Food Environments Influence on Food Choices Among Different Socioeconomic Groups

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.
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Abstract

There has been a shifting focus in research within food security studies to food environments as they are proving to be one of the most influential factors in individuals' food and dietary choices. Situated within the second United Nations (UN) Sustainable Development Goal of Zero Hunger, this thesis examines the physical and social food environments of communities in Hamilton, Ontario to determine the influences these environments have on food and dietary choices. Hamilton was chosen due to its unique food landscape; where some communities could be considered living in a food swamp, with little access to healthy food amidst an abundance of convenience stores and fast food. In contrast, other communities within the city are considered a food oasis, with a wide range of high-quality foods readily available. This study employed a survey as its primary research instrument with 204 surveys completed. In addition, follow-up interviews with 20 participants were conducted to provide in-depth context for the survey results. Participants in this study were drawn from areas based on either postal code or income. The study's findings revealed several similarities irrespective of the postal code or income of the household. Notably, the most popular dietary choice was that the participants did not follow any diet, also called the "house diet." Moreover, in ranking the most important qualities when choosing a grocery store, price, proximity, and quality always ranked the highest among the 13 options. However, when reasoning for rankings were discussed, the higher-income participants expressed maximizing their dollars whereas the lower-income participants preferred stretching their dollars. Moreover, looking at food environments grouped by postal code, 7 out of the 19 participants lived in areas where convenience stores outnumber grocery stores at a ratio of 4:1. In these communities, most participants reported a meat-restricted diet and also ranked accessibility to healthy foods the lowest. Additionally, participants living in areas described as food swamps (high prevalence of low-quality convenience foods), also reported lower than average income compared to participants living in areas with better access to higher-quality food retailers. These finding demonstrate that income plays a consequential role in observed dietary patterns, with 7% of the higher income earners reporting a plant-based diet, compared to 20% of the lower income bracket. In the lower income bracket, 42% reported using alternate modes of transportation to private vehicles, compared to only 8% in the higher income bracket. The findings suggest a chain reaction, where the lower-income earners are more likely to be living in a food environment with low access to healthy foods, and high access to convenience stores. Furthermore, they are less likely to have access to a vehicle, which overall limits their accessibility to healthy, fresh, and sustainable food choices that may be some distance from where they live. These are areas where policies, initiatives, and programs that will promote better accessibility to healthy foods will be the most beneficial, in terms of creating healthy eating patterns that will help achieve Sustainable Development Goal Two.

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Chapter One
1.0. Introduction

1.1 Background

Since the Industrial Revolution, food has become more plentiful due to mass production and distribution (Sarkadi, 2019). While this has been beneficial to meet the food needs of our growing population, it has created detriments to our environment and human health (Sobhani & Eini-Zinab, 2018; Blesh et al., 2019). Approximately 821 million people are currently undernourished, 2 billion people lack essential micronutrients such as vitamin A and iron and 2 billion people are overweight or obese, all suffering from suboptimal diets (Veldhuizen et al., 2020; Blesh et al., 2019., Ferraboschi et al., 2022). The mobility restrictions and economic fallout of the COVID-19 pandemic have pushed an additional 320 million people into food insecurity (O'Meara et al., 2023; FAO, 2021). Food insecurity is the inability to acquire and consume an adequate diet due to financial constrain and can range from marginal: worrying about running out of food to sever: reduced food intake due to lack of food (Statistics Canada). The ongoing impacts of climate change and biodiversity loss call into question the ability of the planet to sustain the current industrial agricultural model (Ingram, 2011; Sobhani & Eini-Zinab, 2018). Local, regional, and global food systems are unable to provide all consumers with nutritious and affordable diets (Ferraboschi et al., 2022).

The second UN Sustainable Development Goal - Zero Hunger (SDG 2), highlights the linkages between food production through sustainable agriculture and equitable access to sustainable diets for food consumption (Veldhuizen et al., 2020). Achieving this multidimensional and complex goal hinges on addressing global environmental sustainability and food security challenges simultaneously (Blesh et al., 2019). This requires change at the political, economic, institutional, environmental, and social levels, at highly varying localized contexts (Veldhurizen et al., 2020 & Galabada, 2022). At each level there are macro, physical, social, and individual factors that require research to better understand influences on diet; both for sustainability reasons and because there has been a rise in diet-related diseases. There has been increased interest by researchers focused on dietary influences; however, there is a gap in the understanding and implementation of policies, regulations, programs, and initiatives (Djojosoeparto et al., 2022). This, in part, is due to the inconsistency of definitions and tools used to measure access, affordability, sustainability, and healthy diets, as well as cultural and personal differences amongst countries, provinces, cities, communities, neighbours, and individuals (Caspi et al., 2012; Downs et al., 2024).

Food environments are recognized through research as the key interface between consumers and food systems that can provide insights into food sustainability (O'Meara et al., 2023). Food environments occupy a critical place within the food system for implementing interventions aimed at encouraging healthy and sustainable diets (Downs et al., 2024). Interventions based on assessment of people's lived experience can help to better characterize any gaps in availability, affordability, convenience, quality, culturally appropriate foods, or

sustainability of foods (Downs et al., 2024). This can be done through community members participating in mapping food accessibility within their own neighborhoods (Bradley 2024). Studies that involve community participation have exposed hidden barriers such as disparities in food accessibility which have led to ineffective initiatives (Soma et al., 2024).

Food security in literature is widely described as a multidimensional concept. In 1996 Rome Declaration on World Food Security defines it as a condition in which "all people, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life" (FAO, 2009; McIntyre & Rondeau, 2011). Building on this the FAO, 2009 identifies four core principles of food security: availability, accessibility, utilization, and stability (Dzanku et al., 2021). More recently food security has been expanded on and used as a framework for many studies; with the framework also including agency and sustainability (Clapp et al., 2022; Chiera et al., 2025). These six principals are used to assess and recognize the power relations between government, industry, environment and induvial to help build long term food system reliance (Chiera at al., 2025).Food deserts are defined as low-income communities where residents face barriers to accessing affordable and nutritious food, often leaving households within food deserts food insecure (Cruz-Piedrahita et al., 2024; Walker et al., 2010; Kelli et al., 2019; Gupta & Freedman, 2020; Michelle, 2019; Fan et al., 2018). These barriers may predispose individuals to rely on the proximity of retail outlets, such as fast-food restaurants and convenience stores (Cruz-Piedrahita et al., 2024). These communities are typical of lower socioeconomic status and have a higher racial composition (Mui et al., 2017). While access to supermarkets is low, these areas often have higher access to liquor stores and several non-nutritious food options, typically making food deserts also food swamps (Smets et al., 2022; Hilmers et al., 2012; Larson et al., 2009; Moore & Diez 2006).

A food swamp is an area with an overwhelming majority of energy-dense food outlets such as convenience stores or fast-food restaurants that "swamp out" the outnumbered healthier food options in each area (Rose et al., 2009; Antrum et al., 2023; Bridle-Fitzpatrick, 2015). Studies have shown that exposure to food swamps does not only influence food choice but can alter food preferences and norms (Robitaille & Paquette 2020). Disparities within these neighbourhoods can go beyond just the availability and access to healthy foods; it can encompass economic constraints, cultural food preferences, education levels, and time constraints that limit home cooking opportunities (Cruz-Piedrahita et al., 2024). Living in a food desert or food swamp has shown a correlation with a higher risk of adverse cardiovascular diseases, stroke, and ischemic heart disease mortality; along with increased rates of mental health disorders, including depression and anxiety (Kelli et al., 2019; Victor et al., 2023; Cruz-Piedrahita et al., 2024; Antrum et al., 2023). While dietary influences in low-income areas often rest on the built environment, this varies in high-income neighbourhoods where the influence on diets is attributed mostly to behavioural and social factors since their built environment supports a healthy diet (Convens & O'Dwyer, 2009). Studies have suggested that while low-income consumers know what constitutes a healthy diet, they must balance and prioritize tradeoffs to

minimize purchasing costs while ensuring adequate food quantity (Vadiveloo et al., 2021; Pitt et al., 2017; Jetter et al., 2019).

Furthermore, when it comes to a sustainable diet, despite the widespread knowledge of the impacts of animal agriculture on the environment, there is a lack of alternatives, therefore, the willingness to reduce meat consumption remains low (Gillison et al., 2021; Engel et al., 2024) A sustainable diet promotes all aspects of individual well-being while having a low environmental impact; it's an accessible, affordable, safe, equitable and culturally acceptable diet (Drewnowski et al., 2020). Therefore, despite the research and knowledge that dietary changes are required for both our health and the health of the planet, there is a large gap in the implementation of solutions.

Since the COVID-19 pandemic, online shopping has seen a rise in popularity, particularly with adults under the age of 40 who are more educated and have a higher income (Duffy et al., 2022; Trude et al., 2022; Rummo et al., 2022). This growth of the online food shopping space has potential and has shown it can improve access to healthy and affordable food but is typically limited to a certain demographic (Duffy et al., 2022; & Trude et al., 2022; Rummo et al., 2022). Marketing intervention for the online consumer has shown positive effects on diets such as nutrition labeling and offering food swamps (Hodges et al., 2023; Zatz et al 2021).

1.2 Research Problem

The SDG-2 goal which is set to be achieved by 2030 is behind schedual due to its complexity. Currently there are several gaps in the implementation of environmental policies, initiatives, other social approaches and their effectiveness regarding their influence on the food environment and individual diets (Djojosoeparto et al., 2022). Achieving this goal will require researching, defining, and adopting the most effective and suitable scientific and social approaches within the local socioeconomic and environmental areas (Poto, 2020). This is why researchers have been shifting focus to better understand local food environments as they are proving to be one of the most influential factors in individuals' food and dietary choices (Story et al., 2008; Karpyn et al., 2020; Downs et al., 2020; Henforth et al., 2017; Ford & Dzewaltowski, 2008).

This thesis focuses on environmental influences on diet as a part of the broader goal of determining how to achieve universal sustainable food security. In a research article, "Creating Healthy Food and Eating Environments," Story and colleagues (2008) categorize what influences individuals' dietary choices into four groups. Macro-level environment (sectors), physical environment (setting), social environment (network), and individual factors (personal) (Story et al., 2008). This thesis uses these four categories of dietary influence to better understand individual food choices within a local scope. The focus is on the physical and social environments and the influences they have on food choices within Hamilton, Ontario.

The research objectives are to better understand Hamilton's food environment and its effects on Hamiltonians' diets. The City of Hamilton is unfortunately home to many food deserts, while also being known as a foodie city, where creative culinary entrepreneurs seek to

create unique and delicious dining experiences (Rumble, 2019). Hamilton is a mix of urban, suburban, exurban, and rural areas and is separated geographically by the Niagara Escarpment into “lower city” and “mountain” (Higgins et al., 2021). The “lower city” is home to the industrial area in the north end, which traditionally had lower-cost housing and attracted immigrants and less-affluent residents; compared to the “mountain” where the wealthier suburbs are located (Bahan et al., 2008; Topalovic et al., 2012; Higgins et al., 2021). Based on the built food environment in Hamilton, many of the lower-income neighbourhoods have lower availability of healthy and fresh food while having a higher number of variety stores compared to higher-income neighbourhoods (Latham & Moffat, 2007). This, combined with the decentralization and the escapement, presents significant challenges in transit connections to access to healthy, fresh, and affordable foods within Hamilton's food deserts (Higgins et al., 2021; Bahan et al., 2008; Topalovic et al., 2012). In 2023, 27.3% of Hamilton households were living with food insecurities which is a significant increase for 18.1% in 2022 and 8.2% just a few years earlier in 2016 (Monitoring food Affordability in Hamilton, 2024; Tran et al., 2016).

1.3 Principal Research Question

How do food environments shape food choices among people living in high-and low-income neighbourhoods within the City of Hamilton, and what policies promote sustainable dietary choices?

1.4 Specific Research Questions

To better understand the different impacts of food environments on food choice and diet, this thesis addresses the following research questions:

1. How do food environments affect food choices and dietary diversity?
2. What are the most influential factors affecting someone’s food choices in a high-income area versus low-income areas?
3. Are there policies or interventions that could potentially promote a healthy and sustainable diet for both high-income neighbourhoods and low-income neighbourhoods?

1.5 Significance of Study

The complexity of the global SDG 2 targets makes it difficult to apply broad targets that match every local context (Veldhurizen et al., 2020). The implementation at the local level should be contextualized by place-based research. This study therefore seeks to address critical research gaps by using person-centered subjective measures like interviews and surveys, to help assess and provide insights on consumers’ perception of their food environments and dietary preferences (Eyler et al. 2015; Vadiveloo et al. 2021). Understanding the different influences and barriers to a healthy and sustainable diet within low-income areas and a high-income area will

help develop targeted policies and initiatives that will work towards SDG 2 implementation in Hamilton and Canada.

1.6 Scope of the Study

This thesis is divided into six chapters. Chapter 1 introduces the study and discusses Sustainable Development Goal 2 and the complexities surrounding achieving this goal. The chapter provides a background on the research that has been done surrounding food sustainability and food environments and underpins this study. Chapter 2 details the literature review and the study's theoretical and conceptual framework. The literature review breaks down the different levels of food environments and how they influence individual dietary choices. Looking at the macro-level, physical environment, social environment and individual level. Chapter 3 provides the methods by which the research was conducted. A mixed methods approach was used in this study through both surveys and interviews. Chapter 4 gives the results of the study, broken down into three sections based on the research questions. Chapter 5 is the discussion where the results are talked about in conjunction with existing literature. Finally, Chapter 6 summarizes the findings of the study and provides some corresponding recommendations.

Chapter Two
2.0 Literature Review

2.1 Introduction

This chapter details the literature review and explores key themes connected to the study. Assessing how food environments influence food security requires food systems and sustainability perspectives. The review, therefore, delves into a description of the theories that underpin and provide a conceptual framework for the study.

