

**Planning for Sustainable Food Systems:  
Students and Food Swamps in Waterloo Region**

by

Tarana Persaud

A thesis

presented to the University of Waterloo

in the fulfilment of the

thesis requirement for the degree of

Master of Environmental Studies

in

Sustainability Management

Waterloo, Ontario, Canada, 2016

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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.

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

## **Abstract**

Since its official definition in 1996 at the World Food Summit, food security has been a focal point in the development of living spaces, with the aim of ensuring that sufficient, healthy food is accessible to all. However, meeting the criteria of food security as defined has proved to be problematic in society. Consequently, researchers and policy makers have identified many challenges to achieving universal food security, with a recent focus on urban areas. One such challenge has been described as ‘food swamps’, which are areas where food availability and accessibility are adequate, but processed and calorie-dense foods dominate the market in place of healthy foods. Recent research in Waterloo Region identifies food swamps as a major obstacle in achieving food and nutrition security, resulting in unhealthy and/or processed foods being more readily available and in higher quantities than healthier alternatives.

Waterloo Region is home to two large universities, with a student population of approximately 50,000. There is evidence that suggests a correlation between poor food consumption habits and the academic outcome and general well-being of students. Using this as a starting point, this research has two primary objectives: (1) to document the extent to which students who reside in Waterloo Region are exposed to food swamp and (2) to understand the relationship students maintain with their food environment, and whether a sustainable food system as a concept is perceived to have value.

Through the use of inductive and exploratory research, data was obtained in the form of an online survey that was shared through various social media platforms, and via email to University of Waterloo’s administrative departments. A total of 263 responses were eligible for comparative data analysis. The results showed a majority of students residing in the city of Waterloo and having more access to processed foods than to fresh and nutritious foods due to both cost and distance. Approximately forty-five percent of students identified not having adequate access to fresh food.

These findings support the fact that students reside in areas in which food swamps have infiltrated the food retail landscape. The retail food system is dominated by the business sector, with nutritional balance in the food landscape being historically omitted from the urban planning agenda. Students’

interest in the food system was twofold: (1) one group was not interested and majority of these students indicated they already understood the process to some extent and (2) the other group of students expressed interest in learning more, although some indicated lack of time being a constraint. This strengthens the case for developing a sustainable food system, as students stand to benefit from both new and updated knowledge on food production and nutrition awareness, bridging the gap between urban consumers and their food.

*Key words: food swamps • food security • sustainable food system • students*

## **Acknowledgements**

I would like to thank first and foremost my supervisor Dr. Bruce Frayne for his honest and insightful feedback and for ensuring that my work is of a high standard. Despite a hectic schedule, Dr. Frayne made sure he was available for guidance whenever necessary and his support has made the successful completion of this thesis possible.

I am also thankful to Dr. Sharon Kirkpatrick and Dr. Prateep Nayak of my oral defence thesis committee, for having agreed to be a part of the revision of my research. I thank them both for their time and input in assessing my research and providing valuable feedback.

I would also like to extend my appreciation to the School of Environment, Enterprise and Development (SEED), the Faculty of Environment and the University of Waterloo for the financial, administrative and academic resources and opportunities made available to me throughout my graduate studies.

Being able to share my experiences, challenges and progress throughout my research with my colleagues has helped significantly, and for that I would like to thank my fellow program colleague Prerna Sharma for the many coffee dates, where we were able to exchange our graduate school experiences in a constructive and enlightening manner.

The balance of academia and extra-curricular activities has aided in my time management and in widening my scope of knowledge and experience in the realm of sustainability management. For this, I would like to acknowledge my volunteer lead Lisa Chapman for providing a positive volunteer experience at Sustainable Waterloo Region. I would also like to thank her for being a beam of support, encouragement and thoughtfulness throughout this academic endeavour.

I must also thank my sister Elmira Persaud, who made time during her examination period to encourage and motivate me, and provide discipline tips to assist me with my research. I cannot thank her enough for the optimism and positive energy provided during my most challenging times.

And last but not least, an enormous thank goes out to my partner David Correia, who always supported and encouraged me to start my graduate studies and then throughout my two years in this Masters Program. I thank him for providing never-ending love, help, guidance, faith and encouragement; without him, I would not be here.

## **Dedication**

I would like to dedicate this thesis to my father Dr. Hardat Persaud and my mother Tarana Kadirova. The successful acquisition of a graduate degree was a goal my parents have worked tirelessly towards for as long as I remember. They have always stressed the importance of education and it is with their blessing and unconditional support that I have been able to embark on this journey in the first place. For the early mornings and late nights with extra classes and school, to making my stay in Canada a comfortable one, to being honest critics and providing feedback on my work; I would like to thank them for everything they have done and continue doing for me.

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## **Chapter 1 - Introduction**

### **1.1 Defining and Understanding Food Security**

The generally accepted definition of food security in use today was agreed to at the World Food Summit in 1996 (FAO, 1996). In this definition, food security is defined as existing “when 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 an active and healthy life” (FAO, 1996). Food security therefore rests on three main pillars of action - food must be nutritious, safe and affordable (Osorio & Corrandini, 2013). Moreover, being food secure would ensure that certain basic food ‘rights’ were not being violated (Munro & Quayle, 2013).

While the definition provisioned by the FAO is more generalised, the various components that influence food security can be monitored to understand how strong a role they play in acquiring food security. Utilising the economic access factor as the basis for investigation, a report was published in 2014 by the PROOF Research Team on the prevalence of food insecurity at the household level in Canada (Tarasuk, Mitchell, & Dachner, 2016). Utilising collected data representing seven provinces and two territories, the report highlighted that for the year prior to 2014, 12% of households experienced food insecurity to a certain degree, strongly correlating to the level of income received (Tarasuk, Mitchell, & Dachner, 2016). This percentage represented 1.3 million households, or 3.2 million individuals (Tarasuk, Mitchell, & Dachner, 2016).

The FAO definition of food security is broad, but there are components in particular that are relevant to this research. In urban areas, the production of food is less important for consumers, and therefore food *access* is responsible for who gets to eat what. Therefore, in the context of this research, the FAO definition is relevant with regards to food accessibility in urbanised spaces. The factors controlling access to food are various, and include education, income, distance and availability (Osorio & Corrandini, 2013). Food security was typically associated with rural communities; however, with the urban transition

now well underway, urban food and nutrition security is increasingly on the development agenda (Crush & Frayne, 2011). This shift was observed in PROOF's report - food insecurity was seen to be more common in urban areas than in rural ones, with the highest recorded food insecurity rate observed in Peterborough, Ontario at more than one in six households (Tarasuk, Mitchell, & Dachner, 2016).

Within this context, the question of how to feed billions of people adequately is one that is continuously being revised for a solution, and it is in this process that new terminologies help to identify gaps that need research and policy attention. For example, food access presents itself in phenomena such as food deserts and food swamps, which identify issues with nutrition and proximity within the consumer-food system relationship (Battersby & Crush, 2014). Urban food safety is also a major public health concern, and falls under what is now being called 'food brownfields' (Osorio & Corrandini, 2013).

These terms borrow their terminology from geographical landscapes, as they provide a metaphorically close description of what occurs in each scenario. A food desert can be defined as an area where there is poor geographic access to food that is healthy (NEUPATH Research Program, 2014). In contrast, a food swamp occurs when there is an abundance of energy-dense, processed foods in comparison to the number of healthy food options available (Rose, et al., 2009). More recently coined, the term food brownfield refers to areas which create conditions that encourage above-average microbial or toxicological risks associated with the consumption of food (Osorio & Corrandini, 2013).

Individually, these definitions assist in identifying in what ways food insecurity has become significant in urban areas. Based on the definitions and the current literature, food deserts and swamps are similar in nature, with both identifying a lack of adequate food in a geographical area. These two terms differ in that food deserts imply that there is a physical lack of food in an area, whereas a food swamp has an abundance of food available. However, the abundant food is made up



significantly of high-energy foods, ‘junk food’, and ‘fast food’. This presents a scenario where consumers have little variety to choose from when looking for fresh or healthier foods. In the context of the definition outlined by FAO (1996), not only is food access an element to focus on in urban landscapes, but the nutrition being provided to the populace living within these landscapes. These elements are more frequently at play in urban landscapes, in comparison to food production, which is traditionally associated with rural areas. Underneath the umbrella that is the generalised food security definition lies more food issues that are defined by its individual limitations. For this research, food swamps are seen as one of these sub-categorised food issues, defined by location and nutrition related limitations.

## **1.2 Food Security in Waterloo Region**

In 2014, an important project report was published that gave a summary of the Region of Waterloo’s<sup>1</sup> (then) current position as a food environment – it was the report for the Nutrition Environment in Waterloo Region, Physical Activity, Transportation and Health, or NEWPATH for short. The findings for the diet and food environment were a mix of good and bad news - the Region does not appear to be suffering from the symptoms of a food desert; however, there is an unnecessarily abundant level of unhealthy food and beverages made easily accessible to residents (NEWPATH Research Program, 2014).

Thus, food swamps are seen to exist within the Region of Waterloo, and it is the exposure of places such as convenience stores and fast food outlets to residents that supports their existence (NEWPATH Research Program, 2014). The NEWPATH study also demonstrated that consumers who had access to healthier alternatives had an improved quality in diet, thereby strengthening the confirmation of food swamp existence (NEWPATH Research Program, 2014).

<sup>1</sup> – The titles “Waterloo Region” and “Region of Waterloo” are commonly used interchangeably

### **1.3 Food and Sustainability**

Sustainability practices related to food production and consumption extend beyond environmental conservation and safety. Along with efficient and logically sound processing and distribution practices, having a sustainable food system in place would encourage a stronger relationship between urban residents and farms through local food (Czarnecki, 2011). This in turn would help to overcome shortcomings of the industrial food model, such as its contribution to environmental damage and the negative impact of high adulterated, processed foods on public health (Czarnecki, 2011; Navaneelan & Janz, 2014). Global populations are expected to expand beyond nine billion by 2050, an increase that has the potential to place immense strain on the global natural resources (Auestad & Fugoni III, 2015). Not only will the pressure be felt on the resources responsible for fuelling the food system, but also on the quality and nutritional value of the food that will be necessary to feed the expected population (Auestad & Fugoni III, 2015). Food is an important aspect of society not only in the traditional rural sense, but in urban settings as well (Pothukuchi & Kaufman, 1999). Therefore, evidence is building towards the need for the implementation of sustainable food systems, which would allow for a stronger and less detrimental relationship between people and their food.

### **1.4 Purpose of Research**

Waterloo Region is the location of two prominent Canadian university campuses – the University of Waterloo and Wilfrid Laurier University (Region of Waterloo, 2010). In 2015, the estimated student population at the University of Waterloo (including the colleges) was 36,760, and 18,850 at Wilfrid Laurier University (Universities Canada., 2015). There is growing data that suggest students' academic and general well-being are affected by the quality of their diets, as well as the access they have to food (Gallegos, Ramsey, & Ong, 2014; Hughes, Serebryanikova, Donaldson, Leveritt, & Michael, 2011; Jessri, Abedi, Wong, & Eslamian, 2014; Oregon State University, 2014; Patton-Lopez, Lopez-Cevallos, Cancel-Tirado, & Vazquez, 2014). The research examined the variety and frequency of retail food establishments

near the residences of students who attend the University of Waterloo. The primary objective of this research was to evaluate whether or not students are residing in areas that can be characterised as food swamps; the secondary objective was to evaluate their perceptions (if any) on food consumption and production, and how it would contribute to the development of sustainable food practices.

Food security is an ideal that should be kept as high priority, for food is something everyone must obtain for survival. As such, ensuring that the right type of food in appropriate portions is accessible to everyone, is a means of creating sustainable food practices. This research has the potential to provide information that strengthens the actions being put in place to support a sustainable food system in Waterloo Region (Waterloo Region Food System Roundtable, n.d.).

Because food is an important aspect of urban spaces, the research also highlighted the significant role that urban planning plays in the encouragement of healthy eating, and ultimately in the development of sustainable food systems. The evidence compiled in this research has the potential to be a tool of assistance in the planning sector at the municipal and regional levels, and also for academic institutions that are considering the well-being of their student populations. The data can be utilised towards efforts to improve the food landscape for students as well as their access to these landscapes, such as an improvement in transit, a change in the structure of store clusters (e.g. plazas and commercial ‘hubs’), or a change in zoning laws that permit higher accessibility to services such as farmers markets or local food stalls. An important outcome of having this research data made available is that it can be utilised as a resource, for example in the process of policy development for an academic institution, or for a municipal region. Another outcome that is important is the contribution to a growing field of research trying to understand urban food insecurity and ways to appropriately measure and analyse its occurrences. Food swamps are relatively new phenomena, with long-term consequences for the well-being of urban neighbourhoods not yet fully researched. This research contributes to the emerging literature on the nature of food swamps, also adding to the growing literature on urban food security.

## **1.5 Organisation**

This thesis comprises five chapters. Chapter 1 introduces the realm of food security and the purpose and interest that has been vested in the research of the topics that are related to food security. In order to preface the research, Chapter 2 provides a review of the relevant literature. The review explains the development and challenges of the urban food landscape, including the most significant findings regarding food swamps. Chapter 2 also discusses the overarching theme of sustainable food systems and the role food plays in the lifestyle of students. The review ends by identifying the research gap in the literature and justifies the novelty and importance of this research. The research methodology follows in Chapter 3 and provides information on the data collection processes and data analyses, and highlights the limitations of this study. Chapter 4 focuses on the research results. The key results are discussed further in Chapter 5, along with the recommendations deemed fitting based on the analysis of the food security scenarios presented.

## **Chapter 2 - Literature Review**

### **2.1 Introduction and Overview**

Utilising an exploratory approach, the literature review discusses more than one element of food security, in an attempts to illustrate the existing connections that these elements have. This review commences with a historic overview of how urban food systems evolved, through a comparison of the way food was produced and accessed before the rise of industrialisation, and the subsequent adoption of the modern food system. This allows food security to be seen from an urban perspective, and arising issues associated with the urban environment. Following this, further literature is reviewed on what implications arose due to this transition in food processing and access, and the relationships these outcomes had with the built environment. The quality and accessibility of food created a shift in the health of urban residents, providing supportive literature towards the influence urban landscapes may have upon the diets of urban residents.

Research on the affordability and accessibility of food in urban areas has already commenced under the investigation of food deserts. However, the literature review makes an argument in favour of a revision of the definition used for food deserts, as parameters used for studying its prevalence are not standard and researchers tend to utilise their framework of choice. As such, within the revision of food desert measurement, a new term ‘food swamps’ had risen to identify food access issues of a different nature, and more concerned with density of calories made available. The literature review at this point culminates in identifying the need for improved food access in urbanised spaces. This need is further argued by looking at previous research that investigates the relationship between food security and tertiary level students, and the level of vulnerability they may be exposed to as a result. Students were identified as a unique subset of the population as they have a different schedule of studying and even being employed simultaneously.

The specific types of challenges associated with a student lifestyle are compared to their dietary habits, in order to observe what correlations may be present. The literature review then concludes by highlighting sustainable food systems, systems that show promise in the improvement of food security and awareness, as well as a means to integrate a holistic approach to food security. Certain elements of the sustainable food system framework can be utilised to improve the urban food landscapes, by bringing elements of urban food consumption systems closer to the production aspect of food. These topics, researched together as demonstrated in this literature review, show a transition in the food access issues that are being faced in present day urban society, and provides an insight into how urban planning, food security, health, student well-being and sustainability have concerns in common. Because these commonalities have not been traditionally explored, the review concludes by identifying significant gaps in the literature that the research sets to fulfil, as well as an overview of the significance of these topics being studied together.

## **2.2 Food and Urbanisation**

Food is understood to be a contributing factor to the creation of cities, influencing the location and design, as well as its financial and political elements (Hayson, 2015; Steel, 2013). The ability for a city to maintain food availability was a standard that was strived for (Hayson, 2015). It is difficult to observe an urban space without the involvement of food in a direct or indirect way; for example, the economic input it generates with job creation, social space creation (e.g. restaurants, tourism) and the resulting economic development (Pothukuchi & Kaufman, 1999). Conversely, it is also difficult to find societal factors which are not influenced by food, such as waste disposal, water pollution, health issues, public transportation and overall quality of life (Pothukuchi & Kaufman, 1999). More than half of the world's population live in an urbanised environment (Mendes, 2007). In Europe alone it is estimated that by 2020 the urban areas will house up to 80% of the population (Reynolds, 2009). Therefore, the role of food, as well as its availability, in an urban space is being relied upon by an increasingly growing population.

