ASSOCIATION BETWEEN FOOD MANAGEMENT BEHAVIOURS AND HOUSEHOLD FOOD WASTE AMONG WORKING ADULTS IN HEALTH CAMPUS, UNIVERSITI SAINS MALAYSIA, KUBANG KERIAN, MALAYSIA

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UNIVERSITI SAINS MALAYSIA

2025

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by

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Dissertation submitted in partial fulfillment of the requirements for the degree of Bachelor in Nutrition with Honours

January 2025

CERTIFICATE

This is to certify that the dissertation entitled “ASSOCIATION BETWEEN FOOD MANAGEMENT BEHAVIOURS AND HOUSEHOLD FOOD WASTE AMONG WORKING ADULTS IN HEALTH CAMPUS, UNIVERSITI SAINS MALAYSIA, KUBANG KERIAN, MALAYSIA” is the bona fide record research work done by Ms. “NURAIN BINTI MOHD TAHIR” during the period from March 2024 to January 2025 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfillment for the degree of Bachelor of Nutrition with Honour.

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duty acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

……

(Nurain Binti Mohd Tahir)

Date: 12/1/2025

ACKNOWLEDGMENT

Alhamdulillah, all praise to Allah S.W.T., the Almighty, for giving me the blessing, strength, chance, and endurance to complete my research project. I am highly grateful to Allah SWT for enabling me to finish this research project in a given time.

It is my genuine pleasure to express my deep gratitude and appreciation to those who have contributed to this study. Foremost, I would like to express my gratitude to my supervisor, Dr. Zafirah Mohd Nor, for her advice, understanding, gracious guidance, feedback, and support, in helping me throughout the research work. Without her, I might encounter difficulties in completing this study. I am also grateful to Dr. Wan Faizah Wan Yusoff, the course coordinator for this subject, for helping and guiding us in all the processes required until submitting this thesis.

Furthermore, I also would like to extend my sincere gratitude to all the lecturers and staff in PPSK, PPSP, and PPSG for all their support, and willingness to help me throughout my research work. Last but not least, I would like to express my gratitude to my parents for their unending support and tolerance throughout the research, as well as to my classmates and friends who helped me directly or indirectly in conducting this research and completing my thesis. I also thank myself for fighting until the very end.

Thank you.

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LIST OF ABBREVIATIONS

FSB	Food Storage Behaviour
FPB	Food Purchase Planning Behaviour
FPBI-S	Food Purchase Behaviour in Store
FPPB	Food Planning Preparation Behaviour
LCB	Leftover consumption behaviour
FW	Food Waste

PERKAITAN ANTARA TINGKAH LAKU PENGURUSAN MAKANAN DAN SISA MAKANAN ISI RUMAH DALAM KALANGAN ORANG DEWAS BEKERJA DI KAMPUS KESIHATAN, UNIVERSITI SAINS MALAYSIA, KUBANG KERIAN, MALAYSIA.

ABSTRAK

Penyelidikan terkini telah menunjukkan peranan penting terhadap amalan penyediaan makanan harian dalam mempengaruhi sisa makanan isi rumah. Pembaziran makanan berlaku sepanjang rantai makanan, namun rumah adalah penyumbang utama. Tujuan penyelidikan ini, adalah untuk mengkaji hubungan antara tingkah laku pengurusan makanan dan sisa makanan isi rumah dalam kalangan orang dewasa yang bekerja di Universiti Sains Malaysia di Kubang Kerian, Malaysia. Dalam kajian ini, saiz sampel 215 orang dewasa yang bekerja di Pusat Pengajian Sains Kesihatan, Pusat Pengajian Sains Perubatan dan Pusat Pengajian Sains Pergigian telah diambil menggunakan pensampelan rawak berstrata berdasarkan kriteria kemasukan. Walau bagaimanapun, hanya 180 maklum balas sahaja yang telah dikumpulkan dan dianalisis dengan SPSS versi 29.0. Antara lima faktor yang disiasat ialah, Tingkah Laku Penyimpanan Makanan (FSB) ($p=0.876$) dan Tingkah Laku Penggunaan Sisa (LCB) ($p=0.764$) yang tidak dikaitkan secara signifikan dengan sisa makanan isi rumah ($p > 0.05$). Walau bagaimanapun, Tingkah Laku Perancangan Pembelian Makanan (FPB) ($p <.001$), Tingkah laku Pembelian Makanan di Kedai (FPBI-S) ($p <.001$), dan Tingkah laku Penyediaan Perancangan Makanan (FPPB) ($p=.039$), menunjukkan hubungan yang signifikan. Dapatan kajian ini, serta kajian terdahulu oleh penyelidik lain boleh digunakan untuk memacu intervensi berkesan yang menumpukan pada situasi sisa makanan tertentu dan interaksi dengan lebih mendalam. Intervensi boleh membantu mengalihkan fokus daripada analisis kepada penyelesaian**.**

ASSOCIATION BETWEEN FOOD MANAGEMENT BEHAVIOURS AND HOUSEHOLD FOOD WASTE AMONG WORKING ADULTS IN HEALTH CAMPUS, UNIVERSITI SAINS MALAYSIA, KUBANG KERIAN, MALAYSIA.