2.2 Conceptualizing Food Security Using a Food System Lens

Food security is the notion that everyone has the right to a healthy and adequate diet that is culturally appropriate. This is a concept that can be defined by availability, accessibility, utilization and stability otherwise known as the four pillars (Guiné et al., 2021),which is interrelated to Sustainable Development Goal 2.

Achieving food security cannot be done without sustainable food systems in place. The food system is a complex web of activities and influences that revolve around the food supply chain (Miller et al., 2023). This encompasses all the elements that go into getting food from the farm to fork, such as the people, environment, processes, inputs, infrastructure, agriculture, production, institutions, distribution, access, marketing, consumption and waste management (FAO, 2018; HLPE 2017; Miller et al., 2023). A food system lens provides a holistic approach that centers on humans interaction (Grenz & Armstrong, 2023; Kuhnlein, 2020). Within the food system, there are three entry points where change can be encouraged, the supply chain, the food environment and consumer behavior. Collective change at each entry point can lead to food security (HLPE, 2017).

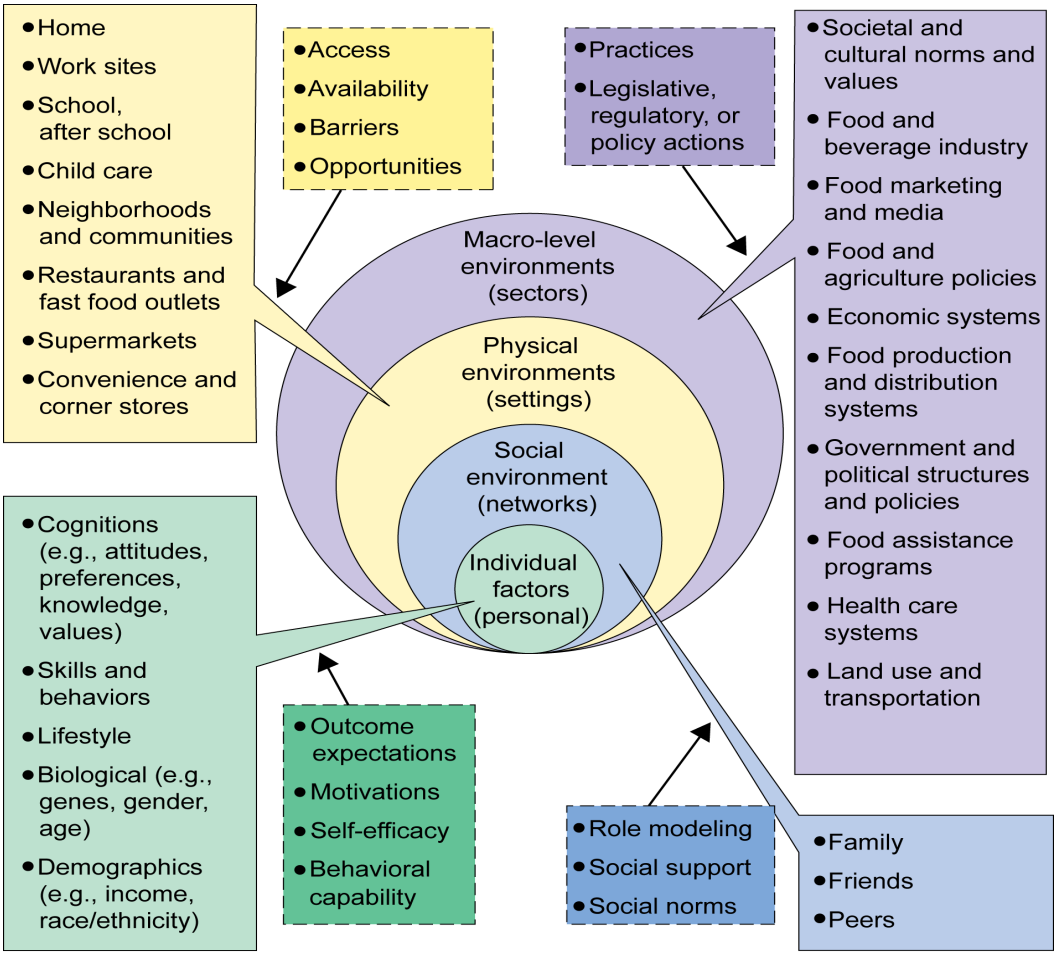
The food supply chain is the movement of food through production, storage, processing, packaging, distribution, retail, marketing, and consumption. Depending on the food, country, policy and trade agreements, food can pass over a few hands and be considered a “short food chain” this is particularly common in low-income food environments. While other food chains can be longer, often involving international travel, passing over many hands (Herforth & Ahmed, 2015). Many decisions are made along the food chain that influence what is available and accessible within the food environment (HLPE, 2016).

A food environment is the physical, political and socio-cultural environment in which consumers interact with food systems to inquire, prepare, and consume food. (HLPE, 2017). A food environment influences diet quality, linking the market and trade systems, consumer demand, agricultural production and consumer purchasing power. This provides many entry points for evaluation, policy change, and interventions to improve food security and diet quality. The key componentss of a food environment are food availability, affordability, accessibility, desirability and convenience (Herforth & Ahmed, 2015).

Consumer behaviour reflects the choices made by consumers at the individual and household level. The day-to-day choices consumers make are about what to purchase, prepare, store, and eat. These choices are influenced by personal preferences, taste, culture, and beliefs. Consumers have the power to influence the market through their purchasing power (Herforth & Ahmed, 2015). However, consumer behaviour is shaped by the food environment and what is available to the consumer (HLPE, 2017).

Applying a food system lens encourages us to look away from end-users being responsible for sustainable food choices but takes a complete look at food systems as a whole (Miller et al., 2023). A sustainable food system defined as "a food system that ensures food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition of future generations are not compromised" (FAO 2018). This study focuses on the food environment portion of the food system and how that influences consumer behavior, using the Story et al., (2008) framework which has intersecting spheres of macro-level environment (sectors), physical environment (setting), social environment (network), and individual factors (personal) (see Figure 2.1 below). Story et al., (2008) study uses an ecological framework to focus on multilevel linkage, the relationship between multiple factors that impact health and nutrition intake and connects people with their environment.

Figure 2.1: A socio-ecological framework of food environment influences on food choices



Source: Story et al., 2008

2.2.1 Macro-Level Environments

Despite the push towards sustainable food systems recently, there is simply a lack of clarity on how to operationalize the conceptual approach of food systems (Béné et al., 2022). A systematic review showed that taxes and subsidies are likely to be effective interventions to improve consumption patterns associated with obesity and chronic disease, but again said that further research is needed as it is a multisectoral strategy to improve diets and health (Thow et al., 2014). Food system analysis is an important first step toward making strategic interventions at the global, national, and local levels (Borman et al., 2022). Understanding the framework of a food system involves discovering the relationships between activities, diversity, and outcomes, and the feedback loops that occur (Borman et al., 2022). This is where more research is needed to better understand major macro-environment level influences over consumption patterns (Auma et al., 2020, Cairns, 2019). According to Story et al., (2008), the macro-environment level

factors form the outer sphere that frames and links other spheres of the food environment, such as the physical, social and individual factors (see Figure 2.1).

At the macro-level environment (sectors), there has been little research on the effects of food system innovations that provide consumers with more affordable and nutritious diets while simultaneously addressing social and environmental challenges (Ferraboschi et al., 2022, Cairns, 2019, Sirdey et al., 2023). Moreover, our current food system is understood to be one of the leading causes of climate change (Priyadarshini & Abhilash, 2020; Sobhani & Eini-Zinah, 2018; Blesh et al., 2019). Globally, industrial agriculture threatens critical ecosystems that crop production depends on (Blesh et al., 2019). Industrial agriculture is responsible for 30% of land use, 70% of freshwater use, and 20% of total greenhouse gases produced annually (Sobhani & Eini-Zinab, 2018). Thus, there is a need for more systemic, consultative, and multiscale methodologies, to effectively support policy dialogue and decision-making on implementing sustainable food systems (Sirdey et al., 2023). A synthesis report done in 2021 identified six principles based on global knowledge, expertise, and practical experience in implementations (Ferraboschi et al., 2022). These principles are evidence-based nutrition innovation, multi-sectoral linkage, inclusiveness, context-specific, accountability and transparency, and scaling-up platform (Ferraboschi et al., 2022). This study is just the beginning of more research and understanding of the macro-level environment and how dietary patterns are interconnected with the ecosystem, government, and political choices (Auested & Fulgoni, 2015; IPCC, 2019; Blash et al., 2019; FAO, 2019).

Most Canadians' eating habits are dependent on a mixture of local produce and imported foods (Smith, 2008). From the consumer perspective, the globalization of food means having a wide selection of manufactured foods, fruits, and vegetables at affordable costs (Sazvar et al., 2018; Philips, 2006; Millard, 2019; Smith, 2008). The high demands for out-of-season food and low costs of foods have increased manufacturing competition with performance improvements becoming increasingly important to companies and organizations as they fight to stay on top of a buyer-driven market (Ojo, Shah, & Coutroubis, 2017; Smith, 2008). The removal of trade barriers, inexpensive transport, and improved food conservation further encourages international standardization and commoditization of conserved foods (Smith, 2008). This contributes to the increasing number of people and institutions affecting what we eat, governing how food is produced, traded, consumed, and distributed day-to-day (Kamble, Gunasekaren, & Gawanker, 2020; Millard, 2019). Markets reflect this through public regulation, cultural customs, civic norms, and private contracts (Borsellino et al., 2020). Yet many of these apparent benefits of cheap food result in non-sustainable ecological impacts that undermine attempts to create a sustainable future. In addition, many of the foods that are available to consumers are highly processed because of the agro-industrial food system, which results in the rise of non-communicable diseases associated with modern diets (Weis, 2013).

Local-level municipal governments have increasingly emerged as prominent actors in food governance, aiming to address food system challenges such as non-communicable diseases, food waste and food insecurity (Sibbing et al., 2021; Roberta, 2009). City governments have a

unique ability to improve local food environments as they are the most connected with the communities (Freudenberg & Atkinson, 2015). In recent elections, food policies have been brought into campaign arguments, legitimizing food policy as a governance issue and contending with prevailing assumptions that food choices were solely an individual responsibility (Freudenberg & Atkinson, 2015). Policies and legislations that are highly prioritized are the promotion/advertising of unhealthy food and beverages in the media, especially around children and schools (Laar et al., 2020). Food marketing controls and restrictions include protecting the population against the marketing of unhealthy foods, including ultra-processed foods (Ngqangashe et al., 2022; Taillie et al., 2019). Restricting unhealthy food marketing is an effective strategy in reducing children's exposure; although marketing policies have been slow to implement (Ngqangashe et al., 2022; Taillie et al., 2019). Furthermore, in the Greater Toronto Area, regardless of public policies that favour large-scale, industrialized agri-food firms, the creative-food sector is thriving due to consumer-driven demands, self-marketing, and action (Donald & Blay-Palmer, 2006). This further proves that the communities are looking for government support. Local food policies are still a relatively new concept; therefore, implementing food policies that address a specific municipality's concerns will vary based on the government's approach (Sibbing et al., 2021).

2.2.1.1 Policy

Many of the current policies and regulations center around supplying enough food to a growing population (Mozaffarian et al., 2018; Gollin & Probst, 2015; Bacon et al., 2019; Story et al., 2008). To do this, governments sought to stimulate the production and distribution of as much inexpensive food as possible (Vedhuizen et al., 2020; Blash et al., 2019; Mozaffarian et al., 2018; Bacon et al., 2019; Story et al., 2008). However, this food was not in line with a healthy diet and nutrition was delegated to the individual's responsibility (Shahid & Bishop, 2019; De Schutter, Jacobs, & Clement, 2020). It is assumed that most individuals are aware of what constitutes nutritious foods, yet people still struggle to change diet-related behaviour, despite having awareness, intention, and capability to do so (Walker et al., 2019). There is an "intention-behaviour gap" because of dietary-choice interventions that have focused on individual decision-making while ignoring the effect of environmental cues on human behaviour (Walker et al., 2019; Dimitri & Rogus, 2014). However, in recent times, governments are expected to share that responsibility by helping implement policies, regulations, legislation, standards, and guidelines (Rosewarne et al., 2020; De Schutter, Jacobs, & Clement, 2020; Shahid & Bishop, 2019; Caputo & Luck, 2019).

The obesity epidemic is revealing the urgent need to align policies with healthy eating practices across all food systems (De Schutter, Jacobs & Clement, 2020; Jurkenbeck, Zuhlsdor & Spiller, 2020; Swinburn, 2008). The World Health Organization (WHO) also urges governments to implement evidence-based policies to improve diet and particularly increase the intake of fruits and vegetables (Pinho-Gomes et al., 2020; Lin et al., 2014). In recent years, there have been several countries that have adopted policy interventions to support healthier diets

(Jurkenbeck, Zuhlsdorf & Spiller, 2020). These interventions range from low levels of intervention, such as education and media campaigns, to nudging, such as placing healthy food products in more visible areas, all the way to elevated levels of intervention, for example, enhancing product standards (Jurkenbeck, Zuhlsdorf & Spiller, 2020). Although there are many different strategies available, the ideal approach remains elusive (Pinho-Gomes et al., 2020).

