

**“I am in total control in my kitchen”: Food Safety Risk Perceptions of Independently
Living Older Adults in Southern Ontario, Canada**

by

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Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be electronically available to the public.

Statement of Contributions

With the exception of the content noted below, the work of this thesis consists of content that I authored.

I developed the semi-structured interview guide in close collaboration with Dr. Majowicz through various discussions and mock interviews. In addition, I received valuable input from all committee members on methodological guidance and data analysis. Their guidance was instrumental during the coding process and in refining and finalizing the themes.

Abstract

Background: Foodborne illness is a significant global public health concern. Older adults are particularly vulnerable to foodborne illness due to age-related physiological changes, including weakened immune systems and chronic health conditions. In Canada, approximately four million cases of foodborne illness occur each year, resulting in over 240 deaths. While the aging population is rapidly growing, there is limited research on how older adults who live independently perceive and manage food safety risks. The overall aim of the thesis was to understand how independently living persons aged 65 and older, living in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) perceive and mitigate their risks of foodborne illness in their home environments. Specifically, the objectives were to explore: (i) how and why these individuals perceive their risk of developing foodborne illness, and (ii) whether these individuals follow recommended food safety practices and why or why not.

Methods: I conducted 14 semi-structured interviews with persons aged 65 and older, who live independently in Southern Ontario, speak English, and are primary food preparers in their households. Participants were primarily recruited using flyers at community centres for older adults, a health fair hosted at one of these centres, the Schlegel-UW Research Institute for Aging, libraries, and religious institutions. The interview guide was informed by the World Health Organization's Five Keys to Safer Food. Each interview lasted 45-60 minutes and was conducted in person (n=10) or virtually (n=4). In-person interviews were audio recorded using Microsoft Teams, while virtual interviews were both audio and video recorded using Zoom, and live transcription was enabled on both platforms. I manually transcribed each recording verbatim and carefully revised the auto-generated transcriptions for accuracy. This study used a post-positivist and interpretive theoretical orientation. I analyzed the data using a combination of inductive and

deductive approaches through reflexive thematic analysis, following Braun & Clarke's six-phase process.

Results: Four themes were developed using an inductive approach based on the interviews with older adults: (1) Trusting my own cooking, (2) Doing what I've always done, (3) Being conscious of minimizing food waste, and (4) Cooking is a chore. Each theme encompassed subthemes that illuminated their nuanced perspectives and experiences. Participants expressed strong trust in their own food handling practices at home, which contributed to their perception of being at low risk for foodborne illness. They believed that preparing healthy meals makes their food naturally safe, leading them to believe that illness is unlikely to affect them. They engaged in varied food handling practices; some followed recommended guidelines, while others deviated, such as not using a food thermometer. Their practices were shaped by long-standing habits, experience, and reliance on both their food safety knowledge and their social networks. Participants described shopping and food preservation strategies aimed at minimizing food waste and costs, which resulted in neglecting best practices. In addition, limited kitchen space affected their food choices and storage practices. Reduced motivation to prepare meals and physical limitations prompted them to adjust their preparation methods and rely on convenience.

Conclusion: This is the first study in Canada to explore older adults' perceptions of food safety risks using semi-structured interviews. While participants demonstrated solid food safety knowledge, they perceived themselves at low risk for foodborne illness in their homes. The findings highlight the need for education and awareness of specific food handling practices. This study provides practical guidance for public health professionals and senior care organizations to develop tailored resources that promote safe food handling, support older adults' independence, and bridge the gap between knowledge and practice to reduce their risk of foodborne illness.

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I would like to express my heartfelt gratitude to my family for their unconditional love, steadfast support, and patience; you have all been my greatest supporters. To papa and mama, thank you for the countless sacrifices you have made to help me reach this milestone. Your encouragement and endless love have been my strongest source of strength. Words cannot fully express my gratitude for all that you have done and continue to do for me. You have profoundly shaped the person that I am today. To Komal, the best sister anyone could ask for, thank you for being an exceptional role model. Your faith in me always motivates me to grow and strive for my very best. You will achieve great heights and continue to inspire everyone around you. To Tuffy, thank you for bringing so much happiness and warmth into my life.

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Above all, I thank God for providing me with strength, guidance, and countless blessings.

Dedication

This thesis is dedicated to my beloved grandparents. I hope every child is as blessed as I am to have grandparents like you.

To my late grandpa, Ram Nath Sarwal, I hope this work honours the visions and dreams you held for me and makes you proud. Thank you for teaching me the value of education and for immigrating to Canada to provide me with the best possible opportunities. Thank you for being my guardian angel, always watching over me.

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This thesis stands as a tribute to your wisdom and the values you have lovingly passed down to me. As my grandma often says, “health is wealth”, and it is with that spirit that I dedicate this research to advancing health, wellness, and equity.

Table of Contents

Author’s Declaration.....	ii
Statement of Contributions	iii
Abstract.....	iv
Acknowledgements.....	vi
Dedication.....	viii
List of Tables	xii
List of Abbreviations	xiii
1. Introduction and Literature Review	1
1.1 Overview of Foodborne Illness.....	1
1.2 Older Adults as a Vulnerable Population for Foodborne Illness	3
1.3 Food Safety, Including in Home Environments	4
1.3.1 Overview of Food Safety	4
1.3.2 WHO Five Keys to Safer Food.....	5
1.3.3 Food Safety in Home Environments.....	6
1.4 Canadian Consumers’ Food Safety Practices	7
1.5 Canadian Older Adults’ Food Safety Practices	11
1.6 Canadian Consumers’ Foodborne Illness Risk Perceptions	13
1.7 Canadian Older Adults’ Foodborne Illness Risk Perceptions.....	14
2. Study Rationale and Aim.....	16
3. Methodology.....	18
3.1 Theoretical Orientation	18
3.2 Study Design and Ethics	18
3.2.1 Interview Guide Development and Piloting	20
3.2.2 Interview Guide Inspired by the COM-B Model.....	21
3.2.3 Recruitment.....	22
3.2.4 Consent	24
3.2.5 Interviews.....	24
3.3 Data Analysis	25
3.3.1 Familiarization with the data	25
3.3.2 Data coding	26
3.3.3 Initial theme generation	28
3.3.4 Theme development and review	28
3.3.5 Theme refining, defining, and naming.....	29
3.3.6 Writing up	29
3.4 Reflexivity and Researcher Positionality	29
4. Results.....	31

4.1 Description of Participants.....	32
4.2 Trusting my own cooking	32
4.2.1 Getting sick is not for me.....	34
4.2.2 Eating healthy won't get me sick.....	36
4.3 Doing what I've always done	37
4.3.1 Habituating cleaning of kitchen and hands	39
4.3.2 Trusting Canadian food and water sources	41
4.3.3 Relying on experience and health literacy	44
4.3.4 Cutting corners when thawing	46
4.4 Being conscious of minimizing food waste	47
4.4.1 Conserving food.....	48
4.4.2 Overriding best practices with sensory cues	50
4.4.3 Shopping strategies to reduce food cost and waste.....	52
4.4.4 Having limited space.....	54
4.5 Cooking is a chore	56
4.5.1 Losing motivation to cook	57
4.5.2 Physically harder to prepare meals	59
4.5.3 Changing preparation methods for convenience.....	60
4.6 Older Adults' Food Safety Practices.....	62
Table 1: Older Adults' Food Safety Practices based on WHO Recommendations	63
5. Discussion.....	66
5.1 Overview.....	66
5.2 Trusting my own cooking	67
5.3 Doing what I've always done	69
5.4 Being conscious of minimizing food waste	72
5.5 Cooking is a chore	74
5.6 Older Adults' Food Safety Practices.....	75
5.7 Strengths and Limitations	77
5.8 Contributions.....	80
5.9 Implications for practice	81
5.10 Future research directions	82
6 Conclusion	84
References.....	86
Appendices.....	116
Appendix A: Semi-Structured Interview Guide and Verbal Consent Form	116
Appendix B: Appreciation Email.....	124
Appendix C: Feedback Letter	125

Appendix D: Recruitment Email to Organizations	127
Appendix E: Recruitment Flyer	129
Appendix F: Announcement and Social Media Caption	130
Appendix G: Pre-interview Screening Questionnaire.....	132
Appendix H: Invitation Email.....	134
Appendix I: Information letter	136
Glossary	140

List of Tables

Table 1: Older Adults' Food Safety Practices based on WHO Recommendations

List of Abbreviations

COM-B Model — Capability, Opportunity, Motivation-Behaviour Model

REB — Research Ethics Board

RTA — Reflexive Thematic Analysis

WHO — World Health Organization

1. Introduction and Literature Review

1.1 Overview of Foodborne Illness

Foodborne illness is a significant global public health, economic, and social burden (Pires et al., 2021). Food that is unsafe to eat causes 600 million cases of foodborne illness and 420,000 deaths globally each year (Havelaar et al., 2015). Foodborne illness can be caused by bacteria, parasites, viruses, toxins, metals, and prions (Thomas et al., 2013; Newell et al., 2010). The symptoms can range from mild cases of vomiting and diarrhea to severe and potentially life-threatening conditions (Thomas et al., 2013; Behravesh et al., 2011).

Foodborne illness remains a pressing public health concern in Canada, affecting approximately one in eight Canadians each year (Thomas et al., 2013). These illnesses lead to more than 11,600 hospitalizations and 238 deaths annually, with the most common pathogens being norovirus, nontyphoidal *Salmonella* spp., *Campylobacter* spp., verotoxin-producing *E. coli* O157, and *L. monocytogenes* (Thomas et al., 2015). However, cases of foodborne illness are often underreported and underdiagnosed (Thaivalappil et al., 2020; Kendall et al., 2006; Redmond & Griffith, 2003), leading to an underestimation of the true burden.

Public health crises like the COVID-19 pandemic have caused significant disruptions in food systems and supply chains, affecting agricultural practices, consumer behaviours, and government decisions (Trmčić et al., 2021; Charlebois & Music, 2021; Cable et al., 2021). At the onset of the pandemic, consumer purchasing habits shifted drastically, with panic buying and stockpiling of household supplies and food products (Taylor, 2021). This sudden behaviour change raised important food safety concerns, particularly around the proper storage and refrigeration of food items (Haas et al., 2020). Since the pandemic, purchasing and eating habits

have changed as consumers have shifted to storing and preparing more food at home (Kuna & Kata, 2020; Coluccia et al., 2021; Charlebois & Music, 2021; Thomas & Feng, 2023). In parallel, notable behavioural changes have been adopted, such as frequent handwashing, washing produce, and increased caution during grocery shopping (Haas et al., 2020; Charlebois & Music, 2001). Despite these positive changes, a persistent issue is the infrequent monitoring of refrigerator and freezer temperatures (Haas et al., 2020). This poses a concern because *L. monocytogenes* can grow at refrigeration temperatures (Dumitraşcu et al., 2020), which elevates the risk of foodborne illness among vulnerable groups, particularly older adults and pregnant women (Public Health Agency of Canada, 2016).

In addition, widespread restaurant closures during the pandemic led to a greater increase in people eating meals at home (Charlebois & Music, 2021; Haas et al., 2020). As indoor dining became restricted, many food establishments shifted to delivery, curbside pickup, and drive-thru ordering services (Abebe, 2022). However, the increase in online food delivery services has raised concerns about food safety, including improper temperature control during transport and insufficient food safety training among delivery drivers (Latter & Heacock, 2020).

Although Canada upholds robust food safety standards and practices (Valleé & Charlebois, 2015), the pandemic has brought food safety concerns to the forefront and emphasized the urgent need to prioritize safe food handling practices. Those most vulnerable to foodborne illness include adults aged 65 and older, pregnant women, immunocompromised people, and children under the age of five (McCabe-Sellers & Beattie, 2004; Fung et al., 2018; Lund & O'Brien, 2011; Behravesh et al., 2011).

1.2 *Older Adults as a Vulnerable Population for Foodborne Illness*

Older adults are at greater risk for developing foodborne illnesses and are more susceptible to morbidity and mortality from these illnesses (Lund & O'Brien, 2011; Smith, 1998; Behravesh et al., 2011; Scott, 2003; Berger et al., 2023). They are more vulnerable to foodborne illness because of age-related decline in immune function, reduced gastric acid production, frequent antibiotic use, and slower digestive processes – all of which make it more difficult for their bodies to fight off pathogens and recover (Medeiros, Hillers, Kendall, & Mason, 2006; Smith, 1998; Wills et al., 2015; Berger et al., 2023). Due to these factors, older adults are more likely to experience hospitalization, complications, and even death from foodborne illness in comparison to younger adults (Cates et al., 2009).

Adults aged 65 and older account for 17.5% of Canada's population, and this is expected to rise to 25% of the overall population by 2040 (Public Health Agency of Canada, 2020). Approximately 92% live in private homes in the community (Public Health Agency of Canada, 2020), where living alone is linked to lower motivation to shop, prepare, and eat meals (Alghamdi et al., 2023). Safe food handling practices are crucial for their well-being, as independent food preparation supports their autonomy and personal identity (Gettings & Kiernan, 2001; Plastow et al., 2015). Additionally, many older adults often cook for others; as a result, their food choices affect not only themselves but also those they care for, such as their grandchildren (Jongenelis & Budden, 2023; Roberts & Pettigrew, 2010).

Several factors increase older adults' susceptibility to foodborne illnesses and influence their food-handling practices. For example, kitchen layout features such as cabinet height, lighting, and furniture arrangement can increase the risk of falls, contribute to cluttered countertops, and improper food storage (Wills et al., 2015; Maguire et al., 2014; Peace, 2016).

Older adults encounter distinct challenges that impact their food safety practices, including chronic health conditions, visual impairments, disabilities, and limited mobility (Thaivalappil, 2020; Kendall et al., 2006; Berger et al., 2023). For example, poor eyesight can make it challenging for older adults to read use-by dates, leading them to unintentionally keep food for up to a month (Hudson & Hartwell, 2002). In addition, health conditions and medications can weaken immune systems, increasing susceptibility to severe infections (Kendall et al., 2006; Njoagwuani et al., 2023).

1.3 Food Safety, Including in Home Environments

Foodborne illness can occur in several ways along the farm-to-fork continuum, especially with the home environment being a significant site of risk. It can occur from consuming food that has been contaminated or from unsafe food handling practices, such as poor personal hygiene (Fung et al., 2018; Byrd-Bredbenner et al., 2013; Evans et al., 2020; Terpstra et al., 2005). Several factors contribute to these illnesses, including contaminated raw food supplies, food handling and preparation errors, and insufficient food safety knowledge (Nesbitt et al., 2014; Redmond and Griffith, 2003; Byrd-Bredbenner et al., 2013; Evans et al., 2020; Madilo et al., 2024). Causes of cross-contamination at home include improper food handling practices, poor personal hygiene, inadequate cleaning methods, and a lack of facilities for separating raw and cooked foods (Nesbitt et al., 2014). Food mishandling can happen at any stage - food preparation, handling, or storage (Nesbitt et al., 2014). Ultimately, a large part of food safety in the home depends on consumers' behaviours, especially around food handling.

1.3.1 Overview of Food Safety

Consumers play a crucial role in ensuring their food is safe to eat (Murray et al., 2017; Nesbitt et al., 2014). Their food safety habits are vital for their well-being and contribute to the

effectiveness of the overall food safety system (Murray et al., 2017; Nesbitt et al., 2014). Consumers often lack adequate knowledge and awareness about preventing foodborne illness at home and how food preparation contributes to these illnesses (Medeiros, Hillers, Kendall, & Mason, 2006; Nesbitt et al., 2014; Lien et al., 2020). They often follow their usual food handling routines at home, leading them to feel confident and underestimate their risk of foodborne illnesses, and even with increased knowledge, they are unlikely to change their behaviours (Young & Waddell, 2016). Consumers who prepare, store, and cook food at home are often considered most likely to make mistakes compared to other parts of the food supply chain (Brennan et al., 2007; Terpstra et al., 2005; Wills et al., 2015).

1.3.2 WHO Five Keys to Safer Food

There are relatively few frameworks that describe food safety behaviours at the consumer level (Young et al., 2018; Health Canada, 2021; Canadian Institute of Food Safety, n.d.). This thesis adopts the WHO Five Keys to Safer Food as a guiding framework because of its widespread recognition, universal relevance, and consumer-oriented approach. This evidence-based strategy is designed to be simple and actionable, with each key behaviour accompanied by clear instructions and explanations of the associated foodborne illness risks (Fontannaz-Aujoulat et al., 2019).

This framework was developed in 2001 in response to the growing need to educate consumers and food handlers about safe food handling practices (WHO, 2006). The Five Keys to Safer Food are: (1) keep clean; (2) separate raw and cooked; (3) cook thoroughly; (4) keep food at safe temperatures; and (5) use safe water and raw materials (WHO, 2006). The first key, keep clean, recommends washing hands before handling food and during food preparation, washing hands after going to the toilet, sanitizing surfaces and equipment, and protecting kitchen areas

from insects and pets. The second key, separate raw and cooked, recommends separating raw meat, poultry, and seafood from other foods, using separate equipment and utensils, and storing food in containers to avoid contact between raw and prepared foods. The third key, cook thoroughly, emphasizes the importance of cooking food, especially meat, poultry, eggs, and seafood, to safe temperatures. It also recommends bringing foods like soup to a boil (70°C), ensuring meat juices are clear, not pink, and ideally using a food thermometer. The fourth key, keep food at safe temperatures, recommends not leaving cooked food at room temperature for more than two hours, refrigerating cooked foods promptly (below 5°C), keeping hot foods above 60°C before serving, not storing food too long in the refrigerator, and not thawing frozen food at room temperature. Finally, the fifth key, use safe water and raw materials, involves using safe water, selecting fresh and wholesome foods, choosing foods that are processed for safety, washing fruits and vegetables, and not consuming food beyond its expiry date (WHO, 2006).

1.3.3 Food Safety in Home Environments

Consumers' decisions about what they purchase and how they handle food have a direct impact on their food safety practices at home. Since most of the food we eat is prepared at home, the risk of food handling mistakes increases (Byrd-Bredbenner et al., 2013). Importantly, foodborne illnesses are frequently associated with food consumed at home compared to other settings (Vrbova et al., 2009; Redmond and Griffith, 2003).

Home kitchens serve multiple purposes and are used for more than just food preparation, handling, and storage (Redmond & Griffith, 2009; Byrd-Bredbenner et al., 2013; Byrd-Bredbenner et al., 2007). For instance, kitchen sinks are used for handwashing, washing produce, dishwashing, and wetting mops (Byrd-Bredbenner et al., 2007). Kitchens are more contaminated than bathrooms, with the highest concentration of bacteria found on sponges, dishcloths, sink

drain areas, and faucet handles (Byrd-Bredbenner et al., 2007; Rusin et al., 1998). There are several other factors which influence food safety practices in a household, including the presence of young children and pets (Scott, 2003; Byrd-Bredbenner et al., 2013).