### **2.2.1 A Brief Comparison of the Food Landscape Before and After Industrialisation**

The evolution of settlements has created a shift in the methods and demands of food production. This shift can be loosely categorised into two time periods – the food system before heavy industrialisation and urbanisation, and the food system that is experienced today and is increasing in momentum (Jennings, Cottee, Curtis, & Miller, 2015; FAO, 2004).

In the period before rapid industrialisation, there were many more actors involved with food production and distribution; both urban and rural areas played a part in producing food but food production was on a much smaller scale (Fonte, 2002; Jennings et al., 2015). Foods were not of the processed nature, and the main provisions were standard staples along with a small amount of meat and dairy products (Jennings et al., 2015). There was a small contribution to the system made by technology, and the scale of farming was considered small, with one to two hectares being utilised by individuals (Jennings et al., 2015). Although the shifts in farming and consumption progressed, it did not eliminate the preceding food system, explaining why small scale farms are still prevalent today (Fonte, 2002).

With regards to transportation and trade, food was sold by traders and transported over short distances in the form of a ‘truckload’ of produce. Foods such as grains that had a longer shelf life were able to be transported to further distances; as a result, the higher levels of food waste occurred within the supply chain, and less with consumers (FAO, 2011; Jennings et al., 2015). In a rising urban setting, produce was sold in wholesale quantities to smaller retailers such as vendors, or speciality stores (e.g. going to the butcher, grocer or baker). Food was distributed locally to various neighbouring towns, with occasional outreach to regional neighbours for global trade (Ericksen, 2008).

Fast forward to a time where urbanisation and industrialisation are prominent and becoming integral parts of society, an updated food system has evolved and involves a different set of steps in the production and distribution of food. As Table 1 shows, in the system we are familiar with today, there is

an increase in food production at both the national and international scales, allowing products to reach many global destinations (Jennings et al., 2015; Ericksen, 2008).

<b><i>Food System Feature</i></b>	<b><i>"Traditional " Food System</i></b>	<b><i>"Modern" Food System</i></b>
<b>Principal employment in food sector</b>	In food production	In food processing, packaging and retail
<b>Supply chain</b>	Short, local	Long with many food miles and nodes
<b>Food production system</b>	Diverse, varied productivity	Few crops predominate; intensive, high inputs
<b>Typical farm</b>	Family-based, small to moderate	Industrial, large
<b>Typical food consumed</b>	Basic staples	Processed food with a brand name; more animal products
<b>Purchased food bought from</b>	Small, local shop or market	Large supermarket chains
<b>Nutritional concern</b>	Under-nutrition	Chronic dietary diseases
<b>Main source of national food shocks</b>	Poor-rains; production shocks	International price and trade problems
<b>Main source of household food shocks</b>	Poor-rains; production shocks	Income shock leading to food poverty
<b>Major environmental concerns</b>	Soil degradation, land clearing	Nutrient loading, chemical runoff, water demand, greenhouse gas emissions
<b>Influential scale</b>	Local to national	National to global

**Table 1: Traditional vs. Modern food system comparison (Source: Adapted from Ericksen, 2008)**

Post-industrial consumption patterns consist of the sales being made under global and regulated markets, no longer under individual sellers, allowing for accessibility to increase (FAO, 2004; Fonte, 2002; Jennings et al., 2015). The sales have also streamlined into a consolidated retail sector, as opposed to individual sellers; supermarkets now dominate the landscape with the ability of being able to offer a variety of produce and products under one convenient roof (Ericksen, 2008; FAO, 2004; Reardon, Timmer, Barrett, & Bergegue, 2003). Diets have also evolved; increases in income also increased the consumption of processed foods, oil, salt, meat and dairy (Ericksen, 2008; Jennings et al., 2015; Johnston, Fanzo, & Cogill, 2014). The food production system has now become industrialised, so the farm lands are now consolidated and labour intensity has reduced (Jennings et al., 2015; Lang, 2003). Here we can see



technology playing a significant role in changing the way food is produced and at what rate (FAO,2004; Lang, 2003). Technology also is responsible for availability – the shelf life of fresh foods can now be extended due to refrigeration, and foods can even be purchased year-round due to improvements in transport and trade ( FAO, 2004; Jennings et al., 2015). Small specialty stores are still in existence, but tend to have a higher price range for their products. Highly processed and packaged foods are also a result of technological advancements and are abundant in the market; its presence is now a staple in the human diet (Ericksen, 2008; Lang, 2003). While food waste still occurs in the early stages of the supply chain, in industrialised countries more than 40% of food loss occurs at retail and consumption stages (FAO, 2011).

### **2.2.2 Implications of this Food Shift in the Urban Food Setting**

In 2008, for the first time in recorded history, the urban population exceeded the rural population worldwide (Satterthwaite, McGranahan, & Tacoli, 2010). In 1900, for every one urban resident that existed in the world, there were six point seven rural residents; it was then calculated that for every one urban resident in 2010 there was less than one rural resident in the ratio (Satterthwaite et al., 2010). It is predicted that by 2025 there will be almost three urban residents to every one rural resident; this gives a very vivid depiction of how urban spaces have expanded and how populated they have become (Satterthwaite et al., 2010).

Due to the anticipated continued increase in urban population numbers for the next decade, there will be consequential socio-economic changes, particularly the means and methods by which urban citizens will be fed and provided with appropriate nutrition. Urbanization not only creates a high demand for food due to the high population, but there is also a change in the dietary wants (Satterthwaite et al., 2010). The food system is continuously changing for the updated demand, and with urbanisation these demands so far have been for meat and dairy products, ‘luxury foods’ as well as processed foods and pre-packaged food items (Jennings et al., 2015; Satterthwaite et al., 2010). Processed and pre-packaged foods in particular are predicted to be in high demand in urban environments due to the lack in physical activity and an increase in work hours. (Satterthwaite et al., 2010).

Even though there is a significant improvement in the way in which food is distributed worldwide and made available, there is evidence showing that poor nourishment, obesity and food waste are major issues that are arising (Jennings et al., 2015). Food production is such a large industry today, but even so there are about 795 million people in the world who are classified as undernourished (World Food Programme, 2015). The issue of undernourishment and malnourishment are not limited to developing countries only; in 2013 it was noted that 14% of households in the United States are classified as food insecure, which means that they were not getting the required amount of calorie intake as advised for a healthy lifestyle (Coleman-Jensen, Rabbit, Gregory, & Singh, 2015). The allocation of land use in an urban setting when developing food landscapes, has provided evidence to suggest that it plays a role in the rise of obesity (American Planning Association, 2007). This happens through both the decrease in physical activity due to the high access of transportation, as well as the increase in food consumption, based on the density and location of food outlets (American Planning Association, 2007).

### **2.2.3 Influence of Urban Planning on the Food Landscape**

It is reported that there are over half a billion adults in the world that are classified as obese which is costing an estimation of two trillion U.S. dollars per year to deal with (Dobbs et al., 2014). A study published in 2011 conducted by the Chicago Council concluded that by 2020, non-communicable diseases (such as obesity) are expected to rise by 15% if the global trends of producing and consuming processed food production were to continue at the rate it was, especially if the population grew less active (Johnston et al., 2014). This rise in obesity and obesity-related issues is seen to be connected with the growth of industrialized food systems, which produce highly processed foods that are made very efficiently and at a cheap rate (Engler-Stringer, Schaefer, & Ridalls, 2016; Jennings et al., 2015). This kind of pricing would suggest that healthier foods would be less accessible due to its cost in comparison to the competition which is the cheaply produced processed food (Jennings et al., 2015). The affordability of and access to food is seen to be tied to socio-economic factors (Engler-Stringer et al., 2016; Larson, Story, & Nelson, 2009; Reidpath, Burns, Garrard, Mahoney, & Townsend, 2002; Tarasuk et al., 2015); this in turn

determines the environmental layout of the neighbourhood and thus the options that are made available in close proximity (Reidpath et al., 2002). As a result of this, Reidpath et al. (2002) suspect a correlation with the levels of obesity being recorded and the ease of availability of processed food such as fast food. Similarly, health is being increasingly associated with the nature of residents' environments, which would include what is available for purchase (Engler-Stringer et al., 2016).

A study conducted in Melbourne, Australia examining the density of fast food restaurants and the popularity of their locations provided sufficient evidence to claim that residents of a lower socio-economic status were in more interaction with fast food outlets (Reidpath et al., 2002). These factors created physical environments where exposure to energy dense foods would occur at a higher rate (Reidpath et al., 2002). There is still the question of why fast food outlets are so popular that they occur in high numbers- it is unclear whether they are set up as a response to local demand, or whether their presence creates a high demand (Reidpath et al., 2002). Another study conducted in the province of Ontario, Canada, concluded that a strong correlation exists between the number of fast food restaurants located in an area and the level of obesity occurring (Polsky, Moineddin, Glazier, Dunn, & Booth, 2016).

Perhaps a predecessor of the food swamp phenomenon, is the obesogenic environment, a term created in the discovery that health issues, such as diabetes and obesity, were affected by the physiological responses to an 'abnormal' living environment (Pincock, 2011). An obesogenic environment is thus described as one where food consumption is encouraged or physical activity is significantly discouraged (Hill & Peters, 1998). It must be noted how important the built environment is with regards to the health and well-being of residents:

“Our current environment is characterised by an essentially unlimited supply of convenient, relatively inexpensive, highly palatable, energy-dense foods, coupled with a lifestyle requiring only low levels of physical activity for subsistence” (Hill & Peters, 1998).

A very interesting point to note was made by Hill & Peters (1998), stating that obesity not only has to deal with the capability based on a person's genetic structure and body characteristics such as a negative mind-set, but it is also based on the natural responses made to the surrounding environment. Dietary habits and behaviour are influenced by the social, economic and physical components of the environments we are surrounded by (Minaker et al., 2016). Based on the environmental cues being provided, food landscapes play a significant role in the ability to encourage obesity rates (Minaker et al., 2013; Pincock, 2011). Environmental cues are one of the ways used in promoting a healthy lifestyle, by surrounding persons with healthy behaviours (Hill & Peters, 1998; Papas et al., 2007; Salois, 2012).

One of the major reasons partially responsible for encouraging obesity levels is the availability and tendency towards high fat diets (Hill & Peters, 1998). Another contributing reason that encouraged the trend was the popularity of the foods as well as the increase of portion sizes (Hill & Peters, 1998; Mattes & Foster, 2014). Fast food restaurants exploit this preference by offering 'super sizing' options to the high energy foods in exchange for a small financial cost; this creates a 'great value for your money' scenario and having too much food is not seen as an issue (Hill & Peters, 1998). The built environment plays a crucial role in providing appropriate options for residents, in order to encourage a positive and sustainable lifestyle. This encouragement can make an impact on the health of residents; educational outreach is important and a key tool in outlining the consequences of supporting large portion sizes and high calorie foods (Hill & Peters, 1998).

There is also literature that suggests that low income communities tend to have fewer supermarkets on average, as well as a higher density of convenience stores which tend to offer fewer healthier products than a grocery store and at a much higher cost (Beaulac, Kristjansson, & Cummins, 2009; Morland, Wing, Roux, & Poole, 2002; Weatherspoon, Oehmke, Dembele, & Weatherspoon, 2015; Whelan, Wrigley, Warm, & Cannings, 2002). Low income areas also show evidence of having higher densities of fast food outlets; given that these communities have limited options, this, along with trends of having low vehicle ownership, encourages food insecurity issues (American Planning Association, 2007).

### **2.3 Challenges in Measuring Food Deserts**

Areas where populations face physical and economic barriers to accessing healthy foods are deemed 'food deserts' (Apparicio, Clouter, & Shearmur, 2007; Battersby & Crush, 2014; Shaw, 2006). However this concept has been considered just that- conceptual, and less operational as a means of classifying geographic areas where food access is challenging (Reisig & Hobbis, 2000). Defining set parameters of food desert occurrence involves understanding what other factors affect food access, apart from geographical location (Reisig & Hobbis, 2000). These other factors have not been identical, thus describing various scenarios under the name of food deserts. This term has witnessed many debates about its definition - the varying combinations of economic, geographical, sociological and psychological factors can produce a variety of scenarios that would qualify a location as a food desert (Shaw, 2006).

While addressing the lack of food analysis in U.S Metropolitan areas utilising Geographic Information Systems (GIS), Sparks, Bania, & Leete (2009) measured food desert occurrence and any demographic and methodological correlations in Portland, Oregon. Their findings concluded that characteristics of food deserts to consider were proximity to supermarkets, level of poverty affecting the populace of the neighbourhood, vehicular access, as well as marketing competition (Sparks et al., 2009). Food deserts are defined slightly differently as an area with a lack of retailers that offer fresh fruits and vegetables and healthy food products (Weatherspoon, et al, 2015). This definition was utilised while researching the fresh vegetable purchasing patterns in Detroit, Michigan, one of the largest urban food deserts in the U.S.A that is further challenged with high income disparity and over 34% of the population being impoverished (Weatherspoon et al., 2015). The researchers sought to assess the demand for healthy foods and factors surrounding these demands such as preparation effort and storage facilities at the household level (Weatherspoon et al., 2015). In this approach to researching food deserts, it was found that residents in Detroit consumed low levels of fresh produce not only due to unaffordability, but also owing to unavailability (Weatherspoon, et al, 2015). They also drew conclusions in favour of revising

retail strategies of fresh produce to suit the limitations of low-income households (Weatherspoon, et al, 2015).

The food desert phenomenon has its origins within rural areas; one example being after the 1970s in the United Kingdom (Shaw, 2006). Due to a significant number of widowed women living in rural areas, food access became an issue where driving was necessary in order to purchase food; as car ownership became increasingly popular, there was a simultaneous decrease in public transportation services, as well as village grocery stores now that larger ones were supposedly more popular (Shaw, 2006). The term itself was first coined in 1995 when used in a policy debate by the Low Income Project Team in the United Kingdom (Apparicio et al., 2007; Beaulac, Kristjansson, & Cummins, 2009; Wrigley, 2002). The term was utilised to describe the trends being observed at the time in the United Kingdom, which linked low income neighbourhoods with becoming more prone to poor health (Wrigley, 2002). This correlation was enforced by the lack of accessibility to shops, creating higher prices that could not be afforded; thus creating food ‘deserts’ (Wrigley, 2002).

The consequences of having food deserts occurring have been stated to go beyond fulfilling the needs of a neighbourhood with regards to food access. The quality of the available food is put into question once the health outcomes change in response. The United States Department of Agriculture, in 2009, conducted a one-year study within the continental United States (i.e. island states were excluded) that explored the outcomes present in areas that were limited in accessibility and affordability to nutritious food (Breneman et al., 2009). One of the defining characteristics found surrounding the lack of food access, was significantly comparable income inequality, and in more rural areas there was a significant lack of transportation (Breneman et al., 2009).

It was also noted that within neighbourhoods that had poor food access, the smaller stores and convenience stores tended to have limited availability of healthy foods, as well as high costs attached to these items (Breneman et al., 2009). Supermarkets and grocery stores on the larger scale were found to be more affordable in comparison, and were the preferred place to obtain healthy food items (Breneman et

al., 2009). Issue can lie in the geographical placement of supermarkets; not all financial classes of society may have the ability to travel to supermarkets; even if public transportation were available, the physical endurance of fetching groceries cannot be expected by everyone (e.g. pregnant women, senior citizens).

To identify the extent of food desert prevalence, Breneman et al. (2009) commenced their research with identifying the locations of supermarkets and grocery stores and used this as a foundation for the database. Food access was then calculated based on the distance of residents to the nearest large food outlets, coupled with population filters such as lack of vehicle ownership and examination within specific socio-demographic sub-populations (Breneman et al., 2009).