In Caputo and Lusk's (2019) study, consumers in the U.S. were asked to rate 13 different nutrition-related policy interventions; there was a clear preference for low-level engagement policies that are more supportive and passive than restrictive. These policies included education, funding for agricultural research, and nutrition subsidies, and there was a strong dislike for policies involving taxation or advertising bans (Caputo & Lusk, 2019). As crucial as these policies are for the health of the population, along with the health of the environment, public perception and acceptance of policies are crucial to their success (Caputo & Lusk, 2019). In 2011, Denmark was the first country to introduce a tax on saturated fats; this tax was highly controversial amongst the public and was then abolished soon after in January 2012 after a change in government (Jurkenbeck, Zuhlsdorf & Spiller, 2020). It has been proven through history and research that to increase public acceptance of policies, there needs to be transparency in policy creation and decision-making (Jurkenbeck, Zuhlsdorf & Spiller, 2020). Policies are more likely to be successful if the public is aware of the decision-making and political reasoning (Caputo & Lusk, 2019). Unfortunately, the call to action from the government to create policies and interventions has only happened within the last decade, making it a recent concept, so determining the correct approaches is difficult due to the lack of research evidence of success (Balie et al., 2018; Symmank et al., 2017; Jurenbeck, Zuhlsdorf & Spiller, 2020).

2.2.1.2 Media and Advertisement

We live in a world that is flooded with advertisements everywhere you look on television, billboards, social media, magazines, music, movies, newspapers, and the internet (Suresh & Tandon, 2018). There has been a great deal of research that indicates that exposure to food advertisements leads to greater preferences for and purchases of advertised foods (Bailey, Wang & Liu, 2021). Food advertisements have been frequently a target for criticism as they most often promote calorie-dense low nutrient and unsustainable food products (Choi & Reid, 2018; Harris et al., 2009), which are associated with increased over-consumption of said unhealthy foods that encourage obesity, eating disorders, and other eating-related issues (Harris & Kalnova, 2018; Shou, Shapiro & Wansink, 2019; Choi & Reid, 2018).

Effective food marketing with the right product, place, price, and promotion can influence decision-making before shopping (Antrum et al., 2023; Clement et al., 2025). Poor dietary patterns are influenced and encouraged through media and advertisements, but with current trends toward a healthy diet, some companies have started making nutrient-content claims such as "less fat," "less sugar," or "fewer calories" (Choi & Reid, 2018; Laska et al., 2015). An advertisement with nutrient-content claims will be viewed more positively and will

reduce consumption guilt due to the perceived healthiness of a food item (Choi & Reid, 2018). Thus, influencing a consumer's choice before even going shopping is important.

The vulnerable populations, such as children and adolescents, are the most impressionable and affected by the media (Canadian Paediatrics Society, 2003). Companies can hook youth early by achieving brand recognition and brand preferences, thereby creating loyal customers for life (Ha et al., 2018). Early life experiences with foods and food habits that are established in childhood are strong predictors of dietary preferences and practices in adulthood (Scaglioni, 2018; Harris & Kalnova, 2018). Children are bombarded by around 5,500 advertisements per year and up to 98% of them advertise food or drinks that are high in fat, sugar, and salt (Harris & Kalnova, 2018; Powell et al., 2007; Toronto Public Health Foundation, 2017). A study was done in 2014 by Jenkin et al., that highlighted strategies used to promote food to children, including the use of promotional characters and celebrities, free toys, collectibles, competitions, TV shows and movie tie-ins, jingles and slogans, gender and age-specific targeting and directions to websites. It has been proposed that to reduce food marketing to children to combat childhood obesity, and in many countries, there should be some regulation systems in place (Canadian Pediatric Society, 2003; Jenkin et al., 2014).

2.2.2 Physical-Level Environment

The physical environment is the setting in which an individual participates in their daily activities and engages with their food system (Drewnowski et al., 2020). A physical food environment refers to the availability of food outlets, including places such as homes, workplaces, schools, neighbourhoods, restaurants, fast food restaurants, grocery stores, markets, and convenience stores (Story et al., 2008; Drewnowski et al., 2020). The local food environment influences people's dietary choices by altering consumer behaviour such as food outlet choices and purchasing patterns (Bucher et al., 2016; Bivoltsis et al., 2020). The retail food environment literature is continuing to grow as access and availability of food products correlate highly with food choices made daily (Dimitri & Rogus, 2014; Mah et al., 2019). This is why food environments have been a critical place within the food system to implement interventions aimed at enabling healthy, safe, affordable, appealing, and sustainable diets (Downs et al., 2024; Drewnowski et al., 2020). One of the main barriers to sustainable food choices is poor availability and access to reasonably priced, nutritious, and good-quality food (Wang & Dia, 2011). Although most studies have focused on objective measures for the built environment using GIS-based methods, few studies use both perceived and objective measures of accessibility to healthy foods (Caspi et al., 2012; Down et al., 2024).

Humans interact and behave with their food environment in complex ways (Mah et al., 2019). As geographic measurement often fails to characterize the more nuanced aspects of food access and availability such as food preferences, vendors, product properties, quality, economic factors, transit options, marketing, and regulations (Vadiveloo et al., 2021; Drewnowski et al., 2020; Turner et al., 2018). Now with opportunities to order food from both restaurants and

grocery stores through a smartphone, this may change and expand individuals' food environments (Vadiveloo et al., 2021). This further complicates defining the geographic boundaries of one's physical food environment (Caspi et al., 2012; Charreire et al., 2010). In a recent study on food environments, a key finding was encouraging the participants to collaborate in drawing the map of their local community while discussing the importance of certain landmarks, to inform researchers more about the community food environment (Down et al., 2024).

Despite the growing interest in the role of the built food environment's influences on diet and individuals' overall health, most research lacks a holistic understanding of how the built environment influences physical activity along with dietary behaviours (Frank et al., 2022). In North America, most food shopping trips are by car, as many cities' built environment promote sedentary lifestyles; such as have a lack of sidewalks or long distances to schools can discourage walking (Fank et al., 2022; Sillis & Glance 2006; Hackett., 2008). Research has shown an association between a neighbourhood's walkability, physical activity, and healthy eating (Frank et al., 2022). Our built food environments are strong contributing factors to the increasing epidemic of obesity and chronic diseases over individual factors such as knowledge, skills, and motivation (Story et al., 2008). Due to the increase in diet-related diseases, researchers and practitioners have focused on understanding how our built environments, (i.e. where we live, work, and play,) impact our behaviours and health, to implement effective and appropriate public health interventions (Karpyn et al., 2020).

2.2.3 Social-Level Environment

The social environment is made up of one's social network and personal beliefs. A social network is interpersonal ties and relationships shared among a group of people, often creating a sense of identity, support, solidarity, and a feeling of belonging (Greig & Thompson, 2020; Jabs, Devine & Sobal, 1998). Social support is provided through material, informational, and emotional mechanisms, thus creating a type of social control that provides a way to enforce social norms (Jabs, Devine & Sobal, 1998). A social network often includes personal connections such as family, friends, and peers, but expands beyond that to include interdependencies such as cultural identity (Abdelghaffar et al., 2020; Story et al., 2008; Powell et al., 2015). Lifestyle behaviours such as diet are highly influenced by someone's social networks due to an individual's wanting to belong, mirror, and conform to the social norms of the people within their social network (Kroenke et al., 2020; Powel et al., 2015; Talegawkar et al., 2020). In many cultures, reasons for choosing or rejecting certain foods are bound up with concerns over identity, image, social belonging, and status (Stead et al., 2011; Fox & Ward, 2008; Tivadar & Luthar, 2005).

One's social network is incredibly important in the maintenance of their overall health as they are influential in promoting healthy food choices (Powel et al., 2015; Reyes et al., 2022). When a study was done where participants were asked to positively change their diets; it was

determined that one of their biggest barriers would be gaining the support from the participants' social network in favor of the dietary change (Hempler et al., 2023). This can be especially true within the household when there is potentially more than one person responsible for grocery shopping and food preparation (Hempler et al., 2023).

However, in recent years, there have been more studies done, not only on individuals' social networks, but also their online social networks. Social media has shown it can influence consumer behaviour both positively and negatively in terms of food choices and shopping behaviours (Pilar et al., 2021). Social networks can be used to influence diets positively as it is a reliable source of information on healthy diets, which can help improve food literacy (Leung et al., 2023; Pilar et al., 2021). As important as self-control and motivation are for making healthy and sustainable food choices, the support of a social network is vital in making positive dietary changes (Sproesser et al., 2011; Backer et al., 2006)

2.2.4 Individual Factors

Individual food choices are reliant on many varied factors, such as lifestyle, age, sex, ethnicity, food preferences, morals, upbringing, social expectations, and economics (see Figure 2.1). Many of these factors interact with one another. For example, a study done looking at different socio-economic standings in young adults' food choices showed that higher-income earners consumed healthier foods than their counterparts (Deshmukh-Taskar et al., 2007). Similarly, a study done in Chicago showed that older adults' dietary hbits are more in line with recommendations than younger adults (Colombet et al., 2019). This includes higher preferences and consumption for fruits and vegetables from older adults than younger adults, possibly due to generational differences in food supply practices and patterns (Colombet et al., 2019). Young adults have also reported in studies a preference to spend less time in food preparation, which will also play a role in individual food choices (Deshmukh-Tasker et al., 2007). When it comes to young adults and adolescence, parental modelling plays a huge role in food preferences and choices (Vue & Reicks, 2007). Parents who have household eating rules, both encouraging and restricting foods will affect the child's food intake (Zabinski et al., 2006; Vue & Reicks, 2007).

Moreover, studies show that different family backgrounds and ethnicities, such as Asian families, have higher influences over young adults' food choices than White or Hispanic families and young adults (Novotny et al., 1999; Vue & Ricks, 2007). Different ethnic backgrounds and upbringings can sway individual food preferences. Research has shown that members belonging to the Asian culture (Singapore) have reported higher enjoyment from foods with multiple textures in comparison to Western cultures (Cheon et al., 2022; Pellegrino et al., 2020). Different culinary traditions and eating habits within diverse cultures play a key role in the individual decision-making process when it comes to food choice (Massaglia et al., 2023; Krieger et al., 2029; Nardone et al., 2020). A study to better understand barriers in food choices among different ethnicities found Black groups reported the lowest fruits and vegetable intakes; while

Hispanic and. Latino groups did report higher intakes of fruits and vegetables, a large portion of participants still did not meet the daily recommendations (Bennett et al.,2022)

Gender and sex also shared differences in individual food choices. Many studies have shown that men consume more meat, both red and white and less fish than women (Touvier et al., 2009). Women traditionally consume more servings of healthy foods such as fruits and vegetables (Deshmukh-Taskar et al., 2007). This is related to the social construct of meat eating being masculine while healthier eating is more feminine (Touvier et al., 2009). Moreover, pregnancy is a powerful stimulus for positive changes in food choices (Obrian et al., 2017). This change is driven by the desire and knowledge that healthier eating supports a healthy pregnancy outcome (Wise, 2015; Obrien et al., 2017). There are some expectations such as adolescent pregnancies, where food choice drivers are appearance and taste, cravings, convenience and cost (Wise, 2015). Another exception is food-insecure pregnant women; they often are forced to default to cheap and convenient food choices despite acknowledging the importance of eating healthy (Zinga et al., 2022). Lastly, a common symptom experienced by women during pregnancy is nausea and vomiting, which may also affect food choices during pregnancy (Fowles& Fowles, 2008).

Dietary choices made by individuals often reflect their lifestyle and beliefs. For example, physically active individuals tend to consume less energy-dense, nutrient-poor foods while choosing to eat more fruits and vegetables (Koehler et al., 2019). Reasons for dietary choices can differ, whether it's to reflect a healthier lifestyle or for ethical reasons (Dyett et al., 2013). Specifically, when individuals choose to follow a meat-restricted diet (vegan, vegetarian, flexitarian, or pescatarian) for health-related reasons over moral reasons, they are more likely to make healthier food choices (Radnitz, Beezhold, & DiMatteo, 2015). Individuals who seek or receive nutrition recommendations from an expert for any reason were also found to make healthier food choices (Kapellou et al., 2022).

2.5 Theorizing Food Security from a Sustainability Lens

The Food and Agricultural Organization of the United Kingdom defines sustainable diets as “diets with low environmental impacts which contribute to food and nutritional security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources” (FAO, 2012a). According to this definition, nutritional, environmental, economic and sociocultural are of equal importance (Jung et al., 2024). This is a diet that’s not only environmentally adequate and optimal for human health but is cost-effective, accepted by consumers, pragmatic and feasible (Dupuits et al., 2024). This requires a complex multidimensional approach to systematically intersect both the global and local scales to achieve widespread food security systems (Jung et al., 2024; Willett et al., 2019).

Three principles capture the scientific rationale when determining healthy and sustainable diets: variety, balance, and moderation (Lawrence, 2024). A universal framework for a healthy and sustainable diet that is rich in plant-based foods, including legumes, fruits, vegetables, nuts, and whole grains, with lower meat consumption, can be adapted for each geographical region (Ibarrola-Rivas et al., 2022; Willett et al., 2019; Atta-Delgado et al., 2023). This also necessitates variety, balance and moderation in terms of animal and plant-based diets to ensure an adequate, healthy and well-rounded diet that protects the environment and biodiversity, resources and limits waste (Lawrence, 2024). For a substantial shift towards healthy dietary patterns, there must be large reductions to food losses and waste, and improvements to food production processes (Willett et al., 2019).

There are three underlying social determinants of health inequalities: material circumstances, psychosocial circumstances, and behavioural and/or biological factors (Solar & Irwin 2010). Focusing on the material circumstances, this includes housing and neighbourhood quality, consumption potential (financial means to buy healthy and sustainable foods), and physical work and school environment (Solar & Irwin 2010). Significant literature outlines the differences between neighbourhood food environments by income and race/ethnicity, with socioeconomically disadvantaged and minority neighbourhoods having less access to sustainable, healthy, and affordable food choices in comparison to higher-income neighbourhoods (Odons-Young et al., 2024; Drewnowski et al., 2020). Government systems often support neighbourhood inequalities by investing in capital-intensive rather than labour-intensive agriculture to deliver cheap food while using the profit to invest in further city development (Dixon & Richads, 2016). Inequalities in food environments restrict and manipulate food choices (Goudie et al., 2023). Social determinants such as food insecurity and access to healthy foods are shaped by structural racism and inequitable polices and distribution of resources (Odons-Young et al., 2024; Solar & Irwin, 2010). With increases in food insecurities due to the cost-of-living crisis, it has become apparent that food affordability is becoming a key determinant in food choices and shifting attention away from sustainability (Johnstone & Lonnie, 2024; Goudie et al., 2023).