Therefore, many cases of foodborne illness result from improper food handling, preparation, and storage in home environments (Evans et al., 2020; Yemane & Tamene, 2022; Taché & Carpentier, 2014; Evans & Redmond, 2015; Byrd-Bredbenner et al., 2007). However, these challenges are not confined to the household since many people prepare and serve food to their family members and the broader community, including at school and religious events (Scott, 2003; Byrd-Bredbenner et al., 2013). Given the widespread impact of consumer behaviours, exploring food safety perceptions can provide valuable insights for reducing the overall risk of foodborne illness.

1.4 Canadian Consumers' Food Safety Practices

Canadians generally demonstrate a solid understanding of foodborne illness and food safety awareness; however, many still engage in unsafe food handling practices at home (Murray et al., 2017; Nesbitt et al., 2014). Canadians feel highly confident in their food safety knowledge and their ability to prevent foodborne illness (EKOS Research Associates Inc., 2010). Males tend to engage in riskier food handling practices than females (Nesbitt et al., 2009; Murray et al., 2017; Brennan et al., 2007; Patil, Cates, & Morales, 2005; Young et al., 2020) and frequently deviate from recommended guidelines, such as ignoring cooking instructions (Murray et al., 2017). This section explores Canadian consumers' food safety practices according to the WHO Five Keys to Safer Food.

1.4.1 Keep Clean

Canadians generally recognize handwashing as a vital practice to prevent illness and remove harmful bacteria (Nesbitt et al., 2009). Many take precautions in their home, such as frequently washing their hands before preparing food (Leger Marketing, 2011; EKOS Research Associates Inc., 2010). However, handwashing routines are not consistent; males are less likely to always wash their hands before eating or handling food and often neglect washing their hands with soap and water after handling raw meat (Nesbitt et al., 2009). Nearly half of Canadians frequently wash their hands using soap and water (Wyne, 2001). Most individuals clean the surfaces used to prepare foods, typically using soap and water (EKOS Research Associates Inc., 2010; Murray et al., 2017). These inconsistencies reflect younger populations; for example, Ontario high school students demonstrate gaps in knowledge about proper hand and kitchen hygiene (Majowicz et al., 2016). Notably, Canadians rarely wash their reusable grocery bags (Nesbitt et al., 2014; EKOS Research Associates Inc., 2010), which poses a potential food safety risk due to the possibility of cross-contamination.

1.4.2 Separate Raw and Cooked

Canadians often wash their hands with soap and water or use hand sanitizer after handling meat and consistently clean preparation surfaces after preparing raw meat or poultry (Murray et al., 2017). Many take precautions to prevent cross-contamination, such as using separate cutting boards for raw meat and other foods, using separate plates for raw and cooked meats, and consciously separating raw meat, poultry, and fish from other foods in the refrigerator (Murray et al., 2017). These practices reflect an increased awareness of minimizing foodborne illness risks by preventing cross-contamination. Nearly half of Canadians store meat, poultry, and seafood on the bottom shelf of the refrigerator, and avoid placing meat or poultry and fresh produce in the same shopping bag (EKOS Research Associates Inc., 2010). On the contrary,

significant gaps in food safety practices have been observed among Ontario high school students, with many neglecting handwashing after handling raw chicken or vegetables, placing raw and ready-to-eat foods on the same plate, and using the same knife and/or cutting board to prepare raw chicken and ready-to-eat products (Diplock et al., 2018).

1.4.3 Cook Thoroughly

Canadians do not routinely use food thermometers (Nesbitt et al., 2014; Murray et al., 2017; EKOS Research Associates Inc., 2010), possibly due to not owning one (Nesbitt et al., 2009; Leger Marketing, 2011). Instead, most Canadians rely on visual cues to determine whether meat was fully cooked, with thermometers being most frequently used for whole poultry or roasts (Murray et al., 2017; Nesbitt et al., 2009; Leger Marketing, 2011). Canadians rely on sensory cues, such as appearance, texture, smell or taste to determine whether food is safe to eat, believing these cues can indicate the likelihood of foodborne illness risks (EKOS Research Associates Inc., 2010; Kosa et al., 2017). Furthermore, Canadians tend to overestimate the minimum safe internal cooking temperature of foods, especially for pork, whole poultry, and ground meat (EKOS Research Associates Inc., 2010), which may increase the risk of consuming undercooked food.

Canadians frequently consume high-risk foods, such as undercooked eggs, deli meats, and unpasteurized milk (Nesbitt et al., 2009; Tooby et al., 2021; EKOS Research Associates Inc., 2010). Interestingly, Canadians demonstrated low awareness of the foodborne illness risks associated with frozen chicken nuggets (Murray et al., 2017). A widespread misconception persisted, with over one-third of Canadians mistakenly believing that pre-cooked products only require warming (The Strategic Counsel, 2018). In response to this misconception, Canadian

legislation changed in 2019 to reduce the incidence of *Salmonella* associated with frozen breaded chicken products (Canadian Food Inspection Agency, 2019).

1.4.4 Keep Food at Safe Temperatures

Very few Canadians have a thermometer in their refrigerator and are often unaware of the recommended safe refrigerator temperature (EKOS Research Associates Inc., 2010; Nesbitt et al., 2009; Leger Marketing, 2011). When it comes to thawing frozen meat, most Canadians use safe methods, such as thawing in the refrigerator, microwave, or under water (Nesbitt et al., 2009). Only few thaw frozen meat on the counter at room temperature, a practice associated with higher foodborne illness risks (EKOS Research Associates Inc., 2010; The Strategic Counsel, 2018). A positive practice is that most Canadians refrigerate leftovers within two hours after cooking and do not keep remaining leftovers after they have been reheated once (Murray et al., 2017; EKOS Research Associates Inc., 2010, Leger Marketing, 2011).

1.4.5 Use Safe Water and Raw Materials

Nearly half of Canadians rinse poultry before cooking (EKOS Research Associates Inc., 2010), despite this not being a recommended practice due to the risk of spreading bacteria through splashing (Young et al., 2020). On a positive note, the majority consistently wash their fruits and vegetables before consumption (EKOS Research Associates Inc., 2010; Nesbitt et al., 2009). In addition, while Canadians often check best-before dates, nearly half are uncertain whether products are safe to eat past the date, and a slight majority believe they can still be eaten for a while beyond that date (EKOS Research Associates Inc., 2010). This highlights a widespread lack of understanding regarding the meaning of best-before dates.

1.5 Canadian Older Adults' Food Safety Practices

Although older adults possess greater food safety knowledge compared to younger individuals (Anderson et al., 2011; Evans & Redmond, 2014; Patil, Cates, & Morales, 2005), they do not always adhere to recommended guidelines (Berger et al., 2023). There is limited research on how older adults manage food consumption, handling, and storage practices in their home environments (Evans & Redmond, 2015; Gettings & Kiernan, 2001). Consistent with the broader Canadian population, older women demonstrate safer food handling practices, such as proper food storage, compared to their male counterparts (Thaivalappil et al., 2020). This section explores Canadian older adults' food safety practices according to the WHO Five Keys to Safer Food.

1.5.1 Keep Clean

Older adults generally demonstrate good hand hygiene practices, such as washing their hands with soap and water before preparing food (EKOS Research Associates Inc., 2010; The Strategic Counsel, 2018). However, they are the least likely demographic to consistently wash their hands after preparing food (EKOS Research Associates Inc., 2010). This indicates handwashing practices in this group require improvement (Wyne, 2001). While older adults have established routines for cleaning food preparation surfaces (The Strategic Counsel, 2018), they often use bleach (Murray et al., 2017), posing food safety concerns if surfaces are not thoroughly sanitized.

1.5.2 Separate Raw and Cooked

Older adults frequently clean and reuse the same cutting board when preparing raw meat and other foods (Murray et al., 2017), which can increase the risk of cross-contamination if the cutting board is not properly washed and sanitized between uses. On a positive note, the majority

wash their hands with soap and water after handling raw meat or raw fish (The Strategic Counsel, 2018). However, most older adults fail to store raw meat, poultry, and seafood on the bottom shelf of the refrigerator, which is a key prevention method for cross-contamination (Thaivalappil et al., 2020). These behaviours suggest a notable knowledge gap in their understanding and application of cross-contamination prevention measures, such as proper storage of meat in containers and leak-proof bags to prevent spills.

1.5.3 Cook Thoroughly

Nearly half of Canadians rarely use a food thermometer when preparing food (EKOS Research Associates Inc., 2010), most likely because they do not own one (The Strategic Counsel, 2018). In contrast, most older adults regularly follow cooking instructions on food labels (Thaivalappil et al., 2020; The Strategic Counsel, 2018). There is a significant gap in the literature about whether older adults prioritize cooking foods thoroughly by checking for safe internal temperatures. This implies that they may rely on less reliable methods, such as sensory cues, which can increase the risk of consuming unsafe food.

1.5.4 Keep Food at Safe Temperatures

Older adults consistently refrigerate leftovers within two hours of cooking (The Strategic Counsel, 2018; EKOS Research Associates Inc., 2010). However, they rarely label or date leftovers they refrigerate (EKOS Research Associates Inc., 2010), which may result in keeping leftovers for extended periods and increase the risk of consuming spoiled foods. In addition, the majority do not monitor refrigerator temperatures and lack awareness of safe refrigerator temperatures (The Strategic Counsel, 2018; Thaivalappil et al., 2020). On a positive note, the majority do not defrost frozen meat or poultry on the counter at room temperature, a practice known to increase bacterial growth (The Strategic Counsel, 2018).

1.5.5 Use Safe Water and Raw Materials

Older adults consistently rinse poultry before cooking, which is not a recommended practice because it can spread bacteria to kitchen surfaces and other foods (EKOS Research Associates Inc., 2010; The Strategic Counsel, 2018). In contrast, they consistently wash fruits and vegetables before consumption (EKOS Research Associates Inc., 2010; The Strategic Counsel, 2018). However, older adults often consume high-risk foods, such as undercooked eggs (Nesbitt et al., 2009). Most are not aware of the foodborne illness risks associated with deli meat, despite being at increased risk for listeriosis (Murray et al., 2017; Thaivalappil et al., 2020). The incidence of listeriosis is higher in vulnerable populations, including older adults and immunocompromised people, and it remains a leading cause of death in these groups (Buchanan et al., 2017; Bintsis, 2017; Anderson et al., 2011). Notably, older adults are the least likely demographic to check best-before dates before preparing food (EKOS Research Associates Inc., 2010), indicating a gap in their understanding of best-before dates.

1.6 Canadian Consumers' Foodborne Illness Risk Perceptions

Canadian consumers express strong confidence in the safety of the national food supply (Sutherland et al., 2020; Nesbitt et al., 2014; Leger Marketing, 2011; The Strategic Counsel, 2018). This trust is rooted in the belief that the government is committed to ensuring a safe food supply; however, foodborne illness outbreaks and recalls can affect their confidence (Nesbitt et al., 2014). A significant concern for consumers is the transparency and clarity in the communication of food safety risk information to the public (Sutherland et al., 2020). Canadians perceive their risk of foodborne illness to be low and may be overconfident in their food preparation and handling practices, especially in their home environment (Sutherland et al., 2020; EKOS Research Associates Inc., 2010). The majority believe that food contamination

occurs before food reaches their kitchen, while few recognize that improper food handling and storage at home can pose a significant risk (Nesbitt et al., 2014; Leger Marketing, 2011).

Consequently, consumers assume the least amount of responsibility for food safety. They believe the responsibility falls onto retailers and manufacturers, thereby minimizing their own crucial role in preventing illness and maintaining food safety (Sutherland et al., 2020). Given that most Canadians prepare and consume most of their food at home (Nesbitt et al., 2014), it is imperative to emphasize the role of consumers in preventing foodborne illness.

Similar to the broad Canadian population, food safety knowledge of Ontario high school students and young adults aged 19-29 is generally low, yet these groups exhibit high levels of confidence in their ability to prepare safe meals (Majowicz et al., 2016; Burke et al., 2016). This pattern mirrors attitudes toward food safety nationwide. Significantly, the disconnect between food safety knowledge and practices is not limited to younger individuals but is also evident among older adults.

1.7 Canadian Older Adults' Foodborne Illness Risk Perceptions

It is crucial not only to understand older adults' food safety practices, but also to explore their perceptions of foodborne illness risk that influence these practices. While most older adults acknowledge their increased vulnerability (Thaivalappil et al., 2020), many perceive themselves to be at low risk for foodborne illness or developing serious complications (The Strategic Counsel, 2018; EKOS Research Associates Inc., 2010). Older adults reflect the broader Canadian population in expressing strong confidence in the national food safety system, but are the least confident demographic overall (The Strategic Counsel, 2018; EKOS Research Associates Inc., 2010). They believe they possess sufficient information about food safety to protect themselves from foodborne illness (EKOS Research Associates Inc., 2010). These complex perceptions

highlight the need to identify gaps in food safety knowledge and behaviours within this vulnerable population.

2. Study Rationale and Aim

Older adults are more susceptible to foodborne illnesses and experience higher rates of morbidity and mortality (Lund & O'Brien, 2011; Smith, 1998; Behravesh et al., 2011; Scott, 2003; Berger et al., 2023). As of 2023, approximately 7.6 million Canadians were aged 65 and older, accounting for nearly one-fifth of the national population (Statistics Canada, 2024). This demographic is projected to grow significantly to 4.7 million by 2051 (Government of Ontario, 2021). In Southern Ontario, older adult populations include 89,705 residing in Kitchener-Cambridge-Waterloo (Statistics Canada, 2023), 23,545 in Guelph (Statistics Canada, 2021), and 7,705 in Woodstock (Statistics Canada, 2017). As the aging population grows, understanding their food safety perceptions and practices is vital for supporting healthy aging, reducing the risk of foodborne illness, and promoting their independence and overall quality of life.

Older adults do not perceive themselves as vulnerable to foodborne illness (Evans & Redmond, 2019; Kavanaugh et al., 2021; Roseman, 2007), despite being aware of the associated health risks (Anderson et al., 2011). It is important to explore why many older adults fail to recognize their increased risk in their home environments (Cates et al., 2009; Gettings & Kiernan, 2001; Evans & Redmond, 2014; Kavanaugh et al., 2021; Nesbitt et al., 2014; Sutherland et al., 2020). This disconnect underscores the need for a deeper investigation into why this high-risk group underestimates their vulnerability to foodborne illness (Evans & Redmond, 2019; Kavanaugh et al., 2021; Roseman, 2007).

In addition, there remains a significant gap in understanding why older adults engage in unsafe food handling practices that increase their risk of foodborne illness, such as not using food thermometers (Kendall et al., 2006; Byrd-Bredbenner et al., 2013; Gettings & Kiernan, 2001; Evans & Remond, 2015; Murray et al., 2017). For instance, while many older adults

understand best-before dates, they often ignore them and rely on personal judgment and sensory cues to determine whether food is safe to eat (Evans & Redmond, 2015; Evans & Redmond, 2014; Berger et al., 2023; Evans & Redmond, 2016). This reliance on sensory cues over recommended guidelines emphasizes a disconnect between food safety knowledge and practice. This highlights the importance of addressing the gap to better support older adults' needs and reduce their risk of foodborne illness (Evans & Redmond, 2014).

To date, no studies in Ontario have specifically explored how older adults perceive and mitigate their risks of foodborne illness in their home environments. Most of the existing literature has been conducted in the United States or the United Kingdom, highlighting a lack of global and Canadian representation on this important topic (Thaivalappil et al., 2020; Redmond & Griffith, 2002; Redmond & Griffith, 2003).

Therefore, the overall aim of the thesis was to understand how independently living persons aged 65 and older, living in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock), perceive and mitigate their risks of foodborne illness in their home environments.

The specific objectives of this thesis were to explore:

1. how and why these individuals perceive their risk of developing foodborne illness; and
2. whether these individuals follow recommended food safety practices and why or why not.

3. Methodology

3.1 Theoretical Orientation

This thesis adopted a post-positivist and interpretive theoretical approach. A post-positivist approach understands that reality is externally constructed and can be influenced by the researcher's values and culture, despite truth being considered to be objective (White & Cooper, 2022; Braun & Clarke, 2022). It acknowledges that observations cannot be pure and perfect and are shaped by selective interpretation (Braun & Clarke, 2022; Haraway, 1988). In this study, a post-positivist approach was taken to deductive coding of interviews to address the second research objective on whether participants followed current food safety guidance. To address the first objective on older adult perceptions of risk, an interpretive theoretical stance was taken. Open coding was used to understand the subjective meanings and interpretations that participants attached to their experiences related to foodborne illness and food safety (Green & Thorogood, 2004). For instance, a participant who has experienced foodborne illness could acknowledge a higher risk, while others could underestimate their foodborne illness risk due to a lack of perceived vulnerability. By exploring diverse experiences, these theoretical approaches enrich our understanding of older adults' food safety practices and risk perceptions, revealing different ways they interpret and attach meaning to food safety and foodborne illness.

3.2 Study Design and Ethics

A qualitative study based on individual semi-structured interviews with persons aged 65 and older who live independently in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) was conducted from March 20, 2025, to April 23, 2025. A final sample of 14 individuals was attained.

The anticipated sample size was between 10 to 30 participants; however, a smaller sample is adequate when participants are highly knowledgeable and provide in-depth discussions (Favourate Y. Sebele-Mpofu, 2020). Reflexive thematic analysis does not have a predetermined minimum sample size; rather, the concept of information power is valued, which considers the richness of the data in relation to the study aims (Braun & Clarke, 2022). According to the information power model, fewer participants are needed when the study aim is narrow, involves specific participants, is supported by established theory, includes strong interview dialogue, and an in-depth analysis (Malterud et al., 2015).

Semi-structured interviews are widely used in health research (Ryan et al., 2009) because they allow researchers to guide conversations around predetermined topics while also giving participants the flexibility to share their insights and experiences (Green & Thorogood, 2004). Although qualitative approaches are essential in food safety research, they are often overlooked despite their ability to uncover nuanced and in-depth understandings (Thaivalappil et al., 2023; Carter et al., 2009; Stickley et al., 2022). This approach focuses on exploring how participants make sense of their experiences by understanding their meanings and perspectives attached to food safety risks (Verhoef & Casebeer, 1997). Its strength lies in layering diverse narratives to build rich contextualized understandings (McAleese & Kitty, 2019).

