to understand and follow. They particularly appreciated the templates, which they found helpful. One user suggested incorporating more recipes into the section on using food scraps, while the other user suggested including more information on composting. These points were taken into consideration and amendments were made accordingly.

5.7 Conclusion

In conclusion, the researcher utilised data from a baseline survey and andragogy principles to design a handbook addressing the issue of household food waste. The purpose of the handbook was to attract the attention and interest of adult learners by emphasising the importance and urgency of reducing food waste and appealing to their emotions and values. The baseline study assisted the researcher in comprehending the prevalent perspectives and behaviours related to food waste in Malta and how to address the issue. The study found that users were unaware of the negative effects of food waste, though the majority had previously utilised food preservation techniques. The handbook contained new recipes for food preservation and a crossword puzzle to aid in learning of terms. The handbook included tips and techniques for food preservation as well as seasonal recipes that were both healthy and economical. In addition, the researcher was mindful of Sustainable Development Goal 12, which seeks to ensure sustainable consumption and production patterns. The handbook linked the necessity of reducing food waste with the promotion of responsible consumption and production.

Chapter 6

Conclusions and Recommendations

6.0 Introduction

This chapter summarises the main research findings and project outcomes and proposes recommendations for further development of this dissertation. The research limitations and suggested areas for improvement are also outlined.

6.1 Main Conclusions of the Study

This dissertation offers an insight into the key features of food waste practices before, during, and after meal preparation as they occur in a sample of Maltese households. Analysis of the results suggested that there are several factors that affect humans with respect to food waste creation and management and, thus, Bronfenbrenner's Ecological Systems theory offers a useful framework to capture overall themes regarding food waste.

Microsystem	The individual's immediate environment regarding meal preparation, grocery shopping, and food storage behaviour
Mesosystem	The individual's relationship with others and the environment can be influenced by factors such as social norms and household practices which can shape their behaviours to reduce food waste.
Exosystem	Food labelling laws and expiration laws
Macrosystem	Cultural and societal values, beliefs and norms in relation to food waste creation and management

Table 24: Summary of Bronfenbrenner's Ecological systems Theory in relation to Food Waste

It was noted that contemporary individual and family lifestyles plays a crucial role since cooking preferences and practices have changed over time. Unfortunately, it seems

many people discard food without hesitation, perhaps knowing they can buy more food whenever they want if they feel financially secure, or fearful that consuming certain food may be unsafe. This behaviour has detrimental effects on responsible personal/household income budgeting, as well as on the natural environment. Lack of awareness regarding the gravity of food waste is somewhat sad in the larger scheme of things, since as mentioned in Chapter 2, according to the United Nations, 320 million individuals worldwide do not have access to enough food to lead a healthy life (FAO, 2021).

6.1.1 Main Findings from the Online Based Survey

The researcher gathered various details, mainly from women, about food habits they practise at home related to food waste. Both positive and negative behaviours were recorded. The main key findings revealed some important insights. Firstly, it was observed that only 40% of the participants consistently checked what they already had at home before going shopping. This lack of awareness contributes to the potential for purchasing unnecessary items and subsequently leads to increased food waste. Secondly, just 50% of the participants reported checking expiration dates, indicating a potential oversight that can result in the disposal of perfectly edible food. However, on a positive note, 67% of the target audience demonstrated the habit of utilising leftovers the following day, indicating existing knowledge and potential for reinforcement. These findings highlighted the need for practical advice and strategies to improve shopping practises, increase awareness of expiration dates, and further encourage the utilisation of leftovers to effectively reduce and avoid food waste.

6.1.2 The Educational Handbook

Based on the findings of the exploratory phase, the researcher developed an educational handbook on food waste management. This handbook is specifically designed for adults who are responsible for food provision, preparation, and storage in their households and who are interested in reducing their environmental impact.

The handbook consists of five chapters that cover various aspects of food waste management. Chapter 1 provides practical tips for effective grocery shopping, including planning ahead, creating shopping lists, and organising food at home to minimise waste. Chapter 2 delves into the topic of food waste at home, emphasising the importance of understanding food labelling and guiding readers on how to keep a food waste diary to track and reduce waste. Chapter 3 explores creative uses for food scraps that are often discarded, offering ideas on how to maximise the use of fruits and vegetables to minimise waste. Chapter 4 focuses on food preservation, presenting simple recipes and techniques for buying in bulk during the season and preserving food items for later use. It encourages readers to take advantage of seasonal produce and reduce waste through preservation. Finally, Chapter 5 provides practical strategies for seasonal meal planning and reworking leftovers to minimise food waste.

The handbook's design principles aim to engage readers by providing clear, step-by-step instructions and opportunities for reflection and application. By incorporating interactive elements like the crossword puzzle, the handbook promotes a learner-centred approach, encouraging readers to actively participate in their learning journey. The inclusion of such interactive activities reinforces the concepts presented and enables readers to apply their knowledge in their own homes, fostering a deeper understanding of food waste reduction strategies.

Overall, the educational handbook seeks to empower readers with the knowledge and practical tools they need to reduce food waste. By promoting learner-centred, engaging, and culturally appropriate messaging and tasks, the handbook aims to meet its objectives of providing practical advice, fostering behaviour change, and encouraging sustainable practises in food provision, preparation, and storage.

6.2 Strengths

The research study design was based on the researcher's passion as a Home Economist around food systems, consumption and better use of household resources in this case food, as well as her training as an educator and keen interest in extending education to the community. Thus, the researcher was well-suited to develop the research questions and objectives, and subsequently a well-structured strategy with appropriate procedures to answer the questions and achieve the objectives. Using Bronfenbrenner's Ecological Systems framework to guide questions development and also handbook content choice, together with application of principles of andragogy in the handbook's design displays a theoretical underpinning as well as the capacity to combine research findings with known knowledge in the area. Furthermore, using a mind map as an organising tool emphasised the researcher's capacity to graphically arrange and link numerous thoughts and concepts.

The strengths of the research can include the researcher's personal experience and familiarity with the topic of household food waste. Growing up with individuals who were already aware of this problem provided the researcher with a unique perspective and a deeper understanding of the issue. Additionally, the researcher's personal interest and passion for the topic likely motivated them to put more effort and dedication into the research, resulting in a more thorough and insightful analysis and

a more carefully designed Handbook. This combination of personal experience and interest can add a valuable perspective to the research and enhance its credibility. The outcome is a practical tool – an educational Handbook – which has the potential to be distributed broadly whether as a hard or soft copy.

6.3 Limitations

While this project-based dissertation has made a contribution to the field of household food waste reduction, through the data collected and reported, as well as the development of an educational Handbook, there are certain limitations. One of the limitations is the small size of the sample and its convenience recruitment characteristic, which precludes generalisability to the larger contemporary Maltese society. Similarly, the majority of the participants in the baseline study were women, which may limit the generalisability of the findings to both genders equally. Although the researcher attempted to collect perspectives from both males and females, limited resources and time constraints made this challenging.

Another limitation is that the researcher did not taste test with adults representative of the target audience all the recipes that were mentioned, which could jeopardise potential effectiveness. Ideally, the recipes would have all been prepared and photos taken to enhance the ‘authenticity’ of the educational handbook. Furthermore, the handbook was written in English only, which may limit its accessibility due to a literacy barrier. Translating the manual into Maltese or other languages could expand its reach and impact, especially in Malta, where both Maltese and English are official languages.

6.4 Recommendations for education policy

Based on the general findings of this study, several recommendations can be made to address the issue of food waste reduction through education and community interventions. Firstly, it is recommended that the education system prioritises even further teaching students about the harmful effects of food waste from a young age through compulsory schooling and even at post-secondary level. This could involve incorporating lessons on food waste reduction into the curriculum, through discrete subjects such as Home Economics, Science and Geography, as well as other initiatives such as Ekoskola, the Home Economics Seminar Centre, and perhaps even having peripatetic Home Economics teachers in the Primary sector on a College basis. The school system would need to provide appropriate training, resources and facilities for teachers to facilitate discussions and experiential learning activities around the topic.

Secondly, community interventions should be implemented to provide household users with tips and tools to reduce food waste. This could involve organising workshops and training sessions for community members through Local Councils or other NGOs, establishing Community kitchens for team learning, giving access to composting facilities or promoting community gardens, and establishing food-sharing networks to redistribute surplus food.

6.5 Suggestions for Future Research

This research study provokes further research ideas in the same field of interest, in relation to the literature review and based on the survey findings. The following are the researcher's main suggestions for further research:

Firstly, it is recommended to work with a larger more nationally representative sample in order to investigate consumers' attitudes, beliefs and practises in relation to food waste, and thus better understand the factors that contribute to food waste generation and management, and be able provide relevant evidence for policy and initiatives.

Secondly, a short- and long-term impact assessment should be conducted to evaluate the effectiveness of the educational handbook, "Sustainable Food Waste Management". This will provide valuable insights into how an educational resource can help nurture and facilitate sustained behaviour change and, in this case, contribute to societal change so that the reduction of food waste becomes a lasting habit and norm.

Thirdly, it is suggested to organise community-based in-person and online workshops for household food providers to practise and evaluate the guidance as provided in the educational handbook. This will provide an opportunity for participants to learn about food waste reduction as applicable to their current needs, and practise implementation of the some of the guidance given sharing back with the group facilitators and barriers to achievement. The workshop will not only be another way of obtaining feedback on the effectiveness of the handbook; but having both an online and in-person option will allow participants to choose a learning setting best suited to their lifestyles and thus encourage continued engagement, perhaps even leading to a sustained community of practice.