Chapter Three
3.0. Methods

3.1 Introduction

This chapter describes the methods for the study. This includes a description of the study area, study design, data collection procedures and tools, data analysis, and ethical clearance.

3.2 Study Area

Hamilton, with a population of 787,000, is a port city on Lake Ontario, most known for its Industrial Heritage. While Hamilton is still the highest producer of steel in Canada, the city is also known for its trails, parks, waterfalls, art scene and its incredible food and restaurant experiences. Hamilton is divided by the Niagara Escarpment, a huge ridge known locally as the Hamilton Mountain that cuts through the city. The Escarpment is known for the Bruce Trail and over 100 waterfalls. Moreover, the escarpment separates the city into "Up the Mountain" and "Down the Mountain" sections. Where Down the Mountain is home to McMaster University, the city's downtown, a huge, diverse food scene. It's also where you'll find most of the resident students, low-income, and immigrant residents. Whereas Up the Mountain is mostly a suburban residential area, demographically, there are higher-income earners.

The reason Hamilton was the chosen location for this study was because of the differences between the Up the Mountain Demographics and Down the Mountain Demographics, and the difference in food landscapes. Down the Mountain had much fewer grocery stores with more corner stores and fast-food shops versus its Up the Mountain counterpart. The reason this study happened in Hamilton was to find differences in participant responses based off the area within Hamilton where they resided, since the food environments and demographics change significantly throughout the city.

3.3 Study Design - Quantitative and Qualitative

This study applied a mixed methods approach to support the collection of both qualitative and quantitative data, to help provide answers to the research questions. The reason for choosing a mixed method approach was to develop a more complete understanding of the barriers in the way of sustainable eating. The philosophical underpinning for mixed methods research is "pragmatism," which upholds the view that both quantitative and qualitative should be merged to create a more complete picture of a situation (Denscombe, 2008). The qualitiative data helps to explain the quantitative data collected (Creswell & Creswell 2018). Merging both quantitative and qualitative approaches provides an enhanced understanding of the food security concept being assessed in this study.

Quantitative data was primarily gained through surveys. This helped group participants based on their responses. For example, using their postal code to determine their proximity and access to healthy food options and examining how this is reflected in their dietary choices. Participants were also grouped based on their reported income to determine differences in how they interact with their food environment. The surveys were used to create groups and determine trends and themes. There were a few open-ended questions in the questionnaire where participants could provide some qualitative data. This allowed further reasoning for their choices, for example, why they ranked certain qualities of a grocery store as important. The bulk of the qualitative data came from the survey participants who responded to in-depth questions that were included in the survey. This was helpful to add reasoning to some of the themes that popped up from the quantitative data.

Furthermore, 20 interviews were conducted, and participants were asked for demographic information so that their information could be grouped with the survey participants' responses. Participants were asked how they felt Hamilton could improve access and accessibility to healthy food. Their responses were then analyzed, and common themes emerged.

Grey literature was used to provide more specific information regarding Hamilton's policies, programs, and initiatives. Grey literature on food environment policies relevant to Hamilton was also collected using Google searches, to complement both the survey and interview responses.

3.4 Data Collection Procedure and Tools

Due to the restrictions of COVID-19 while the research was being conducted, both surveys and interviews had to be collected through contactless methods. Participants for the surveys were found initially through Hamilton Facebook groups (neighbourhood groups, associations, buying and selling groups, the Hamilton Fridges community, etc.), where I made posts explaining my project and asking people to complete the survey.

To find Hamilton Facebook groups (groups), "Hamilton" was typed into the search bar on Facebook and then filtered by group. Groups were then individually assessed to determine that they met the criteria of being a local group. Depending on the group, either administrative permission was needed to enter the group, or you could automatically join. In either case, A message was sent to the group administrator, seeking permission to make a post, advertising my study (see Appendix for advert). If this was approved, I would go ahead and make the following post in the group asking for participants. During the data collection process, I joined 64 Hamilton-related groups. I obtained approval for and made posts in only 16 of those neighbourhood groups. Participants were incentivized to participate in the survey with a chance to win a $50 prepaid Visa.

The goal for the sample size was to get 200 survey participants with half of the study population being male and the other half being female, with different backgrounds and socioeconomic characteristics. The reason 200 participants were chosen was due to the

parameters and timeline of this study. The number of participants were selected to allow for various incomes, ages, lifestyles, and dietary choices and to provide a broad picture of themes of food practices and food environments. The final total of surveyed participants was 204, with 38 male participants, 163 female participants, and 6 who preferred not to say. Participants were screened before the survey and interviewed to confirm they were Hamilton residents and above the age of 18. Those who completed the survey were asked if they would be willing to participate further in the study by completing a 20-minute interview with me (see appendix for advert).

Participants who provided their email were then contacted with more information about the interview and asked if they would like to schedule a time based on the further interview information they were provided. Thirty participants provided an email address to receive more information regarding the interview. Of those 30 participants, 20 agreed and followed through with the interview. It was important that participants were from different backgrounds, ages, lifestyles, and locations within the study area. I had 20 participants total, 5 male participants and 15 female participants. The interviews took place over teams between December 2021 and March 2022. Due to COVID-19, these interviews took place virtually over Teams. At the beginning, all 20 participants were asked for their consent to audio record the interview. All 20 participants agreed, and a log was kept, keeping track of this.

Questions were asked in a way to provide more context to the interview questions that were already asked. Meaning some of the questions were similar, but participants were asked to explain their reasoning. For example, in the interview, participants were asked how far they travel to get groceries; they were given a drop-down with a range of distances they could choose from. In the interview, participants were asked similar questions, but asked if they passed by any other grocery stores along the way, and why specifically they chose that grocery store for shopping, and if distance was important to them. The interview questions were centred around providing further information needed to answer the research questions. Such as providing a better understanding of the participants' social environment and the role that it may play in influencing their diet. Due to the small sample size, participant responses were assessed and sorted manually with Googles Sheets. Throughout the interview, there were a few notes taken but primarily the data collection and recording were done after the interview was completed with the recording. Where it was summarized in a graph.

All grey literature was collected though Google searches, using keywords found within participants responses'. For example, Hamilton Community Fridges was brought up by a participant that said they were a good initiative in the city. "Hamilton Community Fridges" was then searched in Google. The results were merged with the survey and interview results to add context and explanation to what the Hamilton Community Fridges initiative is and how it impacts Hamilton's food environment.

3.5 Data Analysis

A key component of this study was to better understand Hamilton's food environments from the people residing within them. In order to understand Hamilton food environment from an objective measurement a map of Hamilton was created in ArcGIS which coordinated all of Hamilton: grocery stores, convenience stores, meat retailors, candy and confectionery retailers, coffee and tea stores, food products, water companies, cheese stores, food markets, fruits and vegetable and produce retailors were. Food retailers in Hamilton were first identified using a base database provided by the University of Waterloo Geospatial Centre. This dataset, derived from Environics business listings, included a selection of food-related outlets within Hamilton (Hamilton_Food_Stores shapefile). The layer was imported into ArcGIS Online, where each point was attributed by store classification. To ensure completeness, I validated existing points and added new points that were not included in the original data set. This was done systematically reviewing Google Maps at the street level, moving through each neighbourhood to ensure that all food retailers were captured. Each identified retailer was recorded as a point in ArcGIS and classified according to the categories provided on Google. Data collection and validation took place in June and July of 2021.

Postal Codes were then overlayed on the food retailors dataset in ArcGIS to construct Hamilton food environment. Food swamps were identified using a ratio-based approach, which compares the relative presence of unhealthy versus healthy food outlets. For this study, convenience stores were classified as unhealthy outlets, as they typically lack fresh and nutritious food options, while grocery stores and supermarkets were classified as healthy outlets. A postal code area was categorized as a food swamp if the ratio of unhealthy to healthy outlets was 4:1 or greater. This ratio-based approach is supported in food environment literature as food swamps are described as environments where unhealthy options overwhelm healthier outlets (Rose et al., 2009). The Center for Disease Control and Prevention (CDC) define food swamps as areas containing a higher density of unhealthy food retailers relative to all food retail options (CDC 2011). Thus the 4:1 ratio in this study is a transparent and clear way to determine areas where unhealthy food retailers overwhelm healthy food retailers.

During both the survey and interview process, demographic information was obtained to help categorize participants into income, area, age, gender, education, and employment categories. These groupings were used to address all three research questions. Research question one grouped participants using postal codes. This determined if they were residing in a food swamp where convenience and fast-food stores far outnumber healthy food options, which, as stated in the literature review, influences food choices and norms in the area (Robitaille & Paquette, 2020). For the second and third research questions, income was the main participant group that was used. Research suggests that lower-income individuals, though wanting to eat healthier diets, often must rely on their built environment, while higher-income earners' diets are influenced more by their social environment as their built environment often supports a healthier diet (Convens & O'Dwyer, 2009; Vadiveloo et al., 2021; Pitt et al., 2017; Jetter et al., 2019).

3.5.1 Quantitative Measures and Analysis

The surveys due to COVID-19 restrictions were all collected online through Qualtrics. In total, 260 survey responses were collected from November 30th, 2021 to March 30th, 2022. Of those surveys, 52 were either outside of the study area or were not completed. Leaving the study left with 204 surveys were used for data analysis. To minimize the possibility of duplicate respondents, Qualtrics automatically collects IP addresses of all surveys completed. I manually went through the 204 surveys to check for overlapping IP addresses. There were five cases where two respondents had the same IP address. These survey responses were compared to one another to determine variability. In all cases, even though the IP addresses and postal codes the responses were different, suggesting that they represented different individuals residing in the same household, rather than duplicate submissions. These findings lead to no survey being excluded due to duplication.

With 37 being Male, 162 being Female, and 9 preferring not to say or did not complete that question on the survey. Most of the participants were 25-34, with 76 total participants, the next closest age being 35-44 with 58 participants. Participants were mostly located "down the mountain" and within the downtown area. With most making $24,000 or less a year, with 43 participants. The next highest reported income range was $75,000-$84,999 with 24 participants, then $55,000-$64,999 with 21 participants. There were 60% of participants that are working full-time, 13% part-time, 9% keeping house, and the other 18% retired, looking for work or were currently off work. 63% of participants reported having a higher level of education, either through college or university. When asked about the type of household, 32% rented either an apartment or house, and 64% lived in a household owned by them or someone living in their household. When asked how many people resided in your household, kids and adults included. There was a near split between 1-2 and 3 or more.

3.5.2 Qualitative Measures and Analysis

The interviews were recorded through Teams. Once the interview was complete, I went through the recording question by question and wrote out the key and summarized responses including direct quotes into a Google sheets spreadsheet. Due to the small sample size, the data collected and summarized was analyzed manually. Age-wise there were similar numbers of participants in the age group 25-34 with 7 participants, 35-44 with 5 participants and 55-64 with 6 participants. With the other 2 participants in different age categories, one in 18-24 and the last in 45-54. Fifty-five percent of participants were employed full-time, while 10% were part-time, 10% were retired, 10% were unemployed, and 15% were homemakers. Seventy-five percent were living in detached or semidetached houses that they or someone in their household owned, and 25% of interview participants rented. Similarly to the survey data, when asked how many people resided in their household, there was a 50/50 split of 1-2 people and 3+ adults and children included. Thirteen different food areas were surveyed based on the first three letters of

the postal codes given. These variables were used to group interview and survey participant responses to address the research question, *"what are the most influential factors affecting someone's food choices in a high-income area versus low-income areas?"*

The interview contained 14 open-ended questions and six demographic questions. Table 3.7.1 below included an example of how questions were analyzed and grouped together once the responses were written out. The table shows Question 9 – Do you find Healthy food (or food that fits into your diet) accessible and affordable in your Area? Please explain. Here I looked at the participants' responses and if they thought food was accessible, I would indicate that with a *green square* and if they didn't, I would indicate that with a *red square*. Some responses were not a clear yes or no, so I put a yellow square in those sections. I also did the same for affordability. This way responses were easily grouped to find common themes within the study area. I did similar manual coding procedures with the rest of the open-ended questions.

During the interview, participants were asked if they had any suggestions for how healthy food could be more accessible and available, along with their overall thoughts about their shopping experience. These questions and suggestions were used to answer research question three, along with outside research done to further support. It was important for the research to include Hamiltonians' lived experiences, expressing what kinds of changes, if any, would be most beneficial. Community participation has proven to lead to effective initiatives and exposed hidden barriers not known to the researcher (Soma, Li, & Belinda, 2024). An example of this in the study was that two participants brought up the Hamilton community fridges and how they are a great initiative in lower-income neighbourhoods. With further research, along with the information given by participants, the Hamilton Community Fridges were discussed and expanded upon in Results. The suggestions given by participants about ways to make healthy food more accessible and available were used to provide insight into Hamilton's current initiatives and policies in places that were working, and to inform potential recommendations. The suggestions given by participants about ways to make healthy food more accessible and available were used to provide insight into Hamilton's current initiatives and policies in places that were working.