I developed a low-to-moderate risk fieldwork safety protocol plan with Dr. Majowicz for safety measures when conducting interviews, following University requirements. This study was reviewed and received ethics clearance through a University of Waterloo Office of Research Ethics Board (REB #46852).

3.2.1 Interview Guide Development and Piloting

The semi-structured interview guide (Appendix A) was developed based on the two research objectives and informed by the WHO Five Keys to Safer Food (WHO, 2006). This thesis applied the WHO Five Keys to Safer Food as a foundation for developing the semi-structured interview guide. To my knowledge, no previous studies have adopted this framework to explore whether independently living older adults follow recommended food safety guidelines and the underlying reasons behind their practices. This approach offers a novel and nuanced lens for identifying knowledge gaps and understanding older adults' food safety behaviours.

I mapped the questions to the research objectives by including a section on risk perception and structured the other questions around the WHO Five Keys to Safer Food behaviours. The guide was designed with open-ended questions to encourage discussion and allow participants to move freely between topics. I pilot tested the interview guide approximately 15 times with diverse individuals, including Dr. Majowicz, Dr. Diplock, friends, family members, my grandmother's friends, and colleagues in my lab. These mock interviews helped me refine the questions to ensure they were easy to understand and effectively elicited in-depth insights aligned with the research objectives.

The interview guide included an introduction about the study and my role as a student researcher, detailed information about the study, a verbal consent form, 11 main open-ended questions with prompts and probing questions, and a conclusion. Following consent, I began each interview by asking a broad question about what participants typically cook to establish rapport and learn about their general cooking practices. Next, I asked open-ended questions related to how they perceive themselves at risk for foodborne illness to address the first research

objective – understanding how and why participants view themselves at risk for foodborne illness.

The remainder of the interview focused on the second objective to explore whether participants follow recommended food safety guidelines and their reasons behind their practices. These questions were structured around the WHO Five Keys to Safer Food: keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperatures, and use safe water and raw materials (WHO, 2006). I included broad questions about specific food safety behaviours, including food storage, thawing methods, and cleanliness practices. The prompts and probes were incorporated to help draw out in-depth responses and further explore the underlying reasons behind participants' perceptions and behaviours.

Lastly, the interview concluded with a section to learn whether participants wanted resources on food safety or had any questions. I provided time for them to share any final thoughts or reflections on the topic. At the end of each interview, participants shared that they found the discussion enjoyable and demonstrated a genuine interest in food safety. Following each interview, I emailed participants (Appendix B) a letter of appreciation (Appendix C) to thank them for their participation and offered the opportunity to contact me if they wished to receive the study results upon completion.

3.2.2 Interview Guide Inspired by the COM-B Model

The COM-B model is a theoretical framework used to understand behaviour and its influencing factors, including capability, opportunity, and motivation (Michie et al., 2011). Capability is defined as the individual's physical and psychological capacity to perform a behaviour. Opportunity includes physical or social factors outside the individual that make the performance of the behaviour possible, and motivation is the brain processes that energize and

direct behaviour, whether automatic (e.g., habits) or reflexive (e.g., conscious decision-making) (Michie et al., 2011). This model has been applied in many studies to understand behavioural changes in oral and dental research, tobacco use, hearing aids, physical activity, as well as some food safety contexts such as handwashing behaviours (Buchanan et al., 2021; Lakshmi et al., 2023; Barker et al., 2016; Carney et al., 2016; Brown et al., 2022).

The COM-B model inspired the semi-structured interview guide. I had initially planned to use this framework as a part of the deductive coding approach. However, as I engaged with the transcripts, many of the pre-defined codes from this model did not align with participants' rich insights, limiting the ability to capture the depth. As a result, an open coding approach was adopted, along with deductive codes from the WHO's Five Keys to Safer Food. Although the interview questions were designed to explore some of the COM-B components, participants did not explicitly address all elements. Certain aspects related to motivation and psychological capability emerged but were not thoroughly explored. Future research could explore modifying COM-B's pre-defined definitions to align with food safety to address these components.

3.2.3 Recruitment

I began recruiting in early February 2025. I emailed various locations, including local community centres, the Schlegel-UW Research Institute for Aging, libraries, and religious institutions in Kitchener-Waterloo. Please see Appendix D for the email template used for recruitment at various organizations.

Due to limited interest, I expanded recruitment efforts to similar locations in Cambridge, Guelph, and Woodstock. I primarily recruited participants through flyers (Appendix E) at community centers for older adults, a health fair held at one of these centers, the Schlegel-UW Research Institute for Aging, libraries, and religious institutions across Southern Ontario

(Kitchener-Waterloo, Cambridge, Guelph, and Woodstock). The flyer outlined key information, including most of the eligibility criteria: participants aged 65 and older, living independently, and regularly cooking, as well as details about scheduling an interview and my contact email. I also provided organizations with the options of sharing announcements and social media captions (Appendix F). Recruitment efforts concluded when no additional participants expressed interest.

I used a combination of convenience and purposive sampling methods. Convenience sampling was employed due to time and resource constraints. This non-probability sampling method is cost-effective, efficient, and easy to implement (Jager et al., 2017). Participants were selected based on their willingness to participate and their availability to take part in the study. Purposive sampling involved the intentional selection of participants who were more likely to provide relevant data (Green & Thorogood, 2004). Participants were chosen based on the specific eligibility criteria: adults aged 65 or older who speak English, live independently in Southern Ontario, and are primary food preparers (e.g., those who do most of the cooking in their household).

Once participants expressed interest, a brief 5-10 minute verbal pre-interview screening questionnaire (Appendix G) was conducted to confirm participants' eligibility before scheduling a 45-60 minute one-on-one interview, either virtual or in person. The screening questionnaire was conducted in person or online via Zoom, with the camera turned on. The questionnaire gathered information on the participants' year of birth, area of residence, and whether they live independently and are primary food preparers in their household. Once eligibility was confirmed, I emailed participants an invitation (Appendix H) along with an information letter (Appendix I).

After participants reviewed the information letter, I followed up via email or phone to schedule an in-person or virtual interview.

As a token of appreciation, participants were given a \$10 gift card to a grocery store of their choice, selected from six available options: Shoppers Drug Mart, President's Choice, Walmart, FreshCo, Foodland, or Sobeys. For virtual interviews, I sent a digital gift card to the participant's email address, while in-person interviewees were given a physical gift card.

3.2.4 Consent

Before obtaining verbal consent during the virtual or in-person interview, I ensured that participants had thoroughly read and understood the information letter. The information letter outlined the study's purpose, objectives, potential risks and benefits, and their rights as participants. At the beginning of the interview, we went through the verbal consent form, which is included in the interview guide, to reiterate key study details. I then obtained their consent to participate in the study, to allow audio or audio and video recording of the interview, to use anonymized quotes in publications, and to retain their contact information for future research studies. I documented their consent by writing their full name, my signature, and the date on the verbal consent form.

3.2.5 Interviews

I conducted 14 semi-structured interviews; each interview lasted approximately 45-60 minutes and was conducted either virtually (n=4) or in person (n=10). In-person interviews were conducted at a mutually agreed-upon public location, such as a coffee shop. I arrived 30 minutes to an hour earlier to secure a quiet table. I messaged Dr. Majowicz upon arrival and departure from each interview. In-person interviews were audio recorded using Microsoft Teams with live

transcription. The virtual interviews were audio and video recorded in Zoom with live transcription.

Following each interview, I wrote field notes to document my observations, reflections, and comments on the participants' engagement and the overall interaction. During the interviews, I used the side margins of the interview guide to note initial impressions, emerging questions, and contextual details.

Data collection was considered sufficient when it allowed for contextualizing data extracts (Braun & Clarke, 2022). This refers to achieving the depth and richness necessary for readers to understand the significance of the data and to engage with the interpretive narrative (Braun & Clarke, 2022).

3.3 *Data Analysis*

The data were analyzed using reflexive thematic analysis (RTA), using a combination of inductive and deductive approaches (Braun & Clarke, 2006; Braun & Clarke, 2022). RTA involves critical reflection and a subjective approach to analyze and interpret patterns across a dataset (Braun & Clarke, 2022). It falls under the Big Q end of the spectrum in qualitative research, which follows a non-positivist framework that embraces the researcher's subjectivity and reflectivity (Braun & Clarke, 2023; Byrne, 2021). I followed the six-phase process as outlined by Braun and Clarke (Braun & Clarke, 2022):

3.3.1 *Familiarization with the data*

I started familiarizing myself with the data while I transcribed, de-identified, and verified all 14 interviews. First, I listened to the audio recording without taking notes to practice active listening. Then, I downloaded the Microsoft Teams- and Zoom-generated transcripts and securely stored them in OneDrive. Then, I manually reviewed and corrected the autogenerated

transcriptions. This involved transcribing the interviews verbatim, capturing all utterances (e.g., “um”) and non-verbal cues using bracketed notations (e.g., {laughter}). I verified all transcriptions against their original audio recordings to ensure accuracy (Braun & Clarke, 2022). Finally, I re-listened to the audio recordings while checking the transcripts for accuracy and made necessary corrections (e.g., grammatical errors). Next, I familiarized myself with four interviews in-depth. First, I re-read each field note, the side margins of the interview guide, and entries in my reflexive journal, where I documented initial comments, thoughts, and observations. I then re-read each transcript and listened to the audio recording multiple times to become immersed in the data and verify the quality of the transcript. Through this process, I actively engaged with the transcripts by noting initial code ideas and identifying potential patterns. I followed the same process for the remaining 10 interviews to ensure consistency and depth of familiarization.

All transcripts were de-identified by removing any personal or identifying information, such as real names and locations, to maintain participant anonymity. Field notes were similarly de-identified by omitting real names and location details. All participant names used in this study are gendered pseudonyms, thoughtfully created to reflect names familiar to the participants’ generation while also protecting their confidentiality. Participants were also given the opportunity to choose their own pseudonyms to express themselves.

3.3.2 Data coding

To generate initial codes, I independently analyzed four transcripts. I began with a deductive coding approach, a top-down approach that uses pre-existing theories to interpret the data (Braun & Clarke, 2006; Braun & Clarke, 2022), as many of the interview questions were designed to explore whether older adults adhere to the WHO Five Keys to Safer Food. I used

five food safety behaviour deductive codes, including keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperatures, and use safe water and raw materials (WHO, 2006). I used pre-defined definitions for the five behaviour codes as outlined in the WHO Five Keys to Safer Food poster (WHO, 2001). To assist me in exploring whether independently living older adults aged 65 and older living in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) follow recommended food safety practices and why, I coded four transcripts using the five predefined codes, assigning a different colour to each code. I highlighted meaningful quotes that aligned with the established WHO definitions.

As the coding process evolved, open coding revealed nuanced and rich insights. This led to the adoption of an inductive coding approach, a bottom-up approach that begins without predefined codes, allowing themes to develop from participants' insights (Naeem et al., 2023). To explore how and why independently living older adults aged 65 and older living in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) perceive their risk of developing foodborne illness, I applied open coding to these four transcripts. This involved carefully re-reading the raw data, highlighting relevant quotes, and adding comments to generate initial code labels.

After initially coding four transcripts deductively using the WHO Five Keys to Safer Food and applying open coding to explore perceptions of foodborne illness risks, I consulted with Drs. Majowicz, Diplock, and Keller for guidance on the coding process. Based on their feedback, I expanded open coding to explore whether older adults follow recommended guidelines, aiming to capture rich and nuanced insights aside from the deductive coding. This involved highlighting relevant quotes and adding comments as code labels in the transcripts related to food safety practices.

After coding each transcript, I wrote memos to document my thoughts, identify similar patterns across transcripts, and reflections to help interpret the data. I applied the same coding process for the remaining 10 transcripts and developed additional codes.

3.3.3 Initial theme generation

After completing the coding of 14 transcripts, I reviewed each memo and field note to grasp a better understanding of the patterns. I identified codes that shared core concepts and grouped them accordingly. Then, I developed broader categories by carefully reviewing the transcripts and relevant excerpts. This involved identifying similarities, connections, and deeper interpretations across all transcripts, with a focus on developing shared meanings and significant patterns that aligned with the research objectives. This phase required interpretive thinking to deeply explore the “why” and “how” behind participants’ food safety behaviours and risk perceptions. To support this process, I developed a table to systematically organize each category’s name, working definition, and illustrative quotes from the transcripts.

3.3.4 Theme development and review

I refined the categories through discussions with Drs. Majowicz, Diplock, and Keller to develop preliminary themes. I developed broader themes by merging similar categories and discarding some that did not pertain to the research objectives. Then, I carefully reviewed all exemplifying quotes under each theme to determine whether they collectively formed a meaningful pattern. I assessed the accuracy of each theme in relation to all transcripts by thoroughly reviewing the entire dataset. Overall, I ensured that each theme articulated a meaningful narrative that reflected significant patterns in the data and addressed the research objectives.

3.3.5 Theme refining, defining, and naming

After finalizing the themes, I identified the core meaning of each theme, refined its definition, and explained the connection to the research objectives. For each theme, I wrote an in-depth analysis that explains its relevance to the overall narrative and selected supporting and rich excerpts. By the end of this phase, the themes were clearly defined and presented a coherent interpretation of the entire dataset.

3.3.6 Writing up

The last phase involved completing the final analysis and writing the report. Although writing was integrated throughout the entire process, this phase involved writing a coherent and compelling narrative. This thesis includes a detailed analysis of each theme, supported by relevant data excerpts. It offers a meaningful interpretation of the data, emphasizing older adults' nuanced and complex insights related to foodborne illness and food safety risks.

3.4 Reflexivity and Researcher Positionality

Following Braun & Clarke's (2022) guidance, I acknowledge that my personal beliefs, background, and assumptions inevitably influenced the research process, including the interviews and interpretation of the data. As a young female public health researcher without prior experience in food safety or working specifically with older adults, I approached this study with a fresh perspective and a genuine willingness to learn. The age difference between myself and the participants may have affected their comfort level in discussing their beliefs, habits, and food safety practices. I was mindful of this generational gap and sought to build rapport through a respectful, empathetic, and non-judgmental approach. I remained attentive to potential power dynamics and aimed to create a safe environment where participants felt heard, respected and

valued. Throughout the research process, I engaged in reflexive journaling to critically reflect on my emotions, thoughts, assumptions, and evolving interpretations. This practice helped me remain aware of how my positionality could influence the way I interpret the data. Themes were developed with an interpretive lens, with a commitment to amplify the voices of older adults in public health discourse. During the analysis, I made every effort to stay close to the participants' own language and intended meanings, ensuring that their perceptions remained central to the overall narrative.

4. Results

Through semi-structured interviews with adults aged 65 and older who live independently in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock), valuable insights were gathered on how older adults perceived their risk of developing foodborne illness, whether they follow recommended food safety guidelines and the reasons behind their behaviours. Four themes were developed from these interviews based on the inductive analysis: (1) Trusting my own cooking, (2) Doing what I've always done, (3) Being conscious of minimizing food waste, and (4) Cooking is a chore.

Participants expressed a strong sense of trust and confidence in their own food safety practices at home, contributing to their perception of being at low risk of foodborne illness. They often believed that preparing healthy meals makes their food naturally safe, leading them to believe that illness is unlikely to affect them. Many described long-standing habits developed over years of experience and influenced by their food safety knowledge and social networks. While some of these practices aligned with current guidelines, others did not. Participants described shopping and food preservation strategies aimed at minimizing food waste and costs, which resulted in neglecting best practices. In addition, limited kitchen space affected their food choices and storage practices. Participants noted that reduced motivation to prepare meals, especially when cooking for one, combined with physical limitations, led them to adapt their food preparation methods. They increasingly relied on convenience, raising concerns about adherence to recommended food safety guidelines.

Each of these themes encompasses various subthemes that further illuminate the complexity of participants' food safety perceptions and behaviours. Collectively, the themes and subthemes revealed a broader narrative that shed light on how and why older adults perceived

their risk of foodborne illness and engaged in specific food safety practices that may have aligned with recommended guidelines.

4.1 Description of Participants

There was a total of 14 participants who took part in the semi-structured interviews. The participant group was predominantly female, comprised of 13 females and 1 male. All participants live independently in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock). They all met the eligibility criteria of being over 65 years old, with ages ranging from 65 to 85. I conducted 8 interviews with participants who live alone or are widowed, while 6 interviews were conducted with participants living with a spouse or family members. The living arrangement was not a part of the formal data collection, however participants voluntarily shared this information during the interviews.

4.2 Trusting my own cooking

All participants expressed strong confidence in their ability to prevent foodborne illnesses at home. This overarching theme of trust in their own cooking practices reflected their overall attitude toward food safety and shaped how they perceived their risk of foodborne illness. There were two key subthemes for this theme: (1) Getting sick is not for me, and (2) Eating healthy won't get me sick. The first subtheme reflected participants' beliefs that illness is unlikely to affect them. Many did not actively think about foodborne illness, which contributed to their overconfidence in their food safety practices at home and a low perceived risk of foodborne illness. The second subtheme captured their strong conviction that maintaining a healthy and nutritious diet and taking control of food preparation and handling at home reduced their risk of foodborne illness.

Participants placed significant trust in their cooking practices and firmly believed that they would not become sick from food prepared in their kitchens, even if those practices did not fully align with the recommended guidelines. Participants viewed themselves as knowledgeable about food safety, stating they follow rules and take necessary precautions to minimize foodborne illness risks. They generally perceived themselves as being at low risk for foodborne illness because they trust their cooking skills and felt confident in their practices at home. They appeared to follow familiar and trusted food safety practices, such as relying on sensory cues (e.g., smell) to determine whether food is safe to eat. However, only a few participants mentioned that their age and past experiences with foodborne illness could place them at higher risk. While they recognized the severity of foodborne illness, they still did not personally feel at risk.