While a substantiated theory is that food deserts result from a low socio-economic neighbourhood being unable to afford fresh and healthy foods, it is theorised that these ‘deserts’ occur simply due to a lack of an expressed demand for these foods (Weatherspoon et al., 2015; Wrigley, 2002). There are many links that contribute to the occurrence of food deserts - retail access is further determined by transportation and its affordability; household grocery choices are connected to knowledge and affordability, which can then lead to the nutritional and health paradigm being included in the conversation (Whelan et al., 2002; Wrigley, 2002). The development of the urban landscape can be influenced by the accessibility and affordability of its residents – that is, what is considered feasible to be implemented into a particular neighbourhood. For example, the lack of supermarkets can be attributed to the high operating costs that are not restored due to the lack of transportation infrastructure, thereby decreasing accessibility (Bitler & Haider, 2011; Weatherspoon et al., 2015).

A study using data from New Orleans, was conducted to identify whether the city was symptomatic of being a food desert, based on the variety of definitions that had been previously published (Rose et al., 2009). A strong claim made in this research was that the parameters for defining food deserts varied, and thus there was a variation in the phenomena being classified as food deserts; a claim similarly made by Reisig & Hobbis (2000) (Rose et al., 2009). The researchers noted that while this literature suggests that the more common factors to consider are the location and density of stores that sell food,

such as supermarkets and convenience stores, some researchers also include services such as restaurants and fast-food outlets in their parameters (Rose et al., 2009). Another discrepancy is the measurement selection of the researched area, where either density (the level of availability of retail food outlets within a certain radius or vicinity) or distance (how far residents are from the nearest supermarket) is utilised, sometimes even a combination of both (Rose et al., 2009; Sparks et al., 2009). In another study, researchers utilised different measures to illustrate food accessibility in the Chicago metropolitan area, resulting in a wide variation of areas that were deemed highly and lowly accessible (Jaskiewicz, Block, & Chavez, 2016). Utilising various measurement techniques can produce different results, thereby not allowing for a distinct measurement to account for defining what a food desert entails (Jaskiewicz et al., 2016).

Within the New Orleans study, illustrations were created to reflect the variety of definitions that have been published when explaining a ‘food desert’ (Rose et al., 2009). This provided visual evidence that utilising food desert constructs provided in the literature, enable the prevalence rate of food deserts to vary between 17% and 87% (Rose et al., 2009). These statistical figures varied depending on the angle utilised for analysing the neighbourhoods and their characteristics. For example, if a definition for food deserts centralised on ‘socially deprived areas’, a characteristic that would incorporate poverty levels, then the results would vary from if an area was analysed based the lack of proper food facilities (Apparicio et al., 2007; Caraher, Dixon, & Lang, 1998; Rose et al., 2009). It was also found in this study that if the food desert rate in New Orleans was calculated using a two-kilometre distance, it was 46%; however, using a distance of one kilometre it rose to 61% (Rose et al., 2009). At the end of their research, it was concluded that the term ‘food desert’ was not able to perfectly capture the food and access issues being displayed, but “the term may be useful for eliciting change” (Rose et al., 2009).

## **2.4 Food Swamps**

Urbanisation is a continuous process that can generate deficiencies along the way; these deficiencies however can also be continuously carried forward and thus remain unsolved (Davis, 1955).



As a result, the future outcome and potentials of urban spaces can never be predicted (Davis, 1955). This can be considered the case whereby the urban food landscape presents new challenges that require recognition, categorisation and further investigation. Through trying to understand the nature of food deserts and the best characteristics to attribute in identifying this occurrence, it was realised that a different food access issue was presenting itself (Rose et al., 2009).

While conducting the previously mentioned research in New Orleans, it was concluded that while food deserts are worth investigating and identifying, the use of such categorisation will only be helpful up to a certain point. What was a more concerning issue turned out to be not necessarily the lack of healthy and nutritious food being available, but the excessive amounts of unhealthy foods which are being made more readily available, thus metaphorically ‘swamping’ the area with calorie dense options (Rose et al., 2009). After observing that there was a significantly higher availability of energy-dense snack foods compared to fruits and vegetables, the researchers stated that:

“... the extensive amount of energy-dense offerings available at these venues may in fact, inundate, or swamp out, what relatively few healthy choice foods there are. Thus, we suggest that a more useful metaphor to be used is ‘food swamps’ rather than food deserts” (Rose et al., 2009).

One can argue that the variations in determining a food desert is extremely wide and could cause erroneous categorisation or food insecurity oversight. Food swamps have been identified as a result of looking for areas where food deserts occur, but instead finding a variation of the issue that did not qualify for any of the varying definitions that encapsulated food deserts. In order to specifically refer to food access issues that surround the concept of over-nutrition, the new terminology could correct the rate of observed occurrences of food deserts (Rose et al., 2009), thereby categorising food access issues into more appropriately defined phenomena and creating more accurate data.

It was noted that the role of convenience was important, as it was a common decision by community members to buy food from stores that are in close proximity, even if the products they were

looking for may not be available (Whitacre, Tsai, & Mulligan, 2009). In a research that conducted a systematic review of food desert occurrences, it was noted that due to a low-income status that discouraged ownership of a car, there was a reliance on small, independent stores and convenience stores (Beaulac et al., 2009). Unfortunately, these stores tended to have a poor selection of healthy foods as well as a large variety of unhealthy foods (Beaulac et al., 2009). Therefore, when considering proximity to residents, factors such as range of available healthy choices, quality of the choices and the affordability should also be considered (Whitacre et al., 2009). The rate of availability of the healthy choices is what can determine whether places can be categorised as a food desert or a food swamp.

Based on the literature reviewed, within food deserts there is a physical lack of food in an area, whereas within food swamps there is an abundance of food available. It should be noted that the defining characteristic of a food swamp is the high availability of energy/calorie dense foods; the abundant foods consist of significantly high energy foods such as 'junk food' and 'fast food'. This is the singular characteristic which defines this concept as an entirely separate occurrence from food deserts, where the overall lack of food availability is more stressed upon. This presents a scenario where consumers have little variety to choose from when looking for fresh or healthier foods. Food deserts are certainly a defined subset of food issues, with the roles of distance, accessibility and affordability playing significantly in its definition.

A food swamp has since been defined as an urban community that provides a disproportionate amount of unhealthy food choices, in comparison to the amount of healthy options made available (Minaker et al., 2016; Ortega et al., 2015). This phenomenon, along with food deserts, is presented as an important contributing factor to explaining obesity rates and similar community health issues (Ortega et al., 2015). In an intervention project conducted in American urban communities where the majority of the population was of Mexican/ Latino descent, the communities were described to be food swamps with the following description (Ortega et al., 2015):

“...high concentrations of fast food restaurants and other venues that serve foods that are high in fat and sugar (e.g. taco stands, sweet-bread stores, other places selling tamales or fried food, as well as fast food franchises). While there are few supermarkets, there are approximately 150 sole-proprietor owned corner stores in these communities. These small stores largely sell energy-dense foods, sugar sweetened beverages, alcohol and little, if any, fresh fruits and vegetables.”

Food swamps can even be speculated to occur as a result of attempting to eradicate the occurrence of food deserts by increasing the amount of food items available and being strategically placed in closer proximity to neighbourhoods. Unfortunately, the nutritional content of the increased options is limited in diversification it seems, and is creating a separate category of urban food issues. The food selling business is no longer limited to institutions that have food as their main product, such as supermarkets and smaller grocery outlets; food products retail has expanded to places such as pharmacies, convenience stores, and stores that advertise as a ‘dollar store’ (Whitacre et al., 2009). That is, the focus has appeared to shift from quality, and more on quantity.

Though only focusing on the conversion of corner stores, in order to see if there were any resulting changes in the nutritional input of residents, Ortega et al. (2015) were able to identify a need to change the food landscape of the communities due to the poor variety that was being provided and maintained. Data on any health improvements as a result of the corner store conversions have not yet been produced, that is, evidence to support the claim that food landscapes are responsible for obesity and other related issues. This data collection will occur over a two-year time span and is thus still in the research phase (Ortega et al., 2015). This is an indication of how new this topic is within the realm of research and urban food issues, and the need to increase the literature and accompanying research on the nature of food swamps.

In the U.S.A.<sup>2</sup>, attempting to improve food access, by increasing accessibility to and availability of all foods became a more probable reason for increased obesity levels (Breneman et al., 2009; Misselhorn et al., 2012). This is different from the lack of access to healthy foods, because it no longer factors food

accessibility, but more of the density of what is available. Density is a significant measurement in understanding the food environment, as it provides a count of the number of stores, as well as the type of stores, that are within a community (Breneman et al., 2009). Density can be used to map what stores are common, and potentially to what degree of competition is being developed - something that plays a role in the creation of cost of goods (in this case, food) (Breneman et al., 2009).

Food swamps, like food deserts, have been associated with low-income communities (Rose, et al., 2009; Blumenthal & Blackwood, 2013; NEWPATH Research Program, 2014) and are theorised to thrive in such conditions due to the high level of advertising that they are subjected to as compared to higher income neighbourhoods (Blumenthal & Blackwood, 2013). It has been noted by several researchers that promotional and advertising strategies employed in food stores are linked to the creation of food deserts; in such cases the visibility of selective items on shelf spaces and other tactics create a demand, instead of tending to a required supply (Rose et al., 2009). Similar tactics can be applied in the case of developing food swamps. And as a result, in the case of the United States, there is a correlation between the increase in food marketing and obesity (Blumenthal & Blackwood, 2013). One of the reasons for this correlation is affordability, where fruits and vegetables are more expensive and low income families must “compromise nutrition...to ensure they could provide food for the least expense” (Blumenthal & Blackwood, 2013).

Osorio & Corrandini (2013) note that residents who have access to a wide variety of healthy foods are within a healthy landscape, which encapsulates chain stores and large independent supermarkets; these landscapes encourage healthy competition, thus an increased variation of goods and lowered food costs. Conversely, retail competition is lacking in poorer neighbourhoods, which will not only result in a lack of diversity in goods, but also allowing the setting of high prices on selected products (Osorio & Corrandini, 2013). There is somewhat of a reverse scenario occurring when considering the placement of fast food restaurants however; as there is a high desirability by fast food areas to locate in low income areas, and

<sup>2</sup> – The titles “United States” and “U.S.A” are both phrases used to refer to the United States of America and are commonly used interchangeably.

thus food swamp creation conditions begin to form (Osorio & Corrandini, 2013).

The occurrence of having locally available food made unaffordable to locals, points towards an issue in affordability and pricing. One lens through which to observe this phenomenon is the ‘ghetto tax’ attached, which is a result of having businesses in low-income areas causing residents to pay more for products in order to cover the costs of business (Eckholm, 2006). Affordability, therefore, has the ability to place many low income residents into a corner with no choice but to support purchasing of high energy foods; for even if cheaper alternatives were found elsewhere, the energy expended on locating these alternatives and on transportation still puts low income residents at a disadvantage both time and cost-wise (Osorio & Corrandini, 2013).

The history and transition of food is extensive and can branch into countless directions of discussion. In the context of this literature review, the concept of food accessibility has become the clear overlapping theme throughout the issues discussed; it is also made evident that improvements on any system can potentially create new problems to be resolved. This point refers particularly to the concepts of food deserts and newly termed food swamps, with the latter somewhat evolving as a result of the former. These are both still food access related phenomena occurring in recent history and play a part in the sustainability and health of urban communities.

#### **2.4.1 Food Swamps in Waterloo Region**

In 2014, a report for the Nutrition Environment in Waterloo Region, Physical Activity, Transportation and Health (NEWPATH) was prepared by researchers from the University of British Columbia, the University of Alberta and the University of Waterloo in partnership with Waterloo Region’s Public Health Department and the Planning, Housing and Community Services Department (NEWPATH Research Program, 2014). Although Waterloo Region is comprised of the cities of Waterloo, Kitchener and Cambridge as well as the townships of North Dumfries, Wellesley, Wilmot and Woolwich (Donaher, 2012); this research surveyed neighbourhoods only within the three cities (Minaker et al., 2013)

and not the townships. The cities were surveyed by reviewing 1,334 retail food sellers and 1,170 residents from 690 households in 2009 (Weidner, 2014).

Waterloo Region showed to have only a small representative of the sample having good diet, which amounted to 0.3% of the sample; this is low when compared to the percent of good diet keepers in Canada entirely, which is 0.5%; this translates to five in every 1000 residents (CBC News, 2014). Furthermore, 39.6% of the remaining participants were shown to have a poor level of diet quality and the remaining 60% of the participants recorded diets where improvements were advised (NEWPATH Research Program, 2014).

Waterloo Region did not appear to be suffering from the symptoms of a food desert; however, there is an unnecessarily abundant level of unhealthy foods and beverages made easily accessible to residents, while only having an access level to quality fruits and vegetables deemed 'reasonable' (NEWPATH Research Program, 2014). Thus, food swamps are seen to exist within Waterloo Region, and it is the exposure to places such as convenience stores and fast food outlets that are fanning the flames of their existence (NEWPATH Research Program, 2014). According to the report, within a kilometre of a participant's home, the average amount of convenience and fast food stores recorded were five times more than grocery and specialty stores found in the area (Mitchell, 2014). The location of these outlets also showed a trend - convenience stores were found to be an average 521 metres away from a surveyed household; a grocery store was found to be an average of 1001 metres away from surveyed households (NEWPATH Research Program, 2014). Another critical observation made by the NEWPATH project was the amount of shelf space dedicated to high-energy foods was at least three times as much, as opposed to the space provided for fruits and vegetables (CBC News, 2014). The NEWPATH study was also able to show that consumers who had access to healthier alternatives had an improved quality in diet, thereby strengthening the confirmation of food swamp existence (NEWPATH Research Program, 2014). One of the researchers associated with the undergoing of this project, Dr. Leia Minaker, pointed out that the food environment that surrounds us influences the decisions that we make (Irvine, 2015). This is as a result of

having energy dense foods such as fast food and junk food made more available and at an affordable price (TVO, 2015).

## **2.5 The Traditional and Updated Role of Urban Planning**

“Nowhere is the current food crisis more visible than in cities”

(Sonnino, 2009)

This bold statement was written in a special Urban Planning edition of the International Planning Studies Journal in an article that emphasised the need to focus on food in urban spaces, an area that seemed to be overlooked and underestimated for a long time (Sonnino, 2009). City planning is theorised to have come into being in the 1800s, as a means to organise the poor living conditions within cities resulting from the Industrial Revolution (Blay-Palmer, 2009). Planning law is the creation of guidelines that regulate the creation and development of human habitats (Spencer, 2014). The realm of planning focuses on how to improve the liveability and functionality of a human settlement not only in the present, but in the future as well; it is the overarching network of functional systems that create the communities we are familiar with and is usually developed with the public interest in mind (Pothukuchi & Kaufman, 2000). Along with water, food is a necessary substance that allows living beings to be just that – living. The food system is defined as:

“...the chain of activities connecting food production, processing, distribution, consumption, and waste management as well as the associated regulatory institutions and activities” (Pothukuchi & Kaufman, 2000)

Therefore, it is unclear and perhaps even worrying, that while other necessities of life such as water, air and shelter receive significant attention from planning councils and committees, food has been an element that lacked professional focus from a planning perspective (American Planning Association, 2007). Urban food security is overlooked by issues that are more pressing, such as overpopulation, unemployment, functional infrastructure and capable services (Crush & Frayne, 2011). An urban society

is disconnected from their food (Haysom, 2015; Czarnezki, 2011). In rural areas, consumers live near to where their food is produced or somewhat engaged in the production process; in urban spaces, however, consumers are exposed to just the purchasing of their food at the very least (Pothukuchi & Kaufman, 1999 ;Sonnino, 2009). Restaurants, convenience stores and supermarkets are strategically located within the appropriate zones and sectors of the neighbourhood. The decisions made to locate food retail outlets is handled by a multitude of stakeholders – from legislation and land use planning to the developers, designers and managers of the retail outlet (Black, Carpiano, Fleming, & Lauster, 2011). The choices presented in close proximity to a resident can thus also play a role in the development of the frequency of purchase, which can produce scenarios both positive and negative. For example, living near to a farmer's market can create the potential to encourage an individual to frequent the market, thus creating a higher chance of purchasing fresh foods (Minaker et al., 2014). This in turn could improve the well-being of the individual as they now have the ability to purchase fresh food items with minimum hassle and possibly gravitate towards healthier eating habits.