I gathered policy information after the survey and interviews were completed to further support the finding and to better answer research question 3. Information was gathered in May to August of 2023 through various sources. Targeted searches on Google of specifically looking for current food programs, policies, and initiatives in place currently or in the works for the future. Searches such as "Hamilton food environment", "Hamilton food policies", "Hamilton's food security and sustainability". When looking for documents to support and add to research question 3 they needed to be Hamilton, Ontario specific, relevant to food access, availability, affordability, sustainability, or security. I was also looking for documents to be published or updated within the last 15 years. One of the main documents used when making policy suggestions was Hamilton Food Strategy (Tran et al., 2016). The goal of this document was to "connect food policies, programs, and people to build on the great work that is already happening, while addressing gaps and working more effectively together. We envision this Food Strategy as a

powerful tool that will guide out progress toward a healthy, sustainable and just food system for all Hamilton residents." (Tran et al., 2016). This document involved the community, public health, city planning, emergency services along with other experts to give a holistic view of Hamilton current food policies and initiatives and where future work is needed. Another document of note was the Hamilton Food Access Guide, which has all the current Hamilton local food relief programs listed. A thematic analysis approach was taken using these documents, along with interview and survey polices suggestions in order to make policy recommendations from short and long term presented in Chapter 6.

Table 3.7.1 - Interview Question 9 Response Grouping and Analysis

Q9 - Do you find healthy food (or food that fits into your diet) accessible and affordable in your area? Please explain	Accessible Yes or No	Affordable Yes or No	Q9 - Do you find healthy food (or food that fits into your diet) accessible and affordable in your area? Please explain	Accessible Yes or No	Affordable Yes or No
Yes, there are lots of options in the area.			Yes relatively, but everything is getting more expensive. "Say one vegetable type is way cheaper because it on sale, then you know whatever I originally was planning to get, I don't really have a problem swapping it out"		
Yes, there is a lot of food that is affordable if you shop around. I'd prefer to shop in one location, so they don't mind spending more. Depending on the category, yes, for the most part food is affordable in the area.			It really depends on whether there are certain products with their digestive issues that get pretty expensive. But "at the same time it's what I need to drink so I don't have a lot of choice." If something is out that they would normally eat or fits into their diet, they will go without. which is frustrating at times. As well as seasonal stuff like fruits and veggies, it gets expensive. With the higher competition for specialty milk they find		

				that there are more options, but the price hasn't decreased because of it.		
Mostly conveniences/ fast food purely for cost purposes.				“Affordable, I would say, not really. It usually is always more expensive, but accessibility. I would say yes, yeah, quite accessible.”		
For the most part yes, it's accessible with the odd ethnic food that you have to travel for. Such as middle Eastern foods. They also noticed the recent increase in cost of groceries which has affected their personal budget.				“I've noticed the price in the last probably 3 months has gone up significantly, because I usually when I do my grocery shopping, I'm buying similar items each week” “I've noticed my grocery bills going up about $30 a week, buying the same things as I bought 3 months ago.”		
Accessible yes, even if they are deciding to cook a Filipino dish, they can basically find all the ingredients within the city. Affordable though it depends, they mostly wait for sales.				Not really affordability is though right now especially on a student budget. but accessible yes other than wanting more fresh and locally grown produce. With covid availability of some items have been lacking. but at Fortino's you paying a higher price for accessibility.		
It really depends, gluten free products are super super expensive, but they always been available. There is more selection than there was years ago. Meat is expensive too and my husband is willing to travel to Lococo's to get the better-quality stuff since it's the same price as other				Yea they find food affordable and accessible. Since they don't really stick to a particular diet, they don't feel anything is missing and their shopping style is more go with the flow. “I'm not great at budgeting so I don't		

locations.				super pay attention to the price. If it's like outrageously priced, obviously I'm like hell no.”		
They'd like a better selection but otherwise is okay.				“No, I find it really, really pricey” but the stores couldn't be much closer so it's accessible.		
With the diabetic things, no. it's a niche market. You can't get all the things you want from normal grocery stores. There are a lot more options in the states where their sister lives and will sometimes get her to ship them stuff from over the border.				Depends Fortino's is pricey but at the market for organic foods “I don't actually ask them about prices, like I care about the part that it is organic.”		
Prices are expensive I've seen them go up like 25 % in the last year but for food that we are looking for it is available.				Definitely accessible but not affordable. Pricing has been going up even at FreshCo. but “I have to shop.”		
Yes, since their diet isn't meat focused, they are able to “regulate and maximize our food.” They are always able to find a good selection.				Not affordable but definitely accessible.		

3.8 Triangulation of Quantitative and Qualitative Methods

I initially analyzed the quantitative data from the surveys to draw out themes throughout the participants. Once that part was finished, I went through the interviews with the same themes in mind to look for justifications and further context I could add to the qualitative data. A key point to note is that all interview participants had previously participated in the survey. Finally, themes on food environment policies for Hamilton that were identified from grey literature using Google search engines were merged with both quantitative and qualitative results. This analysis was informed by mixed methods research approaches where qualitative data is used to contextualize findings from quantitative data (Creswell & Creswell, 2018).

3.9 Ethical Clearance / Bias Issues

This study was reviewed and received ethics clearance by the University of Waterloo Research Ethics Board (REB #43338).

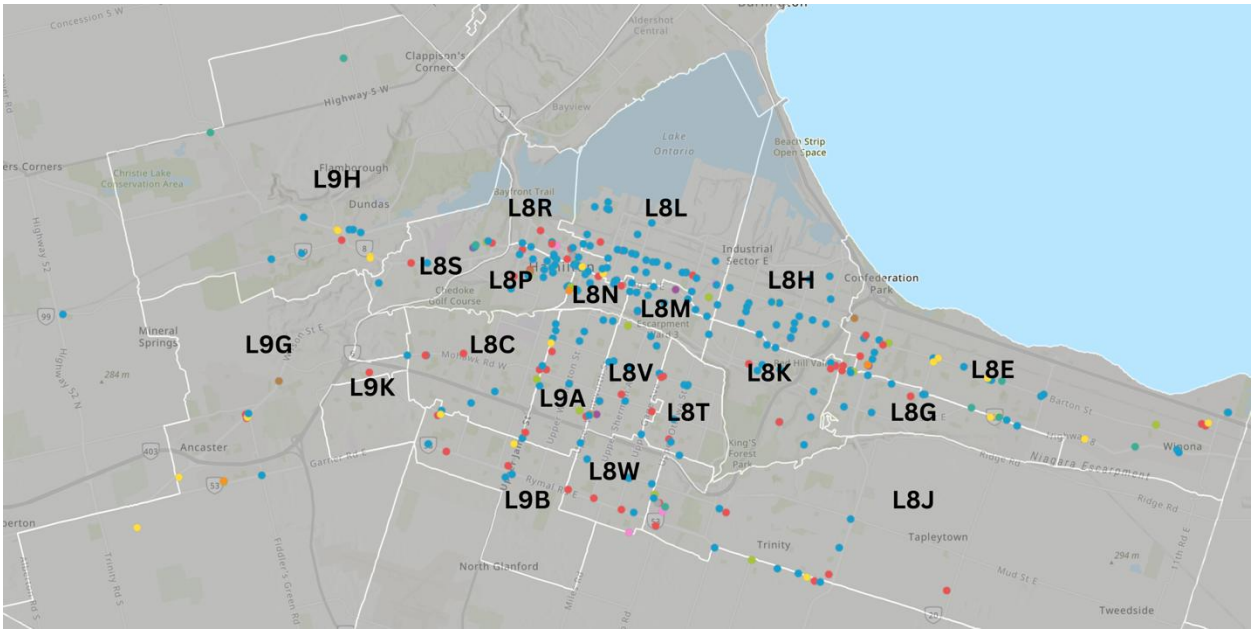
Chapter Four
4.0 Results

4.1 Introduction

This chapter details the results of the study, structured according to the study objectives. The main objective of this study is to better understand Hamilton's food environment and its effects on Hamiltonians' diets. This is to provide a better understanding of differences in diet outcomes in higher and lower income neighbourhoods and support an examination of trends between different socio-economic statuses in terms of the effect that it has on individual dietary choices.

A map of Hamiltons was created (Map 4.1) to illustrate food environments at the postal code level. This map highlights areas that are food swamps with convivence stores (blue points) outnumber grocery stores (red points) 4:1. This map was used to contextualize and compare survey and interview participants with the food environment they resided in.

Map 4.1 Hamilton's Food Environment



4.2 Characteristics of Study Participants

Table 4.1 Participant Demographics

Characteristics	Categories	Frequency
Age	Age 18-24 Age 25-34 Age 35-44 Age 45-54	8 Participants 77 Participants 58 Participants 26 Participants

	Age 55-64 Age 65-74 Age 75+	24 Participants 7 Participants Participants
Education	Bachelor's Degree College Degree Master's Degree High School Diploma Doctorate Professional Degree Other & None of the Above	73 Participants 54 Participants 31 Participants 26 Participants 4 Participants 2 Participants 13 Participants
Annual Income	$24,999 or less $25,000-$34,999 $35,000-$44,999 $45,000-$54,999 $55,000-$64,999 $65,000-$74,999 $75,000-$84,999 $85,000-$94,999 $95+ Prefer not to say	43 Participants 14 Participants 15 Participants 18 Participants 21 Participants 17 Participants 24 Participants 13 Participants 13 Participants 20 Participants
Household	House (Owned) Apartment (Rented House (Rented) Condo (Owned) Other	131 Participants 40 Participants 25 Participants 4 Participants 4 Participants

4.3 Research Question 1

The Effect of Food Environments on Food Choices and Dietary Diversity.

Food environments were determined based on postal codes, which do not encapsulate people's whole food environment picture. For the sake of the project and simplicity, survey participants were asked to provide the first three digits of their postal code to coordinate with a map that was created for the project, displaying where all the grocery stores and convenience stores were located (see Appendix for map). This is how food environments were determined based on the type of food venues that were located within each postal code. So, when determining how food environments affected food choice, participants' postal codes were grouped according to their responses, which were compared to responses within other postal codes (Table 4.2).

Firstly, I looked at the participants surveyed and their postal codes, where convenience stores outnumber supermarkets/grocery stores four to one. There were 7 of the 20 postal codes where this was the case. These postal codes were L8L, L8H, L8M, L9H, L8P, L8G, L0R.

Table 4.2 - Categorization of Participants Based on Postal Codes where Convenience Store Outnumbered Grocery Stores Four to One

Postal Codes	Number of Convenience Stores	Number of Grocery Stores	Average Income	Rating of Accessibility	Participants
L8L	32	2	$25,000-$34,999	7.04	25
L8H	19	1	$45,000-$54,999	5.85	7
L8M	7	0	$35,000-$44,999	5.06	18
L9H	6	1	$85,000-$94,999	9.67	3
L8P	14	3	$45,000-$54,999	8.26	23
L8G	9	2	$55,000-$64,999	7.25	4
L0R	9	2	$35,000-$44,999	7.25	4

The lowest rankings of accessibility to healthy foods were reported within seven of the highest-ranked convenience stores to supermarket/grocery store ratio postal codes (Table 4.2). L8M ranked accessibility to healthy foods as 5.1 out of 10 and L8H as 5.9 out of 10 (Table 4.2). The map for these two postal codes shows that L8M has seven convenience stores and zero supermarkets, and L8H has 19 convenience stores with one supermarket. Of the seven postal codes with convenience stores outnumbering grocery stores four to one, L8L had the most convenience stores of all postal codes surveyed, with 32; while it only had two supermarkets/grocery stores (Table 4.2). L8L participants averagely ranked accessibility to food 7/10 which was the 6th lowest rating among the 20 postal codes surveyed.

When looking at income within these seven postal codes compared to the others surveyed, participants reported an average income of $45,00-$54,4999 or below (Table 4.2). This average excludes L9H because, although convenience stores outnumber grocery stores four to one, there were only three participants within this postal code and one who chose not to report their income. Participants within L8L reported the lowest income with an average of $25,000-$34,999, followed by L8M with an average income reported at $35,000-$44,999 (Table 4.2). As previously stated, these two postal codes have the lowest ranking accessibility to healthy foods within the areas.

Within these 7 postal codes, some commonalities were found. There were 39 participants who preferred eating a more plant-based diet (vegetarian, flexitarian, pescatarian, or vegan) (see Table 4.5 below), and of these, 50% live within these seven postal codes where convenience stores outnumbered grocery stores.

Furthermore, focusing on postal codes that have the highest ratio of grocery stores to convenience stores are L9G, L9B, L8J, L8W, and L8S (Table 4.3). The postal code that had the most grocery stores was L8E, with six, but it also has 15 convenience stores. When L9B was excluded, which had only two participants; other postal codes scored accessibility 7.5 or above for accessibility to healthy foods.

Table 4.3: Categorization of Participants Based on Postal Codes with the Highest Ratios of Grocery Stores to Convenience Stores

Postal Codes	Number of Convenience Stores	Number of Grocery Stores	Average Income	Rating of Accessibility	Participants
L9G	3	3	$35,000-$44,999	7.56	9
L9B	3	3	$65,000-$74.999	6.5	2
L8J	6	5	$45,000-$54,999	8.2	10
L8W	6	3	$65,000-$74,999	9.5	4
L8S	4	2	$45,000-$54,999	7.5	6
L8E	15	6	$75,000-$84,999	7.2	5

When it comes to plant-based diets, 13% of the 39 participants were within these five postal codes. It was also noted that income level may also play a role in dietary patterns, with 7% of participants in higher income brackets reporting a plant-based diet, compared to 20% in lower income brackets.

There is not as large a gap when looking at the top three postal codes with the higher grocery store-to-convenience store ratios versus the bottom three. The top three average reported incomes were $45,000-$54,999, and the bottom 3 reported average incomes were $35,000-$44,999 (Table 4.4).

Table 4.4: Income Comparisons to Postal Codes with High Versus Low Grocery Store to Convenience Store Ratios

Top 3 - highest grocery store-to-convenience store ratio	**Income**
L9G - 1:1 Ratio	$35,000 - $44,999
L9B - 1:1 Ratio	$65,000 - $74,999
L8J – 1:1.2 Ratio	$45,000 - $54,999
Bottom 3 – lowest grocery store-to-convenience store ratio	
L8H – 1:19 Ratio	$45,000 - $54,999
L8L – 1:16 Ratio	$25,000 - $34,999

L8M – 0:7 Ratio	$35,000 - $44,999

Further insights into the dietary diversity of participants are detailed in table 4.5 below. Over 50% of all participants reported not following any type of diet (House Diet) with 112 of 204 total participants. The next most reported was the carnivore diet with 23 participants.