One mechanism for reducing foodborne illness was taking food recalls seriously. Alice highlighted that her awareness of food recalls reduced her perceived risk of foodborne illness. This allowed her to feel more in control and confident when preparing food at home, “I watch for notifications about you know, products that are being recalled, and that kind of thing.” (Alice)

Alice demonstrated a proactive approach to food safety by actively monitoring food recalls. Her vigilance reflected a sense of personal responsibility and reinforced the broader pattern that participants placed greater trust in their own food handling practices. Participants expressed little concern about developing foodborne illness in their home environments because they believed they could effectively prevent it through their own practices. They identified taking “necessary precautions” (Marilyn) and “knowing how to prepare food” (Florence) to avoid illness. For example, one participant shared that she cleans her dishcloth daily, refrigerates all

her food at the time, and thoroughly cleans her sink: “I’m very safe in the kitchen. I adhere to all the rules that I read.” (Rose)

This sense of trust in the food prepared at home came from feelings of confidence and control. Being confident that the food purchased was safe was important for promoting this trust, as well as using safe food preparation practices. However, when others were preparing food, such as in restaurants, this confidence was diminished. As Beatrice expressed:

Yes yes yeah than my own safety at home, buying food yeah cause I think the food I buy is safe and the way I prepare it is safe. But when somebody else is doing it, I am not so sure. Especially when you hear all these stories like don’t say anything negative or they might spit in your food you know. {laughter}

Others raised similar concerns of food being “coughed on” (Alice) when prepared in out-of-home food retail or restaurants. Participants used signs of cleanliness in the establishment as a gauge for food safety and what might have happened to the food before it reached their plate, “I do honestly feel they gotta take responsibility for cleanliness and if they can’t clean the bathroom, who knows what the hell they’re doing in the kitchen?” (Patricia). This highlights a broader sentiment that participants “feel safe” (Shirley) and a sense of control at home, which reduced their perceived risk.

4.2.1 Getting sick is not for me

Many participants did not acknowledge their increased susceptibility to foodborne illness or the potential severity of outcomes. While they recognized that foodborne illness could happen as a general risk, they emphasized that they “haven’t been sick” (Beatrice), leading them to believe it would not personally affect them. Participants expressed sentiments like “it really doesn’t concern me” (Beatrice), which reflected a sense of detachment toward food safety.

Participants viewed food safety as an unconscious aspect of their daily lives. A mechanism driving this confidence is participants' reliance on what they described "commonsense knowledge" (Marilyn). This reinforced their belief in possessing sufficient food safety knowledge to prevent illness at home. Their trust in their own practices and informal knowledge at home contributed to their perception of being at low risk for foodborne illness.

Participants believed they were following the proper and mandatory practices, such as "I buy fresh, and cook right away and clear up my fridge, I watch the expiry dates on things." (Beatrice). This deep trust stemmed from a sense of responsibility to take care of their kitchen and being "conscientious" (Patricia) of the consequences. Participants were confident that foodborne illness would not happen under their care, perceiving their practices as effective protective measures, which made food safety a less important matter in their lives. However, subconsciously, participants are affected by food safety. As highlighted by Doris:

Well, I think the reason why you don't see yourself at risk is because it hasn't happened to you. You know, the minute that it happens you will double up your vigilance... So no, I don't really. It doesn't really occur to me a lot. I wouldn't eat, like I'm very careful if I cook chicken that it's not pink. Even with salmon, I like my salmon to be done all the way through. I don't want any raw, so that's I guess why I think I'm not really at risk, because I do think of those things. You know.

Although Doris does not often think about foodborne illness, she acknowledged that experiencing it firsthand would make someone more cautious and aware of food safety. Participants expressed "I don't get sick" (Gladys), leading them to feel overconfident in preventing illness because they "know how to take care of [their] body." Overall, participants' strong trust in their own cooking practices fostered a sense of invulnerability to foodborne

illness, contributing to their perceived low risk. As a result, participants followed their own guidance in their kitchens, such as relying on familiar routines and personal judgment rather than food safety guidelines, which could increase their risk of foodborne illness. Food safety was viewed as being shaped by an individual's "intellectual level" (Ruth), suggesting that participants made sense of food safety in ways that fit their own understanding and reflected their past experiences. This personalized approach led many to rely on familiar routines that had always worked for them, even if those habits did not align with recommended guidelines.

4.2.2 Eating healthy won't get me sick

Participants described making conscious efforts to eat healthily and prioritized purchasing fresh or organic foods as a way to reduce their risk of illness. However, their preference for purchasing fresh or organic foods may unintentionally increase their risk for illness, as many participants assumed that eating healthy or nutritious meals automatically guaranteed their protection against illness. They also emphasized the importance of preserving the nutritional quality of their foods, with June noting "they seem to be fresher and you don't lose as much vitamins and minerals." This indicates that participants believed that preserving nutritional content could protect them from developing foodborne illness. In their kitchens, participants believed their food was safe because they used methods they felt preserved nutritional value, such as steaming which "actually helps to maintain the nutrition of the vegetable." (Patricia) The belief in consuming healthy meals and using preparation methods they considered safe shaped their perception of being at low risk for foodborne illness. For example, Beatrice expressed:

Well you know, I don't think my body needs it. Not too many vitamins in pesticides. To me, it's to do with the immune system. So the more junk you put in your body, the more your body has to fight to get rid of that so help your body along, give it the good stuff,

Beatrice emphasized that avoiding processed foods will protect her from illness. Her reference to consuming less “junk” suggests that participants often viewed food safety through a nutritional lens, prioritizing consuming natural foods. This allowed them to feel a sense of control and acted as a protective measure against illness. However, this suggests that participants underestimated their food safety risks because even healthy foods, if mishandled, can cause illness. Participants placed greater emphasis on healthy eating compared to recognizing their foodborne illness risks. This may inadvertently increase the likelihood of participants engaging in unsafe food handling practices. Overall, their strong trust in their own practices at home reinforced a belief that they were capable of effectively managing food safety risks on their own. As a result, many felt a sense of immunity to developing foodborne illness.

4.3 Doing what I've always done

Participants described a wide range of food safety practices they have followed for a long time. They continue to follow these practices largely because they have been effective in the past and feel familiar. However, many of these long-established habits did not align with recommended guidelines, highlighting a gap between outdated practices and current guidelines. This theme had four subthemes: (1) Habituating cleaning of kitchen and hands, (2) Trusting Canadian food and water sources, (3) Relying on experience and health literacy, and (4) Cutting corners when thawing. Participants shared their established routines for handwashing and cleaning their kitchen space, revealing a variety of approaches. Furthermore, participants

described their habitual routines of washing the foods they prepare, and their considerable confidence in Canada's food safety system as a protective measure against foodborne illness. Their practices were often shaped by personal and family members' health literacy, as well as relying on past experiences. In addition to engaging in unsafe food handling, most participants described a mix of safe and unsafe thawing methods, which increases their risk of foodborne illness. These habitual behaviours, combined with varying health literacy levels and strong trust in Canada's food safety system, illustrated the complex factors that contributed to why older adults perceived themselves as low risk for foodborne illness and why their adherence to recommended guidelines was often inconsistent.

Participants shared a variety of food safety practices that did not align with recommended guidelines due to adhering to methods that have worked for them in the past. Rose shared:

I don't really think about that because I've done it for so many years so. I just always follow my-- what I normally do for safety, so I don't think anybody is at risk when they eat at my house.

Participants often equated familiarity with handling food with safety, as they expressed a deep confidence rooted in ingrained routines and past experience. This familiarity fostered a sense of comfort that they would not develop illness, and habitual routines provided them a sense of security. They relied on their usual routines, suggesting that these habitual practices had become their personal standard for food safety. This reinforced their perception of being at low risk of foodborne illness. This highlights how experience can create comforting mental shortcuts, as Ruth remarked, "It's probably more a habit than me thinking about it too much." Participants were firm about following their established routines, encapsulated by Gladys's comment, "Why fix something that isn't broken?" These attitudes reflected a strong resistance to making

behavioural changes, stemming from their confidence in their current practices and attachment to long-standing habits, even when these practices did not align with recommended guidelines.

4.3.1 Habituating cleaning of kitchen and hands

Participants described well-established cleaning routines for their kitchens and handwashing habits. They emphasized the importance of maintaining a clean environment in their kitchen and practicing good hygiene as part of their food safety precautions. These precautions were not only essential to the prevention of illness but also helped them to create a sense of control in their food preparation and handling.

Participants shared that they “automatically” (Beatrice) wipe down their kitchen surfaces, highlighting that it is a habitual routine they consistently follow after each meal. This is an instinctive habit that is a part of June’s daily routine, “it’s washed down with a disinfectant every day, every meal, the sinks and the counters, and the stove, and the fridge”. For many participants, these cleaning habits were deeply ingrained, rooted in values, and established from their upbringing and are now carried into their daily lives. This connection between cleanliness and preventing illness reflected personal values and a sense of control, which contributed to their low perceived risk. For example, Patricia grew up in a household where cleanliness was highly valued by her mother. This early foundation influenced her current practices, and she is motivated to protect herself and others from illness. For example:

Well it's health. Just simply health. I don't wanna transfer anything. I don't wanna make somebody get sick because I'm not doing my job on my end and you know, and it's just about cleanliness. I was raised to be clean, you know, from the time I was a little, I was raised in a household where days when you used to have wax and you polish the floors. Those were the days when you got on your hands and knees and used a wool sweater to

polish the floors after you put the paste wax on it. Those were the days. You can't even imagine what it is like. {laughter} And my mother was extremely clean person. We lived on a farm but she was very conscientious, too. (Patricia)

On the contrary, other participants described cleanliness habits that did not align with recommended guidelines, often because they have been doing it for so long. Many participants used the same dishcloth for multiple tasks without cleaning it regularly, “maybe once a week or sometimes a bit longer than that” (Alice). This habitual practice, seeming harmless, can increase the risk of cross-contamination. Furthermore, participants who lived alone frequently left unwashed dishes “for a few days” (Gladys), indicating that living alone changed their motivation to maintain adequate cleaning standards. These behaviours stemmed from a sense of convenience and reduced urgency, especially when rooted in habitual practices. As a result, participants might unintentionally overlook kitchen hygiene risks, believing their usual routines are sufficient.

Participants described handwashing as an ingrained and automatic habit, often stating they “wash my hands a lot” (Ruth). Handwashing appeared to be a routine that required minimal conscious effort. However, others shared different approaches like washing hands only when it was necessary or using less effective methods, such as “I usually have soapy water in the sink, you know, even while I'm cooking so that I'm, you know, push my hands around in there rinsing with water alone.” (Florence) Although these practices reflected long-standing routines, they fell short of current food safety guidelines. Participants relied on personal judgment or intuition to decide whether they needed to wash their hands, rather than following the recommended guidelines of washing their hands before, during, and after handling food. This approach could

increase their risk of foodborne illness. Frank described his infrequent handwashing habits, as illustrated below:

I work out in the garden a lot, so I probably don't wash as well as I should, {short pause} that's what I'm told, I don't wash my hands enough. My wife does because she's a nurse. She washes her hands all the time, but I'm probably a little delinquent on that because I worked in the garden today and I probably got some dirty fingernails. {laughter} Well, I always before preparing, always wash with soap and water, but just like I said if I'm coming in from cutting the grass or something, then I may not wash my hands.

Frank's infrequent handwashing showed his relaxed attitude toward hygiene practices, which may be shaped by his daily routines, upbringing, and personal perceptions of cleanliness. This highlights how handwashing practices were inconsistent and participants showed less vigilance about handwashing when they followed familiar routines.

4.3.2 *Trusting Canadian food and water sources*

All participants emphasized the importance of washing their fruits and vegetables, usually following an established routine. For example, Frank explained his habit of “rinsing” fruits and “ploshing it around” to remove dirt. This behaviour was driven by concerns about bacteria: “is it pesticides or just dirt?” (Frank). However, these methods were not always consistent with current guidelines. Marilyn described her routine to “fill the sink up with cold water and put it in and let it soak and wash it off there”. This is in contradiction with current guidelines as soaking vegetables directly in the sink is a practice that could unintentionally increase the risk of contamination if the sink has not been thoroughly sanitized beforehand. Notably, many participants shared that they rinse meat before cooking, a practice that is outdated

and not recommended. Patricia reflected the habit of relying on sensory cues and rinsing “Chicken. I always rinse off really really good because you can feel that sliminess on it and I would rinse chicken really really good.” Participants often relied on long-established habits due to the comfort of familiar practices, even if they contradicted current guidelines. This demonstrated that ingrained habits override updated information on food safety.

Participants voiced considerable concerns about the safety of pre-washed foods and the water quality being used to wash produce. Joyce questioned, “am I defeating the purpose? Is the water I’m using good enough? I mean I drink it but”. This reflected an underlying tension between trust in their own water supply and doubts about produce being clean and safe. In addition, many expressed skepticism about labels, “they say it’s washed, but I still wash stuff like spinach [and] lettuce.” (June), highlighting that participants prioritized taking caution and extra measures to ensure they feel safe. Shirley commented, “I get paranoid because I don’t know what kind of water they used to wash it so I usually put it in my colander dish and run some water on it.”, revealing feelings of anxiety and the desire to control potential food safety risks at home.

In contrast, some participants expressed confidence in the cleanliness of the produce they purchased and did not feel the need to “go overboard” (Alice) or “go nuts and stuff” while washing food. Gladys reflected this sentiment by stating, “I don’t think washing it additional times is going to make any difference.”, indicating that some participants believed that washing more times did not provide additional protection. However, participants’ confidence in the quality and safety of food sources was closely linked to their strong trust in the Canadian food system. Patricia noted “we have pretty good standards” and that large grocery stores are “top of the line”. This trust in the Canadian food system significantly shaped their perception of being at low risk for foodborne illness. It reinforced the belief that foods that were purchased

domestically will not cause foodborne illness. Participants described Canada as “over-clean” (Beatrice) and suggested that other countries did not follow the same rigorous standards for imported foods, as Shirley questioned, “things that come from Mexico, are they clean?”. This perception illustrated how Canada’s food safety system is perceived by consumers to act as a protective barrier, making the country primarily responsible for food safety rather than the individual consumer. Therefore, participants perceived themselves at low risk for foodborne illness due to the quality of the food system in Canada. This strengthened their sense of safety when purchasing food, helping them feel safe when preparing meals at home. For example:

I buy fresh food. I think you can rely on the markets in Canada, you know well prepared food, I buy a lot of organic food. If I can get organic, I will buy it. So um and my kitchen is clean and I take precautions on how I prepare things... But I think if anything, we are all over-clean in Canada, you know, and we have a lot of rules and regulations and so I think people in general are more concerned about the health aspects of food than the safety. I think we feel pretty confident about the safety of our food. (Beatrice)

Building on participants’ preference to avoid foods from other countries, some mentioned a preference for purchasing Canadian food, and deliberately “avoid US now, like a lot of people” (Frank) due to the current political climate. This shift reflected how socio-political issues could heighten awareness of food safety, motivating participants to “check the labels to make sure it isn't coming from USA because I think we're all taking a stand on that now.” (Patricia) Despite this increased scrutiny and awareness of food labels, participants’ perceptions of foodborne illness risks remained low due to their strong confidence in Canada’s food safety system. This

illustrated that socio-political factors and trusting the food systems can influence purchasing behaviours without necessarily changing perceptions of foodborne illness risks.

4.3.3 Relying on experience and health literacy

Many food handling practices among participants were grounded in personal experience, shaped by years of cooking and their level of health literacy. Over time, participants developed a sense of intuition about which food safety practices were the most effective for them. Patricia stated “at my age, I just know.”, reflecting confidence from years of experience. However, this informal knowledge overrides current recommended guidelines. Specifically, a notable positive practice is that many participants promptly stored their groceries in the refrigerator or freezer as soon as they returned from shopping. This demonstrated awareness of maintaining proper temperatures to ensure food is safely stored. In addition, many mentioned “always have a cooler with ice in it” (Rose) to keep food cold during transport, which is an effective strategy to reduce their foodborne illness risks. Despite these strategies, many participants did not pay attention to the temperature of their refrigerator and freezer regularly and did not use a thermometer to ensure proper temperatures. Instead, they relied on intuition and experience to judge whether the temperature of appliances were adequate. For example:

I would know. I would know right away if things weren't feeling right, cause again it's a thing, as you get older, it comes instant, it triggers something. If I was to open my fridge and suddenly think, you know that doesn't feel very right? You know, I would check and I would say oh something with the fridge, I would know. (Patricia)

Patricia's confidence in her intuition reflected how years of experience shaped sensory awareness that guided her food safety choices.

Participants' perceptions of foodborne illness risks and their food handling practices were often influenced by their health literacy as well as that of those around them. For example, Florence is a retired nurse and expressed confidence in her food safety knowledge, saying, "I kind of know" because of her professional background. Similarly, Joan recently completed a Food Handlers Certificate and believed food safety was on the "top of [her] mind." These examples illustrated how an individual's health literacy or that of those surrounding them can significantly boost their confidence and sense of responsibility to follow food safety guidelines. These influences played a pivotal role in shaping participants' risk perceptions and individual food handling practices. For example:

Um I tend to-- My daughter's a paramedic and she's a bit of a germaphobe, so after my husband died, I moved in with them for 5 1/2 years to look after my new granddaughter. She was going back to work. And she kind of—I guess I followed her lead and so yeah I wipe everything all the time. I wash everything. I use a lot of Lysol. {laughter} (Ruth)

Ruth's diligent cleanliness approach was influenced by her daughter, who works in the healthcare field. This demonstrated that health literacy within your close social network can motivate participants to improve their food handling practices. Conversely, other participants relied on long-established habits developed by their professional experiences, which did not align with current food safety guidelines. For example:

Yeah I think so. I never used to at all ever, and then I was at work and there was a cook there, and she was talking about that kind of stuff. She said do you ever wash your meat, I said never, she says you should always, always wash your meat (Shirley)

This reflection showed how informal social networks served as powerful catalysts for change, and they can also reshape long-standing food safety habits. It highlighted that personal food safety practices were dynamic rather than fixed. Food safety practices could evolve when influenced by external perspectives from social networks.

4.3.4 Cutting corners when thawing

Some participants used safe methods to thaw frozen foods, such as refrigerating overnight, while others continued to rely on less safe methods, such as leaving food on the counter at room temperature to defrost. These approaches reflected long-standing habits and past experiences, where participants have not gotten sick, reinforcing their belief that these methods are still acceptable and safe. Although these methods seemed convenient and harmless, these practices could inadvertently increase their foodborne illness risks. Participants acknowledged that these are outdated methods, indicating that relying on past experiences is a protective measure, but also a barrier to adopting current food safety guidelines. For example:

Well I probably don't do that as well as I should like if I was gonna cook a roast tomorrow. I quite often would put it out tonight to thaw on the kitchen cupboard, but I know that's not the best thing to do. I've never had a problem, but it's not recommended. I know. (Rose)

Participants described planning to thaw food the night before as a persistent challenge, often resulting in the reliance on convenient or quick alternatives. They feel it “depends when I take it out” (Ruth), revealing how thawing frozen food tends to be spontaneous rather than planned. In these spontaneous cases, they often thawed frozen food on the counter for a couple of hours. This decision-making process reflected how ingrained habits and routines overrode best practices, since convenience outweighed adherence to recommended guidelines. Many participants

justified their familiar shortcuts due to past experiences of not becoming ill, reinforcing their belief that their practices were safe and that they were at low risk. This reliance on past experiences created a sense of validation. Doris shared the challenge of balancing intention with the actual practice, as noted:

When I thaw food, I usually, if I'm well enough thinking well enough the day before, I'll take it out wherever it is, and put it in the fridge for a day. I won't leave it on the counter. There's very little that I would actually leave on the counter to thaw.