Black et al. (2011) further explain that zoning in North America has placed emphasis on development of residential neighbourhoods, which in turn displaces the idea of having a more multi-purpose land use plan. While zoning and planning are key actors in the development of an urban food system, the choice of the food outlet type is also responsible for the ultimate offerings provided to the neighbourhood. The choice of what retail outlet to allow in a commercial space is not about achieving balance of goods and services, but more about the risk vs. reward strategy (Black et al., 2011). It therefore appears that the goal is ultimately having the ability to thrive as a business, and not necessarily fill a gap where food access is concerned.

Cities create a high demand for food; as such, an industrial food system is looked towards for assisting with this task (Spencer, 2014). However, this is not necessarily a positive relationship due to the adverse effects felt on the health of the public as well as the environment (Spencer, 2014). The industrialised food system has made abundant foods that undergo a higher rate of processing. Processing



is intended to make food safer to eat, and is conducted in many popular ways such as cooking, freezing and canning (Benderly, 2011). However, processing takes a toll on the food being preserved, by sometimes modifying the nutrient content (Benderly, 2011); ultra-processed foods have additional amounts of sugar, salt, fats and non-naturally occurring chemicals added to the food for imitating the taste of less processed food (Steele et al., 2016). This food system has also made meat and dairy products more available, as well as foods containing high amounts of oil and salt (Ericksen, 2008; Jennings et al., 2015; Johnston et al. 2014).

The regulation of these foods should be encouraged in order to preserve the health of the urban population. Planning systems have come to acknowledge the relationship of food with the built space that planners overlook; there are many dimensions to the linkages between urban planning and food (American Planning Association, 2007). Food is an integral aspect of society, including the urban one; it is therefore noteworthy that the urban food system has not been traditionally associated with the urban planning sector (Cassidy & Patterson, 2008; Pothukuchi & Kaufman, 2000), which would be responsible for the flow and structure of a community. It has been documented that there is a significant lack of attention from the social scientists of the planning sectors with regards to achieving sustainable food systems and practices (American Planning Association, 2009; Sonnino, 2009).

Planning as it pertains to the organisation and development of food access was traditionally carried out through the regulation of related infrastructure and zoning. The roles have varied; here are a few examples as outlined by the American Planning Association (2007):

- Land use planners utilise growth management strategies as a means to regulate land allocated to farming and ranching. They also share the responsibility of organising commercial districts by indicating where it is appropriate for restaurants and grocery stores to be located. Land use planners also assist with the development of food growth in communities such as community gardens and other similar initiatives.

- Economic development planners focus on the maintenance of smaller, independently owned food retail outlets and grocers, as well as finding ways to encourage food processing-related industries to the industrial zones of their community or region.
- Transportation planners have responsibilities such as ensuring that food access is as equal as possible for all economic level households, especially those that are low income.
- Environmental planners contribute to food security by ensuring that food production is carried out with considerations of any adverse effects that may occur, such as to natural bodies of water.

Planning as a practical field of work, in this case that within the urban realm, is trusted to be comprehensive in scope and incorporate the many angles and interconnections within a community (American Planning Association, 2007). Food issues have been given attention in the traditional sense of growth, development and maintenance. However, when it comes to food as it relates to a more holistic community and the sustainability of its practices, this is not as traditional. Because planning deals heavily with the built environment, it appears that food and its revolving issues have slipped through the crack between the heavier attention to air and water, and the focus of services and facilities that do not incorporate the private sector - public infrastructure such as sewage systems, public transit and parks (American Planning Association, 2009; Pothukuchi & Kaufman, 2000). Evidence regarding the influence of the built environment has only become a factor to consider in food-related outcomes within the past two decades (Minaker et al., 2013; Minaker, Fisher, Raine, & Frank, 2011).

In a case study of the impact of zoning regulations and the dispersion of grocery stores, in British Columbia, Canada, one of the key findings by the researchers was that urban planning and the exclusionary zoning policies in place played a significant role in the density and spatial layout of food stores in the province (Black et al., 2011). Supporting this conclusion was previous research conducted in both Montreal and Edmonton, Canada, indicating that financial prosperity of the neighbourhood did not play a notable role in fruit and vegetable accessibility in the cities (Apparicio et al., 2007; Smoyer-Tomic, Spence, & Amrhein, 2006). This led the researchers to believe that more attention may be worth paying to

the mechanisms behind the decisions to place food outlets in their geographic locations (Black et al., 2011). As a result, one speculation presented in relation to food security was that what is made available in the local residential environment has the ability to influence dietary behaviour (Black & Macinko, 2008; Black et al., 2011; Irvine, 2015). As a result, what one can locate in the close proximity of their residences can play a pivotal role in the decisions made regarding food choices.

Unfortunately, the scenario can also be the total opposite, and individuals may come face to face with negative possible outcomes based on the type of food products available in close proximity to their residences. Research shows that the food system is not dealt with on a regular basis in the realm of planning, even though planning creates such influences that impact the food landscape in a community or city (Pothukuchi & Kaufman, 2000). Based on a historic absence of food systems as a topic in planning literature, it can be said that food systems are now receiving more attention due not only to the awareness of its existence, but because of the various ways in which the food system breaks down and produces publicly felt issues (and thus the creation of new terminologies and categories of food challenges being met).

In a study conducted in the United States, 22 city planning agencies were contacted regarding their focus, if any, on food related issues and were asked about having food policy councils and/or food organisations that acted recently (Pothukuchi & Kaufman, 2000). It was discovered by the researchers that the city planning agencies were not equipped with the knowledge of the food system to make any proactive decisions; any actions that were taken tended to be more reactive in nature (Pothukuchi & Kaufman, 2000). A similar lack of assistance or input was cited years earlier in another research concerning the U.S.A.'s 1995 Farm Bill and policy creation towards a more sustainable food system (Gottlieb & Fisher, 1995). Gottlieb & Fisher (1995) noted that the government's response to various food related issues in both the urban and rural communities lacked cohesion and an overarching vision. They also noted that the individual programs created to assist with food related issues were not in favour of developing long term solutions that would support a sustainable food system (Gottlieb & Fisher, 1995).

Within the last decade, planners have become more active in their role to improve the healthy and sustainability of food systems within cities, ultimately improving the well-being of municipalities (Mah, Cook, Rideout, & Minaker, 2016). This approach is already seeing results in Canada, in areas such as Victoria, British Columbia and London, Ontario, apart from Waterloo Region (Mah et al., 2016). The task of urban planning and food now goes beyond just feeding the city; it has evolved to encompass the economic outcomes of supporting various food sources (such as local vs. imported) (Sonnino, 2009). It has also started to consider the well-being of the community in a social, health and cultural perspective (Sonnino, 2009). Urban food planning has begun to grow roots and becoming an important decision making sector where a sustainable food system is concerned; consumers and producers are becoming more aware of the effects food production and consumption has on public health, ecological integrity and social justice (Morgan, 2012). In Canada, strides of progress are observed such as in Toronto, where the Toronto Food Strategy and the Toronto Food Policy Council are now existent elements (Morgan, 2012); before, food insecurity was treated as a domestic problem and not a political one, thereby not attracting the relevant policy attention (Crush & Frayne, 2011; Maxwell, 1999). The understanding and development of appropriate food systems was a new concept in the realm of planning at the start of the new millennium (Morgan, 2012).

Food policies have a tendency to be associated with agricultural regulation, which are geographically located in rural areas, or areas that are not at the scale of an urban city. As a result, the misconception of food security and malnutrition not being associated with an urban space has also translated itself into the lack of correlation between food issues and urban areas (Battersby & Crush, 2014; Haysom, 2015) .

Unknowingly, the Toronto Food Policy Council after its formation in 1991 (Toronto Food Policy Council, 2016) became an exemplary model to follow when other countries began embarking in taking similar steps to incorporate food policy development into their urban planning strategies (Blay-Palmer, 2009; Morgan, 2012). In 2006, the Healthy and Sustainable Food for London strategy was launched in an

attempt to focus on reducing food miles and the associated environmental damage, as well as to tackle the 20% obesity rate London was facing (Reynolds, 2009). Toronto has also been the influential example that encouraged many Food Policy Councils to be formed in the United States (Morgan, 2009). Soon enough there was a growing interest in developing sustainable food planning policies around the world – in 2012 there were more than 100 such policies worldwide (Morgan, 2009). The Toronto Food Policy Council is credited for being able to provide a model for other cities to imitate; one that incorporates improved planning strategies as it focuses on relieving social, economic and environmentally taxing actions and legislation as it relates to food security (Morgan, 2008).

The urban food system was highlighted as a significant factor in the health of urban populations in Australia, as well as the environmental health of food producing lands (Spencer, 2014). Spencer (2014) identified the planning laws in place in Australian urban spaces as an influential factor in the food consumption choices made by members of the population, though it must consider the consumers' right to a freedom of choice. Banning or elimination of products are options that are highly unfavourable and can be considered interference with the freedom of choice given to consumers (Spencer, 2014). This creates the perception of government ruling being more 'parental' or 'babysitting', a vision that created controversy in previous attempts to strengthen food consumption regulations in Australia (Spencer, 2014).

The planning committees focusing on food are a graft of many professions and backgrounds in both the public and private sectors working together for the common goal of having a food system that is sustainable and more aligned with the goals of public health improvement, ecological integrity and ensuring social justice (Morgan, 2012). It is important to consider alternative means of encouraging a healthy diet. Food swamps are a phenomena named as such due to the abundance of calorie-dense foods made available to consumers in comparison to healthier or fresh foods. Food plays a significant contributing factor to environmental impact in urban society (Morganti, 2011). Although food transportation is the culprit identified (Morganti, 2011), there is reason to believe that the erosion of the

relationship between people and food plays a role in the negative environmental and food trends occurring as well.

Strategies are focusing on not only bridging the gap between food and the health and social well-being of urban residents, but are also aiding in the re-design of the urban environment to incorporate the goals of improved quality of life for residents (Sonnino, 2009). Sonnino (2009) suggests that sustainable food systems can be developed with focus on public food and the spaces in which they are sold, as well as an integrated approach when developing food policies.

## **2.6 Food Security and Students**

Food swamps are an emerging aspect of urban food security, and as yet does not have a substantial published literature associated with the concept. While Waterloo Region has conducted a region-wide survey that produced data on food swamp prevalence, there is no significant attention given to the student population that resides within the region. This is noteworthy, given that the region hosts two large universities as well as several colleges, making the student population a significant portion of the residential demographic (Region of Waterloo, 2010).

While food security amongst students is a recent concern, there are studies that point towards an increasing recognition of the problem, especially as students are a subgroup of the population demographic that experience a unique set of vulnerabilities. While conducting food security research at the household level in Canada, the PROOF Research Team was able to identify correlations between hunger and health in children and possible negative manifestations in adolescence and early adulthood (McIntyre, Williams, Lavorato, & Patten, 2013; Tarasuk et al., 2015). Studies show that food insecurity is related to students who are earning lower grades and come from less well-off financial backgrounds (Patton-Lopez et al., 2014). A situation whereby a student must choose whether to afford living or to cut corners in order to pursue studies is an extremely serious one. Discontinuation of studies or poor maintenance of grades can affect the future of students regarding their means of eating; social and mental

aspects of their lives are also affected (Patton-Lopez et al., 2014). There is, however, little research to support this for now (Cady & Oregon State University, 2014; Patton-Lopez et al., 2014).

Between the years 2007 and 2010, a food security related survey was developed and distributed to students at the University of KwaZulu-Natal, in an attempt to understand trends related to poor academic performance (Munro & Quayle, 2013). The results displayed high levels of worry regarding students' sourcing of food, as well as students' hunger; this in turn resulted in difficulties with concentration and struggles with fatigue (Munro & Quayle, 2013). In particular, students who were receiving financial aid for their studies had a higher rate of vulnerability to food insecurity (Munro & Quayle, 2013).

In 2014, another such study was conducted at Western Oregon University regarding the nutritional circumstances of the students attending (Oregon State University, 2014). The results showed that 59% of students were categorised as 'food insecure' (Radcliffe, 2014). The reasons for this occurrence included rising cost of college tuition, a high cost of living (Oregon State University, 2014) and a change in socio-economic background of students (Radcliffe, 2014). There are more students who are the first of their families to attend college, and as a result having limited funds that can be utilised for sustenance while attending school (Radcliffe, 2014). Research has also indicated that food insecurity has shown associations with poor health and nutrition, lowered academic achievements and an increase risk in becoming overweight or malnourished (Gallegos et al., 2014). There is reason to believe that food insecurity can have a direct relation with the reduction of physical and mental capacity in students; it also has the potential to hinder the social and economic aspects of their lives (Hughes et al., 2011). Inadequate food intake or improper timing of food intake can result in health issues that can affect the ability of students to function at their best when studying and/or working (Hughes et al., 2011). If these aspects of health are diminished, then students' abilities to have healthy, active and social lives are also diminished (Hughes et al., 2011)

The circumstances are not alleviated if students take on employment whilst being a student; the Oregon University study showed that students were working an average of 18 hours a week whilst

studying (Radcliffe, 2014). This does not leave much time for meal preparation, grocery shopping and cooking. Another correlation made in this study was that students who identified a lifestyle characteristic of food insecurity had a likelihood of having a 3.1 grade point average (GPA) or lower, in comparison to students who were more food secure (Radcliffe, 2014).

As argued in this review, food security can take its form in more ways than one, from not having sufficient food to not having a high-quality diet, and even in the form of having anxiety about food acquisition and the reliance on relief and external services involving charity (Hughes et al., 2011). In a cruel metaphorical manifestation of a double-edged sword, food insecurity can be held responsible for both over-nutrition as well as malnourishment (Hughes et al., 2011). This goes to show to what extent a nutritional balance is important, or else the health of a person can sway to less ideal conditions.

Another study was conducted at the University of Hawai'i with 410 students surveyed about the presence of food insecurity in their household and to what degree it was prevalent (Chaparro, Zaghloul, Holck, & Dobbs, 2009). The results showed that 45% of the surveyed students were experiencing food insecurity or a risk of it befalling them (Chaparro et al., 2009).

At another university, this time in Australia, 400 students were surveyed regarding their food habits, financial and transportation situations, and usage of support services related to food (Hughes et al., 2011). It was noted from the survey results that personal finances and time management were two components that greatly influenced food related decisions with food insecure students more than those who categorised themselves as food secure (Hughes et al., 2011). Students who had food prepared for them were also less food insecure than those who relied on buying takeaway food (Hughes et al., 2011). This research provided evidence to support that low income is strongly correlated to the ability to maintain food security, even as a student; the suggested measures to be taken by this research were to revise the government policy and the role it plays (Hughes et al., 2011).



Further interesting research was conducted on the campus of the University of Alberta, where the Campus Food Bank Hampers were examined to determine whether they are providing adequate and balanced nutrients for recipients (Jessri et al., 2014). Hampers were distributed to more than 1,500 students and thus it was crucial to ensure that a balanced source of nutrition (or as close as possible) was being offered (Jessri et al., 2014). The research found nutritional inadequacies with the hamper, resulting in food insecurity amongst the students even after utilising the hampers (Jessri et al., 2014). One observed issue was a deficit in the amounts of vitamin A and Zinc that were being provided in the hamper items (Jessri et al., 2014). The second issue was that the iron content of the items was in the form of lower-frequency absorption foods; this could potentially be an issue for iron deficient students who depend on the hamper's items for sustenance over long periods of time (Jessri et al., 2014).

An additional related issue with the hamper was the high fibre content, which would also negatively affect iron intake in the body (Jessri et al., 2014). Yet another iron-related issue was the lack of animal sources of food, which meant a high reliance was being put on plant based meals (Jessri et al., 2014). This would not be ideal in the case of distributing food to more than 1000 persons who are not necessarily in agreement with a heavy plant based lifestyle (such as vegetarianism) (Jessri et al., 2014). As a result, these minor deficiencies add up to produce a substantial reason to classify the students who receive the hampers remaining as food insecure. Jessri et al. (2014) note that one way to overcome this barrier is to involve the skill of a dietician when outlining the policies surrounding food hampers. It may seem like a few inadequacies, but considering the food hampers are given to students who already cannot afford food at its regular cost; it would be a challenge for them to supplement the hamper with items such as meat and dairy products, which can be expensive (Jessri et al., 2014).