ABSTRACT

Recent research has begun to demonstrate the vital role of daily food provision practices in influencing household food waste. Food waste occurs throughout the food chain, yet homes are the primary contributor. The purpose of this research, is to investigate the association between food management behaviours and household food waste among working adults at Universiti Sains Malaysia in Kubang Kerian, Malaysia. In this study, a sample size of 215 working adults from the School of Health Sciences, School of Medicine, and School of Dentistry was recruited using stratified random sampling based on inclusion criteria. However, only 180 responses were gathered and analyzed with SPSS version 29.0. Among the five investigated factors, Food Storage Behaviour (FSB) ($p=0.876$) and Leftover Consumption Behavior (LCB) ($p=0.764$) were not significantly associated with household food waste ($p > 0.05$). However, Food Purchase Planning Behaviour (FPB) ($p < .001$), Food Purchase Behaviour in Store (FPBI-S) ($p < .001$), and Food Planning Preparation Behaviour (FPPB) ($p=.039$), demonstrated significant associations. The findings of this study, as well as previous studies by other researchers, can be utilized to drive effective interventions that focus on specific food waste situations and interactions in greater depth. The intervention could particularly help to shift the focus from analysis to solutions.

CHAPTER 1 INTRODUCTION

1.1 Background of study

Food waste refers to the amount of organic waste released from various sources, such as food processing facilities, households, commercial kitchens, restaurants, and cafeterias (Chen et al., 2017). Food waste has a direct effect on the environment (e.g., water, climate change, energy, depletion of resources, disruption of biogenic cycles due to intensive agricultural activities), the economy (e.g., increasing costs, consumption, resource efficiency, price volatility, waste management, commodity markets), and society (e.g., health, equality) (Olle, 2021). Food production that is heavily reliant on resources has a negative impact on the environment (Mourad, 2016). For example, water pollution and air pollution are caused by food waste. Deforestation and soil erosion are also caused by food waste, as well as greenhouse gas emissions. In addition, food waste has a significant impact on the global economy in terms of price volatility and waste management, as well as the impact it has on commodity markets. Large quantities of food waste have a major impact on sustainability as it leads to high levels of greenhouse gas emissions and resource depletion (Graham-Rowe et al., 2019). Food waste occurs at every stage of the food supply chain (agriculture, industrial production and processing, retail, and household consumption).

In other words, “food waste” includes all edible food materials produced for human consumption, but not consumed, lost, or disposed of at any stage of the food supply chain (Chen et al., 2017). Food waste can also happen when any edible item meant for human consumption is discarded due to decisions made by retailers, food service providers, or consumers themselves (Food and Agriculture Organisation, 2019). The United Nations (UN) has set a goal of Sustainable Development Goal (SDG) 12.3 to reduce global food waste per person by 2030. The goal is to reduce food waste at retail

and consumer levels, and to reduce food waste along production and supply chain chains (Food and Agriculture Organisation, 2019). In terms of food waste disposal, homes account for most of the food waste, followed by food processing and the food service sector. This includes both edible and inedible food waste as well as preventable and unavoidable food waste (Diekmann & Germelmann, 2021). If, on the other hand, only the removal of edible food sources or avoidable wastage is considered, the ranking of the main causes of food wastage changes (Diekmann & Germelmann, 2021). Households are still the largest contributors to avoidable waste, but the food service sector (canteens, restaurants, etc.) is then the second largest contributor(Beretta et al., 2013). Thus, it is clear that the food service sector represents an important stage of the food waste chain and has a high potential to reduce avoidable wastage(Diekmann & Germelmann, 2021).

Despite a recent increase, there is still an absence of empirical study on the variables influencing home food waste (Porpino, 2016) Rather, research concentrates on broader issues of meal preparation, storage, and supply; leftovers are only one component of this larger picture (Porpino, 2016). Most of the studies on household food waste have looked at food waste cumulatively and measured total food waste while looking at the common factors that affect food waste in a household (Ananda et al., 2021) .Each food category has specific characteristics that affect people's decisions to sort, prepare, store, and discard that food. While there is a direct relationship between the generation of household food waste and consumer behaviour, there are other factors that may indirectly influence consumer behaviour (Ilyuk, 2018). These factors may include material infrastructure, living conditions, and the geographical location of stores and transportation which influence daily routines and therefore household food wastage behaviour (Hebrok & Boks, 2017).

Apart from consumer behaviour towards food waste, other external factors can also affect consumer behaviour. A growing middle class and rising incomes may lead to an increase in food waste quantities simply because they are able to afford to waste more food. Food waste trends differ by income category. In low-income countries, food is wasted in the production to processing phases, while in high-income and middle-income countries, it is wasted at the final stage of household consumption (Hebrok & Boks, 2017; Ilyuk, 2018). As more affluent households move into urban areas, this will also lead to more food waste being generated. According to the World Biogas Association (2018), with 70% of the global population projected to live in urban areas by 2050, understanding what causes urban food waste is essential for policymakers to implement effective solutions to reduce food waste.