Doris acknowledged her careful approach to thawing food, demonstrating a strong awareness of proper thawing methods. However, participants emphasized that their decision-making process around thawing frozen food often depended heavily on being “well enough thinking” (Doris), specifically whether they felt alert or focused during that time. This highlighted how fluctuating mental capacities and age significantly influenced proper food handling practices.

Overall, participants’ food handling practices were shaped by their long-standing habits, personal experience, individual health literacy and their social networks, and their strong trust in the Canadian food safety system. These factors collectively fostered a sense of security, which minimized their perceived foodborne illness risks. Together, these serve as protective measures against illness. They act as a psychological shield that diminishes their perceived threat of foodborne illness and strengthens their comfort when following established routines.

4.4 Being conscious of minimizing food waste

Participants expressed a strong belief in the need to reduce food waste. This tendency reflected generational values, emphasizing a sense of frugality. Participants highlighted generational differences in their attitudes toward food waste, suggesting that younger generations tend to be less cautious about waste. The reluctance to waste food included four subthemes: (1)

Conserving food, (2) Overriding best practices with sensory cues, (3) Shopping strategies to reduce food cost and waste, and (4) Having limited space. Many participants described conserving food and finding ways to repurpose leftovers to minimize waste. Participants discussed overriding best practices with sensory cues, as they determine whether food is safe to eat through sight, smell, or taste. This suggests many follow unsafe food handling practices, such as not using a food thermometer. Participants also shared shopping strategies to reduce food cost and waste, revealing cost as a large driver of consumption behaviours. Lastly, several participants described having limited kitchen space, resulting in overcrowded areas and improper food storage. This may unintentionally lead to an increased amount of food waste. This reflects an ongoing tension between minimizing food waste and prioritizing food safety.

4.4.1 Conserving food

Participants described a strong inclination to make use of their food by repurposing leftovers into new meals or freezing meals for future use. For instance, Patricia demonstrated a resourceful approach by repurposing bread that showed signs of spoilage, saying she “saved it and made bread crumbs with it”. This reflected a practical mindset shaped by frugality and a need to minimize food waste. These strategies to reduce waste were deeply rooted in feelings of resourcefulness. Florence captured this when she said “I think about what I can use it for before I throw it out”, emphasizing a conscious and reflective decision-making process that prioritized usefulness over discarding food. This behaviour was not only a practical strategy, but also reflected a sense of moral responsibility, where throwing away food felt guilty. Participants described food as being tied to responsibility and generational values passed down. For some, conserving food was a form of self-expression shaped by life experiences and reflected how they grew up. For example:

So I do my best not to throw anything away. I'm very how would I say, conscientious about waste. And or I'll incorporate into it another meal the following day. I don't throw it away, okay. I try to find out either another way to use it or whatever and I try to do that within two days. I do not like to leave anything more than three days in the fridge. If it's gonna go that long, I will then pack it up and put it in the freezer. (Patricia)

Participants were conscientious about making use of their food. Rose shared that she is reluctant to throw away food, she tends to “cut away the bad spots and eat the rest” because she is “not big on throwing food away”. This demonstrated that participants aimed to be resourceful but poses food safety concerns. This reluctance to waste food reflected values rooted in their upbringing, for instance, Ruth emphasized, “I was a war baby and came from a large family. We didn't like to waste anything, and it really upsets me if something goes bad and I have to throw it out.” Her comment was illustrative of how her upbringing and experiences during times of food shortages continued to shape her current food safety perceptions. Participants expressed difficulties in deciding when to throw out food, and this persistent hesitation created a challenge to balancing food safety and following long-standing habits. June captured this tension, “I’m from an era where we didn’t throw anything out. We weren’t to waste our food. So then I’m caught between a rock and a hard place.” This strong emotional commitment to avoid food waste led to participants consuming spoiled food, as they prioritized minimizing food waste over adherence to food safety guidelines.

Marilyn reflected on generational differences in attitudes toward food waste, noting that people today tend to waste more food compared to previous generations. Her upbringing influenced her current approach toward waste, as she perceived society as disposable, highlighting a cultural shift away from mindfulness to food excess. For example:

Well it was just the way we were before our daughter moved. Like when the kids were home, I would buy meat and freeze it. When I would get a meal ready, I get the meat out and have it thawing [the same day?] yes so I really don't remember checking the best before [No worries]. Whether it's a younger generation cause I know my daughter in law is very much like my daughter {laughter} as far as best before stuff and if it looks, she'll just pitch it, which is fine. I guess whether it's an age thing. I know my dad is like 94 and still lives on his own, but I guess we, especially him, when he lived through the depression and everything, we don't throw out. It's such a disposable society now. You just didn't waste. Anything so like if you had some vegetables that looked a little funky, maybe them put them in a stew or cook them up or whatnot. Yeah it's different. (Marilyn)

Participants' food safety behaviours were deeply shaped by generational differences and cultural values. This revealed how economic factors and societal norms from older generations fostered habits to prioritize resourcefulness over adherence to recommended guidelines.

4.4.2 Overriding best practices with sensory cues

Participants described judging whether food was safe to eat through sensory cues, including smell, taste, and sight. For example, Doris shared knowing when her chicken was cooked, she “always cut it open to make sure that there's no pink. That's all.”, rather than using a food thermometer. Participants have cultivated a strong sense of intuition over the years for judging safety; they “would have been able to tell from looking at it or smelling it” (Rose). This confidence was rooted in long-standing habits and intuition, which shaped their food safety decisions, and did not align with recommended guidelines. Participants acknowledged “that's not

the safest way to do it, but I've never been wrong yet so" (Rose), showing their continued use of unsafe practices because of their effectiveness in the past and not becoming ill.

While most participants owned food thermometers, only a few used them regularly. Those who did described them as being "fanatical" (Joan), having consistently used them to "make sure it's up to temperature". Some participants only used a food thermometer for cooking large roasts. However, the majority relied on their own judgement, experience, and sensory cues to confirm whether food was thoroughly cooked. Florence shared, "I don't often use a thermometer or anything like that. I know I probably should, but I again know when it's cooked." This reliance on long-standing habits underscored a disconnect with current food safety guidelines and practice. Additionally, some participants expressed concerns about the reliability and accuracy of food thermometers, which further reinforced their preference to use their intuition over recommended guidelines. This showed how familiar practices and doubts about new methods can influence food handling. For example:

Sometimes I use a thermometer, although I don't find thermometers are terribly reliable for me. Well, you know, it's the-- it'll say-- I'll look it up on my Google, and it'll say, you know, the internal temperature must be 165 and maybe it's dry and overcooked, and it still doesn't show that it's 165, you know, stuff like that. I just I don't find really works very well for me. (Alice)

Building on participants' reliance on sensory cues, many expressed skepticism toward best-before dates, stating they "don't think best-before dates really matters" (Florence). Foods like milk and coffee creamer were commonly kept past their best-before dates, with participants trusting their senses to determine their safety. For instance, Patricia shared "But I'll smell it, again, great smeller and I check it when I pour it into my coffee as it's starting to kind of curdle.

It's still okay". Similarly, Alice noted "it still tastes and smells good, then it doesn't get dumped.", leading to them to keep foods for extended periods. These unsafe practices illustrated how participants relied on personal judgement and experience to prolong the use of foods, driven by a deep commitment to minimize food waste – even if this means straying away from recommended guidelines. Participants were particularly lenient with canned goods and condiments, such as ketchup and salad dressing, often using them beyond their best-before dates without concern. This behaviour was also largely driven by a desire to reduce food waste. Gladys humorously remarked "I think it would scare you if you went through my fridge and checked out the condiments for the expiry dates. But I haven't gotten sick so." This confidence is reinforced by past experiences of not getting ill, which validated their habitual behaviours.

In contrast, only a few participants, such as Doris was a "great believer in best before dates", emphasizing they "don't take chances" on certain foods. This highlighted their awareness of the severity of illness and a strong desire to protect themselves. This divide regarding best-before dates and reliance on sensory cues reflected how experience, upbringing, and long-standing habits shape food safety decisions, while also revealing a strong moral commitment to minimizing food waste.

4.4.3 Shopping strategies to reduce food cost and waste

Participants described varying shopping habits, with some preferring to purchase food in bulk for convenience or cost savings, while others purchased smaller quantities more frequently, often enough for a single meal. They highlighted strategies for preserving foods, such as diverse storage methods to extend freshness and improve cost-efficiency. While some expressed less concern about the cost of food, most acknowledged the pressure of rising food costs. These economic concerns contribute to unsafe food handling practices, such as keeping food longer

than recommended. These strategic shopping choices and preservation methods are intertwined with participants' efforts to reduce food waste, control expenses, and maintain food safety. Shirley chose to buy pre-packaged salad bags instead of individual vegetables, explaining that "it's more expensive to buy lettuce and buy this and buy that", which drove her decision to buy ready-made salads. Other participants echoed this practical approach, expressing that purchasing pre-packaged salads helped them manage costs and reduce food waste by purchasing the right amount of produce. In addition, some participants expressed a desire for greater variety in foods, without needing to purchase "huge amounts" and then "throwing stuff out" (Beatrice). This highlighted how participants adjusted their purchasing behaviours in response to prioritizing minimizing food waste.

Patricia illustrates this resourcefulness further, "always try to make use of everything", such as reusing milk bags for food storage because it's "more economical" than purchasing 2-litre freezer bags. These decisions revealed how economic factors and a desire to minimize food waste shaped participants' food purchasing and storage behaviours. Participants explained financial reasoning behind their shopping choices, "because you get a better deal. I'm a senior living on my pension" (Gladys). Living on a limited income and relying on a pension influenced their food choices and shopping behaviours. In contrast, several participants described buying in bulk as a cost-saving strategy, often dividing purchases into individual meal portions. For example:

With hamburger, it's just cost-efficient, if bulk is on sale, then I'll buy a big bulk and that could be 3-4 pounds, which we couldn't eat. So that's why I will divide it into 1 pound bags. Sometimes I'll make meatloaf and whatnot. (Marilyn)

While this approach helped them save costs, it also required greater planning to ensure proper storage, prevent food spoilage, and avoid unnecessary waste. These behaviours illustrated how monetary factors influenced what and how much they bought, but also how they managed food safety risks. Furthermore, participants described diverse strategies to extend the shelf life of certain foods while maximizing cost-efficiency. These approaches reflected how knowledge of resourcefulness gained through years of experience and upbringing influenced their food handling behaviours. Participants were motivated to reduce waste and maximize the value of their food. While these practices were rooted in experience and habitual behaviours, they used innovative preservation techniques to adapt to today's economic constraints. For example, Ruth described a food preservation technique:

Well I try and find ways that I can keep things longer. And to make them cost-efficient for me. I have found with celery for instance, I have an old tupperware container and I was told that if you wrap the celery, don't wash it again. You wrap the celery in foil and put it in an airtight container, and I've had celery that lasts four weeks.

This reflected how participants actively sought out practical strategies to extend the shelf life of certain foods, not only to minimize food waste but also to maximize the costs. These personal adaptations are rooted in past experience, which are turning into trusted habitual routines.

4.4.4 Having limited space

Participants described challenges with their kitchen layouts that affected how they handled and prepared food, especially as many have shifted to apartment living and no longer have access to a standalone freezer. A common issue among participants was overcrowded freezers, Joan noted “my freezer is pretty full right now so I try and just get fridge stuff”, highlighting how limited storage space shaped daily choices around food purchasing. Gladys

commented that her “counter space is quite limited” but she works around this issue, revealing participants may have cluttered countertops. Participants have limited storage space caused by cooking large quantities and purchasing more food than their kitchen can hold. These constraints raised food safety concerns due to an increased risk of food spoilage and poor storage habits. Participants tended to overbuy food, a habit passed down from earlier generations, reflecting values of frugality and reducing food waste. However, with smaller living areas and limited spaces, these habits led to overcrowded kitchens and freezers, creating challenges for safe food storage practices. Rose shared:

Because I have a huge upright freezer and it is so full. I can't get anything else in.

There's only two people in my house {laughter} but I do have a lot of company but I wish

I could learn to just buy food for the week. (Rose) Habit. I learned it from my mother. I

blame her.

As noted by this example, participants frequently freeze food for extended periods, often accumulating more food than they can effectively manage. This overstocking is shaped with intentions to minimize food waste but sometimes led to negative consequences. Marilyn took food out of the freezer and found it “freezer burned” and “it just didn’t look good”, ultimately leading her to throw it out. While freezing food is a practical and economical technique, it revealed tension with reducing food waste and following proper long-term storage. Prolonged freezing can result in food spoilage and waste, which is not the participants’ original intent. Overcrowded freezers increase the risk of food handling concerns, such as improper thawing or cross-contamination. Alice reflected:

Maybe one place where my safety would fall down would be that sometimes I would try cooking something that has been in the freezer a little bit longer than maybe it should have been. But if it doesn't taste good, or smell that then I just throw it out.

This highlights how habitual behaviours and sensory cues overrode food safety guidelines, with food spoilage often only being noticed at the point of food preparation. These challenges led to participants adapting their shopping choices, carefully considering how much they can buy, store, and consume to reduce waste.

Overall, participants have a strong commitment to reducing food waste, often adjusting their purchasing habits or innovatively repurposing leftovers. This motivation was shaped by a desire to be resourceful, but also by being aware of economic barriers. In efforts to minimize waste, participants shared unsafe food handling practices, such as relying on sensory cues and not using food thermometers due to habitual routines. Additionally, participants' food handling practices were influenced by their living arrangements and kitchen layout.

4.5 Cooking is a chore

Participants expressed a noticeable decline in both motivation and energy when it came to preparing meals. This was expressed in three subthemes: (1) Losing motivation to cook, (2) Physically harder to prepare meals, and (3) Changing preparation methods for convenience. For many, the mental effort for decision-making and meal planning has become increasingly taxing, while the physical demands of cooking have grown more demanding with age. This shift reduced participants' enjoyment of cooking, turning what once was a pleasurable experience into a chore that demanded effort and stamina. Participants described the physical challenges of being in the kitchen, which now posed as a barrier to safe meal preparation. As a result, participants gravitated toward fast, convenient, and less labour-intensive meals. This reflected how

participants adapted their routines, increasingly relying on convenience as motivation reduced and physical limitations grew. It highlighted how aging reshaped daily food safety practices by influencing not only what they decided to cook, but also the methods they decided to use in meal preparation.

Participants found “if you have to [cook] everyday then it becomes a grudge” (Beatrice), showing how they did not have the mental or physical capacity as they used to. Participants still want to prepare their own meals, however their motivation was diminished. They expressed challenges, such as “it’s really hard to come up with a meal every single night, year after year” (Alice) because they did not look forward to it anymore. They did not have “the energy or the emotional stamina” (Marilyn) to prepare meals and relied on leftovers and other convenient options like ready-to-eat meals. As Patricia reflected:

It’s time consuming. It’s very time-- When I was younger, yes, but you know, now I’m thinking what am I doing this for? I could be out, you know, in the backyard and enjoying a glass of wine or watching the fishpond or whatever the heck eh. {laughter} (Patricia)

Participants felt that priorities changed as they aged, which influenced their food handling practices. Food safety behaviors are not only shaped by participants’ knowledge or capabilities but also by changes in their lifestyle and energy levels.

4.5.1 Losing motivation to cook

Participants described a gradual loss of motivation over the years. They viewed cooking as a necessity, like a means to eat, rather than something they enjoy doing. This shift stemmed from a combination of factors that accumulated with age, including physical limitations, emotional fatigue, and social network changes. Many participants expressed fatigue when they needed to decide what to cook, plan meals, and manage food preparation tasks alongside other

daily tasks, which made cooking feel like a burden. Frank shared, “There’s no motivation to think ahead.” For some, this fatigue led them to prepare meals they later no longer felt like eating, potentially resulting in excess food waste. Reduced motivation was linked to physical fatigue and cognitive overload, which reshaped cooking into a chore for survival rather than a source of pleasure and nutrition. This showed how the emotional toll of decision-making affects motivation, but also their relationship with food and handling practices. For example:

No no I don't like cooking cause the thing is, you have to decide what to make then you have to go get it then you have to bring it home, then you have to put it away, then you have to get it back out again, by the time I've decided I don't want that anymore.

{laughter} (June)

In addition, the loss of a partner diminished participants’ motivation in preparing meals. Without someone to cook for or to share meals with, the emotional symbolic meaning attached to food preparation faded. Cooking no longer carried the same sense of purpose, but rather it felt like a mandatory task. For many, the act of cooking was tied to family, connection, and tradition, so once that connection was gone, so was the motivation. For example:

Physically it's not hard for me. Mentally, you know the motivation is not there. It's a lot easier to cook for somebody else. And I always told myself when I went back to the apartment from my daughter's place that I was gonna set the table and sit at the table every night for dinner. And I did that for about 3 weeks. Now I sit in my lap. {laughter} (Ruth) Well, especially when I lived with my daughter, we were a family of six then. I was cooking all the meals. Dinner was ready when they come home at supper time. Yeah so. But that wasn't a problem for me because that's what I used to. Grew up in family. I can

cook better for a group of people than I can for myself. But now I think, I think most seniors, you'd find that it's motivation. Being motivated to make the effort. (Ruth)

Participants described how the absence of a spouse or loved ones diminished the emotional reward associated with preparing meals. When cooking lost its meaning, participants viewed food safety as less important relative to the effort they would have to invest in preparing meals. Their perception of cooking evolved from a relational and meaningful service to a burdensome chore. This mirrors broader changes in identity and independence as people aged. As motivation reduced and physical limitations increased, cooking was less about enjoyment and more about meeting basic needs. As a result, participants may follow unsafe food handling practices and rely on convenience and habitual behaviours, ultimately increasing their risks of foodborne illness.