More recently, a food security focused study was conducted in the U.S.A. across four universities in the state of Illinois involving the participation of 1882 students. It was recorded that 16.6% of the students identified with having low food security, while another 18.4% of students suffered from very low food security, totalling to 35% of the student population (Morris, Smith, Davis, & Null, 2016). There was

a correlation noted between the level of food security and the recorded grade point average (GPA) of students; students with the lowest GPA scores were more likely to be found food insecure, while those with higher GPA scores were less likely to be found food insecure (Morris et al., 2016).

While the importance of policy and governance have been outlined as key stakeholders in improving food security for students, Gallegos et al. (2014) look at ways the schools themselves can improve their agenda and provide an improved food landscape for tertiary students, so as to ensure this encourages the retention of students in any way possible. Studies conducted in Canada show that food insecurity has a high correlation with the rising of academic tuition fees and inadequate loan support; as a result, students turn to more affordable and not necessarily healthy alternatives for eating (House, Su, & Levy-Milne, 2006; Hughes et al., 2011; Rondeau, 2007). One of the measures taken as a result of this is the placement of food banks on campus (Hughes et al., 2011).

In another study, after conducting a web-based survey to students on campus at an Australian university, results showed that one in every four students were suffering from food insecurity at the household level; there was a significant decrease in these students' intake of fruit and vegetables (Gallegos et al., 2014). Also related to these food insecure students were the likelihood of having poor or fair health as well as deferring their studies for financial reasons (Gallegos et al., 2014). Solutions at the tertiary institution level have been proposed to include additional assessments of students to purposely determine their food security status; this information could be then used to link students suffering from different variations of food security to appropriate programs and assistance (Cady & Oregon State University, 2014).

Food security is not an unusual occurrence with students; a study conducted in a large university located in the south-eastern area of the U.S.A., revealed that 14% of the students were experiencing food security in some shape or form (Cady & Oregon State University, 2014). There are several researches carried out indicating that there are negative impacts associated with food insecurity at the elementary and high school level of students (Cady & Oregon State University, 2014). The assumption is therefore carried

forward that food insecurity is affecting tertiary level students as well (Cady & Oregon State University, 2014).

It is noted that not many young adults in the U.S.A. meet the national dietary recommendations that achieves optimal nutrition (Nelson & Story, 2009). Especially with those who are students enrolled in college, it has been observed that this period of time strongly correlates with poor eating habits as well as an increase in body weight (Nelson & Story, 2009). There is little knowledge regarding the food environments in the residential settings of young adults, so the dormitory rooms of young adults were investigated in a research conducted by Nelson & Story (2009) through the University of Minnesota. The aim of this study was to conduct an observational assessment of what foods and beverages would be located in the dormitories of students (Nelson & Story, 2009).

After observing this setting, it was found that the most popular items fell under the category of ‘salty snacks and other savoury items’; out of the 100 volunteer students recruited, 88 had this type of food item in their dormitory (see Table 2) (Nelson & Story, 2009). Only 54 of the students in the study had fruits and vegetables (Nelson & Story, 2009). The presentation of the results show how processed or less healthy foods are most dominant purchases at the top of the list, while healthier food items are the least popular purchases at the bottom of the list. While 78 students were noted having ‘main dishes’ in their dormitories, it is noted by the researchers that this category consisted of meal items such as microwaveable meals, pasta and bread products (Nelson & Story, 2009). Therefore, it is not entirely clear if students were having healthy main dishes.

The results of the study carried out provided evidence that was similar to other studies which suggested that unhealthy diets and additional weight gain were common within the student population, and there was also a correlation of what students had available in their dormitories and what they consumed (Nelson & Story, 2009). As a result, the research concluded by highlighting that campus food outlets are important outlets to encourage and promote improved nutrition strategies (Nelson & Story, 2009).

	<i>Number of items</i>	<i>Students with item in dorm. room (%)</i>
<b>Food Items</b>	2259	96
<i>Food and beverage subtypes</i>		
<b>Salty snacks and other savoury items</b>	349	88
<b>Cereal or granola bars</b>	336	78
<b>Main dishes</b>	380	78
<b>Desserts/candy</b>	403	75
<b>Sugar-sweetened beverages</b>	211	71
<b>Low-calorie beverages</b>	114	57
<b>Fruit and vegetables</b>	149	54
<b>Dairy Products</b>	65	41
<b>Tea/coffee</b>	93	39
<b>100% fruit/vegetable/ juice</b>	23	23

**Table 2: Food and beverage characteristics in a university dormitory**

**(Source: Adapted from Nelson & Story, 2009)**

## **2.7 Food Security and Sustainability**

Food security is a goal that is constantly being worked towards and within this concept there are many issues to be dealt with. This is not only in light of health and nutrition concern, but also due to the various environmental challenges that are being faced (Veeramani, 2015). The importance of nutrition and the need for secure and sustainable food consumption is a strategy that is becoming increasingly recognised (United Nations, 2015). Identified under the United Nations' new list of 17 Sustainable Development Goals, food security is the second goal that targets not only reduction of hunger, but also the improvement of nutrition as well as the promotion of sustainable agricultural practices (United Nations, 2015).

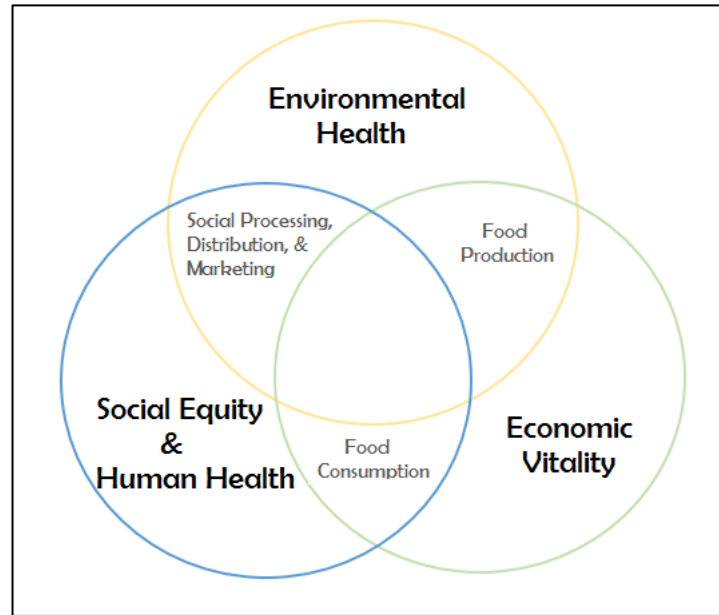
Sustainable development has been defined as a means to consider the future generations' well-being while simultaneously catering to present generations (World Commission on Environment and Development, 1987). In 2005, Waterloo Region was able to publish its first food system assessment, which described some less than desirable outcomes for the people that resided in the region; there was a

one in ten occurrence of food insecurity with residents, as well as a difficulty for farmers to earn a living through their traditional farming methods (Region of Waterloo Public Health, 2013). The assessment also noted that the fossil fuel usage by the food system was not sustainable, and encouraged a goal of working towards a healthy food system (Region of Waterloo Public Health, 2013). This is defined as a system where: “...all residents have access to, and can afford to buy, safe, nutritious, and culturally-acceptable food that has been produced in an environmentally sustainable way and that sustains our rural communities.” (Region of Waterloo Public Health, 2013). This definition has many of the traits that aims to be achieved within the concept of a sustainable food system.

Even though not directly related to the commonly assumed sustainability related factors of the environment, it is important to understand the human and social aspects, and how food access can be improved to ensure ‘sustainability’ is realised in all manners and forms. A sustainable food system utilises the concept of sustainability and executes its application to overcome food insecurity matters; it can be defined as a system where food that is consumed meets criteria of accomplishing environmental health, economic vitality and human and social equity (Food Security Network NL, 2014). The Venn diagram in Figure 1 shows these criteria and how they are inter-related. A sustainable food system is perhaps the most appropriate placement for the solution to reduce food swamps, in the context of sustainability.

Food swamps can be perceived as a challenge to overcome in order to achieve a sustainable food system. Understanding why food access is limited can lead to the corrective measures being put in place. For instance, if the cause is due to the development costs in order to increase food accessibility, then this indicates a need for subsidy programs and the reconsideration of zoning policies (Breneman et al., 2009). If, on the other hand, the major influencing factor is based on the consumers, such as a lack of nutritional knowledge and awareness, then public education and health knowledge can be focused on (Breneman et al., 2009). The American Planning Association acknowledged that they have a large role to play in the reduction of both hunger and obesity levels; there is also an economic component to acknowledge as

supporting local food growth and rearing is a means to develop the local and regional economies (American Planning Association, 2007).



**Figure 1: Venn diagram explaining the relationships within a sustainable food system**

**(Source: Adapted from Food Security Network NL, 2014)**

The concept of a sustainable food system can be inclusive of a variety of food networks, including that of an urban space. A sustainable food system can exist if it is made affordable enough for people to access it on a more regular basis. For this, one of the main factors would be cost. An opportunity to create a better food environment (which in turn can contribute towards a sustainable food *system*) can present itself in the lowering of the cost of food in an urban space. One suggested means of doing this is to access more local sources of food, which would not only reduce the number of persons the produce must go through in order to make it to the destination (Jennings et al., 2015), but it would also encourage the support of local food producers. If there are less intermediate players, then the costs can possibly be reduced, in order to make the produce more affordable and accessible to more members of society (Jennings et al., 2015). A study carried out in London, Ontario focusing on the impact of farmers' markets

on pricing and availability of goods, revealed that the presence of a farmers' market affected the price of groceries by creating a decrease of 12% over three years (Larsen & Gilliland, 2009). The introduction of fresh food from a close proximity allowed for the availability of fresh food to increase and lower food cost gradually, making the fresh options readily available to a larger population (Larsen & Gilliland, 2009).

The relationship between food and the environment can be immediately thought of in the traditional agricultural sense, with factors such as land use, water, climate being analysed in relation to their impact on crops and livestock. Subsequently, sustainability in the context of food is also traditionally rooted in the agricultural, resource use and production aspects of food. This is not the only relationship that exists between these two elements. Food and sustainability can be looked at it in terms of the interaction of food with a community on a holistic level- this involves the physical space, financial, physiological, and health aspects that residents are maintaining.

Reassessment is needed for the way in which food supply is issued in towns and cities as well as the rural areas around them (Jennings et al., 2015; McMahon, Holmes, Barley, & Barley, 2011). Providing evidence of this are the increasing cases of climate impact from agriculture, health impacts such as obesity, ecosystem degradation and employment instability especially in rural areas (McMahon et al., 2011). Building sustainable food systems is becoming a popular strategy to revise and improve the policies and strategies of the food system and the accompanying societal welfare (Allen & Prosperi, 2016). Production and consumption of food plays a very large role that can impact the building and expansion of sustainable food systems for cities (Jennings et al., 2015). These statements highlight just a few of the many angles of food security that is being investigated in recent years.

The occurrence of food swamps does not instantly reflect a deficiency in sustainable practices; rather it is a result of poor insight into the structure of the food landscape. If it were to be studied from a sustainability perspective, the most appropriate context would be within the realm of sustainable food systems. Using Figure 1 as context, food swamps deal primarily with the economic vitality and the social

equity and human health of the food system, hence being directly related to food consumption. Environmental health is more focused on the agricultural and production aspects of food, whereas food swamps focus on the purchasing options and the accessibility.

One of the findings published by Rose et al. (2009) was that there was a consistency in the lack of accessible healthy foods, with the examples of fruits and vegetables given. In the research carried out by Larsen & Gilliland (2009), they observed that more research is required in order to understand the nature of food access impacts and its relationship with Canadian residents. They also shed light on the issue that supermarkets, although abundant in affordable fresh groceries, are not easily accessible (Larsen & Gilliland, 2009). Therefore, intermediate solutions such as setting up farmers' markets solves the issue of proximity and availability. Their research also provided evidence that, in time, such establishments have the ability to influence price and make produce less expensive and more available to households of varying financial brackets (Larsen & Gilliland, 2009).

Through researching the nature and prevalence of food swamps, the intention was to highlight that food swamps, residing under the broad umbrella of food insecurity, is an issue whose presence disrupts the positive intentions of sustainable food practices and thus must be regulated accordingly. This can only be done feasibly if there is a substantial amount of data and literature to provide evidence of the existence and significant prevalence of food swamps, as well as any subsequent trends that are being observed due to its presence.

## **2.8 Gaps in the Literature and Conclusions**

In order to remain up to date with any research published regarding food swamps and as part of data collection for the literature review, a weekly Google Alert was created with this term. The Google Alert would then highlight any publications made available with the words 'food swamp' in it and generate a weekly list to the subscriber. During this research, this alert was kept active over a span of approximately seven months between 2015 and 2016. Only two articles of relevance were identified in the list of publications generated; all other articles were regarding either the geographic feature of swamps or



other food related issues that were irrelevant to this research. This is just one indication of the lack of relevant literature available to address the issues associated with urban food insecurity.

The gaps that were identified strengthen the argument that food swamps need to be understood more and identified better in order to reduce its occurrences and outcomes. The gaps in the literature also point toward a lack of research being conducted with students as the target population in food security research.

### **2.8.1 ‘Food Swamps’ Needs More Supporting Literature and Data**

A study conducted in the U.S.A. uncovered the shift from food deserts to food swamps when looking at whether local food availability had an impact on the obesity rate in children (Lee, 2012). Although the results were inconclusive, it was noted that children who resided in a lower-income community had more access to fast food and convenience stores (Lee, 2012). Such communities had almost double the amount of these food retail outlets (Lee, 2012). Lee also mentions that the data acquired did not include questions regarding what people were buying and their reasoning for the purchases (Morrison, 2012). This information provides proof of a gap in data that could be investigated in order to strengthen the premise of food swamps. It is no longer a question of whether grocery stores with healthy options are present, because Lee’s research shows that they are- it is now a question of why are there are more fast food outlets and convenience stores present and why are persons choosing these options (Morrison, 2012).

The degree of diversity presented with the definitions of a food desert shows that the concept is approached with various boundaries, and can thus lead to varying results - in an extreme case using one definition can potentially categorise an area as a food desert, while another definition can omit the area. On the less confusing side, literature on the subject has consistently shown an agreement that lack of availability of fresh fruits and vegetables within neighbourhoods is categorised as food deserts (Rose et al., 2009). However, these discrepancies make clear the lack of compounding literature available to

uniformly define such occurrences, and thus sheds light on the need to enforce the boundaries of the definitions.

The importance of studying food accessibility patterns such as food deserts has been noted by the Economic Research Service of the U.S. Department of Agriculture; the role of food produced locally and its accessibility has opened the doors for social change and enlightenment (Whitacre et al., 2009). The health outcomes and implications resulting from food deserts began to be researched in the United Kingdom since the 1990s (Whitacre et al., 2009). It was seen that the discussion and investigation of food deserts in the United Kingdom resulted in the combined efforts needed from the public health sector, economists, community planning and advocacy just to name a few (Whitacre et al., 2009). It requires a multi-sectional approach in order to improve food access because the effect is also multi-sectional (Whitacre et al., 2009).

In order to improve and sustain healthy communities, a key aspect in which information and data is important for, geographic accessibility to healthy food should be understood (Rose et al., 2009). Identification of areas where food access is sub-par allows for policy development in the direction of improving food and nutrition as well as community health, development and food security (Rose et al., 2009). During a food access study conducted in London, Ontario focusing on food deserts, it was determined that more research was required in order to understand the rate and ways in which food access is affecting Canadian city residents (Larsen & Gilliland, 2009). Larsen & Gilliland (2009) also point out the lack of research associated with food deserts; this indicates an even bigger gap in the resources available to understand food swamps and other evolving urban food issues.