The Hazuchová et al. (2022) show that the approach to waste, or the way in which the individual perceives waste, is the most important factor in a change of attitudes towards waste and consequently a reduction of food waste. Hence, appropriate tools can be targeted to change attitudes toward waste and thus reduce food waste. There is no doubt that Malaysians are very aware of the issue of food waste. However, food waste remains at an alarming pace. If food waste continues, Malaysia will become the world's third greatest greenhouse gas emitter after the United States and China (Hazuchová et al., 2022).

1.2 Problem statement

One of the most popular travel destinations worldwide is Malaysia. It is known as the most culturally rich country in the world and offers a wide range of traditional and contemporary food. These high-end attractions could help to boost the economy of the country. However, the issue of food waste has been a major concern and challenge for many years. This is because of the growing population and urbanization in the country, which has raised the standard of living and increased the amount of waste generated (Hassan et al., 2015). Even though Malaysia is considered a food paradise and is renowned for its high-quality cuisine, it is regrettable that the poor culture regarding food waste is still prevalent in the community (Hashim et al., 2021). Unfortunately, its amazing food culture has also turned into a culture of wastage (Zainal & Hassan, 2019). It is found that Malaysia has wasted 16,688 tons of food waste daily, which is enough to provide 3 meals for 2.2 million persons per day (Hashim et al., 2021). The amount of food waste usually increases during the festive season.

Numerous things contribute to the number, such as the home, hotel and restaurant operators, business activities like event planning, conference planning, seminar planning, and many more. This number is expected to grow each year, as it has doubled in the last four years (Sulaiman & Ahmad, 2018). It has become a major concern for the country, not only due to the waste of edible food, but also due to its impact on the country's economic growth (Sulaiman & Ahmad, 2018). To make matters worse, according to Solid Waste Management and Public Cleansing Cooperation (SW Corp), it is estimated that by the end of 2020 the amount of food waste produced will be enough to fill all 16 Petronas twin towers in Malaysia (451.9 meters high) (Saalah, Rajin, Yaser, & Azmi, 2020).

Food waste disposal is also heavily dependent on the use of landfills, accounting for 93.5% of all food waste disposal. Even in the year 2020, the reliance on landfills is

inevitable, accounting for more than half of all total food waste collection methods (Kamyab et al., 2015). Currently, Malaysia uses landfills and incineration for the disposal of food waste. Landfilling is a common and accepted way of disposing of food waste as it is economical and easy to implement. However, today food waste disposal via landfill is more difficult as most landfills in Malaysia have reached their maximum capacity (Kamyab et al., 2015). As this method does not seem to be sustainable for food waste management, it is important to prevent food waste at the household consumption level. Hence, a study will be undertaken to explore the association between food management behaviours and household food waste among employed individuals at USMKK. Given the scarcity of research in Malaysia, where previous studies have primarily focused on non-Malaysian contexts, this study aims to pave the way for tailored interventions to curb household food waste in the region.

1.3 Research Questions

i. Is there any association between food storage behaviour (FSB) and amount of food waste among working adults in Health Campus, USMKK?
ii. Is there any association between food purchase planning behaviour (FPB) and amount of food waste among working adults in Health Campus, USMKK?
iii. Is there any association between food purchase behaviour in-store (FPBI-S) and amount of food waste among working adults in Health Campus, USMKK?
iv. Is there any association between food planning preparation behaviour (FPPB) and amount of food waste among working adults in Health Campus, USMKK?
v. Is there any association between leftover consumption behaviour (LCB) and amount of food waste among working adults in Health Campus, USMKK?
vi. What is the proportion of food management behaviour among working adults in Health Campus, USMKK?

1.4 Research Hypothesis

Hypothesis 1

H_O: There is no association between food storage behaviour (FSB) and amount of food waste among working adults in Health Campus, USMKK.

H_A: There is an association between food storage behaviour (FSB) and amount of food waste among working adults in Health Campus, USMKK.

Hypothesis 2

H_O: There is no association between food purchase planning behaviour (FPB) and amount of food waste among working adults in Health Campus, USMKK.

H_A: There is an association between food purchase planning behaviour (FPB) and amount of food waste among working adults in Health Campus, USMKK.

Hypothesis 3

H_O: There is no association between food purchase behaviour in-store (FPBI-S) and amount of food waste among working adults in Health Campus, USMKK.

H_A: There is an association between food purchase behaviour in-store (FPBI-S) and amount of food waste among working adults in Health Campus, USMKK.

Hypothesis 4

H_O: There is no association between food planning preparation behaviour (FPPB) and amount of food waste among working adults in Health Campus, USMKK.

H_A: There is an association between food planning preparation behaviour (FPPB) and amount of food waste among working adults in Health Campus, USMKK.

Hypothesis 5

H_O: There is no association between leftover consumption behaviour (LCB) and amount of food waste among working adults in Health Campus, USMKK.

H_A: There is an association between leftover consumption behaviour (LCB) and amount of food waste among working adults in Health Campus, USMKK.