6.6 General Conclusion

In conclusion, this research seeks to be a catalyst for change, inspiring individuals to view the issue of household food waste from a different perspective and to take meaningful action. Even if the impact is initially felt by only a few individuals, the potential for a positive ripple effect should not be underestimated. By educating and raising awareness on the issue, there is a greater likelihood of a shift in attitudes and behaviours towards a more sustainable and mindful approach to food waste management and avoidance. Ultimately, this can lead to a significant reduction in national household food waste, resulting in a positive impact on the environment, society and the economy.

References

Afrane, G., & Ntiamoah, A. (2011). Use of Pesticides in the Cocoa Industry and Their Impact on the Environment and the Food Chain. *Pesticides In The Modern World - Risks And Benefits*. doi: 10.5772/17921

Allen, M. (2017). *The SAGE Encyclopedia of Communication Research Methods*. https://doi.org/10.4135/9781483381411

Aschemann-Witzel, J., de Hooge, I., Amani, P., Bech-Larsen, T., & Oostindjer, M. (2015). Consumer-Related Food Waste: Causes and Potential for Action. *Sustainability*, *7*(6), 6457-6477. doi: 10.3390/su7066457

Attard. (2016, May). *BREAKING THE FOODBERG A SOCIO-ECOLOGICAL STUDY OF FOOD WASTE PRODUCTION IN MALTESE HOUSEHOLDS*. Retrieved October 27, 2022, from https://www.um.edu.mt/library/oar/bitstream/123456789/15546/1/16MED0057.pdf

Bahceci, H., Martínez, M., Braun, A., Cornelisse, F., Dilrosun, D., Wang, J., & Yang, J. (2020). *Food Waste in the Maltese Retail Sector* [Ebook]. Retrieved from https://foemalta.org/wp-content/uploads/2021/01/FoEM_WU_Food_Waste_Report_2020.pdf

Bamberg, S. (2013). Changing environmentally harmful behaviors: A stage model of self-regulated behavioral change. *Journal Of Environmental Psychology*, *34*, 151-159. doi: 10.1016/j.jenvp.2013.01.002

Barrett, D. (2016). *Encyclopedia of Food and Health* [Ebook] (6th ed.). Retrieved from https://www.sciencedirect.com/topics/food-science/pickling/pdf

Bell, D., Corsten, D., & Knox, G. (2011). From Point of Purchase to Path to Purchase: How Preshopping Factors Drive Unplanned Buying. *Journal Of Marketing*, *75*(1), 31-45. doi: 10.1509/jmkg.75.1.31

Bell, J. (2005). *Doing your research project: A guide for First-time researchers in education, Health and Social Science*. Open University Press.

Bergin, T. (2018). An introduction to data analysis: Quantitative, qualitative and mixed methods. SAGE.

Boulet, M., Hoek, A. C., & Raven, R. (2021, January). Towards a multi-level framework of household food waste and consumer behaviour: Untangling spaghetti soup. *Appetite*, *156*, 104856. https://doi.org/10.1016/j.appet.2020.104856

Boulet, M., Hoek, A. C., & Raven, R. (2021, January). Towards a multi-level framework of household food waste and consumer behaviour: Untangling spaghetti soup. *Appetite*, *156*, 104856. https://doi.org/10.1016/j.appet.2020.104856

Boulet, M., Hoek, A., & Raven, R. (2021). The gaze of the gatekeeper: Unpacking the multi-level influences and interactions of household food waste through a video elicitation study. *Resources, Conservation And Recycling*, *171*, 105625. doi: 10.1016/j.resconrec.2021.105625

Bravi, L., Francioni, B., Murmura, F., & Savelli, E. (2020). Factors affecting household food waste among young consumers and actions to prevent it. A comparison among UK, Spain and Italy. *Resources, Conservation And Recycling*, *153*, 104586. doi: 10.1016/j.resconrec.2019.104586

Broad Leib, E., Beckmann, J., Ardura, A., DeBode, S., Oto, T., & Becker, J. et al. (2022). *Opportunities to Reduce Food Waste in the 2023 Farm Bill*[Ebook]. Retrieved from https://chlpi.org/wp-content/uploads/2022/04/2023-Farm-Bill-Food-Waste.pdf

Broom, D. (2019). *South Korea once recycled 2% of its food waste. Now it recycles 95%* [Ebook]. Retrieved from https://www.weforum.org/agenda/2019/04/south-korea-recycling-food-waste/

Buzby, J., & Hyman, J. (2012). *Total and per capita value of food loss in the United States*. Pdf.sciencedirectassets.com. Retrieved 22 July 2022, from https://pdf.sciencedirectassets.com/271787/1-s2.0-S0306919212X00058/1-s2.0-S0306919212000693/main.pdf?X-Amz-Security-

Caldeira, Cobalea, De Laurentiis, & Sala. (2019). *Review of studies on food waste accounting at Member State level* . Retrieved July 28, 2022, from https://eplca.jrc.ec.europa.eu/uploads/food_systems_report%203.pdf

Carrus, Lettmayer, Schwarzinger, & Pihkola. (2019). *Lifestyle changes and sustainable transition in neighbourhoods*. Retrieved April 15, 2023, from https://www.cleancultures.org/wp-content/uploads/2023/04/CLEANcultures_D2.1_Lifestyles.pdf

Caruana, V., Piscopo, S., Cutajar, S., Levikov, N., & Ali, M. for the President's Foundation for the Wellbeing of Society. (2018). *Access to Healthy, Clean and Fair Food: An*

exploratory Study of the Maltese Scenario. President's Foundation for the Wellbeing of Society.

Chen, M. A., Hwang, G., & Chang, Y. (2019, May 27). A reflective thinking-promoting approach to enhancing graduate students' flipped learning engagement, participation behaviors, reflective thinking and project learning outcomes. *British Journal of Educational Technology*, *50*(5), 2288–2307. https://doi.org/10.1111/bjet.12823

Choon, C. (2016). South Korea cuts food waste with 'pay as you trash'. Retrieved 29 August 2022, from https://www.straitstimes.com/asia/east-asia/south-korea-cuts-food-waste-with-pay-as-you-trash

Chrisafis, A. (2015). France to force big supermarkets to give unsold food to charities. Retrieved 30 August 2022, from https://www.theguardian.com/world/2015/may/22/france-to-force-big-supermarkets-to-give-away-unsold-food-to-charity

Clark, J. (1998). Retrieved 20 July 2022, from https://www.cambridge.org/core/services/aop-cambridge-core/content/view/ECF4D52E9B714DC791163168DADCBEFB/S0029665198000962a.pdf/taste-and-flavour-their-importance-in-food-choice-and-acceptance.pdf

Clinical Medicine. (2010). Retrieved 20 July 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4951875/pdf/624.pdf

Creswell, J. W. (2017). Research design. qualitative, quantitative, and mixed methods approach. SAGE Publications.

Creswell, J. W., & Plano Clark, P. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE.

Date marking and food waste prevention. (n.d.). Retrieved April 23, 2023 from https://food.ec.europa.eu/safety/food-waste/eu-actions-against-food-waste/date-marking-and-food-waste-prevention_en

Davies, M., & Hughes, N. (2014). *Doing a successful research project: Using qualitative or quantitative methods*. Palgrave Macmillan.

de Hooge, I., Oostindjer, M., Aschemann-Witzel, J., Normann, A., Loose, S., & Almli, V. (2017). This apple is too ugly for me!. *Food Quality And Preference*, *56*, 80-92. doi: 10.1016/j.foodqual.2016.09.012

Diekmann, L., & Germelmann, C. (2021). *Leftover Consumption as a Means of Food Waste Reduction in Public Space? Qualitative Insights from Online Discussions*. Retrieved 28 July 2022, from. https://www.mdpi.com/2071-1050/13/24/13564

EkoSkola Malta. Food Waste Action Plan for Malta - EkoSkola. Retrieved 30 August 2022, from https://ekoskola.org.mt/resource/food-waste-action-plan-for-malta/

European Commission. (2016). Retrieved 28 July 2022, from https://food.ec.europa.eu/safety/food-waste_en.

European Commission. (2020). Retrieved 30 August 2022, from https://food.ec.europa.eu/safety/food-waste/eu-actions-against-food-waste_en

European Court of Auditors. (2016). *Combating Food Waste: an opportunity for the EU to improve the resource-efficiency of the food supply chain* [Ebook]. Retrieved from https://www.eca.europa.eu/Lists/ECADocuments/SR16_34/SR_FOOD_WASTE_EN.pdf

European Environment Agency. (2021). *Overview of national waste prevention programmes in Europe - Malta* [Ebook]. Retrieved from http://file:///Users/Claire/Downloads/Malta%20Waste%20Prevention%20Country%20Profile%202021.pdf

European Parliament. (2017). *Food waste: the problem in the EU in numbers [infographic] | News | European Parliament*. Europarl.europa.eu. Retrieved 28 July 2022, from https://www.europarl.europa.eu/news/en/headlines/society/20170505STO73528/food-waste-the-problem-in-the-eu-in-numbers-infographic.

Eurostat. (2020). *492 kg of municipal waste generated per person in the EU*. Ec.europa.eu. Retrieved 28 July 2022, from https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20200318-1.