4.5.2 Physically harder to prepare meals

Participants described a range of physical challenges they encountered when handling or preparing food, which hindered their ability to follow recommended food safety guidelines. The time and effort required for preparation felt mentally exhausting, prompting many to simplify their meals or perhaps skip necessary safety steps. For example, participants shared having “trouble peeling 10-pound bag of potatoes now because of arthritis” (Ruth). These physical limitations “kind of bother” (Marilyn) participants, and they found it “challenging” and expressed worry about “what if I can’t get it open?”. These physical barriers complicated food preparation and prompted participants to prioritize quick and simple meals that demanded minimal effort. For example:

Harder. It's the mobility issues and things. And just carrying the groceries home {laughter} but not necessarily the prep because as you can tell from the conversation I

keep a very simple ways. I am not at the stove all day making sauces and you know whatever so my cooking is really very quick. (Beatrice)

This illustrated how physical limitations reshaped everyday food safety practices. Specifically, participants described the challenges of standing for extended periods while cooking. To manage this, many took breaks throughout food preparation. These physical barriers made the entire cooking process longer, potentially leading them to not cook thoroughly for themselves. The feelings of burden and physical discomfort played a significant role in how participants adapted their meal preparation and influenced their food choices. For example:

Um well it's harder to cook because both my knees are bad and I can't stand that long without hurting. So then I only prepare so much and then I have to take a break because I have to get up and feel my legs. It's a longer process. (June)

4.5.3 Changing preparation methods for convenience

Along with physical challenges, participants emphasized a strong preference for convenience in both preparation methods and meal choices. While many described cooking as “second nature” (Patricia), something they’ve done their whole lives, their reduced motivation has affected their food safety behaviours. Reduced motivation could lead to them taking shortcuts or skipping important food safety steps, which ultimately increases their foodborne illness. Participants commonly expressed that they prefer using appliances such as air fryers, toasters, and microwaves compared to traditional ovens because of their speed, ease of use, and efficiency. They preferred putting “meals together very quickly” (Beatrice). This shift reflected a change in preparation methods, but also they’re adapting to their physical limitations. They had a strong desire to maintain autonomy and a sense of control over preparing meals. For example:

I do cause it's convenient. I find they're convenient because I cook usually one portion at a time so to me to put a chicken breast in the oven, I warm the big oven, where airfryer is so compact, and then I can cook the vegetable at the same time, I put it at the bottom.

(Shirley)

Moreover, this shift toward convenience led participants to have greater reliance on ready-to-eat meals and frozen foods. Many shared that preparing meals from scratch was time-consuming and physically demanding. This was extra effort that they did not want to invest in, especially when cooking for one. As a result, they often assembled meals quickly or relied on frozen foods and pre-packaged items. This shift reflected participants' response to aging-related challenges, but also tension to balance convenience, food safety, and nutritional quality in their daily lives. While pre-made meals simplified everyday practices, they also carry foodborne illness risks, especially when handling or storing them. Participants preferred ready-to eat meals because they “don't have to cook it and it's easier and it's there” and they “can have it cold” or “can warm it up in the microwave and have it hot” (Beatrice). The convenience of not cooking makes their lives easier.

Participants often stored large quantities of food in their freezers due to convenience, which can result in overcrowding, food spoilage, and waste. This practice encouraged them to quickly grab easy-to-cook meals to save time and effort. Participants shared that they preferred to “cook in quantity and put food in the freezer” (Ruth), allowing them to reheat portions as needed. Similarly, Patricia explained that she bought “enough for a meal for myself” and froze the rest. This dependence on leftovers further demonstrated how participants strategically adapt their food preparation and safety routines to prioritize convenience. This was a strategy for them to maintain independence despite the physical and cognitive challenges of aging. It reflected how

simplifying meals was essential for them due to the convenience of saving time and energy, but also to support their daily autonomy. For example:

I rarely get fresh. If I got fresh, it would be in the oven and I would cook it, but that's rare. I used to you know like when you're by yourself and it's just a lot of work for nothing. And I have leftovers or whatever. Too many dishes. {laughter} (Beatrice)

Overall, participants shared that reduced motivation when preparing meals is very common as you age. Participants described their physical challenges, which contributed to their unsafe food handling practices. Due to reduced motivation and physical limitations, participants shifted to following convenient foods and preparation methods.

4.6 Older Adults' Food Safety Practices

Through the process of deductive coding based on the WHO Five Keys to Safer Food, valuable insights were gained into older adults' food safety practices (Table 1). Due to various factors such as relying on long-standing habits, experience, and health literacy of those around them, participants mentioned engaging in unsafe and safe food handling practices. These practices were organized based on the WHO Five Keys to Safer Food, as shown below.

Participants in this study mentioned several practices that follow WHO guidelines. Specifically, they had established kitchen and hygiene practices, they washed their hands regularly before preparing food and cleaned kitchen counter tops daily. Other recommended practices they followed included using separate cutting boards for raw meats and other foods, refrigerating cooked food within two hours, using a cooler for groceries during transport, and purchasing fresh and wholesome foods. They also had well-established routines to wash fruits and vegetables by rinsing them with water before consumption.

However, they also mentioned following practices that do not align with the WHO recommended guidelines. They rarely washed their hands during and after food preparation. They mentioned briefly washing their hands during handling food, highlighting inconsistent handwashing routines. Participants used dishcloths for multiple tasks like cleaning the countertops and stoves, without regularly washing them. They relied on rinsing dishcloths in the sink. Those who lived alone expressed leaving unwashed dishes in the sink for a couple of days. There were mixed practices for thawing methods, as some followed proper practices to thaw overnight in the refrigerator, whereas others still relied on thawing on the counter at room temperature. There were mixed practices when discarding leftovers, as participants kept food for up to a week or longer. Furthermore, many relied on sensory cues such as sight, smell, or taste to judge whether food was thoroughly cooked. The majority did not use food thermometers, except in rare occasions for meat such as large roasts when having company. In addition, participants did not monitor the temperature of the fridge or freezer, nor did they have a thermometer for this. Participants did not consistently check best-before dates before preparing meals and often ignored best-before dates. Lastly, participants rinsed meat and chicken, which is also not a recommended practice.

Overall, participants had varying food safety practices that did not fully align with WHO guidelines. This table illustrates which practices are well-adopted and which are being neglected, indicating which behaviours need to be prioritized for food safety education among older adults.

Table 1: Older Adults' Food Safety Practices based on WHO Recommendations

WHO Five Keys to Safer Food (WHO, 2006)	Participant Practices that follow WHO Recommendations	Participant Practices that do not follow WHO Recommendations
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Keep clean	Wash hands regularly before cooking	Rarely wash hands during and after food preparation
	Clean kitchen countertops daily	Use dishcloths for multiple tasks without regularly washing
		Leave unwashed dishes in the sink for a couple of days
Separate raw and cooked	Use separate cutting boards for raw meat and other foods	
	Use separate knives for raw meat and other foods	
Cook thoroughly		Do not use a food thermometer except rare occasions for meats
		Judge food doneness through sight, smell, or taste
Keep food at safe temperatures	Thaw frozen food in the refrigerator overnight	Thaw on the counter at room temperature
		Do not monitor the temperature of the fridge or freezer
	Refrigerate cooked food within two hours	Do not use a thermometer for the fridge or freezer

		Discard leftovers after extended periods
	Use a cooler for groceries during transport	
Use safe water and raw materials	Buy fresh and wholesome foods	Do not consistently check best-before dates before cooking
	Wash fruits and vegetables, typically rinsing with water before consumption	Rinse meat

5. Discussion

5.1 Overview

The overall aim of this thesis was to understand how independently living persons aged 65 and older, living in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock), perceive and mitigate their risks of foodborne illness in their home environments. The specific objectives of this thesis were to explore: (1) how and why these individuals perceive their risk of developing foodborne illness; and (2) whether these individuals follow recommended food safety practices and why or why not. To achieve this, semi-structured interviews were conducted with persons aged 65 and older living independently in Southern Ontario, which revealed nuances regarding older adults' food safety behaviours and risk perceptions. Four themes were developed based on the inductive analysis: (1) Trusting my own cooking, (2) Doing what I've always done, (3) Being conscious of minimizing food waste, and (4) Cooking is a chore, and a comparison to WHO best practices was made deductively.

Participants expressed strong confidence in their food handling practices at home, rarely thinking actively about foodborne illness and generally assuming it was unlikely to affect them. Instead, they developed personal protective measures, such as following their long-standing habits, relying on past experiences, their health literacy and that of those around them. Participants also had strong beliefs in minimizing food waste, with strategies of repurposing leftovers and employing different shopping tactics. However, this mindset, along with space limitations in the kitchen, often led to participants neglecting recommended guidelines. Finally, participants expressed a lack of motivation to prepare meals, along with physical limitations, which contributed to their preference for convenient foods and preparation methods.

5.2 Trusting my own cooking

Participants expressed strong trust in their own cooking practices within their home environments, attributing this confidence and sense of control to many personal protective factors. Participants demonstrated the illusion of control, where they perceived themselves as having nearly total control of food safety in their homes (Evans & Redmond, 2019). They attached the meaning of food preparation as a way to control their lives and maintain their identity and independence. Older adults perceived themselves as having a low risk of foodborne illness despite being a high-risk group (Evans & Redmond, 2019; Berger et al., 2023). Consistent with existing literature, participants in this study had solid food safety knowledge and are aware of the risks associated with foodborne illness (Anderson et al., 2011; Berger et al., 2023; Kavanaugh et al., 2022). However, they did not acknowledge that they are more susceptible to developing foodborne illness or experiencing severe outcomes. This is similar to the overall Canadian population, where they perceive themselves at low risk for foodborne illness and are confident in their practices (Sutherland et al., 2020; EKOS Research Associates Inc., 2010). Notably, older men are more likely than older women to perceive themselves as low risk for developing foodborne illness (Hanson & Benedict, 2002).

Participants believed they knew all the food preparation practices needed to ensure food safety (Evans & Redmond, 2019), and the majority felt like they had sufficient knowledge of food safety (Evans & Redmond, 2019; Bruhn, 1999). Participants also believed food prepared in their own homes was the least likely way to develop foodborne illness and that food bought from takeaway restaurants was more likely to cause illness (Evans & Redmond, 2019; Redmond & Griffith, 2004). This perspective reflected confidence in their own practices and distrust toward external food handlers. Existing literature supports this sentiment, showing older adults have

greater trust in their home-cooked meals due to low perceived control compared to those prepared by external sources (Bryd-Bredbenner et al., 2013; Berger et al., 2023). This highlights that participants often lack awareness of food safety risks in the home environment. Their inability to identify meals cooked at home as a source of illness has important implications for food safety (Redmond & Griffith, 2004). Most food handling mistakes are made by consumers at home, and if consumers misidentify the source of their illness, they tend to underestimate the severity and are less motivated to change their behaviours (Bruhn, 1997).

An interesting belief among participants was the perceived protective measure of eating healthy. Many felt that consuming organic or fresh foods and preserving the nutritional quality of foods would protect them from developing illness. This belief contributed to their underestimation of developing foodborne illness. While eating healthy is important, this reveals a common misconception that eating healthy equates to food safety because any food that is mishandled can cause illness. Participants' trust and guidance in their own kitchen, including their dietary and purchasing choices, were grounded in years of experience, further reinforcing their perceived invulnerability to foodborne illness. This highlights a knowledge gap, specifically in distinguishing nutrition and food safety. Importantly, existing literature does not show that older adults use healthy eating and preserving the nutritional quality of foods as personal protective mechanisms against foodborne illness.

The findings align with existing literature that older adults have perceptions of personal invulnerability, optimism bias, and illusions of control (Evans & Redmond, 2019; Redmond & Griffith, 2004). Their perception was shaped by optimism bias, which is a belief that older adults underestimate their risk of encountering negative consequences (Weinstein, 1980), and the illusion of control, which leads them to feel personally invulnerable because they believe they

can manage the potential risks (McKenna, 1993). Older adults believed they were less likely to become ill because they had never knowingly experienced foodborne illness themselves and had control in their own practices at home (Evans & Redmond, 2019; Redmond & Griffith, 2004). This underscores the need for tailored food safety messaging (Evans & Redmond, 2019), especially that addresses misconceptions and unsafe practices, as a one-size approach for high-risk groups is not effective (Berger et al., 2023). It is important to note that individuals need to first recognize that their current food safety practices place them at risk, and taking action would be a way to reduce that risk. Therefore, tailored messaging should incorporate aspects of perceived low risk and control at home environments (Redmond & Griffith, 2004; McIntosh et al., 1994).

5.3 Doing what I've always done

Participants' food handling practices were shaped by long-established habits and confidence in their own judgement (Kendall et al., 2006; Berger et al., 2023; Young & Waddell, 2016; Kavanaugh et al., 2022). Older adults tend to feel safe in their kitchens due to these lifelong experiences (Berger et al., 2023; Wills et al., 2015). Older adults are more likely to engage in unsafe practices related to food storage, handling, and cooking (Kendall, Hillers, & Medeiros, 2006; Byrd-Bredbenner et al., 2013; Gettings & Kiernan, 2001; Evans & Remond, 2015; Murray et al., 2017). They handle food differently than younger adults, often relying on past experiences and habits, leading to a significant gap between behaviour and knowledge of proper food handling and storage practices (Terpstra et al., 2005; Brennan et al., 2007; Evans & Redmond, 2016; Gettings & Kiernan, 2001). Older adults are also more likely to rely on emotions, heuristics, and decision-making shortcuts compared to younger people (Price et al., 2000; Johnson, 1990; Riggle & Johnson, 1996; Fung & Carstensen, 2003). In this study,

participants described routines and habits as an unconscious activity that is influenced by their past experience and upbringing. They often used heuristics when handling and preparing food, for instance, they used their intuition to determine whether their fridge temperature was correct. They were also guided by “commonsense knowledge” and sensory awareness to determine whether food was safe to eat. This is largely because of habitual routines and experience, which act as barriers to adopting safer food behaviours such as not using a food thermometer or avoiding washing poultry (Kavanaugh et al., 2021). Many participants used established habits, which makes food handling behaviours difficult to change among this high-risk group (Armstrong et al., 2024; Young & Waddell, 2016).

Older adults tend to rely on sensory cues, such as sight, taste, and touch, to judge whether food is safe to eat, and many use utensils to cut food open to assess doneness (Gettings & Kiernan, 2001; Berger et al., 2023). In this study, participants frequently relied on their senses of smell, taste, touch, and sight to determine whether food was safe to eat, which often resulted in unsafe behaviours. Although many continue to use sensory cues to evaluate food safety, they are not reliable to determine whether food is safe to eat (Ackerman et al., 2020). This reliance poses risks, as the senses of smell, taste, and vision naturally diminish with age (Doty, 1989; Swenor & Ehrlich, 2021; Schiffman, 1997). This decline reduces the accuracy of their judgment as it may become difficult to detect food spoilage. This creates a heightened challenge for older adults since relying on diminishing senses increases the likelihood of unsafe food handling practices.

Older adults expressed strong trust in the Canadian food safety, reinforcing their belief of being at low risk for foodborne illness. Canadians have high levels of confidence in the food system (Leger Marketing, 2011), however, this study revealed that participants viewed this national trust as a protective factor from developing foodborne illness. This means that

participants delegated most of the responsibility for food safety to external settings compared to themselves as consumers, indicating they did not perceive their homes as a site of risk for illness. Participants believed food is being checked and handled safely before reaching them, reflecting the Canadian population's perception that food contamination occurs before food reaches their kitchen (Nesbitt et al., 2014; Leger Marketing, 2011). The discussion of political issues revealed a sense of underlying distrust in imported foods. Participants in this study viewed the Canadian food system as a protective factor because they believed that the foods they purchased were already safe, which led to high confidence in their food safety practices and low perceived risk. These high trust levels reduced their perceived need to take any personal precautions against foodborne illness. Future studies could explore whether older adults' trust in their food systems beyond Canada is a protective factor against illness.

Participants shared that they learned food handling practices and habits from their social networks, including family, friends, and colleagues. This shows how social influences shape participants' behaviours more than recommended food safety guidance. There is a lack of research in this topic among older adults; however, there are social influences on consumer food handling (Young & Waddell, 2016; Kavanaugh et al., 2022). In this study, health literacy of participants and their social networks was seen as a protective factor from foodborne illness. However, having a background in healthcare, either personally or through family members in roles such as paramedic or nursing, does not necessarily equip individuals with accurate or adequate food safety knowledge. Overall, in this study, older adults' perception of being at low risk for foodborne illness and their continued unsafe practices was often rationalized because of long-standing habits, trusted routines, personal experience, their own knowledge and of their close social networks. This study highlights that older adults have a fragmented and personalized

understanding of food safety, underscoring the need for tailored educational resources that acknowledge their lived experiences and address their knowledge gaps.

5.4 Being conscious of minimizing food waste

In this study, participants demonstrated a strong reluctance to waste food. They shared unsafe practices, such as overcrowded freezers leading to poor storage behaviours, suggesting that they could be potentially wasting more food despite their good intentions. Older adults tend to waste less food (Visschers et al., 2016; Quested et al., 2013). In this study, participants were more mindful of their food purchases and wasted less, thus, they were hesitant to throw away spoiled food, perhaps due to their past experiences with portion control and food shortages during World War II (Young & Waddell, 2016; Visschers et al., 2016; Quested et al., 2013; Milne, 2011). This behaviour reflects a cohort effect, where those who grew up with shorter supply chains, less processed food, fewer best-before dates, and less refrigeration tend to perceive themselves as low risk for foodborne illness (Wills et al., 2015; Terpstra et al., 2005). Participants felt a moral responsibility to avoid food waste; they viewed wasting food as wrong because of their informal food safety knowledge they developed over the years and traditional teachings they learned growing up (Quested et al., 2013).

Research shows younger generations, including Gen X, Y, and Z are less resourceful in using leftovers, causing them to waste more food (Karunasena et al., 2021). This study highlights how older adults are knowledgeable and skillful in conserving food through practices such as repurposing foods or keeping foods fresh for longer. Participants attached the meaning of conserving food to continuing familial habits and tradition. Furthermore, many participants ignored best-before dates in this study. This reveals a gap in the literature regarding older adults' understanding and perceptions of best-before dates (Hall-Phillips & Shah, 2017; Barone &

Aschemann-Witzel, 2022; Meah, 2014). To my knowledge, there is no literature in Canada exploring how older adults understand and perceive best-before dates.

In this study, participants shared their shopping strategies to reduce food waste, often driven by cost considerations (Quested et al., 2013). Some participants bought in bulk, while others bought just enough food, both with the intention of reducing food waste. Reflecting on the number of people in the household, buying for one shows the impacts of living alone. There is a gap in the literature on how older adults manage buying food in large quantities, as this would require more planning and proper storage practices. To encourage positive food purchasing behaviours, it would be beneficial to partner with retailers and manufacturers to modify packaging. A strategy to help consumers reduce food waste is to purchase the right amount of food. This could be achieved by offering appropriately sized portions, providing clearer and more consistent storage and freezing guidelines, and improving label application to extend shelf life (Quested et al., 2011).