Table 4.5 - Participants Reported Dietary Diversity

Diet Choice	Number of Participants
Carnivore	23
Flexitarian	15
Gluten Free	6
House Diet	112
Low-Carb	8
Paleo	1
Pescatarian	5
Vegan	8
Vegetarian	11
Other	15

4.4 Research Question 2

The most influential factors that affect food choices in high-income areas versus low-income areas.

When grouping participants into high-income areas and low-income areas, they were first grouped based on the first three digits of their postal code, like the previous question. Then the average reported income was taken from the participants within their postal code.

The top 5 postal codes that had the highest reported average income were L9H, L8E, L8W, L9B, and L9C. The bottom 5 postal codes with the lowest average reported income were L8M, L0R, L8N, L9G, and L8L. Although these groupings made sense when comparing food environments' effect on food choices in the previous question, for this one, the number of participants in the higher income postal codes was only 24 in comparison to the 68 in the lower income postal codes. Therefore, for a better understanding of what is influencing high-income earners versus low-income earners, I separated participants' responses based on income into the top 50 high-income participants and the bottom 50 low-income participants (Table 4.6). The higher-income participants reported earning $75,000 or greater, and the low-income participants reported earning $34,999 or less.

Initially, when analyzing the responses from participants grouped based on postal codes, it was noted that the higher-income postal codes rated accessibility to healthy foods 8.3/10 whereas the 5 lower-income postal code participants rated it 6/10. When comparing the amount of grocery stores/supermarkets to convenience stores there are 39 total convenience stores to 16

total supermarkets/grocery stores. Whereas the lower income postal codes have a total of 57 convenience stores compared to only 9 supermarkets/grocery stores.

When analyzing the top and bottom 50 participants based on income, the following patterns were noticed. Participants were asked about their primary mode of transportation, which can play a role in how far people are able and willing to travel to access healthy and sustainable foods. Among the 50 low-income earning participants, 42% reported using an alternate mode of transportation outside of a vehicle, whereas only 8% of participants reported a vehicle alternative as a primary mode of transportation.

In the survey and the interview, participants were also asked about the frequency of food shopping (Table 4.6). Presumably, access to a vehicle may increase the frequency of food shopping, but it may decrease the need for more frequent trips to the store. As accessibility to a variety of shops would increase with a vehicle, so would your carrying capacity. While some who walk, bike or take buses to get groceries will have a lower carrying capacity. Though there are many reasons for someone's frequency of shopping, whether it's dependent on vehicle, proximity to store, time or money availability. The significance is that the findings show the less often someone goes food shopping, the less likely they will be to consume healthy, fresh foods regularly.

When looking at the frequency of food shopping, 13 participants in the lower-income group go shopping once every other week or less and in the high-income group only 4 reported shopping less than once a week (Table 4.6). The rest of the participants reported shopping at least once a week or more. As mentioned above, the more plant-based (fresh fruits and vegetables) your diet is the more environmentally sustainable it will be. These findings act as a chain reaction; the lower your income, the more likely you'll be living in an area with less access to healthy food and higher access to convenience stores. You would also be less likely to have access to a vehicle that may help you gain better access to healthy food options. Therefore, you are less likely to shop regularly, meaning you cannot have fresh, healthy, and sustainable foods as they are more likely to perish.

Table 4.6: Categorization of Highest and Lowest Income Earners

Bottom 50 Income Earners	**Top 50 Income Earners**
Primary Mode of Transportation: Car – 29 participants Other (walk, bike, bus) - 21	Primary Mode of Transportation: Car - 46 participants Waking – 4 participants
Distance to Primary Grocery Store: 1km or less – 15 participants 2km-4km – 24 participants 5km-9km – 9 participants 10km-14km – 2 participants	Distance to Primary Grocery Store: 1km or less – 15 participants 2km-4km – 21 participants 5km-9km – 11 participants 10km-14km – 1 participant 15+ - 2 participants
Frequency of Food Shopping: Once a week – 14 participants Twice a week – 16 participants	Frequency of Food Shopping: Once a week – 20 participants Twice a week – 20 participants

Every other week – 12 participants 3 or more times a week – 4 participants Longer than every other week – 1 participant	Every other week – 4 participants 3 or more times a week – 5 participants Every day – 1 participant
Meal Eaten Out Per-Week: 1 meal – 25 participants 2-4 meals – 10 participants 5-7 meals – 1 participant Never – 14 participants	Meals Eaten Our Per Week: 1 meal – 31 participants 2-4 meals – 12 participants 5-7 meals – 3 participants All – 1 participant Never – 3 participants
Diet: House Diet – 25 participants Meat Alternative – 10 participants Carnivore – 6 participants Other – 9 participants	Diet: House Diet – 32 participants Meat Alternative – 9 participants Carnivore – 7 participants Other – 2 participants

Additionally, participants were asked how far they travel to their particular food shopping location. The results of the higher and lower-income participant groups were nearly similar. 15 participants in both the higher and lower income groups reported traveling under 1km to shop. Then 21 participants within the high-income group and 24 in the lower-income group traveled 2km-4km to their nearest grocery store. This was interesting, as previously determined there are few grocery stores located within the lower income areas and there was reported lower access to healthy food versus the higher income participants.

Food shopping and preparing at home are also only part of the picture when it comes to assessing the food environment. Participants were also asked about their eating-out habits. When the low-income group was asked how often they consumed food prepared outside the home, 36 of 50 said they ate out 1 meal at least a week, with 14 of those reporting never eating out. Whereas the high-income group, 47 of the 50 ate out 1or more meals per week, with 3 participants among those reporting never eating out. Moreover, 11 participants in the low-income group and 16 participants in the higher-income group reported eating out more than once per week. Participants were asked where they were most likely to eat out whether it be a restaurant or fast food/takeout. Within the lower-income group, 26 chose fast food/takeout, 13 chose a restaurant, and 11 chose other (mostly including never eating out). The higher-income group has 19 choosing fast food/takeout, 25 choosing restaurants, and 6 choosing others. Although the numbers were closer to the amount that people were eating out between the lower and higher income groups, the type of food they chose to eat outside the home was different.

Furthermore, participants were asked what type of diet they followed if any, focusing on participants who reported eating some variation of a reduced meat diet considering that meat eating is not environmentally sustainable. When grouping participants into high and low income it was found that the numbers were similar, with 10 participants in the low-income group and 9 participants in the high-income group reporting a diet with some variation of a meat-reduced diet, including vegan, vegetarian, pescatarian and flexitarian.

Participants were asked to rank the following 13 food store qualities and amenities based on importance when choosing where to purchase grocery stores (accessibility, company name, pricing/affordability, parking availability, familiarity, proximity/location, amenities, quality of food/freshness, store layout, staff, cleanliness, points program, and food options/variety). Overall, the most evident finding was that no matter how participants were grouped, price, proximity, and quality were the top three most important qualities when choosing a grocery store. With that though, when asked for the reasoning for their ranking, there were different themes that appeared throughout the low-income group that did not appear in the high-income group and vice versa.

For explanations supporting why price, proximity and quality were ranked high among low-income earners, the main themes identified were sticking to or having a tight budget, price being the most prioritizing factor, and food being expensive, so finding food value for money is of high importance. Only a couple of participants among low-income earners expanded on why proximity was ranked highly; reasons being having limited access or no access to a vehicle and having to rely on other modes of transportation.

Similarly, looking at the high-income earning groups' reasons for ranking important factors, price was not mentioned in nearly as many responses and when it was, participants explained that they looked for the best value for their money and maximizing their dollar, and a few talked about price-matching and browsing flyers. The more prominent theme throughout the high-income participants' reasoning was speaking about how the quality and freshness of food was important, that fresh/good quality food meant it would last longer and be of better value to them. Again, only a few had mentioned why they ranked proximity high. Still, those who did mention valuing time and not having to drive around, wanting to shop close to home and being on a tight schedule.

To conclude, although participants ranked the most important factors when choosing a food shop, it did not matter how participants were grouped as price, proximity, and quality always ranked in the top three. Though the reasoning for the rankings varied. Both groups talked about the same topics, but the themes in their reasoning were different. The low-income participants talked about prioritizing low pricing and sticking to a tight budget. In contrast, the high-income participants, when talking about price, spoke about the best value that would maximize their dollar, not focusing on finding the cheapest but the best value for quality. Next, when talking about proximity, the higher-income group expressed being on a tight timeline and that closer proximity was equal to being more efficient. When talking about proximity, the lower income group referenced how the distance of a store made it more or less accessible to them.

4.5 Research Question 3

The Food Policies, Strategies, and Intervention Options that Promote Healthy and Sustainable Diet Choices for Low-Income Neighbourhoods and High-Income Neighbourhoods.

When looking into what policies, strategies, and interventions that would be helpful throughout Hamilton in either or both the higher-income neighbourhoods as well as the lower-income neighbourhoods in promoting a healthy and sustainable diet, interviewed participants were asked if they thought of anything that could make healthy food more accessible. Interview participants were further asked about how accessibility to healthy food could be improved, ultimately promoting more sustainable diets among both higher and lower-income neighbourhoods. The participants' responses to initiatives and policies that are already taking place and others that could be addressed are outlined below, along with grey literature to support them.

4.5.1 Food Pricing

Food pricing was brought up in seven of the 20 interview responses on ways we can increase accessibility to healthy foods in Hamilton. Participants wanting "*More consistency with food prices*" as many of the participants mentioned that "*Unfortunately right now food prices are just like creeping up and up and up.*" Few participants more specifically mentioned lowering pricing on food that is required for people with dietary restrictions such as lactose-free and gluten-free foods. "*More available of products for diabetics at better prices*" one participant saying "*The prices on specialty things for their diet is frustrating as they did not choose to have this restriction so why should they have to pay more.*"

4.5.2 Support Local-grown Food

Some participants suggested having more access to locally grown food such as Farmer's markets *"More little markets, in the summer they are great, and I like supporting the farmers"* and they are also great way to provide healthy foods to the community while supporting the community.

4.5.3 Food Policies

"*Government programs aren't keeping up with the times*" was a statement mentioned by a couple low-income participants "*Government programs could be a big part of the solutions not necessarily even directly for me, but other people who want to eat healthy and have low income.*" It was further mentioned that subsidies, and tax exceptions specifically on healthy and sustainable food would not only make them more accessible to food insecure individuals but incentives for everyone to make healthier dietary choices.

4.5.4 Zoning Bylaws

Another Municipal Government recommendation was about "*Zoning bylaws that reserve land for housing or apartments over grocery stores, the local government needs to think carefully when approving subdivision development and residential development, especially if it's clear that access to grocery stores and healthy food options is lacking*"

4.5.5 Food Interventions

The Hamilton Community Fridges was brought up in two interviews, both mentioning how awesome the program is. The community fridges are a volunteer-run, publicly accessible, and low-barrier resource where the community can access free food. The fridges are filled with donations from people within the community and businesses. As of right now, there are 5 different fridge locations throughout Hamilton.

Community Gardens was another food intervention that was brought up during the interview process. Community gardens are a space where plants are grown by community members to meet the community's needs and encourage the community to grow their own vegetables and herbs, get exercise, and meet new friends. Along with community gardens, self-gardening was also expressed as a solution to creating better access to healthy foods, but it would require space, time, and resources.

Chapter Five
5.0 Discussion

5.1 Introduction

The objective of this study was to better understand Hamilton, Ontario's food environment and how it affected Hamiltonians' diets. Due to the layout of the city, with the escarpment splitting Hamilton into "Up the Mountain" and "Down the Mountain," it has created inequalities in Hamilton's food landscape, with some neighbourhoods having access to healthy and fresh food, while other neighbourhoods are living in a food desert. This was one of the reasons Hamilton was chosen as the study area, as it was hypothesized that within the same city, there would be participants whose responses to the survey would be very different based on which neighbourhood they were residing in. As expected, most participants didn't follow any type of diet and selected "house diet" in both the survey and interview. What was not hypothesized was that many of the responses, no matter where the participant lived, or any other factor like age or sex within the survey, were not as polarizing as expected. For example, most of the participants, when choosing a grocery store or supermarket, valued price, proximity and quality over all other options.

Despite many similarities in participants' responses, there were some differences in trends when grouping similar food environment neighbourhoods. Ratings of accessibility to health and fresh food were lower in areas with significantly fewer supermarkets and grocery stores than convenience stores. There was also a higher percentage of meat alternative diets reported within those same areas, along with reports of lower incomes. Similar results were found when grouping participants based on their income, where lower-income participants' responses were compared against higher-income participants. Again, hypothesizing that responses in the survey and interviews would be different when it comes to navigating their food environment, there were still many similarities in responses, such as the percentages of meat alternatives participants in the higher and lower income earning groups. In terms of how far participants travelled to get to the nearest supermarket, it was nearly the same for both groups, although the reasons behind them differed. While the lower-income was working with a budget and going to the closest supermarket, the higher-income was focused on optimizing their time and money, making sure they were getting good value for the goods exchanged.

5.2 Food Choices, Influential Factors and Interventions-Implications for Sustainable Food Security

One of the objectives of this study was to connect the data of Hamilton's built environment to how participants interacted with that environment. The way humans interact with built environments is complex, and geographic measurements alone fail to characterize the more nuanced aspects of food access and availability (Vadiveloo et al., 2021; Drewnowski et al., 2020;

Turner et al., 2018). According to prior research, communities living in food swamps face barriers in accessing affordable and nutritious food. This overall aligns with the findings of this study, when participants were asked to rank accessibility to healthy and affordable foods. Participants living in areas with a high concentration of fast-food restaurants, which significantly outnumber healthy food options, had some of the lowest rankings of accessibility, with a score of 5.1 and 5.9 out of 10. In the counterpart communities with more supermarkets and grocery stores, accessibility was ranked from moderate to high. Although when averaging out the 7 most food-swamped areas with the 7 least, the average accessibility ratings were just 0.6 apart, which is relatively similar. Despite the built environment data showing differences in accessibility. This is potentially due to the presence of a store which sells food, convenience or 'nearby' that provides a sense of accessibility.