1.5 Objectives

1.5.1 General Objective

To investigate the association between food management behaviours and household food waste among working adults in Health Campus, Universiti Sains Malaysia, Kubang Kerian, Malaysia.

1.5.2 Specific Objective

i. To determine whether food storage behaviour (FSB) influences the amount of food waste among working adults in Health Campus, USMKK.
ii. To determine whether food purchase planning behaviour (FPB) influences the amount of food waste among working adults in Health Campus, USMKK.
iii. To determine whether food purchase behaviour in-store (FPBI-S) influences the amount of food waste among working adults in Health Campus, USMKK.
iv. To determine whether food planning preparation behaviour (FPPB) influences the amount of food waste among working adults in Health Campus, USMKK.
v. To determine whether leftover consumption behaviour (LCB) influences the amount of food waste among working adults in Health Campus, USMKK.
vi. To determine the proportion of food management behaviour among working adults in Health Campus, USMKK.

1.6 Significance of study

The most important aspect of this study is the human behaviour in reducing food waste within the household context among working adults at the Health Campus, USMKK. Understanding the relationship of food management behaviour with household food waste provides valuable insights into the knowledge that can be used to identify modifiable habits that may have a significantly effect on waste generation. Gaining this insight could enhance food purchasing, storage, planning, preparation, and leftover consumption, thereby lowering food waste in the USMKK environment.

Addressing food waste is important because it can bring about significant economic and environmental benefits. Food waste increases food costs, putting burden on those responsible for grocery shopping. It also creates unnecessary waste, which worsens the environmental impact. By understanding the root causes of food waste and developing effective strategies to reduce it, this study has the potential to not only save money for the household but for the country as a whole. The findings can be used to inform broader initiatives to address food waste. This information can be useful for policy makers, educators and even organizations creating awareness campaigns.

Second, the insights gained from the analysis of the association between the management behaviour and the household food waste will guide future interventions, highlighting best practices and making it easier to implement targeted interventions. The question of whether reducing food waste will lead to positive environmental impacts remains unanswered. Most of this research paper provides a framework to explore further pathways of food waste implications. The outcome of this study will also help people have better knowledge along with good attitudes and practices on food management behaviours and household food wastage.

The significance of the study lies in its exploration of the association between food management behaviors and household food waste among working adults specifically at Universiti Sains Malaysia, Kubang Kerian, Malaysia (USMKK). It is critical to comprehend how individual activities impact household food waste in light of growing concerns about food sustainability and environmental impact.

The study's focus on working adults targets a demographic that is sometimes ignored in this kind of research and offers insightful information about the dynamics of food management in this cohort. USMKK offers a well-defined working adult population, enabling a targeted examination of food waste practices in a particular academic and maybe medical setting. Furthermore, the sociodemographic setting of Kelantan is distinct due to its predominately Muslim and Malay populace. Research at USMKK may provide insight into the ways in which behaviour and health are influenced by cultural and religious variables.

Furthermore, because there hasn't been much prior research done in this area, doing the study in Malaysia—more specifically, the state of Kelantan—adds a fresh perspective. The results of this study may help guide the creation of focused interventions and regulations meant to cut down on food waste in households, supporting environmentally friendly consumer habits and conservation initiatives both in Malaysia and abroad.

CHAPTER 2 LITERATURE REVIEW

2.1 Food Waste and Environment

Food waste, dry or wet waste, is a major contributor to waste in the global food industry. It is a topic that is all the rage right now. Not only is food waste a major environmental and economic problem, but it is also a growing concern in today's world. With an ever-increasing global population, population movements, and global climate change, food production is at an all-time high (Roy et al., 2023).

The relationship of food loss, waste, and climate change is becoming increasingly significant, as is the interaction between supply chain resilience, agriculture, and climate change. It is also noticeable how severe weather events affect supply chain resilience and agriculture. Landfills are also a major source of greenhouse gas emissions. Food that is predicted to break down anaerobically in landfills emits a greenhouse gas (GHG) called methane, which has a warming potential 21 times greater than that of carbon (Nordin et al., 2020). Furthermore, because organic waste breaks down anaerobically in poorly managed landfills, these sites also play a substantial role in methane emissions. The warming effect of methane is 25 times larger than that of CO2 (Nordin et al., 2020). Food waste depletes not just land and other resources but also water along with has an adverse effect on biodiversity and nitrogen cycle. According to (Filho et al., 2022) both of which are responsible for climate change. Despite this, the world's population is expanding, and food supply must keep up with demand (United Nations, 2019).

2.2 Food Waste at Household Level

Given the ethical and environmental issues that food-waste raises, it is concerning that the efforts of organisations and government agencies to raise awareness about food-waste remain largely ineffective. As a result, food-waste accumulates in our daily lives and remains largely unregulated (Kim et al., 2020). This is especially important at the

household consumer level (Bravi et al., 2020). Since consumers account for a large share of food waste, it is important to examine the causes of food wastage at the household level (Aydin & Yildirim, 2021). For instance, young people waste more food than senior citizens and retired households with fewer members waste less food. According to research, 18-30-year-olds account for the largest share of food waste and need immediate communication to help them change their behaviour (Manika et al., 2022). Food consumption and waste are a part of every consumer's life. Therefore, to address unsustainable food consumption and waste, it is critical to understand how these behaviours emerge and evolve over time. According to (Nordin et al., 2020)human behaviours impact food waste in different ways throughout the journey of food as it enters and passes through the home. For instance, planning, buying, storing, and preparing.