In addition, participants expressed how living in small apartment living spaces influenced their food safety practices, such as having overcrowded freezers. Kitchens are ineffective in terms of size and layout, as participants expressed having limited storage and counter space. There is a relationship between older adults' food handling practices and the kitchen space (Wills et al., 2015; Ibrahim & Davies, 2012). However, there is a gap in the literature exploring how physical kitchen limitations influence older adults' food safety practices and strategies to overcome these barriers. This study addressed this gap by highlighting that ineffective kitchen layouts, constrained living arrangements and limited storage space significantly affect how older adults manage and handle food safely. These limitations contribute to challenges such as improper storage and frequent food spoilage, and waste.

5.5 Cooking is a chore

Participants viewed handling and preparing food as tiring and burdensome rather than enjoyable. They attached preparing meals to relationships, family and tradition; however, this meaning diminished without someone to cook for. In this study, participants who were on their own put less effort into preparing their meals (Whitelock & Ensaff, 2018; Sidenvall et al., 2000). Notably, women who lost their partner felt less motivated to cook for themselves (Bloom et al., 2017). Also, older men face additional challenges as they may not be well prepared to take on food-related responsibilities after the loss of a spouse (Bloom et al., 2017; McDonald et al., 2000).

In addition, participants expressed a preference for simpler meals, including ready-to-eat options, which carry potential nutritional risks (Whitelock & Ensaff, 2018). The preference for simple meals and reluctance to invest time or effort suggest that older adults prioritize convenience, which may lead them to skip or rush essential food safety practices. As people age, they often experience physical changes and health conditions, including diminished taste and smell (Oemichen & Smith, 2016). This study demonstrated that physical difficulties affected older adults' ability to prepare meals, making it more difficult to follow safe handling practices (Oemichen & Smith, 2016; Ibrahim & Davies, 2012). This highlights the need for social support, motivation-enhancing strategies, and simplified cooking guidance like community programs. Similar to Ontario high school students, older adults require tailored education on safe preparation methods for convenient meals (Diplock et al., 2019). Overall, older adults' reduced motivation combined with physical limitations led them to follow long-standing habits, which in turn influenced their food choices, purchasing behaviours, and meal preparation methods.

5.6 Older Adults' Food Safety Practices

Older adults followed practices that did not fully align with the WHO recommendations. Participants followed established hygiene practices, such as handwashing before preparing food, cleaning kitchen surfaces daily, cleaning cutting boards for raw meats and other foods, and washing fruits and vegetables before consumption. This aligns with existing literature, where participants have good kitchen hygiene practices, such as frequent handwashing and cleaning cutting boards out of habit (Berger et al., 2023; Armstrong et al., 2024). Notably, participants in this study washed their hands more frequently before preparing meals and were more conscious of bacteria spreading in their kitchens. This behaviour could be linked with the impacts of the COVID-19 pandemic, as many became more aware of bacteria and increased their use of disinfectants (Haas et al., 2020). Interestingly, many participants in this study used a cooler for groceries during transport, indicating the initiative they took to prevent food from becoming spoiled. They also adhered to storing food in safe temperatures; specifically, they refrigerated cooked food within two hours.

However, older adults continue to follow practices that do not align with the WHO recommendations. Participants rarely washed their hands during and after food preparation, showing inconsistent handwashing routines. They also used dishcloths for multiple tasks like cleaning the countertops and stoves, but often went days or weeks without regularly washing them. Those who lived alone expressed that they left unwashed dishes in the sink for a couple of days, which has not been reflected in existing literature. There were mixed practices for thawing methods, as most followed correct practices to thaw overnight in the refrigerator, whereas others still relied on thawing on the counter at room temperature, which is consistent with existing literature (Gettings & Kiernan, 2001). Older adults tend to defrost frozen food at room

temperature or put frozen food in water and store raw meats incorrectly in the refrigerator (Cates et al., 2009; Byrd-Bredbenner et al., 2013; Scott, 2003; Thaivalappil, 2020; Kosa et al., 2011; Evans & Redmond, 2018; Gettings & Kiernan, 2001).

In addition, participants relied on sensory cues such as sight, smell, or taste to judge whether food was thoroughly cooked and ignored best-before dates, aligning with existing literature (Berger et al., 2023; Gettings & Kiernan, 2001). This led to inconsistent disposal of leftovers, which warrants further exploration on how older adults manage and store leftovers. Older adults tend to prolong their storage of ready-to-eat foods beyond the recommended date (Evans & Redmond, 2016). In addition, the majority of participants in this study did not use food thermometers (Cates et al., 2009), except on rare occasions for meat such as large roasts when having company. This suggests that older adults lack awareness about when to use food thermometers and tend to associate them with cooking meat. Moreover, participants did not monitor the temperature of the fridge or freezer, which aligns with existing literature (Cates et al., 2009; Evans & Redmond, 2016; Thaivalappil et al., 2020). This is concerning due to older adults' increased risk of listeriosis (Evans & Redmond, 2016).

Participants in this study rinsed their meat, which is not a recommended food safety practice. This aligns with existing literature that older adults rinse poultry out of habitual practices (Berger et al., 2023; Young et al., 2020; Kosa et al., 2017). Overall, older adults continue to engage in unsafe food handling practices (Evans & Redmond, 2016; Armstrong et al., 2024; Hanson & Benedict, 2002). There is an urgent need to improve older adults' food safety practices regarding monitoring fridge and freezer temperatures, the use of food thermometers, rinsing meat, and general hygiene practices, which also reflect the overall

Canadian population (EKOS Research Associates Inc., 2010; Nesbitt et al., 2009; Leger Marketing, 2011).

Finally, it is important to note that participants did not thoroughly explore each of the WHO Five Keys to Safer Food due to the nature of a semi-structured interview guide. However, each participant provided deep and rich insights into specific behaviours depending on which they felt more comfortable or interested in discussing.

5.7 Strengths and Limitations

This is the first study to use the WHO Five Keys to Safer Food as a guiding framework to explore whether older adults follow recommended food safety guidelines. This framework enhances the study's relevance and comparability to other studies because the WHO recommendations provide a universal standard for food safety behaviours. To my knowledge, this is the first Canadian qualitative study to use semi-structured interviews to explore how and why independently living older adults perceive and mitigate their foodborne illness risks at home. This study draws directly from participants' voices, providing rich insights from their lived experiences. These perspectives allowed the intersection of multiple dimensions, including protective factors (e.g., eating healthy, preserving nutritional quality of food, trust in the Canadian food system, health literacy of their social networks), practical considerations such as kitchen layouts, and economic factors influencing food purchasing, storage, and handling practices that were aimed at minimizing food waste. There were also emotional and physical factors, like low motivation and physical limitations. Collectively, these findings contributed to a cohesive understanding of why older adults perceived themselves at low risk for foodborne illness and why they continue to engage in unsafe food handling practices. By drawing directly

from participants' voices, this is the first study to integrate these diverse factors into a coherent narrative.

In addition, the use of semi-structured interviews was a key strength, specifically the interview guide provided flexibility for participants to share rich, in-depth, and unique insights into their food safety practices and perceptions. This approach supported a nuanced exploration by uncovering underlying values and emotions that shaped their food safety behaviours. Participants were able to move fluidly between topics and guide the conversation toward what they perceived as the most meaningful, offering deep insights into their experiences.

The data was analyzed using reflexive thematic analysis, combining inductive and deductive approaches, which added depth to the development of the themes. This approach uncovered many layers of meaning embedded in participants' narratives. For example, an unexpected insight emerged that food safety was often an unconscious aspect of participants' daily lives, where they did not deliberately think about it. This thesis amplified older adults' voices and drew directly from their own words. It captured the subjective meanings they attached to their food safety practices. For example, preparing food had a symbolic meaning tied to relationships and spending time with loved ones, highlighting the emotional and social aspects of food safety. This study addressed a significant gap in the literature by focusing on an underrepresented population in food safety research and offering a local perspective from Southern Ontario. While it provides rich insights into older adults' food safety practices and foodborne illness risk perceptions, there are several limitations that should be acknowledged.

A study limitation was social desirability bias, where participants tailor their responses to align with perceived societal norms or expectations. This bias can be influenced by the presence of the interviewer (Althubaiti, 2016) and has been shown to be more prevalent in older adults

(Soubelet & Salthouse, 2011). Participants could state responses that they feel are socially acceptable, factually correct or aligned with what they think the researcher wants to hear (Redmond & Griffith, 2003; Nesbitt et al., 2014). As a result, participants may have overstated their use of proper food handling practices and understated their risky behaviours to present themselves in a more positive light. To mitigate this, I took several steps. To create a comfortable and non-judgmental environment, I emphasized the confidentiality of their responses and adopted a neutral stance throughout the interviews. I also asked open-ended questions with sensitivity and encouraged participants to pause or discontinue the interview if needed. To ensure clarity, I used simple language and allowed extra time for participants to reflect and respond. These strategies helped me build rapport and trust with participants, encouraging them to speak openly about food safety.

Due to time and resource constraints, recruitment posed challenges that resulted in the underrepresentation of certain groups. This includes older adults who were unable to access the recruitment materials, such as those who are socially isolated, living in rural or underserved areas, and individuals who do not speak English. To address this, I reached out to a wide range of recruitment locations across Southern Ontario to include participants from diverse backgrounds. Nonetheless, future research could explore strategies to improve outreach and accessibility for older adults' participation.

This study focused on understanding food safety perceptions of independently living older adults in Southern Ontario who are primary food preparers in their households. The sample was predominantly female, with only one male participant. While the findings provide in-depth and contextualized insights into a specific group, they may not be representative of the broader population of older adults. Since all participants resided in Southern Ontario, this limits the

transferability of the findings to other regions in Canada and globally. To mitigate this, recruitment efforts targeted diverse locations to include participants of varying ages and backgrounds, therefore adding depth and breadth to this study.

5.8 Contributions

This is the first study in Ontario and in Canada to explore how independently living older adults perceive and mitigate their food safety risks at home, using semi-structured interviews. These valuable insights contribute to the existing body of literature by providing updated and context-specific evidence on why older adults perceive themselves at low risk for foodborne illness. This thesis highlights several key factors that influence older adults' food safety practices, including their perceived sense of control at home, long-standing habits, relying on experience and knowledge, reluctance to discard food, and emotional attachments. Older adults shared personal protective measures which are not shown in previous studies, such as eating healthy and preserving nutritional quality, and their strong trust in the Canadian food safety system. These findings provide in-depth insights into the underlying reasons why older adults perceive themselves at low risk for foodborne illness.

By adopting the WHO Five keys to Safer Food as a framework for both deductive and open coding, this study provides a nuanced understanding of older adults' adherence to recommended guidelines. This thesis identified specific food safety behaviours that can be improved among older adults, including the limited use of food thermometers, inadequate monitoring of refrigerator and freezer temperatures, and improper food storage practices. In addition, older adults rinsed meat, ignored best-before dates, and relied heavily on sensory cues such as smell, taste, and sight to judge whether food was safe to eat. This highlights specific areas where targeted education is needed among this high-risk group.

This study also revealed deeper values and meanings that participants attached to their food safety behaviours. For example, they attached cleanliness as a habitual practice rooted in their upbringing. They viewed hygiene practices as not only a precaution to prevent illness, but as an ingrained habit. This thesis reveals fresh insights into older adults' strong reluctance to waste food and their commitment to preserving it. These experiences are overlooked in current public health messaging. This underscores the need to develop new communication strategies that align with older adults' values and language that resonates with them.

5.9 Implications for practice

This study offers several implications for public health professionals, senior care organizations, and policymakers aiming to prevent foodborne illness among older adults. The findings suggest the need for community-based educational initiatives that go beyond food safety information. These initiatives could incorporate social and emotional aspects to help create opportunities for older adults to connect, reduce social isolation, and increase motivation to prepare safe and nutritious meals. This would also improve their awareness and health literacy of food safety in a supportive environment. Educational programs are needed in places where older adults frequently attend, including libraries, health centers, and religious institutions, to provide hands-on experience (Gettings & Kiernan, 2001).

This study reinforces that current public health messaging is not effectively changing older adults' food safety behaviours. This warrants the need for targeted and tailored food safety messaging. The findings emphasize the need for additional awareness of specific food safety practices, such as encouraging the use of food thermometers. In addition, this study highlights an opportunity to improve food labels by including clear information on proper cooking temperatures and guidance on thermometer use. It would also be beneficial to spread awareness

on best-before dates, as there seems to be confusion about what best-before dates mean. Public health messaging could raise awareness about the hidden foodborne illness risks, such as the dangers of consuming spoiled food that may still appear visually fine. Further resources are needed to support older adults' safe practices in their home environments, such as providing food safety checklists that are easily accessible due to their perceived low risk of foodborne illness at home. In addition, public health professionals could provide guidance on safe food storage practices for small living spaces like apartments to address the practical challenges older adults face. Moreover, participants expressed a desire in learning about which foods stay fresh for longer and which options are healthier. This highlights the need to disseminate community and educational resources to help them practice safe food handling in their daily lives. Improved communication channels are needed, such as implementing a dedicated and easily accessible food safety hotline for older adults, as suggested by a participant.

The findings also revealed a growing use of convenient preparation tools, such as air fryers and toasters, compared to traditional ovens. Public health and senior care organizations could adapt their educational materials to reflect current technologies and trends, and ensure guidelines are compatible with the appliances older adults use. Older adults would also benefit from easy-to-follow, low-effort, and free meal plans to reduce their decision-making fatigue and encourage safe food handling practices. Overall, older adults appear to be motivated to change their food safety behaviours, driven by three factors: (1) saving costs, (2) efficiency and convenience, and (3) protecting the health of their families and those they frequently cook for.

5.10 Future research directions

The findings provide valuable insights into older adults' perceptions of food safety practices and their understanding of foodborne illness risks. It highlights the need for further

research with a larger and diverse sample of older adults, especially including those who were underrepresented. Expanding research beyond Ontario to other regions will help reveal geographical and cultural differences in food safety perceptions and behaviours. In addition, future research could explore how cultural, sociopolitical, and economic factors influence food safety behaviours.

Future studies could delve deeper into habitual behaviours, such as older adults' tendency to ignore best-before dates, which may suggest confusion about what best-before dates mean. Observational studies could investigate unsafe food handling practices, such as neglecting to use a food thermometer, which warrant closer exploration. Furthermore, the influence of physical limitations such as arthritis and emotional factors like reduced motivation on food safety perceptions could be explored. This can help in understanding the barriers to adopting safe food handling practices and could be guided using behavioural frameworks like the COM-B model. Moreover, this thesis did not fully explore the influence of health literacy of social networks on older adults' perceptions of food safety.

Lastly, participants shared an increased use of technology, specifically using Google and social media platforms like Facebook. Future studies could investigate how digital platforms shape older adults' knowledge and practices around food safety. Changing food safety behaviours in older adults is often viewed as difficult (Armstrong et al., 2024; Young & Waddell, 2016; Berger et al., 2023), however, the findings of this study indicate otherwise. Older adults have adopted new appliances to enhance convenience, demonstrating that with appropriate support, they are both capable and willing to change their unsafe food handling practices.

6 Conclusion

Foodborne illness remains a significant public health concern, especially for older adults who are at increased risk of foodborne illness (Lund & O'Brien, 2011; Smith, 1998; Behravesh et al., 2011; Scott, 2003; Berger et al., 2023). As aging in place becomes increasingly common and older adults are expected to represent 25% of Canada's population by 2051 (National Research Council Canada, 2024), it is essential to provide insights on food safety to enhance their health, well-being, and ability to maintain independence.

This is the first study in Canada to explore how independently living persons aged 65 and older, living in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock), perceive and mitigate their risks of foodborne illness in their home environments post-pandemic. Consistent with existing literature, older adults perceive their risk of developing foodborne illness to be low in their home environments. This perception was shaped by several factors, including long-standing habits, relying on past experiences and health literacy. Despite their confidence in safe food handling, they often engage in unsafe practices, such as limited use of food thermometers and improper monitoring of fridge and freezer temperatures.

The findings underscore the need for targeted and tailored food safety messaging and resources that are not only informative but also resonate with their lived experiences and values. This study challenges the portrayal of older adults as resistant to change and passive in their health behaviours. Instead, it presents them as active and open to adjusting their behaviours, particularly when public health guidance is practical, accessible, and clear. Older adults expressed pride in maintaining their independence and resourcefulness, illustrating that food safety strategies should aim to empower them and build on their current strengths. This study offered rich and context-specific insights into this underrepresented group. It reveals a powerful

narrative that goes beyond the need for updated guidelines, but for tailored and inclusive resources that promote both food safety and older adults' independence. Ultimately, understanding older adults' perceptions and practices related to food safety is essential for developing public health strategies that are both effective and respectful of their experiences and unique needs.

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Appendices

Appendix A: Semi-Structured Interview Guide and Verbal Consent Form

Interview Script and Semi-Structured Question Guide

Introduction, Information, and Consent

Hi <Participant Name>, Thank you so much for agreeing to participate in our interviews, which should take about 45-60 minutes.

Only ask if the interview is online: Is this still an ok time to talk?

[CONFIRM OR REBOOK]

Great! I will first provide you with some information about the study, go through a consent form with you, and then we can begin the interview properly.

[READ VERBATIM]:

“As outlined in the information letter, this study will investigate how people aged 65 and older in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) perceive and manage their risks of foodborne illness and what they think and do about food safety. We would like to talk to a range of people 65 years of age or older who live independently in Southern Ontario and do most/a good amount of cooking in their house. Everyone’s experiences are

different and important, including yours. Ultimately, our goal is to inform public health and senior care organizations to better support seniors with respect to food safety.”

[VERBAL CONSENT SCRIPT AND DOCUMENTATION FORM]:

Have you had a chance to read the information letter? Do you have any questions about the study?

As a reminder, your participation is voluntary. You may end this interview at any time by letting me know or skip any questions that you prefer not to answer. By providing your consent, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

Do you consent to participating in the interview?

YES NO

Do you give permission for your interview to be audio-recorded?

YES NO

Online: Do you give permission for your interview to be video recorded?

YES NO

When we report the results of the study, we will include example quotes from the interview to support our conclusions. This means we will assign a pseudonym, for example, using X instead

of Kanika if it were me, to make sure your identity will be anonymized. Do you agree to the use of quotations in any paper or publication resulting from this study with the understanding that a pseudonym will be used in place of your real name? YES NO

Do you consent to the researcher keeping your contact information for future contact about related studies?

YES NO

Participant's name: _____

Researcher's signature: _____

Date: _____

[CONSENT GIVEN, OR INTERVIEW STOPPED]

May I turn the recorder on now?

[TURN RECORDER ON]

Thank you.

LEAD-IN

“What kind of things do you generally like to cook?”