Based on the literature available, it appears that a link between health issues and urban food access has been established but not with enough substantial research supporting it, even though a correlation is speculated. Understanding the variations of new and evolving trends in food systems are a key point which should be further studied in order to be understood. The connections between accessibility to nutritious food and systems of measurement such as the Body Mass Index (BMI) are still

poorly understood (Breneman et al., 2009). Consumers must be able to understand the relationship between BMI and their health; transportation and financial resources are the well-known and prioritised factors but consumers should also be knowledgeable of the foods that they should be consuming and how to prepare it (Shaw, 2006).

Conducting research in Waterloo Region, Ontario, an area where food swamp occurrence has already been established (NEWPATH Research Program, 2014), will allow for further understanding of the choices made by consumers, and what factors play the biggest role in the decision making process. Understanding why certain choices are being made can then provide a foundation for improvement of policies in Waterloo Region to support the recovery from food access issues. Health and well-being are important factors that fall under the holistic umbrella that sustainability presents itself as.

If the physical landscape of our environment is truly affecting decisions that, in turn, can affect food demands as well as community health and well-being, then the concept of sustainability is being breached and issues arising should be dealt with accordingly and as soon as possible.

### **2.8.2 Urban Food Security Needs More Attention**

The gap in the literature also has the potential to address ongoing urban food system issues through the means of action research (Sonnino, 2009). Sonnino (2009) debates that the scope of the food security being faced in cities needs to be addressed during the ongoing process of collecting data and information regarding how to update the urban food system. Sonnino (2009) adds to this statement by highlighting the role of applied researchers in this transition – they have the potential to contribute to the ‘knowledge-building process’ at the municipal level through the contribution of case studies and data collection. This allows planners and policy makers to gain perspective on the issues they are faced with resolving and can apply the most appropriate legislative changes, in order to not only understand how to ensure a properly functioning urban food system, but also to implement appropriate adjustments (Sonnino, 2009).

The action-led research should not be limited to just one urban area; knowledge exchange is another means by which urban food systems can be analysed and improved (Introduction: Food security is a global concern. 1999; Sonnino, 2009). Each urban space will have their own unique deficiencies; it is therefore in the best interest of urban spaces to have an interlinked network of resources that can be made accessible to policy developers and planners when needed (Sonnino, 2009). Local and global levels of action are required and it is suggested that this begin and continuously be updated with the input of research (Sonnino, 2009). This research-centric approach to urban food security emphasises the need to provide a stronger literature background for everyone interested in playing a role – from planners, and government members to food retail businesses and consumers(Sonnino, 2009) .

This research provides potential information that can be added to the existing literature regarding urban food security and student-related food swamps. Being able to contribute to the literature can create substantial evidence that encourages planners and policy makers to re-evaluate their approach and incorporate the most recent concerns being identified within Waterloo Region.

A further gap relates to conversations regarding urban planning and food and their lack of popularity in the developed regions of the world. Most research that looks into the relationship a city has with food is focused in developing countries of world (Blay-Palmer, 2009; Crush & Frayne, 2011), giving an implication that these issues are not highlighted in developed cities. Building the research to support the existence of urban food security gives this issue a spotlight, and allows this topic to have more resources (e.g. academic, financial) invested into its understanding and subsequent reduction.

### **2.8.3 A Structured Approach to Researching Food Security is Lacking**

Another gap that the existing literature has made evident is the lack of structure in measuring food insecurity, thus there are many angles with which this topic is being approached. This does not encourage cohesion in the knowledge obtained, and thus can be a hindrance to understanding the level of difficulty that food insecure neighbourhoods and cities are living with (Cady & Oregon State University, 2014).

Measuring and understanding the nature of food security is proving challenging due to the many approaches being taken. Food landscapes are typically classified according to the types of stores that are found and analysing their geographic locations in the context of density and location. A better approach to researching food security is lacking; identifying food outlets that are available in a geographical space is no longer proving to be an adequate method of research (Fuller, Engler-Stringer, & Muhajarine, 2016). There needs to be a larger effort towards collaboration of research methods, such as the use of GPS (Fuller et al., 2016). Cady & Oregon State University (2014) re-iterate this point in their research as a limitation, stating that the lack of cohesion does not allow for an ease of using the data together in order to “paint a broader picture”. Engler-Stringer et al., (2016) emphasise the need to have more qualitative research being incorporated into the understanding of food environments.

While the research conducted for this thesis did not avoid the use of identifying what retail food outlets were near to the participants of the research, the use of qualitative data was implemented, allowing for both of these strategies to be utilised. This allowed for a comparative analysis of the data collected using each approach, as well as individual experience with each method of data collection.

#### **2.8.4 There Is Little Research with Students and Food Security**

Another limitation highlighted by the authors of this article is that there were no published studies found that focused on the relationship (if any) between the academic achievement of college students and food insecurity that may be present in students’ lives; it was noted that more of these studies were typically carried out with younger students such as those at the high school and elementary level (Cady & Oregon State University, 2014). The lack of studies that focused on the association between food insecurity and poor academic performances was also highlighted in a food insecurity study that was conducted at the University of Hawai’i (Chaparro et al., 2009); the researchers also mentioned the positive potential for this kind of data in order to assist in policy making decisions and the creation of effective strategies for food insecurity reduction (Chaparro et al., 2009).

In a much broader context, in a recent study conducted with children aged 10 to 14 regarding their perceptions of their food environment, the researchers highlighted that more research should be conducted with various age groups to understand their interaction with food environments (Engler-Stringer et al., 2016). This research therefore aims to contribute to the emerging data pool that allows tertiary level student lifestyles to be better understood, as well as to learn in what ways to ensure that food-related deficiencies are being acknowledged and dealt with.

### **2.8.5 Literature Review Highlights**

The literature has been able to outline the ways in which food security has the ability to affect the well-being, health and education of students. While doing so, the literature was also able to draw from many other attributes of food security and provide an overview of how they are unfolding within urban landscapes. A change in the production of food prompted a shift in the dietary demands of urban populations, having products higher in calories made more readily available. This occurrence, coupled with the rise in cost and scarcity of fresh produce, especially in low-income neighbourhoods, prompted the classification of food deserts. However, under the revision of parameters used to measure food deserts, urban food insecurity is seen to be presented in one of its newer iterations called food swamps. Food swamp occurrence has already been cited in Waterloo Region, though only at the household level (NEWPATH Research Program, 2014).

This research aims to investigate to what extent food swamp occurrence will prevail at the student demographic level. At the tertiary education level, students are strengthening their knowledge as well as social and extra-curricular activities that are meant to improve their overall quality of life. As such, it is important that the food they have access to has the ability to nourish and assist with these activities they are pursuing. This reasoning is substantiated with recent studies conducted at tertiary education institutions worldwide, showing the many effects food insecurity has on students' well-being. However, there is lacking information on the quality of the landscape they are most exposed to and how these affect their food choices.

This research will be able to fill the gap in order to understand to what level are students in Waterloo Region experiencing food insecurity and what reasons could be responsible for this. Whilst it is enticing to present inexpensive options to students, they should also have accessibility to a larger variety of foods beyond energy dense and ‘fast’ foods. More data needs to be produced surrounding the ways in which students are affected as well as which of the suggested solutions are most effective.

The outcome of this research on food swamps and its relation to students has the potential to improve and strengthen the food environment faced by students, in order to increase their chances of doing better at school and improving their social capacities. The research also has the potential to become solid data for the implementation of appropriate policies that would facilitate the improvement of food environments on/near tertiary institution campuses.

On a greater scale, the revised literature points towards the need for more sustainable approaches to food consumption carried out in urban landscapes, such as improved options for socio-economically challenged residents, and a stronger correlation between the health sector and the planning sector. It may not seem like these elements go hand in hand, but in the case of urban food security it is appearing that way.

## **Chapter 3 - Research Methodology**

This chapter explains the strategies utilised to obtain data in researching the prevalence of food swamps in the residential area of students attending the University of Waterloo. After outlining the main research questions utilised to guide the research, the methodology in data collection and analysis is further discussed. This includes a description of the study area as well as the study sample criteria outlined for the research. The strategy of the methodology was to engage students through a variety of social media platforms, as well as through the assistance of the administrative departments of the University of Waterloo. The data analysis involved comparative analysis with the use of frequency tables. The qualitative data obtained was coded and the most frequent responses were ranked in order to observe the prevalence of any trends in the responses. This chapter concludes by providing more detail on the data analysis conducted.

### **3.1 Research Objectives**

The objectives of conducting this research were two-fold:

1. an investigation into whether students resided in or near areas with poor access to nutritious food, and can thus qualify to be deemed food swamps, and
2. finding out whether students were interested in the sourcing, production and sustainability of the food they consume.

The first objective focuses on the growth of the food swamp phenomenon and how this literature could be utilised to foster more attention and assistance from relevant stakeholders that are involved with food access. The second objective aims to achieve a better understanding of what measures should be implemented in order to successfully develop a sustainable food system.



### **3.2 Research Questions**

The primary research questions outlined for this research are as follows:

1. What types of retail food outlets predominate in close proximity to where students of the University of Waterloo live, within Waterloo Region?
2. Are students making food purchasing choices based on what is in close proximity to where they reside?
3. Are students discouraged from understanding the value of a holistic and sustainable food system, and thus disconnected from the food system?

### **3.3 Research Hypothesis**

The hypothesis that was outlined for this research is as follows:

Food swamp occurrence affects students at the University of Waterloo by not only providing an imbalance of food retail options and risking health and well-being, but also widening the disconnect between students and food production, thus hindering the progress of developing a sustainable food system.

### **3.4 Research Methods**

While utilising the NEWPATH research as a guide for which direction the research would take, the methodology primarily followed an inductive and exploratory approach. An inductive approach to research begins with the collection of information as well as responses from open-ended questions (Creswell, 2014; Punch, 2005). These are then analysed to outline any noticeable themes which can then lend itself to support broader theories or generalisations (Creswell, 2014; Punch, 2005). Implementing inductive reasoning was the most fitting approach, since data was being collected to complement the literature reviewed, with the intention of exploring the relationship between the two and identifying any themes that presented themselves.

Utilising an exploratory research approach is appropriate for research that lacks a scope (Singh, 2007); in this case it was utilised due to the key elements that were researched under the broad category of food security. The numerous focal points created a scope that was wide and not always clearly defined. Because the nature of the research is exploratory, these elements of interest are utilised as guidance rather than a traditional framework. As previously mentioned in the literature review (Chapter 2), this research attempted to study the possible relationships between the topics of urban food security, urban planning, food swamps, sustainable food systems and student well-being. Exploratory research was conducted with the goal of gathering information relevant to these topics, in order to investigate the strength of these interconnectivities, if they existed.

The NEWPATH study was conducted in the form of a food environment assessment that focused on four main parameters: the distance of the participants' residences in relation to the retail food outlets, the level of quality of the fresh produce that is made available, the availability of healthy foods and beverages in comparison to unhealthy foods and beverages, and the comparison of cost between healthy and unhealthy foods and beverages (NEWPATH Research Program, 2014). The study was also conducted at the household level, acquiring responses from various individuals within one household (NEWPATH Research Program, 2014). These parameters were adopted and modified to create questions for students to answer in the form of an electronic survey.

Data was gathered through the use of an online survey advertised to University of Waterloo students. The survey comprised 19 questions, with 18 questions retrieving information about the participants related to the research and the 19<sup>th</sup> question asking participants to leave an email address if they were interested in entering a draw for the gift card as compensation for their input (see Appendix A). The questions were not standardised but were developed for this specific research. The types of questions utilised were mixed and included multiple choice, scalar and open ended questions, allowing for a mixed-methods approach to be utilised when analysing both the qualitative and quantitative data gathered.

Information was then analysed in Microsoft Excel, with the utilisation of pivot and frequency tables, as well as charting the data in order to obtain a visual representation of the data collected.

The online survey method was utilised in order to appeal to the characteristics of the population sample; that is, young adults who are more engaged with digital formats of information. Although it is understood that not all students are young adults, the assumption was made that majority of the students were young adults. Further assumptions that a digital survey would be most suitable are based on experience and personal similar preferences to the typical student age group. The advantage of this approach was the ease in ability to share the link through a variety of platforms that would be frequented by students, as well as the instant collection and tabulation of the responses recorded through the use of Google Forms, the platform chosen to host the survey. Another advantage of the digital medium was the ability to regulate when the survey was active and when it no longer needs to be active (that is, participants who visited the survey after the end date were not be able to complete it). This allowed for the regulation of responses; the content within the survey could also be edited at any time (for example if spelling errors or incorrect information was accidentally posted) allowing for error regulation as well.

### **3.4.1 Brief Overview of Waterloo Region**

Waterloo Region, its full title being the Regional Municipality of Waterloo, is located in Southern Ontario and is comprised of three cities and four townships. As Figure 2 shows, the cities include Kitchener, Waterloo and Cambridge and the townships are North Dumfries, Wellesley, Wilmot and Woolwich (Region of Waterloo, 2016b). The total population of the Region was estimated to be 575,000 in 2015 (Region of Waterloo, 2016a).



**Figure 2: Map of Waterloo Region (Source: Region of Waterloo GIS and Mapping, edited by T. Persaud)**

The food landscape in Waterloo Region is vast, with about 65% of the lands being dedicated to agricultural production due to the fertile soils within the region (Long, n.d.). Agriculture and agriculture-related businesses were responsible for the support of almost 20,000 jobs in Waterloo Region in 2003 (Long, n.d.). Subsequently there is a growing appreciation for local food and gastronomy, with many restaurants in the Region gaining attention for their support of local agricultural products. With regards to the health and well-being of the city, the Region of Waterloo has in place many community practices and local policies that promote the awareness and support of fresh and local foods (Region of Waterloo Public Health, 2013).

Waterloo Region published its first food system assessment in 2005 titled ‘Towards a Healthy Community Food System for Waterloo Region’(Region of Waterloo Public Health, 2013). There is such a thing as food democracy that is practiced with the help of the Waterloo Region Food System Roundtable, which allows a voice to be heard from the collective of citizens who are in some way working with or just interested in food issues (Region of Waterloo Public Health, 2013). Waterloo Region is active in its attempts to make food accessible and well-advertised, as well as educating the public about the local options available (Region of Waterloo Public Health, 2013). In 2013, a regional council committee within Waterloo Region endorsed a Local Food Charter that would act as a set of guiding principles to encourage the access to locally sourced and sustainably produced food, as well as to protect farmlands where urban expansion is contemplated (Herhalt, 2013). However, the charter is simply a guidance tool, and while it is encouraged to follow the principles, it is not enforced by law nor is it mandatory in any way by food related businesses (Herhalt, 2013)

Waterloo Region is home to two universities, the University of Waterloo and Wilfrid Laurier University, both located within the city of Waterloo (Martin & Parkin, 2015). As a result, the Region of Waterloo houses thousands of students (Figure 3), making for a substantial portion of the total population, especially within the city of Waterloo where it makes up roughly 19% of the total city population (the student population of Waterloo was divided by the total population of Waterloo, then multiplied by 100 to arrive at this estimate) (see Figure 3).

	<i>Region of Waterloo</i>	<i>Cambridge</i>	<i>Kitchener</i>	<i>North Dumfries</i>	<i>Waterloo</i>	<i>Wellesley</i>	<i>Wilmot</i>	<i>Woolwich</i>
<b>Total Population Year-End 2015</b>	575,000	134,900	239,900	9,820	133,700	11,070	20,780	24,810
<b>Temporary Student Population</b>	22,370	(1,120)	(1,060)	(110)	25,060	(50)	(190)	(160)
<b>Students Arriving</b>	30,160	700	32,760	30	26,480	40	60	90
<b>Living in Student Residences</b>	9,850	0	530	0	9320	0	0	0
<b>Living in Other Accommodations</b>	20,310	700	2,300	30	17,160	40	60	90
<b>Students Leaving (Reverse Flow)</b>	(7,780)	(1,820)	(3,820)	(140)	(1,420)	(90)	(250)	(250)

**Figure 3: Student population within Waterloo Region**

(Source: Adapted from Martin & Parkin, 2016)

### 3.4.2 Sample Structure

The population sample relevant to this research were students who were currently attending the University of Waterloo as well as currently residing in the Waterloo Region, be it temporarily for school or permanently as a resident. The target size of the sample was 500 students. This number was aspired towards in order to obtain data that can be significant and the facts and trends resulting from the data can be used to represent the student population within the university. The total number of participant responses recorded was 294. Of these response, seven persons opted not to participate and ten persons did not qualify to participate in the survey as they did not reside within Waterloo Region. Further, due to a technical error during the posting of the online survey, 14 participants did not have access to the controlling questions asking their city/township of residence and/or their level of study. As a result, these responses could not be used and had to be omitted from the data set. The resulting total number of responses applicable to be analysed for this research is 263.