Evans, D. (2011). Beyond the Throwaway Society: Ordinary Domestic Practice and a Sociological Approach to Household Food Waste. *Sociology*, *46*(1), 41-56. doi: 10.1177/0038038511416150

FAO, -. (2013). *Chapter 5 Baseline Study in PRCA*. Participatory Rural Communication Appraisal. Retrieved November 10, 2022, from https://www.fao.org/3/y5793e/y5793e07.htm

FAO. (2013). *Food wastage footprint: Impacts on natural resources*. Fao.org. Retrieved 22 July 2022, from https://www.fao.org/3/i3347e/i3347e.pdf.

FAO. (2017). SAVE FOOD: Global Initiative on Food Loss and Waste Reduction. Retrieved 29 August 2022, from https://www.fao.org/save-food/news-and-multimedia/news/news-details/en/c/1036297/

FAO. (2020). 15 quick tips for reducing food waste and becoming a Food hero. Retrieved 30 August 2022, from https://www.fao.org/fao-stories/article/en/c/1309609/

FAO. (2021). The State of Food Security and Nutrition in the World 2021. Retrieved 29 August 2022, from https://www.fao.org/state-of-food-security-nutrition/2021/en/

FAO. (2022). FAO Food Price Index | World Food Situation | Food and Agriculture Organization of the United Nations. Retrieved 17 August 2022, from https://www.fao.org/worldfoodsituation/foodpricesindex/en/

Flanagan, K., Robertson, K., & Hanson, C. (2019). *Reducing Food Loss and Waste: Setting a Global Action Agenda* [Ebook]. Retrieved from https://wriorg.s3.amazonaws.com/s3fs-public/reducing-food-loss-waste-global-action-agenda_0.pdf

Food and Agriculture Organisation of the United Nations. Sustainability Pathways: Food loss and waste. Retrieved 21 July 2022, from https://www.fao.org/nr/sustainability/food-loss-and-waste/en/

Food and Agriculture Organization of the United Nations. (2018). *DO GOOD: SAVE FOOD! EDUCATION MATERIAL PACKAGE ON FOOD WASTE REDUCTION IN PRIMARY AND SECONDARY SCHOOLS* [Ebook]. Retrieved from https://www.fao.org/3/ca1170en/ca1170en.pdf

Food labelling rules. (2022, September 16). Retrieved April 23, 2023, from https://europa.eu/youreurope/business/product-requirements/food-labelling/general-rules/index_en.htm#shortcut-0

Food Print. (2018). The Problem of Food Waste. Retrieved 21 July 2022, from https://foodprint.org/issues/the-problem-of-food-waste/

Food Sustainability Index. (2021). *Food Sustainability Index 2021 Global Executive Summary* [Ebook].

Food Waste in America in 2021: Statistics & Facts. (2022). [Ebook]. Retrieved from https://www.rts.com/wp-content/uploads/2021/04/RTS_Food_Waste_Guide_2021.pdf

Fowler, F. J. (2009). Sampling. *Survey Research Methods (4th Ed.)*, 18–47. https://doi.org/10.4135/9781452230184.n3

FUSIONS. (2016). [Ebook]. Retrieved from https://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf

Geislar, S. (2019). The Determinants of Household Food Waste Reduction, Recovery, and Reuse: Toward a Household Metabolism. *Encyclopedia Of Food Security And Sustainability*, 567-574. doi: 10.1016/b978-0-08-100596-5.22448-7

Giordano, C., Alboni, F., Cicatiello, C., & Falasconi, L. (2018). Do discounted food products end up in the bin? An investigation into the link between deal-prone shopping behaviour and quantities of household food waste. *International Journal Of Consumer Studies*, *43*(2), 199-209. doi: 10.1111/ijcs.12499

Giovanni, M. (2020). Report: Food Waste in the Maltese Retail Sector - Friends Of the Earth Malta. Retrieved 28 August 2022, from https://foemalta.org/blog/foodwastestudy/

Gjerris, M., & Gaiani, S. (2013). View of Household food waste in Nordic countries: Estimations and ethical implications. Retrieved 21 July 2022, from https://www.ntnu.no/ojs/index.php/etikk_i_praksis/article/view/1786/1783

Godoy, M. (2016). NPR Cookie Consent and Choices. Retrieved 30 August 2022, from https://www.npr.org/sections/thesalt/2016/07/20/486664266/walmart-world-s-largest-grocer-is-now-selling-ugly-fruit-and-veg?t=1661865736961

González-Santana, R., Blesa, J., Frígola, A., & Esteve, M. (2020). Dimensions of household food waste focused on family and consumers. *Critical Reviews In Food Science And Nutrition*, *62*(9), 2342-2354. doi: 10.1080/10408398.2020.1853033

Graham (Ed.). (2017, April 13). *A Simple, Easy to Understand Guide to Andragogy | Cornerstone University*. Cornerstone University. Retrieved May 9, 2023, from https://www.cornerstone.edu/blog-post/a-simple-easy-to-understand-guide-to-andragogy/

Graham-Rowe, E., Jessop, D., & Sparks, P. (2014). Identifying motivations and barriers to minimising household food waste. *Resources, Conservation And Recycling*, *84*, 15-23. doi: 10.1016/j.resconrec.2013.12.005

Graham-Rowe, E., Jessop, D., & Sparks, P. (2015). Predicting household food waste reduction using an extended theory of planned behaviour. *Resources, Conservation And Recycling*, *101*, 194-202. doi: 10.1016/j.resconrec.2015.05.020

Greene, J. C. (2007). Mixed methods in social inquiry. Jossey Bass.

Gunders, D. (2012). *Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill* [Ebook]. Retrieved from https://www.ccrrc.org/wp-content/uploads/sites/24/2014/03/wasted-food-IP.pdf

Gunders, D., & Bloom, J. (2017). *WASTED: HOW AMERICA IS LOSING UP TO 40 PERCENT OF ITS FOOD FROM FARM TO FORK TO LANDFILL* [Ebook]. Retrieved from https://www.nrdc.org/sites/default/files/wasted-2017-report.pdf

Gustavsson, J., & Cederberg, C. (2011). Retrieved 20 July 2022, from https://www.fao.org/3/mb060e/mb060e00.pdf

Hagedorn, W., & Wilts, H. (2019). Who should waste less? Food waste prevention and rebound effects in the context of the Sustainable Development Goals. *GAIA - Ecological Perspectives For Science And Society*, *28*(2), 119-125. doi: 10.14512/gaia.28.2.10

Haig, D. (2018). The Philosophy of Quantitative Methods. Oxford University Press.

Hesse-Biber, S. N., Johnson, B., & Kelly, U. (2016). Mixed methods and the problems of theory building and theory testing in the social sciences. In The Oxford Handbook of multimethod and Mixed Methods Research Inquiry(pp. 594–605). essay, Oxford University Press.

Himmelheber, S. (2013). *American wasteland : how America throws away nearly half of its food (and what we can do about it) : Bloom, Jonathan, 1976- : Free Download,*

Borrow, and Streaming : Internet Archive. Internet Archive. Retrieved 22 July 2022, from https://archive.org/details/americanwastelan0000bloo.

Hutchings, J. (2011). *Food Color and Appearance*. New York: Springer.

International Trade Administration. (2021). *Malta - Waste Management*. International Trade Administration | Trade.gov. Retrieved 28 July 2022, from https://www.trade.gov/country-commercial-guides/malta-waste-management#:~:text=Under%20the%20new%20EU%20rules,and%2065%20percent%20by%202035.

Ishangulyyev, R., Kim, S., & Lee, S. (2019). Understanding Food Loss and Waste—Why Are We Losing and Wasting Food?. *Foods*, *8*(8), 297. doi: 10.3390/foods8080297

Jayasinghe, J., & De Silva, L. (2014). Fast Food Consumption and Health Status of Students of a University in Sri Lanka. Retrieved 30 August 2022, from https://d1wqtxts1xzle7.cloudfront.net/74483117/download-with-cover-page-v2.pdf?Expires=1661855238&Signature=PPCk4ftnItfUokvUchNttnYoSZsj-pe7g6Odk1dY7AMThEiC~pZuLmHT-mvuqfgi~IUqGJ9z9eY1QDdTQLFz7nGEtHOcqy-znLDza006omoIgggKgjONk5oJaGHc7HYD6-iC0KhQo5g8ytFJtJonG1h3Ye16Uhus8skfa3CsId-7NlG5~VQfwchKB9NRCdD7u4zXfWyTu~XnT72or1IOznJYJ234zfVLjU2NUFc7CAM9bFztNKphnsl4L~xQc7Cf7GhsM~kbXwY9Ic5oeqY~wKmRxr0rjWuYMyA8U2cRpm4FQmckN5pO0Yud8nV4cT3HImUoMrrYsXn6D5RUbOo2fg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

Juviler. (2022, April 1). *The 20Best Color Combinations to Try on Your Website [Bookmarkable Guide]*. The 20Best Color Combinations to Try on Your Website [Bookmarkable Guide]. Retrieved May 9, 2023, from https://blog.hubspot.com/website/website-color-schemes

Kiaya, V. (2014). *POST-HARVEST LOSSES AND STRATEGIES TO REDUCE THEM*. Action contre la Faim. Retrieved 22 July 2022, from https://www.actioncontrelafaim.org/en/publication/post-harvest-losses-and-strategies-to-reduce-them/.