2.3 Food Storage Behaviours (FSB) – storage

Household food waste is defined as the waste of food and beverages consumed in the home, including retail and contribution from domestic food and takeaway (Nordin et al., 2020).

There is no denying that some of the reasons for household food waste can also occur because of poor food preservation during storage (Nordin et al., 2020)since it mainly relates to the consumer's ability to store and preserve food properly after having bought it; when consumers store food poorly (i.e., poor freezing techniques, inadequate space allocation for food, mis-storing cooked food, etc.) there is a high likelihood that the food will spoil (Bravi et al., 2020). For instance, previous studies have shown that several participants living on campus reported that they wanted to reduce their food waste but felt limited by their surroundings, which was frustrating (Nikolaus et al., 2018). If students try to take food with them, dining hall patrons may face a fine. Some people would use the food storage container to bring extra food. However, due to limited storage space in

residence hall rooms, and the perception of not being able to bring food when travelling for vacation or term breaks, extra food was wasted (Nikolaus et al., 2018). Other factors that contribute to domestic food waste are indirectly linked to poor storage practices(Bravi et al., 2020). In some cases, participants were unsure of the types of food that can be frozen, the duration of freezing, and the correct procedure for de-frosting (Dobernig & Schanes, 2019). Consistent with the previous literature, it is reasonable to assume that poor storage techniques result in a higher frequency of household food waste.

2.4 Food Purchase Planning Behaviours (FPB) – planning

According to a recent systematic literature review by Amirudin & Gim (2019), one of the reasons for consumer food waste is that people do not plan and check their food stocks at home prior to buying food from the store.

The existing research has shown that proper food stock checking and proper food purchase planning based on an appropriate shopping list can lead to food waste reduction (Amirudin & Gim, 2019). In this respect, an important issue concerns the attention towards date labels or expiration date of food. In this context, one of the most significant issues is the focus on date labels or expiration dates. People often misinterpret the “use by,” “best before,” or “expiration date” on food expiration labels (Secondi, 2019) thus leads to a lot of wastage. Therefore, consumers should be able to tell whether the date refers to a safety threshold (e.g., use by) or to a quality threshold before buying things at store (Secondi, 2019) in order to avoid buying food close to the expiry date that leads to food waste if you don’t consume it within a short period of time.

As mentioned by Nordin et al. (2020) making a grocery shopping list and checking the stock in your kitchen cabinet before you start cooking or buying food can help you reduce food waste. Failing to check food stocks before go shopping and not preparing an

appropriate shopping list increases the likelihood that food will go bad and you will have to throw it out (Bravi et al., 2020). Making a grocery list or planning your meals ahead of time can help you reduce unplanned food purchases and reduce food waste.

2.5 Food Purchase Behaviours in Store (FPBI-S) – purchase

Poor meal planning combined with retail level promotions will result in the purchase of excess food ingredients, which build up in the kitchen and take up shelf space in the pantry and fridge (Aloysius et al., 2023). Therefore, avoiding the commercial trap of "buy one, get one" when shopping can help reduce food waste (Dobernig & Schanes, 2019). Purchasing should be on the basis of the need of the food on a particular day (Phooi et al., 2022). Most people rely on food buying habits rather than what they need on those days (Romani et al., 2018). Most people regularly buy more food than they need or food they never use, which leads to more food waste. According to Lee (2018) one of the main causes of food wastage caused by overconsumption in hypermarkets and supermarkets is that people simply forget about the food and do not have time to eat or cook it.

Nowadays, there are a lot of changes in the food retailers in the last few years that increase the temporal food environment. The way consumers buy food has changed a lot from local markets to supermarkets and now with convenience stores and online food buying. This online food buying websites also increase the food waste because now people can buy food whenever they want on the internet without any closing or opening hours because it is available 24 hours.

2.6 Food Planning Preparation Behaviours (FPPB) – preparation

Planning your meals ahead of time can also help you avoid impulse buying and reduce food waste. However, many people view meal planning as outdated and out of sync with their daily meal plans (Dobernig & Schanes, 2019). According to (Dobernig &

Schanes, 2019), Some participants responded that the weekly meal plan "signified a limitation of personal control over what, when, and how they ate." In some cases, the weekly meal plan is not always flexible. For example, children often asked for certain foods during grocery shopping trips, but never ate them. Previous research tends to support this finding.

One participant reported from Dobernig & Schanes (2019)sometimes they do not know what they are going to have for dinner and do not have time to cook, so they will order something they have got on hand. Convenience foods, on the other hand, tend to be more prone to food waste because they are easy to grab and go. Thus, based on previous studies and existing research, they hypothesise that an educational intervention aimed at improving consumers' perception of skills associated with food preparation planning behaviours would lead to a decrease in domestic food waste (Romani et al., 2018).