An additional component to the online surveys was an in-person interview with five students, with the intention of asking the questions on the survey, as well as asking supplementary questions that would encourage more detailed responses. However, this portion of the research was reconsidered and not carried out due to the high number of responses received in the open ended portions of the online survey.

It was debated that five interviews would not be a significant contribution to the data when there was an average of 200 responses recorded for each open ended question in the survey. It was decided that these responses would be more than sufficient in providing additional detail and context than the questions that were to be asked in an in-person interview.

The limitations placed on the sample were that the participants must be students, they must be attending the University of Waterloo and that they must be living in Waterloo Region. These boundaries were chosen in order to make the data easily applicable to the entire region as opposed to just specific cities; Kitchener and Waterloo are nicknamed twin cities (Rumble, 2013) and even though a high percentage of students would likely live in these two cities, the research aimed to analyse the data in the regional context. The previously conducted NEWPATH Project was also conducted within the Waterloo Region, although focusing on just the cities alone and not the townships (Minaker et al., 2013). Nevertheless, this encouraged the research to hold similar boundaries in order to possibly compare and contrast both sources of data in the future if necessary.

### **3.4.3 Data Collection**

The research was conducted in the form of an anonymous online survey (see Appendix A) that was shared via social media, as well as through the administrative departments of the various academic offices of the University of Waterloo via email. Before the link to the survey was shared, ethical clearance for the content as well as means of distribution was first sought and received from the Office of Research Ethics of the University of Waterloo.

The questions presented were non-standardised, and consisted of a combination of 19 multiple choices, SATA (select all that apply), scalar and open ended questions. In exchange for participating in the survey, participants were given an opportunity to leave their email addresses in order to enter a draw for a CAD\$25 Amazon Canada Gift card. Apart from the option of leaving their email addresses for entering the draw for the gift card, the identity of the participants remained anonymous. The email

addresses recorded were immediately separated from the data collected and was disassociated from the data analysis.

The survey platform Google Forms was used and the link was shared through social media and e-mail outreach through the various academic programs of the University of Waterloo. This survey platform was utilised for many reasons. It was one of the few survey platforms that provided a variety of questions types, including the function of skip logic, which would typically be provided with an additional fee or in an upgraded package of other popular survey platforms. Skip logic allowed for participants to access and complete the survey only if they fit the criteria of the desired population sample; otherwise they were guided to the end of the survey and given instructions to exit their browser. In this survey, the criteria for participants were that they had to be students attending the University of Waterloo and must be living within Waterloo Region. Another advantage of utilising Google Forms was the ability to save the information in the form of a spreadsheet, which could then be downloaded as a Microsoft Excel spreadsheet. Google Forms was also advantageous in its ability to display the information being collected in chart form in real time, as responses were being submitted.

The survey was made available for completion on the internet for four weeks. This allowed for weekly posts on social media regarding the survey, attempting to attract the interest of students who may not have seen the survey link before that point in time. After the four weeks, the prize draw was conducted and the winner contacted with further information regarding the prize. The selection of the prize draw winner was carried out by attributing a numerical value to each email address, and then choosing a number at random through a random number generator on the website [www.random.org](http://www.random.org). The corresponding email address to the value chosen was considered the winner.

The methods used to distribute the survey was through the utilisation of convenience sampling. Convenience sampling permitted the sharing of the survey link electronically on social media webpages that were easily accessible during the data collection period, and forwarded via emails to groups of students with the assistance of administrative offices of the university.



An email was sent to majority of the administrative departments of the University of Waterloo in order for them to forward the survey link to their students. Social media was utilised to also appeal to students to participate in the survey; the platforms used specifically were Facebook, Twitter and Instagram. The information sharing website Reddit was also utilised to share the link of the survey. Due to the nature of the dispersion of the survey link, it is unclear which platforms were most and least successful in recruiting participants.

#### **3.4.3.1 Email to Administrator of Academic Departments of the University of Waterloo**

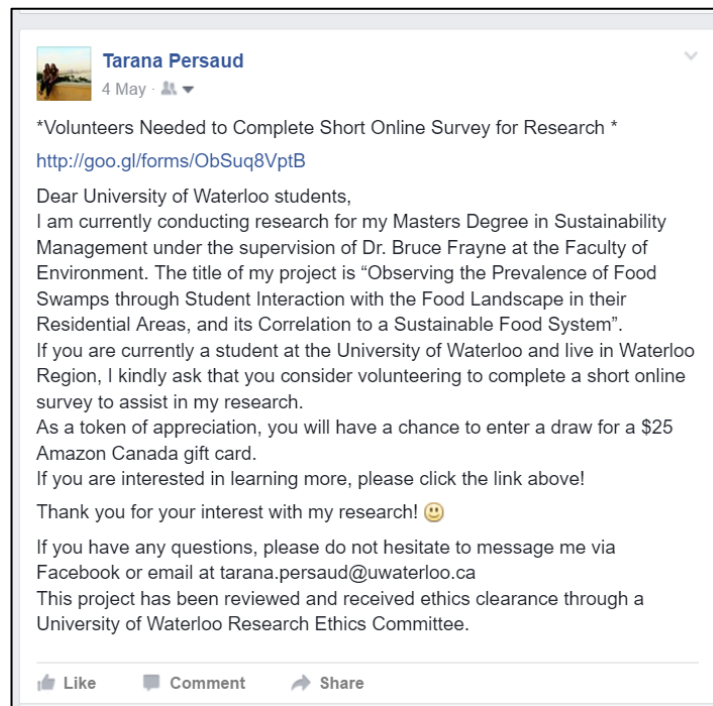
In an attempt to reach out to as much of the entire student population of the university as possible, an email was drafted to be sent to the administrative assistants of various academic programs and departments within the University of Waterloo (see Appendix B). The administrators' email addresses were found by visiting the university's official webpage, clicking the 'Faculties and Academics' heading, and looking at the staff contact information of each program listed. There were 103 programs listed. Of this list, 97 email addresses of administrative staff were identified and an email was sent to each. The other six of the programs did not offer contact information for staff members or were not considered appropriate to send an email of this nature to. The email outlined the nature of the research and requested that they forward the survey to their program's student list. It is unclear if all 97 administrators agreed to this request as there were no responses received; however, two students sent emails regarding the research, indicating they learnt of it via email. This means that some administrators complied with the request and shared the survey with their student mailing list.

An email was also sent to the Executive Director of Sustainable Waterloo Region, a volunteer-heavy organisation that focuses on sustainability practices within businesses in Waterloo Region, Ontario. Due to personally being a volunteer at this organisation, and knowing that there were other volunteers who were University of Waterloo students as well, the survey link was submitted to be part of a weekly update email that was sent to all volunteers and staff of Sustainable Waterloo Region. This way, the link was made accessible to University of Waterloo students.

### 3.4.3.2 Facebook

The link to the survey was posted in a Facebook status (Figure 4) of my personal profile and captioned to attract the attention of Facebook contacts who were University of Waterloo students. This status was posted twice in the duration of the survey being active in an attempt to attract the attention of those who may not have seen the first status or may have meant to participate and forgot to do so.

The link to the survey, as well as a short post describing the nature of my research was also posted on public Facebook groups, namely those titled “University of Waterloo” and “Geography and Environmental Management”. The groups were chosen due to previously being a member of them, and no new groups were added during this time in order to avoid the impression of joining just for ‘spamming’ the timeline of groups.

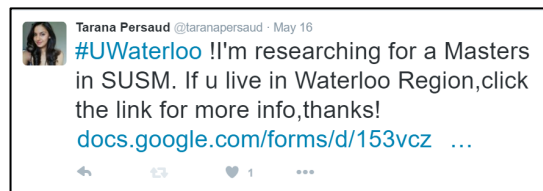


**Figure 4: Screen capture of Facebook status used to recruit volunteers**

(Source: <https://www.facebook.com/tarana.persaud>)

### 3.4.3.3 Twitter

Twitter is one of the more popular social media platforms utilised today, as it boasts 310 million active users on just a monthly basis and with 83% being active via mobile device (Twitter, 2016). Every week for four weeks, using my personal Twitter account, a tweet was posted using the hashtag ‘#UWaterloo’ and with a link to the survey embedded into the tweet (see Figure 5). This way, the tweet would appear as part of the news feed under the profile of the University of Waterloo. Students would be able to access the tweet either by visiting my page, the University of Waterloo’s page and by clicking the hashtag to see all other statements with the same hashtag. Students who were reading the tweet would have the option of clicking the link and accessing the survey right away, whether they were browsing on their computer or mobile device.



**Figure 5: Screen capture of tweet used to recruit volunteers**  
(Source: <https://twitter.com/taranapersaud>)

### 3.4.3.4 Instagram

In order to capture the attention of the target audience, the utilisation of four comedic illustrations related to food were posted, one image per week, with relevant hashtags utilised in the caption of the image (See Figure 6). Along with the description of the research and the request for volunteers, the University of Waterloo, the Faculty of Environment and the Student Success profiles were tagged, so that if other students were browsing through those profiles, my image would appear as well. Hashtags related to school such as “#uwaterloo” “#waterloowarriors” “#uwcampus” and “#universityofwaterloo” were included so that students would be able to see the image I had uploaded, should they be browsing through images containing that hashtag. Hashtags that were relevant to geographic locations were also utilised to

attract the attention of residents or visitors of Waterloo Region who may be eligible to complete the survey. The caption of the images directed viewers to click the link in the biography section of my personal Instagram profile. The link was placed in the description of my profile so that persons interested would be able to click the link to the survey and access it instantly. If the link were placed in the caption of the images, it would only be in static text with no ability to be clicked on, since Instagram captions do not have the ability to host an embedded link or hyperlink. This would have been discouraging for interested persons as they would have to then manually type out the shortened URL of the survey.



**Figure 6: Screen capture of image and capture posted on Instagram to recruit volunteers**  
 (Source: [https://www.instagram.com/p/BFzwaX9IKwV/?taken-by=tarana\\_p](https://www.instagram.com/p/BFzwaX9IKwV/?taken-by=tarana_p))

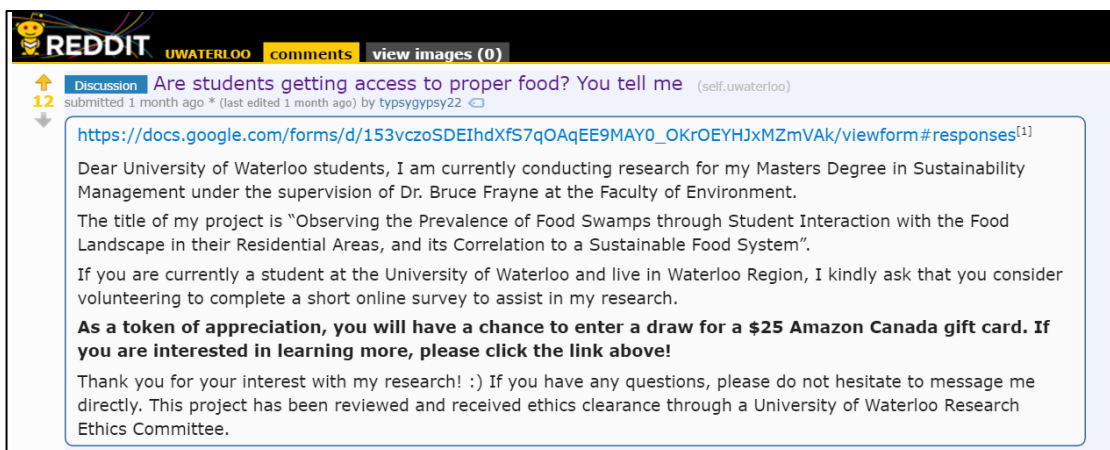
Full caption of the image posted reads:

***University of Waterloo students! I am conducting research for my Master's Degree in Sustainability Management under the supervision of Dr. Bruce Frayne at the Faculty of Environment. If you are currently a student at the University of Waterloo and live in Waterloo Region, please consider volunteering to complete a short online survey to assist in my research! As a token of appreciation, you will have a chance to enter a draw for a \$25 Amazon Canada gift card. If you are interested in learning more, please click the link in my bio! This project has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. Thank you for your interest with my research! @uofwaterloo@uwaterloolife @envwaterloo#uofwaterloo #uwaterloolife #survey#universityofwaterloo #uwcampus#waterloo #kitchener #cambridge#wilmot #wellesley #northdumfries#woolwich #wa***

[terloostudents#waterloowarriors](#) [#uwaterloo](#) [#food#uwcampus](#) [#universityplaza](#) [#slc#studentlifecentre](#) [#waterlooregion#regionofwaterloo](#)

### 3.4.3.5 Reddit

Reddit is a website that hosts information sharing, and considers itself “the front page of the internet” as it claims in its title (Reddit, 2016b). Listed as the 9<sup>th</sup> largest website in the United States of America and hosting millions of users (Reddit, 2016a) this website was seen as a viable option at which to post the survey. The link to the survey as well as a short description of the research was posted in four separate subtopic discussion forums, or ‘subreddits’ as they are called on the website (See Figure 7); namely ‘r/uwaterloo’, ‘r/cambridgeontario’, ‘r/waterloo’ and ‘r/kitchener’. These posts were made available to anyone who is browsing these specific categories on the website.



**Figure 7: Volunteer recruitment posted in r/uwaterloo subreddit on Reddit**

(Source:[https://www.reddit.com/r/uwaterloo/comments/4hxuyv/are\\_students\\_getting\\_access\\_to\\_proper\\_food\\_you/](https://www.reddit.com/r/uwaterloo/comments/4hxuyv/are_students_getting_access_to_proper_food_you/))

## 3.5 Data Analysis

All of the data collected was placed in a spreadsheet in Microsoft Excel and converted to pivot tables. Utilising the pivot table functions assisted with grouping and filtering responses in order to summarise the answers easily and to achieve a percentage breakdown of the composition of answers

within each question. Filters were also placed on the headings of the table to allow easier observation of trends.

### **3.5.1. Multiple Choice and Scalar Questions**

Multiple choice and scalar question formats were utilised in order to provide a variety of options for the survey participant, but to also have the responses controlled. An ‘I don’t know’ option was always placed in case the participant’s response could not be classified into the pre-assigned answers; otherwise, participants are encouraged to choose the best fitting response in a multiple choice or scalar question. Because the answers to the multiple choice and scalar responses were limited in number, data analysis was not difficult. The frequencies of the different responses chosen were tabulated and then illustrated in the form of a pie chart or bar graph, allowing for a breakdown to be seen of the rate the various responses were chosen.

### **3.5.2. Yes/No Questions**

The data obtained from Yes/No (an ‘I don’t know’ option is provided for participants if they cannot answer accurately) questions was also simple to extrapolate from the table by filtering the ‘yes’, ‘no’ and ‘I don’t know’ responses individually for the particular question being examined. Each response amount was then counted and the final totals tabulated. This table was then further utilised to create a pie chart in order to provide a visual version of the data collected.

### **3.5.3. SATA (Select All That Apply) Questions**

There were five questions in the survey that asked students to select all options that applied to their response to the question previously in the survey (e.g. “if you answered Yes, please select which items you purchased). In order to tabulate which responses were chosen, an extensive table was set up in a spreadsheet (see Figure 8). The left most column had the responses selected by the participants; all of their choices were grouped into one cell. The multiple choice options of the questionnaires were placed in individual columns alongside each of the participant’s responses.. Based on what their responses were, a

value of '1' was placed under each column representing the responses that were selected. For example, if asked which retail food outlets were in a walking vicinity of their residence, and the student responded 'grocery store- large' and 'coffee shop', then a value of '1' would be placed under the 'grocery store-large' column as well as under the 'coffee shop' column. The total number of food retail outlets near each student (by finding the total sum across each row), as well as the total number of each type of outlet (by finding the total sum along each column) identified were recorded and used for comparison. The use of pivot tables and filters permitted additional trends to be identified; for example, by placing a filter on the total number of food retail outlets near to each student, one would be able to identify how many students had no outlets, one outlet, two, three, four and up to all of the outlets listed. The filters also allowed trends to be observed showing which outlets were most popular with students who had a specific number of outlets near to their residence.