Kiely, K. (2017). Two-Thirds of Food Wasted at Home in Three Major U.S. Cities Is Edible. Retrieved 10 August 2022, from https://www.nrdc.org/media/2017/171024-0

Kim, M. (2019). The Country Winning The Battle On Food Waste [Blog]. Retrieved from https://www.huffingtonpost.co.uk/entry/food-waste-south-korea-seoul_n_5ca48bf7e4b0ed0d780edc54?guccounter=1

Koivupuro, H., Hartikainen, H., Silvennoinen, K., Katajajuuri, J., Heikintalo, N., Reinikainen, A., & Jalkanen, L. (2012). Influence of socio-demographical, behavioural and attitudinal factors on the amount of avoidable food waste generated in Finnish households. *International Journal Of Consumer Studies*, *36*(2), 183-191. doi: 10.1111/j.1470-6431.2011.01080.x

Koppel, K., Higa, F., Godwin, S., Gutierrez, N., Shalimov, R., & Cardinal, P. et al. (2016). Food Leftover Practices among Consumers in Selected Countries in Europe, South and North America. *Foods*, *5*(4), 66. doi: 10.3390/foods5030066

Kotinsky, R. (2006). [Ebook]. Retrieved from https://infed.org/andragogy-what-is-it-and-does-it-help-thinking-about-adult-learning/

Kuczynski, J.-M. (2012). Empiricism and the foundations of psychology. Advances in Consciousness Research. https://doi.org/10.1075/aicr.87

Lanfranco, & Vella. (2017). *A journal of educational matters* (Debono, Ed.). Retrieved April 30, 2023, from https://mut.org.mt/wp-content/uploads/2018/02/The-Educator-4-2017.pdf

Leavy, P. (2017). Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based... participatory research approaches. GUILFORD.

Leiden, B. N. V. (2012). Empiricism. Historical Materialism, 20(3), 213–218. https://doi.org/10.1163/1569206x-12341264

Lemos, L. (2019). 4 ways France is leading the food waste agenda [Blog]. Retrieved from https://blog.winnowsolutions.com/4-ways-france-is-leading-the-food-waste-agenda

Ligon, V. (2014). *SHOP MORE, BUY LESS: A QUALITATIVE INVESTIGATION INTO CONSUMER DECISIONS THAT LEAD TO FOOD WASTE IN U.S. HOUSEHOLDS* (Master of Science). THE UNIVERSITY OF ARIZONA.

Love Food Hate Waste Survey. (2021). It's Time for Action. Retrieved 30 August 2022, from

https://www.lovefoodhatewaste.com/article/TakeAction?_ga=2.139713719.527198 41.1661845290-785719832.1650876791

Lusk, J., & Ellison, B. (2016). A note on modelling household food waste behaviour. *Applied Economics Letters*, *24*(16), 1199-1202. doi: 10.1080/13504851.2016.1265070

M&E, O. (2013). BASELINE STUDIES/ SURVEYS [web log]. Retrieved 2022, from https://evaluateblog.wordpress.com/2013/05/28/baseline-studies-surveys/.

Mann, T., de Ridder, D., & Fujita, K. (2013). Self-regulation of health behavior: Social psychological approaches to goal setting and goal striving. *Health Psychology*, *32*(5), 487-498. doi: 10.1037/a0028533

Manning-Schaffel, V. (2019). Eat it or toss it: A guide to leftovers. Retrieved 10 August 2022, from https://www.nbcnews.com/better/lifestyle/guide-leftovers-how-store-them-safely-when-toss-them-ncna868316

Matthies, E. (2012). *Informational strategies to promote pro-environmental behaviours: Changing knowledge, awareness, and attitudes* [Ebook]. Retrieved from https://www.researchgate.net/publication/285668068_Informational_strategies_to_promote_pro-environmental_behaviours_Changing_knowledge_awareness_and_attitudes

McCarthy, N. (2021). The Enormous Scale Of Global Food Waste [Infographic]. Retrieved 30 August 2022, from https://www.forbes.com/sites/niallmccarthy/2021/03/05/the-enormous-scale-of-global-food-waste-infographic/?sh=77af167526ac

MEAE. (2014). *Malta's Sustainable Development Vision for 2050*[Ebook]. Retrieved from https://meae.gov.mt/en/Public_Consultations/MSDEC/Documents/Malta%27s%20Sustainable%20Development%20Vision%20for%202050.pdf

Melikoglu, M., Lin, C., & Webb, C. (2013). Analysing global food waste problem: pinpointing the facts and estimating the energy content. Retrieved 21 July 2022, from https://link.springer.com/article/10.2478/s13531-012-0058-5

Mellon, A. (2020). The Sustainable Restaurant Association and Just Eat Fight Food Waste - Food Made Good UK. Retrieved 4 September 2022, from https://www.foodmadegood.org/the-sustainable-restaurant-association-and-just-eat-fight-food-waste/

Meyer. (2017, March 16). *Teaching and Learning Frameworks*. Teaching and Learning Frameworks. Retrieved May 7, 2023, from https://poorvucenter.yale.edu/BackwardDesign

Minister for Sustainable Development, the Environment and Climate Change. (2014). *Waste Management Plan for the Maltese Islands 2014 – 2020*.

Morgan, D. L. (2007). Paradigms lost and Pragmatism regained. Journal of Mixed Methods Research, 1(1), 48–76. https://doi.org/10.1177/2345678906292462

MSDEC. (2014). *Food Waste Working Group* [Ebook]. Retrieved from https://cdn-others.timesofmalta.com/5265204cf0897ce810e13dab2f70adc421d55f42.pdf

Müller, O., & Krawinkel, M. (2005). Retrieved 20 July 2022, from https://www.cmaj.ca/content/cmaj/173/3/279.full.pdf

Nielsen, K. (2017). From prediction to process: A self-regulation account of environmental behavior change. *Journal Of Environmental Psychology*, *51*, 189-198. doi: 10.1016/j.jenvp.2017.04.002

Njeri-Otieno, G. (2021, July 23). *How to code A questionnaire in Microsoft Excel (A practical guide)*. Resourceful Scholars' Hub. Retrieved November 21, 2022, from https://resourcefulscholarshub.com/questionnaire-coding-in-microsoft-excel/

NRDC. (2017). Nrdc.org. Retrieved 22 July 2022, from https://www.nrdc.org/sites/default/files/wasted-2017-report.pdf.

Nunkoo, R., Bhadain, M., & Baboo, S. (2021). Household food waste: attitudes, barriers and motivations. *British Food Journal*, *123*(6), 2016-2035. doi: 10.1108/bfj-03-2020-0195

OECD. (2008). [Ebook]. Retrieved from https://www.oecd.org/environment/consumption-innovation/42183878.pdf

OXFAM. (2012). *food waste | Oxfam International*. Oxfam International. Retrieved 28 July 2022, from https://www.oxfam.org/en/tags/food-waste.

Pallant, J. (2020). SPSS survival manual. https://doi.org/10.4324/9781003117452

Parfitt, J., Barthel, M., & Macnaughton, S. (2015). Food waste within food supply chains: quantification and potential for change to 2050. Retrieved 21 July 2022, from https://royalsocietypublishing.org/doi/epdf/10.1098/rstb.2010.0126

Parizeau, K., von Massow, M., & Martin, R. (2015). Household-level dynamics of food waste production and related beliefs, attitudes, and behaviours in Guelph, Ontario. *Waste Management*, *35*, 207-217. doi: 10.1016/j.wasman.2014.09.019

Payne, C. (2021, December 15). *Book Cover Design Basics*. Book Cover Design Basics. https://www.ingramspark.com/blog/book-cover-design-basics

Pearson, P., & Cappa, S. (2022). *Reducing Food Waste is Imperative: Solutions for Food Loss*. World Wildlife Fund. Retrieved 28 July 2022, from https://www.worldwildlife.org/initiatives/food-waste.

Peng, W., Dernini, S., & Berry, E. M. (2018, November 15). Coping With Food Insecurity Using the Sociotype Ecological Framework. *Frontiers in Nutrition*, *5*. https://doi.org/10.3389/fnut.2018.00107

Peters. (2022). Plain Language Guidelines [Online Document]. In Loschnig (Ed.), *Opening Doors: A Literacy Audit Tool Kit* (Revised Edition, pp. 40–50). Community Learning Network. https://calp.ca/_uploads/63a4b33634257.pdf

Phillips, D. C., & Burbules, N. C. (2000). Postpositivism and Educational Research.Rowman & Littlefield.

Quested, T., Marsh, E., Stunell, D., & Parry, A. (2013). Spaghetti soup: The complex world of food waste behaviours. *Resources, Conservation And Recycling*, *79*, 43-51. doi: 10.1016/j.resconrec.2013.04.011

Raak, N., Symmank, C., Zahn, S., Aschemann-Witzel, J., & Rohm, H. (2017). Processing- and product-related causes for food waste and implications for the food supply chain. *Waste Management*, *61*, 461-472. doi: 10.1016/j.wasman.2016.12.027

Racz, A., Marchesi, V., & Crnković, I. (2018). Retrieved 21 July 2022, from https://hrcak.srce.hr/en/file/302956

Ranganathan, J., Waite, R., Searchinger, T., & Hanson, C. (2018). How to Sustainably Feed 10 Billion People by 2050, in 21 Charts. Retrieved 30 August 2022, from https://www.wri.org/insights/how-sustainably-feed-10-billion-people-2050-21-charts

Redman, E., & Redman, A. (2014, February). Transforming sustainable food and waste behaviors by realigning domains of knowledge in our education system. *Journal of Cleaner Production*, *64*, 147–157. https://doi.org/10.1016/j.jclepro.2013.09.016

ReFED. (2021). Food Waste Solutions - Reduce Food Waste, Food Recycling & Recovery. Retrieved 10 August 2022, from https://refed.org/?sort=economic-value-per-ton

Reynolds, C., Soma, T., Spring, C., & Lazell, J. (2020). *Routledge handbook of food waste*.