Continuing to analyze the groupings of neighbourhoods, researchers have shown that living in a food swamp can not only influence food choices but can also alter food preferences (Robitaille & Paquette, 2020). The findings of this study showed that the percentage of participants who chose a meat-restrictive diet was highest among the areas in Hamilton with the lowest access to healthy and fresh foods. Reasons for dietary choice differ, whether it is for lifestyle, health, or financial reasoning, further affects the level of healthy or sustainable foods within the meat-restricted diet (Dyett et al., 2013).

Income was also a factor looked at when assessing dietary patterns. According to prior studies, higher-income earners were more likely to consume healthier foods than their counterparts (Deshmukh-Taskar et al., 2007). Participants in this study who were living in food swamp communities were more likely to report a lower income than their counterparts. Food deserts and food swamps are often located in low-income communities (Cruz-Piedrahita et al., 2024; Walker et al., 2010; Kelli et al., 2019; Gupta & Freedman, 2020; Michelle, 2019). When group participants were grouped based on their earnings, 7% of higher-income earners reported a plant-based diet, compared to 20% of participants in the low-income bracket.

Transportation was also a key factor, and lower-income earners were more likely to use alternative modes of transportation. This is potentially due to reduced access to a vehicle, which can have a chain effect on dietary choices. As found in prior studies, communities living in a food swamp not only have less access to healthy and fresh food options, meaning they must travel further to grocery stores and supermarkets; but they are also more likely to have limited access to a vehicle. These barriers predispose individuals to rely on proximity to retail outlets, fast food stores, and convenience stores (Cruz-Piedrahita et al., 2024). Participants in this study within the higher-income group were more likely to shop at least once a week than their counterparts. This is further illustrates that higher-income individuals have greater access and opportunity to food shop more than once a week.

Despite differences in built environments and accessibility, when participants were asked how far they travel to food shops, both groups reported an average of 2km-4km. Moreover, another area of similarity was that both high- and low-income earning groups reported eating out a similar number of times. Although, when diving deeper into those responses, it showed that

among the low-income earners, the meal out was more likely to be from a fast-food restaurant, whereas the higher-income earners were more likely to eat out at a restaurant. This theme continued in the interview, which was used to add context to the surveys. Participants were asked why they ranked certain qualities higher when choosing where to eat and shop and although the overwhelming majority choose price, proximity and quality as their top three qualities, the reasons provided differed. Themes of budget, low price, and limited vehicle access were brought up among low-income earners, compared to high income earners who gave reasons such as maximizing their money, and valuing quality and freshness. This lines up with Covens & O'Dwyer, 2009 study expressing that dietary influence among low-income earners rests on the built environment while high-income earners dietary influence is attributed to behavioral and social factors, since the built environment supports healthy diets. While low-income earners must balance and priorities purchasing tradeoffs to minimize cost to ensure adequate food quantity (Vadiveloo et al., 2021; Pitt et al., 2017; Jetter et al., 2019).

Another objective of this study was to help bridge the intention-behaviour gap, as many people understand what constitutes a healthy and sustainable diet, but are constrained and unconsciously influenced by their built environment (Walker et al., 2019; Dimitri & Rogus, 2014). In both the survey and interview, participants were asked where and how Hamilton communities can improve them to eat a healthier and more sustainable diet. Three major themes emerged: food strategies, food policies, and food interventions. Within food strategies, the topic of raising prices for groceries was a concern for many study participants. Improvement suggestions included price consistency and more accessibility to locally grown foods. Pricing on food can often fluctuate depending on many factors, some of which can be controlled by the government, which can implement systems to create price consistency, such as trade systems and agreements, agricultural production costs, distribution and travel (Herforth &Ahmed, 2015).

In the past few years, Hamilton has seen an increase in households facing food insecurity. Communities are looking to the government and expecting help by implementing policies, regulations, standards and guidelines (Rosewarne et al., 2020; De Schutter, Jacobs, & Clement, 2020; Shahid & Bishop, 2019; Caputo & Luck, 2019). Currently, Hamilton's agricultural industry does not grow enough food for everyone to eat locally, yet there is increased demand for locally grown foods (Tran et al., 2016). Policies could include social assistance, jobs paying livable wages, affordable housing, and zoning bylaws. It is important when creating and implementing policies to include and encourage communities to get involved with decision-making, as well as being transparent in policy creation and goals (Downs et al., 2024; Jurkenbeck, Zuhlsdorf & Spiller, 2020).

In this study, it was important to understand what people living in the community felt was the barrier to healthy foods and how they felt that could be improved. Implementation of policies and programs is more likely to be successful if the public is aware of them (Capito & Lusk, 2019). At the local and community level, there are also a few initiatives that participants brought up that Hamilton is doing well. For example, we have the Hamilton community fridges where people can leave or pick up food as needed, many community gardens throughout the city, year-

round farmers markets and kitchens that provide meals, food banks, and Meals on Wheels Program, which you can find access to using Hamilton's food guide (Food Access Guide, n.d. & Community Fridges HamOnt, n.d.). These are a few Hamilton food interventions that help target and reduce barriers to food insecure individuals in accessing healthy foods, but it does not target the greater epidemic of factors that cause food insecurity.

5.3 Summary

Most of the findings in this study indicate a systems connection where participants who were lower-income earners were more likely to be living in a food environment with low access to healthy foods, and high access to convenience stores. Furthermore, they were less likely to have access to a vehicle, which overall limited their accessibility to healthy, fresh, and sustainable food choices. Despite similar ratings of accessibility, this study still showed how Hamilton's built environment affects dietary food choice. Low-income and food swamp areas are where policies, initiatives, and programs can be implemented to promote better accessibility to healthy foods, thereby creating healthy eating patterns that will help achieve SDG 2. Through the interviews and open-ended survey questions, we learned that dietary influences among the lower-income participants were more physical, such as distance to the store and budget constraints. With their counterpart high-income earners dietary influences being more social constraints such as food shopping convenience and working on a tight schedule. When price was brought up it was not in the form of sticking to a tight budget but rather finding good value for good quality. Understanding the different environmental influences barriers within both high-income and low-income areas will help the city and the government systems better develop more targeted policies and initiatives.

5.4 Study Limitations

This study's limitations were the sample size and collection process. Due to the time in which the surveys and interviews were taken, the COVID-19 lockdown was in effect. This changed the way data collection was done. When collecting data from participants, it had to be fully virtual. Participants in this study were recruited from many different online Hamilton communities, from mom groups, to trading groups, to neighbourhood groups. This inevitably excluded anyone who is not online, not in online Hamilton community groups, and not willing to participate in online surveys. TheFacebook groups had a predominantly female demographic, which likely led to only 18% of survey and 23% of interview participants being male. Prior studies have noted that gender and sex influence individual food choices (Touvier et al., 2009 & Deshmukh-Tasker et al., 2007). With most participants in this study being female, this has the potential to skew the data. I also believe that the sample size is a limitation; Hamilton is a big city with lots of communities, with 204 participants being a very small representation of

Hamilton as a whole. The sample of participants was reactively small and drawn using a convenience-style recruitment strategy, which cannot capture the full diversity of residences and experiences. There were a couple of instances when grouping participants based on their postal code, where there were only 2-4 participants surveyed, which made it hard to know if that was an accurate repetition of that community. For these reasons the surveys and interviews cannot be generalizable for the whole of the Hamilton population.

This was a cross-sectional study which focused on identifying associations between food environments, perceived accessibility and socio-economic factors; highlighting patterns and connections. It did not explore any impact or cause-and-effect relationships between variables. As such the findings cannot be interpreted as establishing a causal relationship or measuring direct impact.

Chapter Six
6.0 Summary of Findings and Recommendations

6.1 Introduction

The chapter summarizes the findings of the study in alignment with each study objective and the implications for food choices in Hamilton. The chapter concludes with some study recommendations and suggestions for future research.

6.2 Summary of Findings

The study's findings, despite choosing Hamilton for its diverse food landscape, revealed many similarities among participants. When ranking accessibility to healthy foods, the 7 communities grouped by postal code with the highest ratio of convenience stores to grocery stores and the lowest ratio both ranked accessibility around 7 out of 10. Both groups also reported similar distances travelled, 2-4km to a grocery store. Regardless of the grouping, the participants ranked price, proximity and quality highest of the 13 options when asked what they valued most in a grocery store. When participants were asked to expand their reasoning for certain rankings and responses, those with lower income areas talked about stretching their dollar, while participants in higher income areas spoke about maximizing their dollar. The final similarity among participant responses was that most participants indicated that they do not follow any type of diet. Of the participants who did choose some type of meat-restrictive diet, they were more likely to report a low-income and reside in one of the 7 postal codes with the highest ratio of convenience stores to grocery stores. It was also noted that lower-income participants reported shopping for food less frequently, having limited access to a vehicle, and although they mentioned eating out a similar number of times per week, were most often choosing fast-food options versus their counterparts which who were more likely to choose a restaurant. When asked for ways Hamilton can improve accessibility to healthy foods, the theme of food prices, food interventions, wanting to eat and support local, and reducing barriers for those already food insecure were all highlighted. This is where government policies and interventions are needed to support and work with communities to create healthy eating patterns.

6.3 Research Contributions

This study used both qualitative and quantitative information to draw an understanding of how Hamilton's built environment is influencing its community food and diet choices. To my knowledge, it is the only study that has been conducted on food environment factors within the Hamilton area. To better understand Hamilton’s built environment, a comprehensive map was created using ARC-GIS, determining where every grocery store, convenience store, deli, farmers

market and specialty store was. The Hamilton Food Map overlayed postal codes to split Hamilton into clear communities. This was used to determine which communities in Hamilton had limited access to healthy and fresh foods. This map can be updated and used for future food-related city planning or assessments.

The results of this study determined that no matter where you live in Hamilton, price, proximity, and quality are the most influential factors in food choices. In both the surveys and interviews, price was the most prioritized quality when choosing where to shop. It was the most expanded topic in the open-ended question "reasoning for ranking" in the survey. It was also the most talked about in the interview when participants were asked what improvements could be made to increase accessibility. Now reasoning for ranking did vary among high and low-income participant groups, which highlights the relevance of this type of study. Using mixed methods to understand human behaviour is critical to getting a full understanding. Knowing price is of high importance to Hamilton and can be used as a guide for future policies, programs and initiatives that focus on creating affordable food spaces throughout the city. On a larger scale, these findings show that changes may be required in macro-level environments, in sectors, trade agreements, and government systems. This adds to the research needed to better understand the effects and influence that macro-environments have on consumer patterns.

The findings from the survey's responses indicate that, despite the study area, the rating of accessibility similarly averaged for areas of food swamps and areas that are considered food oases. In choosing a food environment such as Hamilton, it was hypothesized that areas where the built environment had a low number of healthy food options would rate accessibility to food low, and participants living in areas with many healthy and fresh food choices would rate accessibility high. This was not the case for this study. This is significant to research as it further proves the complexity of food choices and dietary patterns. The perception of food availability also plays an important role in food choices. Despite some participants living in food swamps with low availability of healthy and sustainable foods, there are still the options of convenience stores and fast food, making the perception of food availability high.

Although the perception of accessibility was similar among participants; dietary choices were not. The findings showed that around 50% of the participants that chose a meat restricted diet lived in the 7 most food swamped communities out of the 21 communities surveyed, proving that the built environment is affecting dietary patterns. To draw further conclusions from this would require further research to better understand the reasoning behind diet choices, including whether meat restrictions are due to ethical or moral reasons, health reasons or financial reasons.

6.4 Conclusion

The objective of this study was to gain a better understanding of Hamilton's food environment and its effects on Hamiltonians' diet. Hamilton is often referred to as a foodie city with many unique restaurants and multicultural food shops. But as new restaurants emerge, so is

the rate of food-insecure households. The purpose of this study is to determine the way in which dietary patterns can be influenced to be more sustainable to achieve SDG 2. Sustainable diets are food secure, culturally appropriate, affordable, and environmentally considerate. Responses that emerged showed that price, proximity, and quality were ranked highest in priority when choosing where to go to food shop. Participants viewed Hamilton as accessible food no matter where the participants resided. It was found that participants who had low-income were also more likely to have reduced access to a vehicle and be more likely to follow a meat-restrictive diet. Moreover, they were also more likely to shop less than once a week and would choose fast food restaurants when eating out compared to their high-income counterparts. More clear differences were found in participant responses when they were grouped based on income over when grouped based on where they lived. It was important to study to ask the participants about their perceptions of how Hamilton can improve food accessibility, as no one understands the inner workings of a community better than someone residing in it. Again, many participants brought up the rising price of healthy food and how it is creating a barrier to accessibility to sustainable dietary choices. This, along with finding the negative chain reaction among income groupings, speaks to larger influences at play beyond the built environment. With the rising cost of living, it is apparent that food affordability is becoming a key determinant in food choices, potentially above the built environment.