2.7 Leftover Consumption Behaviours (LCB)

The term 'leftovers' is used to describe food that is produced or purchased in one meal, becomes surplus or 'left over' after that meal (Andrews et al., 2018). Leftovers is considered as an area of insufficient research (Andrews et al., 2018). From the findings of Andrews et al. (2018), there has never been a study that examined the current state of knowledge on consumer behaviour towards food waste in households. However, this research paper by Andrews et al. (2018) fills the gap by providing a comprehensive review of food waste literature covering the period 2009-2022, with a particular focus on the behaviour of households on how to generate leftover food waste.

In some cases, leftovers include leftovers from pre-packaged meals and excess food ingredients used in food preparation but not used in food preparation (Aloysius et al., 2023). For example, food that is thrown away because it has been stored incorrectly or too

much, food that is thrown away while it is being cooked (e.g., peelers), or food that is cooked but not served and thrown away (e.g., kitchen waste) (Diekmann & Germelmann, 2021). The most common reasons for food wastage include over-buying, poor food storage, and over-cooking without re-using the leftovers (Romani et al., 2018). Other personal factors that affect the amounts of leftovers on the plate include people's intentions to not leave food on the plate, people's attitudes towards leftovers, subjective norms, and people's perception of how much control they have over how much leftovers they leave on the plate (Diekmann & Germelmann, 2021).

2.8 Conceptual Framework

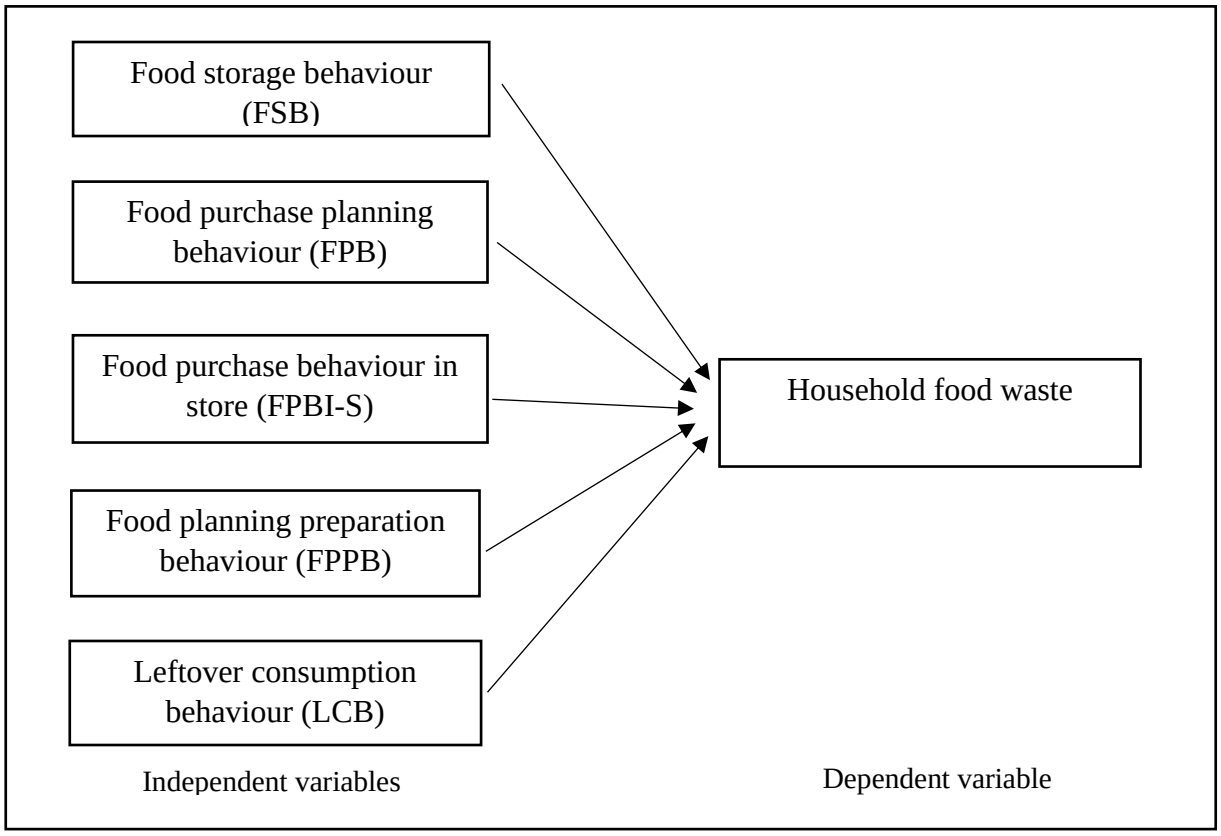

Figure 2.1: Conceptual Framework

The conceptual framework shown above will be used by the researcher to examine the association between food management behaviour and household food waste among working adults of Health Campus, Universiti Sains Malaysia, Kubang Kerian, Malaysia. An independent variable is assumed to cause a change or variation in the dependent variable (Rogers & Révész, 2019). Five independent variables used in this study: food planning, purchase, storage, preparation, and leftover consumption while the dependent variable is household food waste.