Ringland, M. (2022). Tackling Rising Food Prices and Food Waste in 2022 - ReFED. Retrieved 29 August 2022, from https://refed.org/articles/tackling-rising-food-prices-and-food-waste-in-2022/

Robinson. (2018). *Theoretical Framework* . Theoretical Framework - Office for Multicultural Learning - Santa Clara University. Retrieved June 7, 2023, from https://www.scu.edu/oml/about-us/theoretical-framework/

Rosa, F., & FoodWIN. (2018). *THE STORY OF Bruges CASE STUDY*[Ebook]. Retrieved from https://zerowasteeurope.eu/wp-content/uploads/2018/09/zero_waste_europe_cs11_bruges_en.pdf

RTS. (2022). Food Waste in America in 2022: Statistics & Facts | RTS. Retrieved 20 August 2022, from https://www.rts.com/resources/guides/food-waste-america/

Rubio. (2020, April 15). *Easy Guide To Choose A Colour Palette For Your Design | Contributor FP*. Contributor FP. Retrieved May 9, 2023, from https://contributor.freepik.com/blog/easy-guide-to-choose-a-color-palette-for-your-design/

Ruel, E., Wagner III , W. E., & Gillespie, B. J. (2016). Survey question construction. *The Practice of Survey Research: Theory and Applications*, 44–77. https://doi.org/10.4135/9781483391700.n4

Russell, S. V., Young, C. W., Unsworth, K. L., & Robinson, C. (2017, October). Bringing habits and emotions into food waste behaviour. *Resources, Conservation and Recycling*, *125*, 107–114. https://doi.org/10.1016/j.resconrec.2017.06.007

Schanes, K., Dobernig, K., & Gözet, B. (2018). Food waste matters - A systematic review of household food waste practices and their policy implications. *Journal Of Cleaner Production*, *182*, 978-991. doi: 10.1016/j.jclepro.2018.02.030

Sheeran, P., & Webb, T. (2016). The Intention-Behavior Gap. *Social And Personality Psychology Compass*, *10*(9), 503-518. doi: 10.1111/spc3.12265

Shi, R., Irfan, M., Liu, G., Yang, X., & Su, X. (2022, February 11). Analysis of the Impact of Livestock Structure on Carbon Emissions of Animal Husbandry: A Sustainable Way to Improving Public Health and Green Environment. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.835210

Siers, J. (2017, July 6). *Stealing from the Table of the Poor and Hungry - EndHunger*. EndHunger. https://endhunger.org/stealing-from-the-table-of-the-poor-and-hungry/

Smith (Ed.). (2021, December 14). *8 Reasons You Should Have a Company Employee Handbook*. Paycor. Retrieved April 25, 2023, from https://www.paycor.com/resource-center/articles/8-reasons-you-should-have-a-company-employee-handbook/

SPORE. (2019). *Post-harvest management. Adding value to crops. The magazine for agricultural and rural development in ACP countries.N° 152*. Retrieved 22 July 2022, from http://spore.cta.int/en.

Stefan, V., van Herpen, E., Tudoran, A., & Lähteenmäki, L. (2013). Avoiding food waste by Romanian consumers: The importance of planning and shopping routines. *Food Quality And Preference*, *28*(1), 375-381. doi: 10.1016/j.foodqual.2012.11.001

Stenmarck, Å., Jensen, C., Quested, T., & Moates, G. (2016). *Estimates of European food waste levels* [Ebook]. Retrieved from http://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf

Stöckli, S., Niklaus, E., & Dorn, M. (2018). Call for testing interventions to prevent consumer food waste. *Resources, Conservation And Recycling*, *136*, 445-462. doi: 10.1016/j.resconrec.2018.03.029

Survey Planet, (2022). Survey descriptive research: Method, design, and examples [web log]. Retrieved November 10, 2022, from https://blog.surveyplanet.com/top-10-advantages-of-online-surveys-you-should-know-about.

Taravella, S. (2019). The United Nations World Food Programme launches a global movement to help fight food waste | World Food Programme. Retrieved 30 August 2022, from https://www.wfp.org/news/united-nations-world-food-programme-launches-global-movement-help-fight-food-waste

Taylor. (2021, October 5). *Making Vegetable Stock From Kitchen Scraps - Extra Helpings*. By Blue Apron. Retrieved May 7, 2023, from https://blog.blueapron.com/vegetable-scraps-arent-kitchen-waste-theyre-soup-material/

Teddlie, C., & Tashakkori, A. (2008). Foundations of mixed methods research integrating quantitative and qualitative approaches in the social and Behavioral Sciences. Sage.

Tournas, V., Stack, M., Mislivec, P., Koch, H., & Bandler, R. (2001). BAM Chapter 18: Yeasts, Molds and Mycotoxins. Retrieved 30 August 2022, from https://www.fda.gov/food/laboratory-methods-food/bam-chapter-18-yeasts-molds-and-mycotoxins

UN Environment Programme. Definition of food loss and waste. Retrieved 21 July 2022, from https://www.unep.org/thinkeatsave/about/definition-food-loss-and-waste

UN Environment. (2014). Worldwide food waste. Retrieved 10 August 2022, from https://www.unep.org/thinkeatsave/get-informed/worldwide-food-waste

UNDP. (2020). Sustainable Development Goals | United Nations Development Programme. Retrieved 29 August 2022, from https://www.undp.org/sustainable-development-goals?utm_source=EN&utm_medium=GSR&utm_content=US_UNDP_PaidSearch_Brand_English&utm_campaign=CENTRAL&c_src=CENTRAL&c_src2=GSR&gclid=EAIaIQobChMIiOrj19nr-QIVaI9oCR1rSQt-EAAYASAAEgJXG_D_BwE#responsible-consumption-and-production

UNEP. (2021). [Ebook]. Retrieved from https://wedocs.unep.org/bitstream/handle/20.500.11822/25183/TES_FoodKit%20ToolKit_WEB.pdf?sequence=1&#:~:text=Think.-,Eat.,significantly%20reduced%20around%20the%20world

UNEP. Why the global fight to tackle food waste has only just begun. Retrieved 30 August 2022, from https://www.unep.org/news-and-stories/story/why-global-fight-tackle-food-waste-has-only-just-begun

United Nations Environment Programm. (2022). *REDUCING CONSUMER FOOD WASTE USING GREEN AND DIGITAL TECHNOLOGIES* [Ebook]. Retrieved from

https://unepccc.org/wp-content/uploads/2022/03/reducing-consumer-food-waste-using-green-and-digital-technologies.pdf

United Nations Environment Programme. (2021). [Ebook]. Retrieved from http://file:///Users/Claire/Downloads/FoodWaste.pdf

United Nations Human Rights. (2019). Retrieved 20 July 2022, from https://www.ohchr.org/sites/default/files/Documents/Publications/FactSheet34en.pdf

United Nations. (2022). [Ebook]. Retrieved from https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/undesa_pd_2022_policy_brief_population_growth.pdf

URBACT. (2022). A FOOD WASTE URBAN APPROACH - To reduce the depletion of natural resources, limit environmental impacts, and make the food system more circular. Retrieved 30 August 2022, from https://urbact.eu/food-waste-urban-approach-reduce-depletion-natural-resources-limit-environmental-impacts-and-make

USDA. (2015). Retrieved 30 August 2022, from https://www.usda.gov/foodwaste/faqs#:~:text=In%20the%20United%20States%2C%20food,worth%20of%20food%20in%202010.

van der Werf, P., Seabrook, J., & Gilliland, J. (2019). “Reduce Food Waste, Save Money”: Testing a Novel Intervention to Reduce Household Food Waste. *Environment And Behavior*, *53*(2), 151-183. doi: 10.1177/0013916519875180

van Geffen, L., van Herpen, E., & van Trijp, H. (2019). Household Food Waste—How to Avoid It? An Integrative Review. *Food Waste Management*, 27-55. doi: 10.1007/978-3-030-20561-4_2

Vella, D. (2016). *Analysing Household Food Waste in the Maltese Islands* (Undergraduate). UOM.

von Massow, M., Parizeau, K., Gallant, M., Wickson, M., Haines, J., & Ma, D. et al. (2019). Valuing the Multiple Impacts of Household Food Waste. *Frontiers In Nutrition*, *6*. doi: 10.3389/fnut.2019.00143

Watson, M., & Meah, A. (2012). Food, Waste and Safety: Negotiating Conflicting Social Anxieties into the Practices of Domestic Provisioning. *The Sociological Review*, *60*(2_suppl), 102-120. doi: 10.1111/1467-954x.12040

Webb. (2013). Safely Canning Food at Home | HealthUnit Haldimand-Norfolk. Retrieved 30 August 2022, from https://hnhu.org/safely-canning-food-at-home/

World Food Programme. (2020). 5 facts about food waste and hunger | World Food Programme. Retrieved 30 August 2022, from https://www.wfp.org/stories/5-facts-about-food-waste-and-hunger

World Food Programme. (2022). Donate | World Food Programme. Retrieved 20 July 2022, from https://www.wfp.org/support-us/stories/donate?utm_source=google&utm_medium=cpc&utm_campaign=11487077959&utm_content=111568931185&gclid=Cj0KCQjwz96WBhC8ARIsAATR253ot0fq1KlHf4IMhHywRGt0KiHCuJMORiNtVZJgNtEqtJQ0ymE6lCAaAqiREALw_wcB&gclsrc=aw.ds

World Health Organisation. (2022). UN Report: Global hunger numbers rose to as many as 828 million in 2021. Retrieved 20 July 2022, from https://www.who.int/news/item/06-07-2022-un-report--global-hunger-numbers-rose-to-as-many-as-828-million-in-2021#:~:text=As%20many%20as%20828%20million%20people%20were%20affected%20by%20hunger,9.8%25%20of%20the%20world%20population

worldwildlife. Fight climate change by preventing food waste. Retrieved 20 August 2022, from https://www.worldwildlife.org/stories/fight-climate-change-by-preventing-food-waste

WRAP. (2017). Food date labelling. Retrieved 10 August 2022, from https://wrap.org.uk/taking-action/food-drink/actions/date-labelling

WRAP. (2022). *Food Waste Action Week* [Ebook]. Retrieved from https://wrap.org.uk/taking-action/citizen-behaviour-change/love-food-hate-waste/key-campaigns/food-waste-action-week

WWF. (2022). The Next Farm Bill Can Save Money, Reduce Food Waste, Address Hunger, and Combat Climate Change. Retrieved 27 August 2022, from

https://www.worldwildlife.org/press-releases/the-next-farm-bill-can-save-money-reduce-food-waste-address-hunger-and-combat-climate-change

Yap, R. (2009). *Understanding the Adult Learners' Motivation and Barriers to Learning.* [Ebook].

Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. European Journal of Education, 48(2), 311–325. https://doi.org/10.1111/ejed.12014

Younis, K., Ahmad, S., & Badpa, A. (2015). Retrieved 21 July 2022, from https://sci-hub.se/http:/dx.doi.org/10.4172/2157-7110.1000434

Zellner, D., Loss, C., Zearfoss, J., & Remolina, S. (2014). It tastes as good as it looks! The effect of food presentation on liking for the flavor of food☆. *Appetite*, *77*, 31-35. doi: 10.1016/j.appet.2014.02.009

Zellner, D., Siemers, E., Teran, V., Conroy, R., Lankford, M., & Agrafiotis, A. et al. (2011). Neatness counts. How plating affects liking for the taste of food. *Appetite*, *57*(3), 642-648. doi: 10.1016/j.appet.2011.08.004

Zero Waste Europe. (2020). *Achieving the EU's Waste Targets: Policy Briefing* [Ebook]. Retrieved from https://zerowasteeurope.eu/wp-content/uploads/2020/07/zero_waste_europe_policy-briefing_achieving-the-eu%E2%80%99s-waste-targets.pdf

Zero Waste Europe. (2020). *France's law for fighting food waste Food Waste Prevention Legislation* [Ebook]. Retrieved from https://zerowasteeurope.eu/wp-content/uploads/2020/11/zwe_11_2020_factsheet_france_en.pdf

Zero Waste Europe. (2020). *Italy's law for donation and distribution of food and pharmaceuticals to limit food waste Food Waste Prevention Legislation* [Ebook]. Retrieved from https://zerowasteeurope.eu/wp-content/uploads/2020/11/zwe_11_2020_factsheet_italy_en.pdf

Zero Waste Europe. (2020). *Lithuania's law for donation of food waste Food Waste Prevention Legislation* [Ebook]. Retrieved from https://zerowasteeurope.eu/wp-content/uploads/2021/11/zwe_11_2020_factsheet_lithuania_en.pdf

Appendices

Appendix 1 – Dissertation Proposal Form

L-Università ta' Malta
Faculty of Education

Masters in Teaching and Learning
Dissertation Proposal Form

Date	Day	Month	Year
	19	07	2022
Proposal Number	1 ☑	2 ☐	3 ☐
Proposal Identifier			
Course Years	2021 - 2023		

1. Name of Applicant:	Claire Agius		
1.1 I.D. 119798M	**1.2** Teaching Area	Home Economics and Health and	
1.3 Mobile 79824295	**1.4** Tel.	21803293	
1.5 Email claire.c.agius.18@um.edu.mt			

2. Name of Principal Supervisor * BLOCK LETTERS	PROF SUZANNE PISCOPO		
2.1 Faculty / Department / Institute	EDUCATION, HPECS		
2.2 Telephone (office/mobile)	23402310		
2.3 Email suzanne.piscopo@um.edu.mt			
2.4 Post	Full Time ☑	Part Time ☐	TR status
2.5 I confirm that, as Principal Supervisor, I have discussed the proposed research with the student and endorse this M.T.L. dissertation proposal	Signature		

3. Name of Advisor *			
3.1 Faculty / Department / Institute			
3.2 Telephone (home, mobile)			
3.3 Email			
3.4 Post	Full Time ☐	Part Time ☐	TR status
3.5 I confirm that, as Advisor, I have discussed the proposed research with the student and endorse this M.T.L. dissertation proposal	Signature		
* External Supervisor / Advisor / Co-Supervisor to submit short CV where applicable			

4. Title of Research Study/Project (max.15 words)
Plan, Prepare and Practice - Developing a Handbook on Sustainable Food Waste Management in the Home
4.1 Research Questions (2-3 research questions)
RQ 1: What are common challenges and good practices in Maltese households with respect to food waste reduction? RQ 2: What information and practical tips would adults who are main food managers in their household find useful in an educational handbook on sustainable food waste management?
4.2 Abstract of the proposed research or project work (approx. 300 words)
Tonnes of edible foods are lost or wasted every day. Globally, around 17% of food produced is lost between harvest, retail and consumption each year, with an estimated 11% from households (UN, 2021). In 2017, results from NSO showed that 22%, or nearly a quarter, of food bought in Malta ends up wasted and thrown away. To help combat the ever-growing problem of food waste in the Maltese Islands, this research aims to develop an educational handbook to motivate and facilitate reduction of food waste in households. The target audience of my study is the individual primarily in charge of purchasing groceries and preparing meals for the household. In terms of research methodology, I will conduct an online anonymous survey via questionnaire for adults over 18 years to gather valuable data revealing the challenges experienced and practices implemented by Maltese households when it come to food management to avoid food waste. The data collected will be used to inform the development of an educational Handbook with various sections so as to nurture behavioural change among adults. A varied andragogic approach will be adopted, knowing that the readers are adults who may be at different levels of self efficacy, but who are self-driven and can take responsibility for their actions. Therefore, to facilitate the behavioural change process, material of the handbook will focus on identified particular concerns and aid readers to become more aware of their behaviour and its impacts, self-evaulate their actions and address problems so as to help in preventing food waste in their household. This handbook will also help achieve SDGs 2030 which intends to reduce consumer food waste by half.

5. Keywords (3 – 6 keywords related to the content of dissertation)		
1 Food Waste Management	2 Sustainable Practices	3 Household Experience
4 Handbook Development	5 Adult Readers	6 Food Waste Education

6. Description of Research Methods to be applied.

6.1 Please indicate the research method that you will use in your dissertation*:

- Resource development informed by an online survey

* A non-exhaustive list of possible research methods includes:

Bibliographic Search; Case Study/ies; Curriculum Development/Evaluation; Curriculum Study; Educational Intervention; Extended Literature Review; Focus Group; Individual Interview; Historical Research (involving analyses of secondary and primary historical sources); Philosophical Inquiry; Project-Based Dissertation; Questionnaire; Resource Development/ Evaluation; Text Analysis; or any other methodology relevant to the field of study.

6.2 Will your research involve collection of primary data from human participants?	YES ☑	NO ☐

If YES - Where will the participants come from?

Sector:	Primary ☐	Secondary ☐	Tertiary ☐
Other (please specify)	☑ General adult population		

6.3 If applicable, explain primary data collection from human participants for the different Research Methods chosen:

- Who will be your sample? (Indicate salient characteristics, such as age, gender, nationality, occupation)
- What is the minimum-maximum number of participants?
- How will the participants be recruited? (a brief explanation of how researcher proposes to gain access to potential informants for EACH research method ticked)
- What will participants be required to do?

An anonymous online survey will be conducted via google forms. A questionnaire will be available on various social media platforms where adults (18 years plus) will be invited to participate. This method of data collection was chosen as is proves to be the most efficient in reaching out to potential participants initially and summarises the responses automatically. The aim is to gather at least 50 responses from this survey.

6.4 How long is the duration of the data collection process?

1 month

7. Ethical clearance:

Anyone planning to carry out research under the auspices of the University of Malta must complete the Online Form for Ethics and Data Protection review once this proposal has been approved from the MTL Dissertation Board.

For Office Use:

Dissertation Proposal # has been:	
Accepted	X
Accepted subject to minor amendments	☐
Accepted subject to major amendments (to resubmit form)	☐
Rejected	☐
Chairperson (MTL Dissertation Board) 	Date 20 July 2022
Name Dr Stephen Schembri	

Official feedback for student:
Approved as a Project-based Dissertation

Appendix 2 – Questionnaire English Version

Information Letter

Plan, Prepare and Practice

Developing a Handbook on Sustainable Food Waste Management in the Home

Invitation and Information Letter

August 2022

Dear Sir/Madam,

My name is Claire Agius and I am a student at the University of Malta reading for a Masters in Teaching and Learning (MTL) in Home Economics and Health and Social Care. I am currently conducting a research study for my project-based dissertation titled *Plan Prepare and Practice: Developing a Handbook on Sustainable Food Waste Management in the Home*. This is being supervised by Professor Suzanne Piscopo. This letter is an invitation to participate in this study. Below you will find information about the study and about what your involvement would entail, should you decide to take part.