6.5 Recommendations

6.5.1 Long-Term

Many suggestions were made in Question 3 regarding consistency in food pricing. With the increased costs of food, there is a fear of not being able to afford or access adequate food, potentially pushing individuals into food insecurity. Hamilton has seen a rising number of households reporting some level of food insecurity, whether it's worrying about food running out or having to reduce food intake. Food-insecure individuals were focused on buying the most amount of food for the lowest cost, which typically involves ultra-processed and ultra-packaged foods that do not align with a sustainable diet. Hamilton has a food access guide, which is a compiled list of different avenues where people can access food. This guide lists all the Community Fridges, Gardens, Kitchens, Meals, Food Banks, and Meals on Wheels Programs. While this can help families stay afloat, it does not address the root cause of why food insecurity is rapidly increasing. One of the main findings of this study is that affordability and price are major food choices influences along with the knowledge of the increasing number of food-insecure households, suggesting that policy change is required. Policy changes can support: social assistance programs that provide adequate benefits, basic income guarantee or jobs that pay living wages, affordable housing, public transit and childcare, free income tax filing support for low-income households, tax benefits, incentivized purchasing programs and public pension plans (Canadian Pension Plan, Old Age Security, and Guaranteed Income Supplement) with

benefits that keep older adults out of poverty (City of Hamilton, 2025). Studies done in other cities showed that as minimum wages increased, the prevalence of food insecurity declined as it successfully lifted families above the poverty threshold and increased household income and labour force participation (Odons-Young et al., 2024).

6.5.2 Medium-Term

On a city-controlled level, a few participants expressed interest in eating more locally grown food as it's typically healthier, fresher, and supports the communities. There are many initiatives that Hamilton can implement and has been working on implementing. When reading the Hamilton Food Strategy, it suggested Hamilton has initiatives such as: Farm-to-Institution, Farm-to-Consumer, Farm-to-School, and Farm-to-Charitable food program, whereby government policies and programs can be put in place that can help drive food grown and produced locally. Many suggestions throughout the study revolved around Farm-to-Consumer initiatives. Such as farmers markets, which Hamilton currently has, Hamilton has 2 all-year-round and 9 seasonal farmers markets, 7 community-supported agriculture (CSA) farms, several roadside farm stands, and pick-your-own farms. Food boxes are also a way that consumers can directly support farmers, although these often come with a subscription fee for a set amount of food. These initiatives have been mentioned as a part of Hamilton's Food Strategy to make sure that communities are informed in a transparent way. Furthermore, the city should focus on promoting the benefits of the initiatives in order for them to be successful in connecting farmers with the community and consumers.

6.5.3 Short-Term

Finally, a suggestion brought up in a couple of interviews was to have more Community Gardens. Hamilton currently has around 30 community gardens, many of which have a long waitlist of people wanting to join. The city should focus on programs to expand and or increase the number of community gardens throughout the city as this would increase access to spaces where people could grow and harvest their own food.

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Appendixes

Permission message for Facebook groups

Hi ___,

My name is Josie Campbell and I'm currently doing a research study at the University of Waterloo under Dr. Bruce Frayne. I'm looking into Hamilton's food environments and the availability, affordability and accessibility of healthy foods. In the hope of discovering strategies to promote higher consumption in both healthy and environmentally sustainable foods within the Hamilton area. I'm looking for around 200 participants for an anonymous survey and 25 participants for a virtual interview. I was hoping to get your approval to make the following posts asking for participants.

"Hello,

My name is Josie Campbell and I'm currently conducting a research study with the University of Waterloo, under Dr. Bruce Frayne in the Hamilton area. The study is looking into Hamilton's food availability, affordability, and accessibility in the hope to find ways to promote healthy food options. If you are currently a Hamilton resident and are 18 or older I'd appreciate your help. The survey linked below will take you around 10 minutes to complete and your participation will be anonymous. You'll also gain the opportunity to enter a draw for a chance to WIN 1 of 2 $50 prepaid Visas. This study has been reviewed and received ethics clearance through the University of Waterloo Research Ethics Board. If you are interested or have any questions, please send me a direct message here or reach out to me via email at jj2campb@uwaterloo.ca."

https://uwaterloo.ca1.qualtrics.com/jfe/form/SV_cUydGg4UIiGTrgy

3.4 Data Collection Tools

Asking participants if they would like to participate further in the study with an interview:

"If you would be interested in further participating in this study, I am looking for around 25 interview participants. Interviews will be 20 minute long and be done virtually through MS Teams. There will be an additional chance to win a $50 prepaid Visa. If you are interested or want to hear more information please leave your name and email below.

This information will be kept separate from your survey responses in order to kept your survey anonymous."

Survey Questions

Question Number	Question	Options if Applicable
Q1	What is the first three characters of your postal code?	
Q2	How would you classify your dietary practices? - Selected Choice	- Carnivore - Flexitarian - Gluten free - House Diet (No Diet in Particular) - Low-Carb - Paleo - Pescatarian - Vegan - Vegetarian - Other
Q3	In your household are you the primary grocery shopper?	- Yes - No
Q4	In your household are you the primary food preparer?	- Yes - No
Q5	Select all that describe your shopping style.	- Convenience shopping - Planned shopping - Shopping with a list - Only purchasing items and brands that you have previous purchased - Shopping alone - Quick in-and-out shop - Buying new items / trying new things - Shopping with someone else - Longer shopping outings - Shopping on a scheduled day or days
Q6	How many stores on average do you go to, to get groceries?	- 1 - 2 - 3 - 4 or more
Q7	How would you rate accessibility to healthy foods in your area?	- 1,2,3,4,5,6,7,8,9,10 - 1 being least accessible 10 being most
Q8	Please rank the following based off importance when choosing where to purchase groceries. 1 being the most important factor, 13 being the least important factor. click and drag to rank. - Accessibility	- Accessibility - Company Name - Affordability - Store Layout - Staff - Cleanliness - Proximity / Location - Quality of Food / Freshness

		- Point Program - Parking Availability - Familiarity - Amenities (i.e. carts, hot foods, self checkout, butcher, etc.) - Food Options / Variety
Q9	Please explain your reasoning for your top choices and or any other reason that would influence you to choose a specific grocery store or supermarket?	
Q10	Where do you currently purchase most of your daily food and meals? - Selected Choice	- Grocery Store - Supermarket - Fastfood or Takeout - Corner store / Convenience Store - Market - Restaurant - Other
Q11	How far on average do you travel to get groceries?	- 1km or less - 2lm – 4km - 5km – 9km - 10km – 14km - 15km or More
Q12	What is your primary mode of transportation? - Selected Choice	- Car - Bike - Bus - Walking - Other
Q13	How frequently do you shop for food?	- Once a week - Twice a Week - Once every other week - 3 or more times a week - Everyday - Longer then every other week
Q14	How much is your average food shop?	- **$24 or less** - **$25 - $49** - **$50 - $74** - **$75 - $99** - **$100 - $124** - **$125 - $149** - **$150 - $174** - **$175 - $199** - **$200 or more**
Q15	On average how often do you eat out a week?	- **1 meal** - **2 – 4 meals** - **5 – 7 meals** - **Almost all** - **Never**

Q16	When eating out do you typically choose - Selected Choice	- **Restaurant** - **Fast Food / Take Out** - **Other**
Q17	What is your Age	- **18 – 24** - **25 – 34** - **35 – 44** - **45 – 54** - **55 – 64** - **65 – 74** - **74+**
Q18	Gender: How do you identify? - Selected Choice	- **Man** - **Women** - **Prefer Not to Say**
Q19	Which of the following best describes your ethnic heritage? Choose all that apply. - Selected Choice	- **Canadian** - **White European** - **Spanish** - **Hispanic** - **Vietnamese** - **Middle Eastern** - **First Nations** - **Latino** - **Filipino** - **Chinese** - **Pacific Islander** - **Russian** - **Black African** - **Native Hawaiian** - **Japanese** - **Asian Indian** - **Korean** - **Puerto Rican** - **Cuban** - **American** - **Mexican** - **Other**
Q20	What is the highest degree that you've earned? - Selected Choice	- **High-school diploma or equivalent (GED)** - **Collage Degree** - **Bachelor's Degree** - **Master's Degree** - **Doctorate** - **Professional Degree** - **Other** - **Non of the above (less than high-school)**
Q21	What are your current main daily activities?	- Working full-time - Unemployed or laid off - Keeping house or raising children full-time - Looking for work

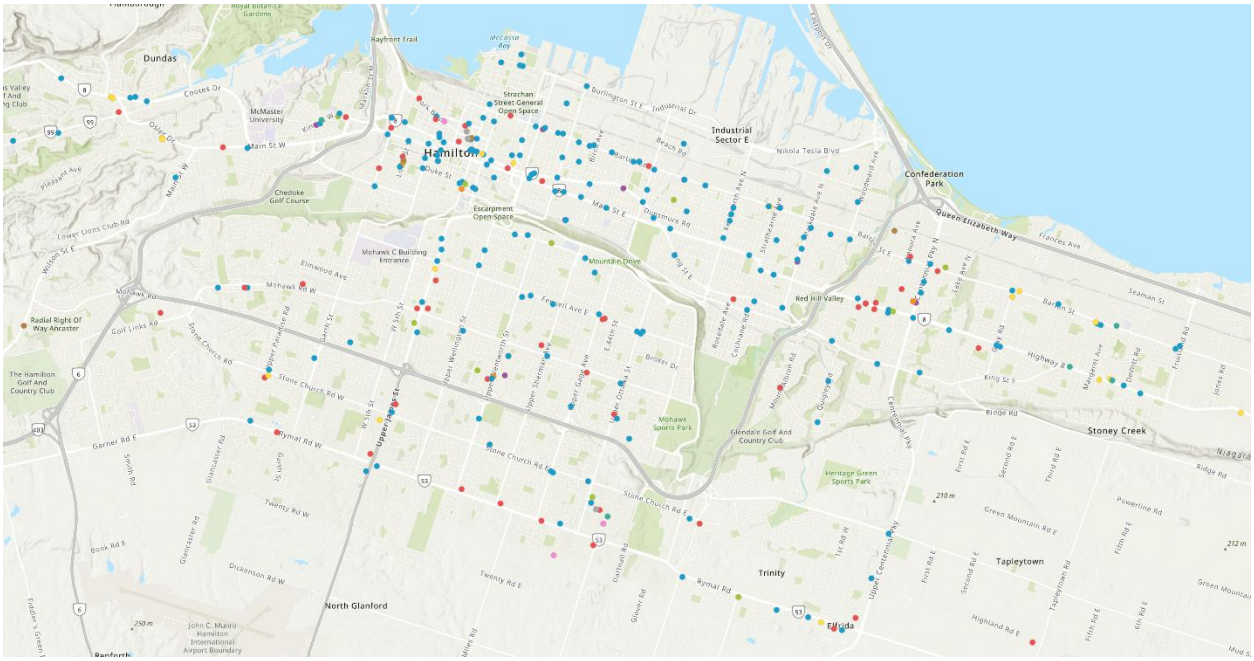
		- Retired - Off work due to COVID-19 - Working part-time
Q22	What best describes your occupation if any? - Selected Choice	- Management - Business or Financial Operations - Computers and Mathematics - Architecture or Engineering - Life, Physical or Social Sciences - Community and Social Services - Law - Educational Instructor - Art, Design, Entertainment, Sports and Media - Healthcare Practitioner - Healthcare Support - Protective Services - Food Preparation and Serving - Building and Grounds Cleaning and Maintenance - Personal Care and Services - Offices and Administrative Support - Farming, Fishing, and Forestry - Construction and Extraction - Installation, Maintenance and Repair - Production - Transportation and Material Moving - Military - Trades and Other Services - Not Working
Q23	How much did you earn before taxes and deductions last year?	- $24,999 or less - $25,000 - $34,999 - $35,000 - $44,999 - $45,000 - $54,999 - $55,000 - $64,999 - $65,000 - $74,999 - $75,000 - $84,999 - $85,000 - $94,999 - $95,000 and greater - Don’t Know - Prefer not to say
Q24	How many people are living in your household?	
Q25	Of those people how many are adults, over the age of 18?	
Q26	Of the adults, how many are bringing in household income?	
Q27	What type of household do you live	- Household owned by you (or someone

	in? - Selected Choice	living in your house) - House (Rented) - Apartment (Rented) - Condo
Q28	How much is your combined household income before taxes and deductions	- $24,999 or less - $25,000 - $34,999 - $35,000 - $44,999 - $45,000 - $54,999 - $55,000 - $64,999 - $65,000 - $74,999 - $75,000 - $84,999 - $85,000 - $94,999 - $95,000 and greater - Don't Know - Prefer not to say

Interview Questions

Q1	Where do you currently purchase the majority of your daily meals? & why?
Q2	How far do you travel to pick up your daily food? Do you pass any stops along the way? Is distance important?
Q3	What id your primary mode of transportation? Does this play a role in where you shop?
Q4	How frequently would you say you shop for food?
Q5	Do you shop at multiple locations? If so how many and why?
Q6	How would you describe your shopping style?
Q7	Do you follow any particular diet? Does this affect where or how you shop for food?
Q8	How often would you say you eat out per week? What types of places are you choosing when you do eat out?
Q9	Do you find healthy food (or food that fits into your diet accessible and affordable in your area? Please explain
Q10	Do you have any suggestions for how food could be more accessible and available in your area?
Q11	What are some of the main qualities that a grocery store has that you look for? what influences you to choose particular stores?
Q12	Do you feel like there is anything in the way of eating healthier (or your ideal diet)?
Q13	Have you have been taught through media or schooling about environmental impacts that dietary patterns have?
Q14	Overall do you feel your shopping experience is good or bad? and final thoughts?
Q15	First three digits of your postal code?
Q16	How old are you?
Q17	How would you identify your gender?
Q18	What is your current employment status?
Q19	How many people are currently living in your household? and how many are adults?
Q20	What type of household do you live in?

Research Question 1 – Hamilton Food Map



Hamilton Food Map - https://arcg.is/18bHej3

Symbology

Hamilton_Food_Stores

- GROCERS-RETAIL
- CONVENIENCE STORES
- MEAT-RETAIL
- CANDY & CONFECTIONERY-RETAIL
- COFFEE & TEA
- FOOD PRODUCTS-RETAIL
- WATER COMPANIES-BOTTLED/BULK & ETC
- CHEESE
- FOOD MARKETS
- FRUITS & VEGETABLES & PRODUCE-RETAIL
- Other

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