CHAPTER 3 METHODOLOGY

3.1 Research Design

The study was a cross-sectional design to examine the association between food management behaviours and household food waste among working adults at Universiti Sains Malaysia, Kubang Kerian, Malaysia. The research was carried out using an online platform that used a questionnaire directly towards working adults only. The cross-sectional research was selected for its ability to capture a snapshot of the association between variables in the current picture at one point in time (Wang & Cheng, 2020). This design was a form of observational study design in which data from a population was analysed concurrently (Wang & Cheng, 2020). In a cross-section study, the participants were randomly selected from a population of potential interest to the study. Once the participants were chosen, the investigators collected the data and evaluated the relationship the between results and exposures. Additionally, cross-sectional studies were relatively fast and inexpensive to carry out (Rezigalla, 2020). The design of the cross-sectional study depended on the pre-determined inclusion and exclusion criteria (Rezigalla, 2020).

3.2 Study Area

The study was conducted in the Health Campus of Universiti Sains Malaysia, which was located at Kubang Kerian, Kelantan, Malaysia. This study location was chosen since there had been few studies conducted in Malaysia, especially in the state of Kelantan, and prior research had mostly concentrated on nations outside of Malaysia. Additionally, there was limited generalizability because the prior study did not address consumer behavior unique to USMKK residents. USMKK represented a specific demographic group of working adults. Understanding their food management behaviours and the resulting food waste was crucial due to the significant portion of daily meals consumed by this

population group. This significance made it possible for the results to directly address the problem of food waste among a substantial segment of the population.

Concentrating on a single area, such as USMKK, it was possible to take into account regional cultural, economic, and infrastructure elements that might have an impact on food waste production and management practices. This localized approach ensured that the study findings are contextually relevant and could be applied directly to the region, increasing their practical utility and impact.

3.3 Study Population

The target population was the population of interest that the study was intended to study or treat (Majid, 2018). The study population for this study was working adults ranging from 20 to 60 years old from Universiti Sains Malaysia, Kubang Kerian, Kelantan. USM Health Campus consisted of three different schools including Health Sciences (PPSK), Dental Sciences (PPSG) and Medical Sciences (PPSP). The working adults were recruited from each of the schools in USMKK. Only working adults who were responsible for purchasing or cooking food in their households were chosen and allowed to participate in this study. Therefore, by recruiting working adults, this study could explore food management behaviours that were specifically related to the challenges they may faced due to time and planning constraints.

The age of the consumer was selected as it had a significant impact on the knowledge and perception of risk associated with the processing of the leftovers. Young consumers tended to select leftovers less often for their meals and save leftovers (Roe et al., 2020). Young consumers had low skills and experience when it comes to managing household food compared to the elderly (Bravi et al., 2020). Consumers aged 35-44 engaged in leftovers processing activities most often (Aloysius et al., 2023). Older people

tended to save leftovers for fewer days compared to young people. The food management behaviour associated to household food waste might be varied with age.

3.4 Subject Criteria

3.4.1 Inclusion Criteria

i. Female and male working adults in USMKK
ii. Working adults responsible for either purchasing or cooking food in their household.
iii. Aged between 20-60 years old
iv. Currently employed in the USMKK
v. Participants must be fluent in the language(s) of the survey used for data collection (e.g., Malay, or English language).

3.4.2 Exclusion criteria

i. Participants who cannot access the online Google Form survey.
ii. Individuals who do not play a significant role in managing food within their household (e.g., living with parents and not involved in food management decisions).

3.5 Sample Size Estimation

The sample size is calculated by using the formula:

$$\boldsymbol{n = [\frac{z}{\Delta}]^2 p(1-p)}$$

Where,

p = 0.15 (15%)

z = 1.96 (α= 0.05)

Δ = 0.05

Using the 95% of the confidence interval, the Z score is 1.96. The Precision decided is 5% (0.05). A study on food management behaviours in households revealed that 15% of respondents frequently engaged in food waste, suggesting a common occurrence within this population (Moroșan et al., 2024).

$$\boldsymbol{n = [\frac{1.96}{0.05}]^2 0.15(1 - 0.15)}$$

$$\boldsymbol{n = 195.9}$$

$$\boldsymbol{n \approx 195}$$

The minimum sample size required is 195 without drop-out.

By adding 10% drop-out,

$$\boldsymbol{n = \left(\frac{10}{100} \times 195\right) + 195 n = 214.5}$$

$$\boldsymbol{n \approx 215}$$

∴ The minimum sample size required is 215 with 10% drop-out.

The target population of the study is working adults from all three schools in Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kelantan. Therefore, with a 95% of confidence interval and a 5% margin of error, the required sample size for this study was 215 respondents. The study achieved a response rate of 83.7% which is above the commonly accepted threshold for survey-based research (Fincham, 2008). While the initial target was 215 participants, the 180 responses collected are representative of the study population and sufficient for meaningful analysis.