The aim of my study is to identify the common challenges and good practices in Maltese households with respect to food waste reduction in order to inform the development of an educational handbook. Your participation in this study would help contribute to strategies to combat the ever-growing problem of food waste in the Maltese Islands and among Maltese households. Any data collected from this research will be used solely for the purpose of this study. Data collected will remain anonymous and stored securely, and only myself will have access to data collected.

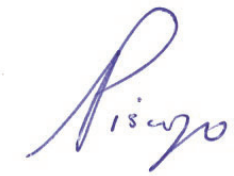
Should you choose to participate, you will be asked to fill in this online questionnaire https://forms.gle/mZF2TURSXWt3XUJc6. Participation in this study is entirely voluntary; in other words, you are free to accept or refuse to participate, without needing to give a reason. You are also free to withdraw from the study at any time, without needing to provide any explanation and without any negative repercussions

for you. Should you choose to withdraw, any data collected from you may still be used since it is anonymous.
If you choose to participate in this study, please note that there are no direct benefits to you. Moreover, your participation does not entail any known or predicted risks.

Please note also that, under the General Data Protection Regulation (GDPR) and national legislation, on completion of the study, following publication of results, all data will be destroyed.

Thank you for your time and consideration. Should you have any questions or concerns, please do not hesitate to contact me by e-mail on claire.c.agius.18@um.edu.mt You can also contact my supervisor over the phone: 23402310 or via email: suzanne.piscopo@um.edu.mt

Sincerely,



Claire Agius
claire.c.agius.18@um.edu.mt

Professor Suzanne Piscopo
suzanne.piscopo@um.edu.mt
23402310

Online Questionnaire in English

Plan, Prepare and Practice – Developing a Handbook on Sustainable Food Waste Management in the Home

Buying groceries and basic knowledge regarding food

1. Are you the person mainly in charge of food shopping / food provision / food storage and menu planning in your household*

Yes - Please continue to question no 2
No - Thank you for considering participating in this survey; however, you do not meet the eligibility criteria.

2. a) Do you shop for groceries daily?*

Yes - go to question 2b
No - go to question 3

2. b) If yes, which foods do you typically buy?

_____

3. How often do you do your main food shopping?*

Weekly
Fortnightly
Monthly

4. When you do your groceries, do you draw up a shopping list to ensure you only buy what you need?*

Yes No

5. Do you check what you have in your refrigerator / drawers / cupboards before drawing up your shopping list or going shopping?*

Always
Nearly Always
Sometimes
Hardly Ever
Never

6. Do you buy non-perishable groceries (e.g. beans) in bulk?*

Yes No

7. Do you buy fresh produce in bulk when in season locally? For example tomatoes*

Yes No

8. When buying food items, do you check for expiry dates / best before / use by?*

Always
Nearly Always
Sometimes
Hardly Ever
Never

9. What do you understand by ‘best before’?*

- The food will be at its best flavour and quality if eaten before this date
- Food automatically spoils after the ‘best before’, so throw it out

10. What do you understand by ‘use by’?*

- Indicates the date the item will begin to lose its freshness and appear ‘old’
- It is found on perishable food items and the food should not be consumed after this date

Meal planning, food preferences, and leftovers

11. a) Do you plan your meals?*

Always
Nearly Always
Sometimes
Hardly Ever
Never - go to question 11c

11. b) For what duration do you plan?*

For the next day
For the next week
For the next month

11. c) If you never plan your meals, choose from the following reasons: *

Lack of time
Lack of knowledge
I / My family like to decide what to eat on the day.
Other: _____

12. If you have any leftovers, what would you do? *

Save it for the next day
Freeze it
Throw it away
Give it to animals
Other: _____

13. Do you throw away food scraps? (“scraps” are usually neglected /discarded parts of foods such as vegetable stems and orange peels)*

Yes No

14. Do you make stock from vegetable scraps? *

Yes No

15. a) Have you ever tried rework of food? (E.g., prepare bread pudding from stale bread) *

Yes - go to question 15b
No - go to question 16

15. b) If yes, can you mention a few examples?

_____

16. When an item starts getting mouldy, what do you prefer to do?*

Discard it completely
Remove the mouldy part and still consume it

17. When an item is slightly squashed, what do you prefer to do? *

Discard it completely
Remove the squashed part and still consume the food

18. a) Do you waste fresh produce?*

Always
Nearly Always
Sometimes
Hardly Ever
Never

18. b) Can you please tell me why?*

_____

19. a) Do you waste frozen foods?*

Always
Nearly Always
Sometimes
Hardly Ever
Never

19. b) Can you please tell me why?*

_____

Food preservation and reheating

20. Can you mention 2 types of food preservation? For example, pickling*

_____

21. How often do you buy jams / pickled items / marmalades?*

Every week
Monthly
Yearly

22. a) Have you ever tried food preservation? *

Yes - go to questions 22b and 22c
No - go to question 22d

22. b) What food?

_____

22. c) What type of food preservation have you tried or would be willing to try?

_____

22. d) If you haven't tried to preserve food, can you please share some reasons?

_____

23. How long do you think it takes to preserve pickled onions? *

1 hour

3 hours

1 day

1 week

24. a) Can you provide an alternative that could be done with these items instead of throwing them away?*

TOUGH BROAD BEANS

_____

24. b) Can you provide an alternative that could be done with these items instead of throwing them away?*

VERY RIPE TOMATOES

_____

4. c) Can you provide an alternative that could be done with these items instead of throwing them away?*

LEFTOVER CHRISTMAS TURKEY

---

24. d) Can you provide an alternative that could be done with these items instead of throwing them away?*

DATE SEEDS

---

25. a) Would you freeze beef stew? *

Yes - go to question 25b
No - go to question 26
I don't know - go to question 26

25. b) Have you ever frozen it? *

Yes No

26. a) Would you freeze pasta sauce? *

Yes - go to question 26b.
No - go to question 27
I don't know - go to question 27

26. b) Have you ever frozen it?*

Yes No

27. a) Would you freeze bread rolls?*

Yes - go to question 27b
No - go to question 28
I don't know - go to question 28

27. b) Have you ever frozen it?*

Yes No

28. What do you understand by the term blanching?*

Some final questions…

29. a) Do you tend to reheat meals?*

Yes No

29. b) Can you please share some reasons? *

30. Do you think frozen meat can be cooked, chilled and then frozen afterwards? *

Yes No I Don’t Know

31. Would you reheat lasagna? *

Yes No I Don't Know

32. Would you reheat a slice of pizza? *

Yes No I Don't Know

33. Would you reheat a pie? *

Yes No I Don't Know

34. a) Which of these foods do you throw away most?*

Vegetables
Fruit
Bread
Meat
Milk
Cheese
Canned Items
Other: _____

34. b) Can you please share why? *

_____

AND FINALLY: Personal Details

Gender*

Male
Female
Other
Do not wish to respond

Age*

18 - 30

31 - 45

46 - 60

61 +

Occupation*

Student

Employed full time

Employed part time

Unemployed

Staying at home by choice

Retired

Pensioner

Locality of residence: *

_____

THANK YOU FOR YOUR CONTRIBUTION.

Appendix 3 – Questionnaire Maltese Version

Ittra ta' Tagħrif

Plan, Prepare and Practice:
Developing a Handbook on Sustainable Food Waste Management in the Home
Ittra ta' Stedina u Tagħrif

Awwissu 2022

Għażiż/a Sinjur/a,

Jiena Claire Agius, studenta fl-Università ta' Malta, u bħalissa qed insegwi l-Maġistru fit-Tagħlim fil-Home Economics u Health and Social Care. Ir-riċerka li ser nagħmel għad-dissertazzjoni tiegħi jisimha *Plan Prepare and Practice: Developing a Handbook on Sustainable Food Waste Management in the Home* u t-tutur tiegħi hi l-Professoressa Suzanne Piscopo. B'din l-ittra nixtieq nistiednek tipparteċipa f'dan l-istudju. Għaldaqstant, hawn taħt għandek issib iktar informazzjoni fuq l-istudju u fuq xi jkun l-involviment tiegħek jekk tiddeċiedi li tieħu sehem.

L-għan tal-istudju hu li nistħarreġ fatturi fid-djar Maltin li huma relatati mat-tnaqqis mill-ħela tal-ikel biex nibni ktejjeb edukattiv biex forsi ngħin ħalli l-ħela jitrażżan. Is-sehem tiegħek fl-istudju jikkontribwixxi biex ikun hawn iżjed għarfien dwar kif nistgħu nnaqsu din il-problema u nevitaw illi tkompli tikber. L-informazzjoni kollha li ser tinġabar minn kull parteċipant fir-riċerka tiegħi ser tintuża biss għall-fini ta' dan l-istudju. L-informazzjoni miġbura ser tkun anonima u tinżamm f'post u mod sikur u jien biss ser ikolli aċċess għaliha.

Jekk taqbel li tipparteċipa, nistiednek biex timla dan il-kwestjonarju li jinstab onlajn https://forms.gle/mZF2TURSXWt3XUJc6. Il-parteċipazzjoni tiegħek f'dan l-istudju tkun għal kollox volontarja; fi kliem ieħor, inti liberu/a li taċċetta jew tirrifjuta li tieħu sehem, mingħajr ma tagħti raġuni. Inti wkoll liberu/a li twaqqaf il-parteċipazzjoni tiegħek fl-istudju meta tixtieq, mingħajr ma jkollok tagħti spjegazzjoni u mingħajr ebda

riperkussjoni. Jekk tagħżel li tirtira mir-riċerka, l-informazzjoni li tkun laħqet inġabret jista' jkun li xorta tintuża peress li tkun anonima.