“Can you tell me what comes to mind when I say food safety? What comes to mind when I say foodborne illness?”

RISK OF FOODBORNE ILLNESS

“Do you see yourself as at risk for foodborne illness?”

→ PROBE: “Why or why not?”

→ PROBE: What about when you cook for others – any concerns there about foodborne illness?

RECOMMENDED PRACTICES

“Can you walk me through how you usually prepare food/meals at home?”

“Can you walk me through things you do to make sure your food is safe to eat?”

→PROBE: How long have you been doing these things?

→PROBE: Do you have any other habits or traditions you follow to make sure your food is safe to eat?

→PROBE: For a long time or recent

→PROBE: Automatic or have to think about it

“What about how you cook food?”

→ PROBE: “How do you know when your food is cooked?”

→ PROBE: “How and why do you do that?”

→ PROBE: What about when you’re dealing with leftovers?

→ PROBE: “Is there anything you wish you could do but can’t?”

→ PROBE: Within everything you just described, which parts do you find easy?

→ PROMPT: Temperature

→ PROMPT: Keeping things separate

→ PROMPT: Reheating food

→ PROMPT: Thawing food

“What about how you store food?”

→ PROBE: When you buy groceries, how do you decide where to store different kinds of foods at home?

→ PROBE: “Why do you do that, or why not?”

→ PROBE: “Is there anything you wish you could do but can’t?”

→ PROBE: Within everything you just described, which parts do you find easy?

→ PROMPT: Temperature

→ PROMPT: Separating

→ PROMPT: Storage in fridge and freezer

→ PROMPT: Storage in cupboard

“What about things related to cleaning or cleanliness, in terms of things you do to make sure your food is safe to eat? This could be anything to do with cleaning or cleanliness, for example related to your kitchen workspace, to yourself as a food handler, or to the actual foods you’re preparing”

→ PROBE: “Why do you do that?”

→ PROBE: “Tell me more about how you do that”

→ PROBE: “Is there anything you wish you could do but can’t?”

→ PROBE: Within everything you just described, which parts do you find easy?

→ PROMPT: Handwashing

“How do you decide what’s safe to eat? This could be anything from how you choose foods at the grocery store or when choosing what to eat from your fridge.”

→ PROBE: “Are there any foods that worry you or foods you avoid because you find them risky?”

→ PROBE: “Why or why not?”

→ PROBE: Food labels (Best before dates)

→ PROBE: Food recalls

“Can you describe how easy or hard it is for you to prepare food regularly?”

→ PROBE: Have you noticed any changes in how you handle or prepare food compared to a few years ago?

→ PROBE: Are there things you do now that feel easier or harder than they did before?

→ PROBE: Have you made any changes because of health reasons or lifestyle changes?

So, you told me about all the things you do to make sure your food is safe to eat and why you do those things. Is there anything else you want to share about food safety?

→PROBE: Are there any other factors that influence you to make sure your food is safe to eat?

→PROBE: How do you feel about the resources available to you when it comes to making sure your food is safe to eat?

→PROBE: Are there any information or supports you wish were available to you to keep yourself safe from food risks?

Thank you so much, your input has been really helpful. Just one final question, we're really interested in understanding how and why seniors view and manage foodborne illness risks, so given everything you've told me about, is there anything else you think is important for us to know about food safety or foodborne illness?

Do you have any questions for me?

WRAP UP

“Thank you so much for your thoughtful responses and your time today. I appreciate your participation.”

[PROVIDE GIFT CARD]

Online: I will send a digital gift card to your email. The options include Shoppers Drug Mart, President’s Choice, Walmart, FreshCo, Foodland, or Sobeys. Which grocery store would you like a \$10 gift card to?

In-person: Ask which gift card they want before meeting for the interview.

Thank you and have a great day!

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Appendix B: Appreciation Email

Subject: Thank You for Participating in Our Research Study!

Dear <PARTICIPANT NAME>,

On behalf of myself and Dr. Shannon Majowicz, we would like to take a moment to sincerely thank you for your time and participation in our interviews on <DATE>. We appreciate your willingness to give both your time and valuable input. Your insights are important for informing public health and senior care organizations to better support seniors with respect to food safety.

Please see the attached feedback letter for additional information.

If you have any questions, either now or as this broader work continues, please feel free to contact me at ksarwal@uwaterloo.ca.

Thank you again for your time.

Kind regards,

Kanika Sarwal, Hons. BHSc

MSc Candidate, School of Public Health Sciences

Email: ksarwal@uwaterloo.ca

University of Waterloo

200 University Avenue West

Waterloo, ON, Canada N2L 3G1



Appendix C: Feedback Letter

<MONTH> <DAY>, 2025

Dear <PARTICIPANT NAME>,

I would like to thank you for your participation in this study titled *Seniors' Views of Foodborne Illness and Food Safety*. As a reminder, the purpose of this study is to investigate how people aged 65 and older in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) perceive and manage their risks of foodborne illness and what they think and do about food safety. We will use the results of these interviews to inform public health and senior care organizations to better support seniors with respect to food safety.

We would like to remind you that your identity will be confidential throughout the study. Your name or other identifying information will not appear in any of the results or reports coming from this study, although we may include non-identifying verbatim quotes in published materials and presentations. The physical copies of the screening questionnaire will be stored in a locked office at the University of Waterloo. Once de-identified, the screening data will be shredded. The audio or audio and video recordings of the interview will be transcribed, de-identified and then deleted permanently. The de-identified data will be retained for a minimum of seven years. Data will be accessible only by the researchers and will be kept in a password-protected database on a University of Waterloo server.

Once all the data are collected and analyzed for this study, I plan on sharing this information with the research community through seminars, conferences, presentations, and journal articles.

If you are interested in receiving more information about the results of this study or would like a summary of the results, please let me know, and when the study is completed, anticipated by August 1, 2025, I will email you the information.

This study has been reviewed and received ethics clearance through a University of Waterloo Office of Research Ethics (#46852). If you have questions for the Board, please contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or reb@uwaterloo.ca. For all other questions, please contact me at ksarwal@uwaterloo.ca.

Kind regards,

Kanika Sarwal, Hons. BHSc

MSc Candidate, School of Public Health Sciences

Email: ksarwal@uwaterloo.ca

University of Waterloo

200 University Avenue West

Waterloo, ON, Canada N2L 3G1



Appendix D: Recruitment Email to Organizations

Subject: Request to Recruit Participants for a Research Study

Dear <MANAGER>,

I hope this email finds you well.

My name is Kanika Sarwal, and I am a master's student working under the supervision of Dr. Shannon Majowicz in the School of Public Health Sciences at the University of Waterloo. I am conducting a research study titled *Seniors' Views of Foodborne Illness and Food Safety* as part of my thesis.

I am reaching out to request permission to recruit participants at <ORGANIZATION>. Specifically, I would like to inquire if I could post recruitment flyers, make announcements, or use other recruitment methods (i.e. newsletters, social media etc.) to share information about my study. This study will investigate how people aged 65 and older in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) perceive and manage their risks of foodborne illness and what they think and do about food safety. Our goal is to inform public health and senior care organizations to better support seniors with respect to food safety. Participation would consist of a one-on-one 45-60 minute interview. It would take place in person at a mutually agreed upon place and time or online.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board.

Please let me know if this would be something of interest. I would be more than happy to set up a meeting to provide additional information. Please do not hesitate to contact me at ksarwal@uwaterloo.ca.

Thank you so much for your time and consideration. I look forward to hearing from you.

Kind regards,

Kanika Sarwal, Hons. BHSc

MSc Candidate, School of Public Health Sciences

Email: ksarwal@uwaterloo.ca

University of Waterloo

200 University Avenue West

Waterloo, ON, Canada N2L 3G1





PARTICIPANTS (65 YEARS+) NEEDED FOR A RESEARCH STUDY

DO YOU LIVE INDEPENDENTLY AND COOK OFTEN?

We want to hear your thoughts on food safety and what you do to keep yourself safe



INTERESTED?
Please contact
Kanika Sarwal, MSc
Student at
[**ksarwal@uwaterloo.ca**](mailto:ksarwal@uwaterloo.ca)



WHAT TO EXPECT:

- A 5-10 minute online screening questionnaire with your camera on to confirm eligibility before scheduling an interview
- A 45-60 minute one-on-one interview that can be scheduled at a time that works best for you at a mutually agreed upon public place or online with your camera on



This study has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Board.



Appendix F: Announcement and Social Media Caption

A staff member:

Hello, I am sharing this message on behalf of Kanika Sarwal, a master's student in the School of Public Health Sciences at the University of Waterloo. Kanika is currently working on her thesis under the supervision of Dr. Shannon Majowicz. She is exploring how people aged 65 and older perceive and manage their risks of foodborne illness and what they think and do about food safety. She would like to talk to a range of people who live independently in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) and who do most/a good amount of cooking in their house. The goal is to inform public health and senior care organizations to better support seniors with respect to food safety.

If you would like to participate in this study, you will be asked to take part in a one-on-one 45-60 minute interview. It can take place in person at a mutually agreed upon place and time or online. Before we schedule an interview, you will be asked to complete a brief screening questionnaire to confirm your eligibility for the study. The screening will take place on Zoom or Microsoft Teams, and participants will be asked to leave their cameras on to help confirm eligibility.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board.

If you are interested in participating, please contact Kanika Sarwal by email at ksarwal@uwaterloo.ca.

Thank you and have a great day!

Student Researcher:

Hello, my name is Kanika Sarwal and I am a master's student in the School of Public Health Sciences at the University of Waterloo. I am currently working on my thesis under the supervision of Dr. Shannon Majowicz. I am exploring how people aged 65 and older perceive and manage their risks of foodborne illness and what they think and do about food safety. I would like to talk to a range of people who live independently in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) and who do most/a good amount of cooking in their house. The goal is to inform public health and senior care organizations to better support seniors with respect to food safety.

If you would like to participate in this study, you will be asked to take part in a one-on-one 45-60 minute interview. It can take place in person at a mutually agreed upon place and time or online. Before we schedule an interview, you will be asked to complete a brief screening questionnaire to confirm your eligibility for the study. The screening will take place on Zoom or Microsoft Teams, and participants will be asked to leave their cameras on to help confirm eligibility.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board.

If you are interested in participating, please contact me by email at ksarwal@uwaterloo.ca.

Thank you and have a great day!

Appendix G: Pre-interview Screening Questionnaire

Verbal Script:

Hi <PARTICIPANT NAME>,

My name's Kanika, and I am a master's student at the University of Waterloo. Thank you for expressing interest in our research study on seniors' views of foodborne illness and food safety.

If you don't mind, I have a couple of questions to ask because this research study explores how independently living seniors aged 65 and above in the Kitchener Waterloo region who have adequate knowledge of food preparation and cooking, perceive foodborne illness risks.

This is to confirm that you are eligible for this study. Please note that answering these questions is voluntary and any information you provide will be deleted immediately if you are found ineligible for the study.

Can you please share your year of birth?	
Could you please tell me which area you live in?	
Do you live independently?	
Do you do most or a good amount of cooking in your house?	

Rejection:

Thank you for taking the time to complete the screening questionnaire with me. Unfortunately, you do not meet the eligibility criteria for this study. I truly appreciate your interest in our research study. Thank you for your time, understanding, and willingness to participate.

Have a great day, and take care!

Acceptance:

Thank you for taking the time to complete the screening questionnaire with me. I am happy to let you know that you meet the eligibility criteria for this study, and I am excited to move forward with the next steps.

I will be in touch shortly through email. Could you please share your email address? I will send you an invitation and information letter. The information letter has important details about the study. If you have any questions, feel free to email or call me, and I would be happy to go over it with you.

Would you like to schedule a date and time for the interview now, or would you prefer to confirm at a later time?

Is there any support or accommodations you might need to participate in the interview?

Do you have any questions for me?

Thank you so much for your time. I look forward to speaking with you soon.

Have a great day, and take care!

Appendix H: Invitation Email

Subject: Invitation to Participate in a Research Study

Dear <PARTICIPANT NAME>,

My name is Kanika Sarwal, and I am a master's student working under the supervision of Dr. Shannon Majowicz in the School of Public Health Sciences at the University of Waterloo. I am writing to invite you to participate in a research study titled *Seniors' Views of Foodborne Illness and Food Safety*.

If you decide to volunteer for this study, your participation will consist of a one-on-one interview that will take about 45-60 minutes of your time. The interview will take place in person at a mutually agreed upon place and time, or if you prefer, online (Microsoft Teams/Zoom). During the interview, you will be asked how you view and handle foodborne illness risks and what you think and do to keep your food and yourself safe.

Your participation would be greatly appreciated and will help us identify food safety concerns among seniors in Southern Ontario (Kitchener-Waterloo, Cambridge, Guelph, and Woodstock) and ultimately inform public health and senior care organizations in improving their support for seniors' food safety.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board.

Please read the attached Information Letter for more details regarding what participation will involve. If you would like to participate or require additional information to assist you in reaching a decision about participation, please do not hesitate to contact me at ksarwal@uwaterloo.ca. You may also contact my supervisor at smajowicz@uwaterloo.ca or (519)-888-4567, ext. 41790.

Thank you so much for considering this invitation.

Kind regards,

Kanika Sarwal, Hons. BHSc

MSc Candidate, School of Public Health Sciences

Email: ksarwal@uwaterloo.ca

University of Waterloo

200 University Avenue West

Waterloo, ON, Canada N2L 3G1



Appendix I: Information letter

<MONTH> <DAY>, 2025

Dear <PARTICIPANT NAME>,

Project Title: Seniors' Views of Foodborne Illness and Food Safety

Faculty Supervisor: Shannon Majowicz, School of Public Health Sciences, 519-888-4567, ext. 41790, smajowicz@uwaterloo.ca

Student Investigator: Kanika Sarwal, School of Public Health Sciences, ksarwal@uwaterloo.ca

This letter explains what the study is about, what participation involves, possible risks and benefits, and your rights as a research participant. You may save a copy for your records. If you do not understand something in the letter, please ask one of the investigators before consenting to participate.

Foodborne illness is a major public health issue worldwide. Food that is unsafe to eat causes millions of cases of foodborne illness and deaths each year. Seniors are an important group when it comes to food safety. Since immune systems weaken with age, it is harder for them to fight off infections, putting them at higher risk for developing health complications. It is essential to prioritize food safety for seniors to protect their health and prevent these illnesses.

This study will investigate how people aged 65 and older in Southern Ontario (Kitchener-Waterloo, Guelph, Cambridge, and Woodstock) perceive and manage their risks of foodborne illness and what they think and do about food safety. We would like to talk to a range of people 65 years of age or older who live independently in Southern Ontario and who do most/a good amount of cooking in their house. Everyone's experiences are different and important, including

yours. Ultimately, our goal is to inform public health and senior care organizations to better support seniors with respect to food safety.

Your participation in this study is completely voluntary. It will involve a 45-60 minute interview, in person at a mutually agreed upon place and time, or if you prefer, online (Microsoft Teams/Zoom). After reading the rest of this document, please let me know by <DATE> if you would like to participate.

Before we start the interview, I will ask for your consent to participate in the study. Specifically, I will ask for your consent to have the interview audio-recorded if we are meeting in person or audio and video-recorded if we are meeting through Microsoft Teams/Zoom, and to use non-identifying verbatim quotes in published materials and presentations. I will document whether or not you provide consent. With your permission, I will then turn on the recorder and start the interview.

You may stop the interview at any time or skip any questions that you prefer not to answer without any consequences. You may withdraw your consent at any time and discontinue participation in this study by simply letting the investigator know. If you wish to withdraw your study data after participating, please contact one of the investigators. You can request your data be removed from the study up until the start of data analysis which we anticipate will be April 1, 2025.

Your identity will remain confidential throughout the study. The interview will be audio-recorded through Microsoft Teams to facilitate the collection of information and later manually transcribed for analysis. If your interview takes place on Microsoft Teams/Zoom, please note

that both audio and video will be recorded. We will ask that you turn your camera on for the interview. Microsoft Teams and Zoom have implemented technical, administrative, and physical safeguards to protect the information from loss, misuse, and unauthorized access, disclosure, alteration, or destruction. However, no internet transmission is ever fully secure or error free.

Once the interview is transcribed and de-identified, the recording of the interview (audio or audio and video) will be deleted. The de-identified transcripts will be stored in a password-protected network on a University of Waterloo server. Data will be accessible only by the researchers. The de-identified data will be stored for a minimum of seven years. The interview results will be summarized, presented and published for academic audiences, public health professionals, and senior populations.

There are low anticipated risks to you as a participant in this study. The psychological risk is low but may involve emotional distress when discussing food safety. You can take breaks as needed and adjust your seating to make sure you're comfortable and relaxed.

You will receive a \$10 gift card to one of the following grocery stores: Shoppers Drug Mart, President's Choice, Walmart, FreshCo, Foodland, or Sobeys in appreciation of your time for participating in this study. The amount received is taxable. It is your responsibility to report this amount for income tax purposes. When we schedule the interview, I will ask you which card you would like. I will provide a physical gift card if the interview occurs in person, and a digital gift card will be sent to your email if the interview takes place online. Participants will receive the gift card even if they choose to withdraw from the study.

This study has been reviewed and received ethics clearance through a University of Waterloo Office of Research Ethics (#46852). If you have questions for the Board, contact the Office of Research Ethics toll-free at 1-833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca.

For all other questions or if you would like additional information to assist you in reaching a decision about participation, please contact me by email at ksarwal@uwaterloo.ca. You can also contact my supervisor, Dr. Shannon Majowicz, at (519)-888-4567, ext. 41790 or email smajowicz@uwaterloo.ca.

I hope that the results of my study will benefit organizations and contribute to the broader research community. I very much look forward to speaking with you and thank you in advance for your assistance in this project.

Kind regards,

Kanika Sarwal, Hons. BHSc

MSc Candidate, School of Public Health Sciences

Email: ksarwal@uwaterloo.ca

University of Waterloo

200 University Avenue West

Waterloo, ON, Canada N2L 3G1



Glossary

Best-before dates

Best-before dates indicate whether a properly stored unopened food product will retain its freshness, taste, and nutritional value (Canadian Food Inspection Agency, 2023).

Expiration dates

Expiration dates appear only on certain foods (e.g., nutritional supplements) that have stringent ingredient and nutritional requirements, which may no longer be met after the specified date (Canadian Food Inspection Agency, 2023).

Heuristics

Heuristics are mental shortcuts that help individuals make quick decisions with minimal cognitive effort; however, they can also lead to biased or flawed judgment (Dale, 2015).

Use-by dates

Use-by dates may replace “best before” for pre-packaged fresh yeast only (Canadian Food Inspection Agency, 2023)