Proportional Allocation:

The proportional allocation was done to allocate samples from each school into each stratum based on the population that each stratum represents.

Total staff in Universiti Sains Malaysia Kubang Kerian, Kelantan: 1316

Total staff in School of Health Sciences: 242

Total staff in School of Medicine: 898

Total staff in School of Dentistry: 176

a. **School of Health Sciences (PPSK)**

$$\frac{242}{1316} \times 215 = 39.5$$

$$\approx 40$$

b. **School of Medicine (PPSP)**

$$\frac{898}{1316} \times 215 = 146.7$$

$$\approx 146$$

c. **School of Dentistry (PPSG)**

$$\frac{176}{1316} \times 215 = 28.8$$

$$\approx 29$$

Response Rate:

$$\frac{215}{250} \times 100 = 86\%$$

Response rate for this study is 86%.

3.6 Sampling Method and Subject Requirement

For this study, a stratified random sampling method was used to select respondents among working adults of Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kelantan to examine the association between food management behaviours and household food waste. Stratified sampling was a form of sampling that employs simple random sampling at the time the categories are created (Iliyasu & Etikan, 2021). This type of sampling involved selecting a subset of the population based on a classification and random sampling (Iliyasu & Etikan, 2021). This type of sampling was used in this study to ensure the sample reflected the demographics of the working adult population on campus.

The list of respondents from each of the three different schools was obtained from the USM Health Directory pages of Universiti Sains Malaysia, Kubang Kerian, Kelantan. The researchers then divided the working adult's population at USM into subgroups (strata) based on the school in the health campus, which are PPSK, PPSP, and PPSG. Then, the proportional allocation was done to allocate samples from each school into each stratum based on the population that each stratum represents. Proportional allocation required the population size of one stratum (school) to be divided by the total population size of three schools which was then multiplied by the total sample size. This is done to set the sample size in each stratum equal to be proportional to the number of sampling units in that stratum. Within each subgroup (strata), the working adults were randomly selected to ensure each subgroup was represented in the final sample in proportion to its size in the overall population of working adults at USM and the questionnaire was distributed to them.

Therefore, a poster and an online questionnaire, Google Form were distributed to the working adults easily through email without meeting each of them. Based on the

inclusion and exclusion criteria that had been set for the study, the subject requirement was run until the number of respondents reaches the calculated required sample size, 215 respondents.

3.7 Research Tools

3.7.1 Questionnaire Design

In this study, the online questionnaire was created using a Google Form. The online questionnaire, a Google Form was used to examine the association between food management behaviour and household food waste among working adults in Universiti Sains Malaysia, Kubang Kerian, Kelantan. The online questionnaire was created in both English and Malay versions to ensure all the respondents in this study can answer clearly. The online questionnaire consists of 26 questions and was divided into three parts.

Part A: **Sociodemographic data**

Consists of questions regarding the sociodemographic profile of the respondent including age, gender, educational level, household composition and household income.

Part B: **Food management behaviours**

Consists of 5 sections of questions regarding food management behaviours which is food planning (FPB), purchasing (FPBI-S), storage (FSB), preparation (FPPB), and leftover consumption (LCB) associated with the amount of food waste. In this part, a 5-point Likert-type scale is implemented ranging from ‘never’ (1), ‘rarely’ (2), ‘sometimes’ (3), ‘often’ (4), to ‘always’ (5). This study applied validated measurements (Stefan et al., 2013; Stancu et al., 2016) and added validated items based on Romani et al. (2018).

Part C: **Reported amount of food waste**

Consists of questions regarding the amount of food wasted in general and seven specific subcategories of food which are rice or wheat, fresh fruits and vegetables, eggs, dairy products, meat and poultry, fish and seafood, and bread or other bakery products. It was measured using a 5-point Likert scale ranging from 'not at all' (1), 'less than a tenth' (2), 'more than a tenth but less than a quarter' (3), 'more than a quarter but less than half' (4) to 'more than half' (5) which is adapted from the study conducted by (Stefan et al., 2013).

The questionnaire for this study were adapted with permission from the authors of previous studies. Contact was established with the authors via the email addresses provided in their published articles to obtain authorization for adaptation.

3.7.2 Pilot Test

The term 'pilot' is used in a variety of contexts in the literature. However, according to Fraser et al. (2018), definitions of pilot studies typically refer to experiments, projects, or developments conducted prior to the implementation of a broader experiment, project, or development. The pilot test was conducted to cater to the entire range of working adults in Universiti Sains Malaysia, as the questionnaire obtained from the author of previous studies was translated into Malay rather than merely English. For piloted, an online questionnaire was distributed to 30 working adults of Health Campus, USMKK. According to Machin et.al (2018), the popular number that is suggested for the pilot test should be 30 respondents. Additionally, certain parts of the survey, particularly in Part C, include inquiries about the total quantity of food that is typically thrown away, categorised into seven subgroups that had been adjusted according to local food preferences.

Then, the reliability of all constructs used in the questionnaire of the pilot test was be measured by Cronbach's Alpha test. Cronbach's alpha value ranges from 0.6 to 0.7,