Jekk tagħżel li tipparteċipa, tajjeb tkun taf li m'hemm l-ebda benefiċċju dirett għalik. Il-parteċipazzjoni tiegħek lanqas ma fiha riskju magħruf jew mistenni.

Skont ir-Regolament Ġenerali dwar il-Protezzjoni tad-Data (GDPR) u l-leġiżlazzjoni nazzjonali, l-informazzjoni kollha li tinġabar fl-istudju tiġi mħassra hekk kif jitlesta dan l-istudju u r-rapport finali jiġi approvat.
Grazzi tal-ħin u l-kunsiderazzjoni tiegħek. Jekk ikollok xi mistoqsija, tiddejjaqx tikkuntattjani fuq claire.c.agius.18@um.edu.mt. Tista' tikkuntattja wkoll lit-tutur tiegħi fuq: 23402310 jew elettronikament fuq: suzanne.piscopo@um.edu.mt

Tislijiet,

Claire Agius
claire.c.agius.18@um.edu.mt

Professoressa Suzanne Piscopo
suzanne.piscopo@um.edu.mt
Tel: 23402310

Kwestjonarju bil-Malti Onlajn

Plan, Prepare and Practice – Developing a Handbook on Sustainable Food Waste Management in the Home

Ix-xiri tal-ikel

1. Fid-dar fejn tgħix, inti responsabbli mix-xiri tal-ikel, mil-ħażna tal-ikel, mit-tisjir tal-ikel, u mill-ippjanar tal-menu? *

Jekk iva, għaddi għall-mistoqsija numru 2
Jekk le, grazzi tal parteċipazzjoni tiegħek u talli kkunsidrajt li tieħu sehem f'dan il-kwestjonarju imma sfortunatament mintix eleġibbli sabiex tkompli.

2. a) Kuljum tixtri xi ikel? *

Iva - mur għal mistoqsija 2b
Le - mur għal mistoqsija 3

2. b) Jekk iva, liema tip ta' ikel tixtri?

_____

3. Kemm-il darba tagħmel ix-xirja prinċipali?*

Darba fil-ġimgħa
Kull ħmistax
Darba fix-xahar

4. Qabel ma tagħmel ix-xirja, tipprepara lista ta' x'għandek bżonn? *

Iva Le

5. Qabel ma tmur tixtri tiċċekkja x'għandek fil-friġġ / kxaxen / armarju sabiex tara liema prodotti jkunu naqsu? *

Dejjem
Kważi dejjem
Kultant
Kważi qatt
Qatt

6. Tixtri prodotti li ma jmorrux malajr (bħal fażola tal-bott) bil-kwantità? *

Iva Le

7. Tixtri ikel tal-istaġun lokali bil-kwantità? Pereżempju tadam...*

Iva Le

8. Meta tixtri l-prodotti tal-ikel, tiċċekkja d-data tal-iskadenza?*

Dejjem
Kważi dejjem
Kultant
Kważi qatt
Qatt

9. X'tifhem bil-frazi 'Best Before' ?*

L-ikel ikollu l-aqwa togħma u kwalita' jekk tieħdu qabel din id-data
L-ikel awtomatikament jitlaq wara din id-data u jkollok tarmih

10. X'tifhem bil-fraži 'Use By' ?*

Tindika d-data li fih il-prodott jibda jitlef l-kwalità
Tidher fuq prodotti friski u l-prodott m'għandux jittiekel wara din id-data

L-ippjanar u l-fdalijiet tal-ikel

11. a) Tippjana l-ikel li tkun se ssajjar? *

Dejjem
Kważi dejjem
Kultant
Kważi qatt
Qatt - mur għal mistoqsija 11c

11. b) Għal kemm ġranet tippjana ?*

Għall-għada
Għal ġimgħa
Għal xahar

11. c) Jekk qatt ma tippjana l-ikel, immarka r-raġuni:*

Nuqqas ta' ħin
Nuqqas ta' tagħlim
Jiena / il-familja nippreferu nagħżlu x'se nieklu f'dik il-ġurnata
Other: _____

12. Jekk ikun fadallek xi ikel li tkun sajjart x'tagħmel? *

Tużah 'l għada
Tifriżaħ
Tarmiħ
Tagħtih l-annimali
Other: _____

13. Ġeneralment tarmihom il-'food scraps'? ("food scraps" huma fdalijiet bħal qxur tal-ħaxix u frott)*

Iva Le

14. Qatt għamilt stokk tal-ħaxix mill-fdalijiet tal-ħaxix? *

Iva Le

15. a) Ġieli ppruvajt tagħmel xi ħaġa minn prodott ieħor? (Pereżempju tagħmel pudina mill-ħobż xott)*

Iva - mur għal mistoqsija 15b
Le - mur għal mistoqsija 16

15. b) Jekk iva, tista ssemmi xi eżempji?

_____

16. Meta prodott jibda jimoffa, x'tippreferi?*

Narmih kompletament
Ineħħi l-biċċa mmuffata u nużaħ xorta waħda

17. Meta prodott ikun ftit imħassar, x'tipreferi?*

Narmih kompletament
Ineħħi l-parti l-ħażina u nuża l-prodott xorta waħda

18. a) Ġieli tarmi prodotti friski? *

Dejjem
Kważi dejjem
Kultant
Kważi qatt
Qatt

18. b) Jekk jogħġbok agħti r-raġuni *

_____

19. a) Ġieli tarmi prodotti ffriżati? *

Dejjem
Kważi dejjem
Kultant
Kważi qatt
Qatt

19. b) Jekk jogħġbok agħti r-raġuni *

_____

Il-preservazzjoni tal-ikel

20. Tista' issemmi 2 eżempji ta' preservazzjoni tal-ikel? (pereżempju tuża l-ħall) *

_____

21. Kemm-il darba tixtri ġamm / prodotti fil-ħall / marmellata? *

Kull ġimgħa
Kull xahar
Xi drabi fis-sena

22a. Ġieli ppruvajt tippreserva l-ikel?*

Iva - wieġeb mistoqsija 22b u 22c
Le - mur għal mistoqsija 22d

22. b) Liema ikel?

_____

22. c) Liema tip ta’ preservazzjoni ppruvajt jew tixtieq li tipprova?

_____

22. d) Jekk qatt ma ppruvajt tippreserva l-ikel, jekk jogħġbok agħti r-raġuni.

_____

23. Kemm taħseb li ddum biex tagħmel ‘basal tal-pikles’ ? *

Siegħa

Tliet sigħat

Ġurnata

Ġimgħa

24. a) Tista’ toffri alternattiva ta’ x’jista’ jsir b’dan l-ikel minflok jintrema? *

FUL FTIT XIEREF

_____

24. b) Tista' toffri alternattiva ta' x'jista' jsir b'dan l-ikel minflok jintrema? *

TADAM FTIT MISJUR / ARTAB

---

24. c) Tista' toffri alternattiva ta' x'jista' jsir b'dan l-ikel minflok jintrema? *

FDALIJIET TA' DUNDJAN FI ŻMIEN IL-MILIED

---

24. d) Tista' toffri alternattiva ta' x'jista' jsir b'dan l-ikel minflok jintrema? *

ŻERRIEGHA TAT-TAMAL

---

25. a) L-istuffat taċ-ċanga tista' tiffriżah?*

Iva - mur għal mistoqsija 25b
Le - mur għal mistoqsija 26
Ma nafx - mur għal mistoqsija 26

25. b) Ġieli ffriżajtu? *

Iva Le

26. a) Iz-zlazi ta' mal-għaġin tista' tiffriżahom? *

Iva - mur għal mistoqsija 26b
Le - mur għal mistoqsija 27
Ma nafx - mur għal mistoqsija 27

26. b) Ġili ffriżajtu?*

Iva Le

27. a) Il-ħobż tista' tiffriżah? *

Iva - mur għal mistoqsija 27b
Le - mur għal mistoqsija 28
Ma nafx - mur għal mistoqsija 28

27. b) Ġieli ffriżajtu?*

Iva Le

28. X'tifhem bit-terminu 'blanching'? *

_____

L-aħħar ftit mistoqsijiet…

29. a) Ġieli terġa’ ssaħħan ikel misjur merfugħ? (reheating) *

Iva Le

29. b) Jekk jogħġbok, agħti raġuni.*

30. Taħseb li laħam iffriżat jista’ jiġi msajjar, mkessaħ u jerġa’ jiġi ffriżat?*

Iva Le Ma nafx

31. Il-lażanja tista’ terġa’ ssaħħanha?*

Iva Le Ma nafx

32. Biċċa pizza tista’ terġa’ ssaħħanha?*

Iva Le Ma nafx

33. Tista’ terġa’ ssaħħan torta? *

Iva Le Ma nafx

34. a) Liema minn dan l-ikel tarmi l-iktar? *

Ħaxix
Frott
Ħobż
Laħam
Ħalib
Ġobon
Ikel tal-laned
Other: _____

34. b) Jekk jogħġob agħti raġuni.*

_____

U FL-AĦĦAR: Dettalji Personali

Sess*

Raġel
Mara
Oħrajn
Nippreferi ma nweġibx

Età*

18 - 30
31 - 45
46 - 60
61 +

Xogħol*

Student
Ħaddiem/a full time
Ħaddiem/a part time
Ma naħdimx
Noqgħod id-dar fuq għażla personali
Irtirat/a
Penzjonant/a

Lokalità ta' fejn toqgħod: *

_____

GRAZZI ĦAFNA TAL-KONTRIBUT TIEGĦEK.