4. Within the radius of an average 15 minute walk, what kinds of food outlets would you observe on your walk ? Please tick all that apply	Grocery store - Large	Grocery Store - Small (e.g. Dutchie's Fresh Market)	Convenience Store (including gas stations and mini marts)	Fast Food Restaurant	Market (including temporary farmer's markets)	Coffee Shop	Dine-in restaurant	Take-out restaurant (limited seating)	Specialty Store (e.g. butcher, bakery, health food)	TOTAL # of establishments available nearby
Grocery Store - Small (e.g. Dutchie's ), Convenience Store ( including gas stations and mini marts), Fast Food Restaurant, Coffee Shop, Dine-in Restaurant, Take-out Restaurant ( limited seating )		1	1	1		1	1	1		6
Grocery Store - Large (e.g. Walmart, Sobeyes), Grocery Store - Small (e.g. Dutchie's ), Convenience Store ( including gas stations and mini marts), Fast Food Restaurant, Coffee Shop, Dine-in Restaurant, Take-out Restaurant ( limited seating ), Specialty Store ( e.g. butcher, deli, bakery )	1	1	1	1		1	1	1	1	8
Convenience Store ( including gas stations and mini marts)			1	1						1
Grocery Store - Small (e.g. Dutchie's ), Convenience Store ( including gas stations and mini marts), Fast Food Restaurant, Coffee Shop, Dine-in Restaurant, Take-out Restaurant ( limited seating )		1	1	1		1	1	1		6
<b>TOTAL</b>	<b>130</b>	<b>124</b>	<b>237</b>	<b>233</b>	<b>34</b>	<b>216</b>	<b>216</b>	<b>227</b>	<b>80</b>	

**Figure 8: Screenshot of table used for observing trends with the SATA questions**

### 3.5.4. Open Ended Questions

The most appropriate means of analysing the qualitative responses was by looking for distinct patterns in the responses being provided, and then observing which responses were most and least popular. Utilising the qualitative data analysis approach suggested by Creswell (2014), the raw data was compiled, organised and then coded in order to find any outstanding patterns of responses (see Appendix C). In order to do so, the use of hand coding was implemented- the responses were grouped without the use of a software program. However, the process was assisted with the use of Microsoft Excel and the filtering tool, for ease of data sorting, segregating, summation and storage. The coding procedure was guided loosely by the coding process for transcripts, outlined by Tesch (1990) and referenced by Creswell (2014).

In the survey, there were two yes/no questions that focused on whether students engaged in the recent purchasing of certain foods. A third yes/no question in the survey also asked students about their interest in observing food production first hand. These three questions were then followed by an open ended question, that encouraged students to explain the choices they stated to have made in the previous questions of the survey. For these qualitative data responses, a similar yet separate table used for the analysis of the SATA questions was set up on a spreadsheet, with the students' responses in the left column and empty columns alongside it to the right (see Figure 9). This style of tabulation was set of for each of the three questions. The rows with responses that were explaining the reasoning for choosing 'no' as a response were coloured red and the rows with responses related to the questions being answered with 'yes' were coloured green. The rows with questions that were left unanswered or responded to with 'I don't know' were coloured yellow. These colours assisted with differentiating the responses, improving efficiency and decreasing confusion. Filters were added in order to analyse the responses in categories of those who responded 'yes', 'no' and 'I don't know'. This allowed for organisation and structure during the data analysis.



Analysis was conducted on each statement in order to identify if there were key words in the responses that would translate to a reason for their ‘yes’ and ‘no’ responses. The responses were analysed objectively, with the intention of observing trends in the responses provided. Each response was read and a key word or phrase that would represent a reason for the student’s course of action, was highlighted. Each new key word or phrase that was relevant to answering the question, was highlighted in the responses, and a column would be labelled with that phrase. Within that column, alongside the response being analysed, a ‘1’ value would be placed if that word or phrase was mentioned. This was repeated for all of the open ended responses. For example, if the response was given as ‘too busy and too expensive’, a ‘1’ value was placed under the column titled “lack of time” and another under a column titled “cost factor”. If a student provided a response with a previously mentioned keyword or phrase, a ‘1’ value would be placed in the pre-existing column alongside the student’s response. After completing this with all of the responses recorded, the total sum of the ‘1’ values in each column was calculated in order to identify which reasons were the most popular amongst students and which were not as frequent.

17. Please explain the reasoning for your answer	Curious/interested to know /learn how food is grown/processed and where it comes from	A fun/ cool experience to take part in	Personal enjoyment/ familiarity with this environment & expanding on this experience	Interested in Food Security, Community Development, Local Food, Sustainability and similar social and environmental topics	Acquisition of fresh, local and/or organic produce straight from the farm	For the Betterment of Consumer Choices	Possibly visit if it were conveniently timed/ organised/ located	Would Hinder Concience when Consuming Certain Products	Possibly visit a farm/ processing plant depending on the end product	Too busy to visit such an establish emnt	Lack of motivation/ Incentive/ general interest in the realm of farming/ food	Indifference to where food comes from and how it is processed / not priority to learn about	Will not learn anything new /not worth the time /have already been to a farm
it would help me make smarter purchasing decisions as a consumer.						1							
I don't see the opportunity as helpful to me at this time.													1
It would be cool		1											
Not very interested											1		
My family owns a farm. I see it all the time.													1
My parents buy products from the farm because it is more fresh, not injected with GMO and we can pick it ourselves (strawberries, apples).						1							

**Figure 9: Screenshot of table used for identifying key words in open question responses**

The approach taken to analyse the data was simple in nature, as were the data collection and survey tool. The intention was to obtain information through simple questions and obtain answers with as little confusion as possible, allowing the data collected to ‘speak for itself’, so to speak. This approach also remained simple in order to further investigate the gap in the literature identified in Section 2.9.3. This methodology approach was able to fulfil the needs of the research by producing results that were understandable and usable for analysis. The structure allowed for controlled questions to be asked in order to provide factual statistics, while also providing an opportunity for participants to provide more in depth answers and additional context to the data being collected.

## **Chapter 4 - Results**

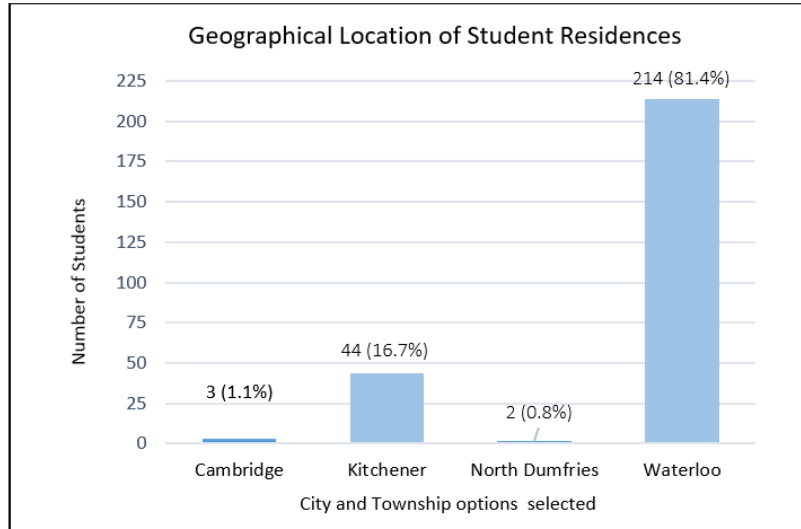
As previously mentioned in Chapter 3, a total of 263 eligible responses were collected with the electronic survey that was distributed. The results of the statistical analysis of each question are discussed in this chapter, along with any trends that are noted to be of significance. In addition to questions that collected demographic data, the questions asked in the survey were related to four general food-related areas:

- what food outlets and types of foods students perceived to be sold within a 15-minute walk from their residence
- the food-related purchases made within the week prior to taking the survey
- the perceived ratio of fresh to packaged foods in their residential environment
- their perceived level of interest in learning about food production first-hand

This breakdown of the data gathered sets the foundation for Chapter 5's discussion and analysis of the data in relation to the literature review and the gaps that were identified. To conclude the analysis, a review of the limitations encountered with the research is highlighted. To provide context to the results identified in this chapter, Appendix A provides a sample of the questionnaire that was made available to students electronically.

### **4.1 General Demographics**

The first question provided a brief explanation that Waterloo Region was a composition of three cities and four townships and identified the names of these areas. Participants were then asked to identify which one they resided in. The option 'none of the above' was also placed; if participants chose this option, they no longer qualified to complete the survey and were prompted to exit their browser.

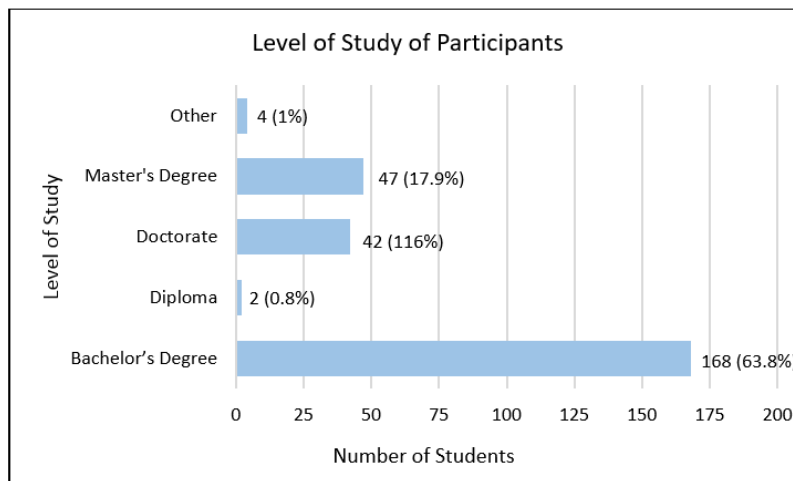


**Figure 10: Geographical location of students’ residences**

As Figure 10 shows, the distribution of the 263 responses indicated that the most of the students resided in Waterloo, with a count of 214 representing about 81.4% of the total. Following Waterloo, Kitchener was the second highest represented city with a count of 44, representing 16.7% of the responses. Cambridge was represented by three responses which amounted to 1.1% of the total and lastly North Dumfries was the only township identified as the place of residence, with a total count of two, making up for the remaining 0.8%. None of the students identified themselves residing in Wellesley, Woolwich or Wilmot.

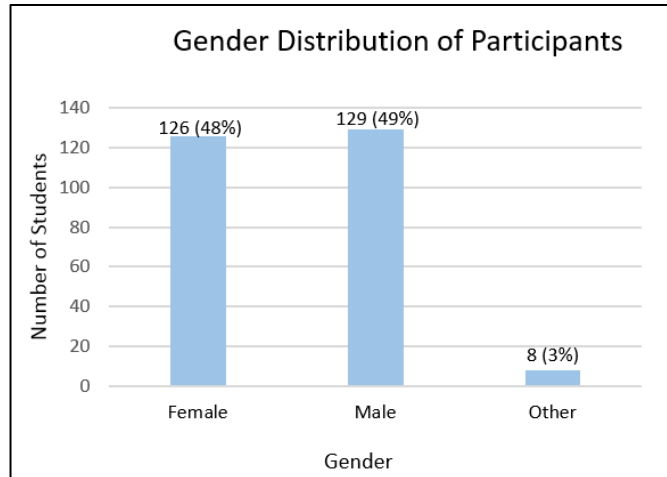
The second question asked participants what level of study they were pursuing at the University of Waterloo. This information is valuable in order to observe what trends are present within a specific student demographic and which academic or municipal sectors would find the data from this research most useful. The highest response came from students pursuing their Bachelor’s Degree with a total count of 168 students and making up 63.8% of the sample (See Figure 11). Masters students were the second highest responders with a total of 47 responses, followed by Doctorate students with a count of 42 responses. Two participants identified themselves as enrolled in a diploma program, while the remaining four students categorised as ‘other’ were those who were in a specific scenario such as continued learning.

It should be noted that many of the participants who are categorised under ‘Doctorate’ initially identified themselves as pursuing their studies at the University of Waterloo School of Pharmacy. Some of the responses included ‘PharmD’, ‘Doctor of Pharmacy’ and ‘Pharmacy’. After investigating the types of degrees that can be earned at this sector of the university and noting that the title earned is a Doctor of Pharmacy (School of Pharmacy, 2016), a decision was made to group these responses with those that indicated being part of traditional doctorate programs.



**Figure 11: Level of study being pursued by participants**

The third question was asked to identify the participants’ gender. This is a frequently used segmentation of data to observe whether gender possibly plays a role in the trends presented. This data was obtained in order to observe trends within the category of gender if necessary. Within this study, out of the 263 responses, 129 identified themselves as male, and 126 identified as female, leaving eight responses in the category of ‘Other’. The ‘other’ category encompasses responses that include a preference of not revealing their gender, and identifying as ‘agender’ meaning without gender. Thus, the responses are comprised of 49% males, 48% female and a 3% of the responses represented by ‘other’ (See Figure 12).



**Figure 12: Gender distribution of survey participants**

#### **4.2 Students' Residential Food Landscape**

The fourth question was located within a new section of the survey, which focused on asking participants more in-depth questions related to the food landscape that surrounds their residence and could potentially play a role in the food choices made. Participants were asked to identify if certain food-related establishments were within a 15-minute walk from their residences. The time frame of 15 minutes was chosen by the researcher as it was a reasonable assumption made that persons who would walk to purchase food would not want to walk far, and would opt to use another mode of transportation (e.g. bussing, driving) or a delivery service. The time frame was also used because it would identify what stores perceived to be closest to the participants' residences, which would help to identify whether they were living in areas that provided a positive urban food landscape or a negative one.

The participants were given a list of categories of food-related establishments to choose from and were asked to indicate if these types of stores and restaurants were available to them in close proximity of their residences. They were asked to select all categories that applied; the categories were:

- Grocery Store - Large (e.g. Walmart, Sobeys)
- Grocery Store - Small (e.g. Dutchie's Fresh Market)
- Convenience Store (including gas stations and mini marts)
- Fast Food Restaurant
- Market (including temporary farmer's markets)
- Coffee Shop
- Dine-in restaurant
- Take-out restaurant (limited seating)
- Specialty Store (e.g. butcher, bakery, health food)

An 'I don't know' option was provided for participants who would not be able to accurately respond to this question. The purpose of this question was to commence the description of the layout of the food related establishments that were near to the participants' residences. This question would also be able to provide a very high level view of how balanced the food landscape tended to be for areas that students are residing in. If the trend in responses reveal that a higher percentage of food outlets were those that sold processed or high-calorie foods, this would be providing evidence to support the hypothesis of this research. Table 3 provides the details into what establishments are located nearby.

When asked what students could identify nearby, the results in Table 3 show a large response in being able to locate convenience stores (237 students were near one), fast food restaurants (233 students were able to access one) and take-out restaurants (227 students were near one). When looking at the ease at which students can walk to a grocery store, 130 were able to access a large one and 124 were near to a smaller one. Specialty stores were not as common with only 80 students living near one; the least accessible establishments are markets, as only 34 students claimed to be in close proximity to one.

	Total # of establishments available nearby	Total # of students with this environment	Large Grocery Store	Small Grocery Store	Convenience Store (gas stations and mini marts included)	Fast Food Restaurant	Market (temporary farmer's markets included)	Coffee Shop	Dine-in restaurant	Take-out restaurant (limited seating)	Specialty Store
no response	4										
1 food outlet	3	2	0	1	0	0	0	0	0	0	0
2 food outlets	6	2	1	2	3	1	1	1	0	1	1
3 food outlets	7	1	0	5	5	1	5	1	2	1	1
4 food outlets	21	10	3	18	15	0	14	9	15	0	0
5 food outlets	65	28	14	55	60	2	45	52	58	11	11
6 food outlets	88	34	55	88	83	5	82	84	83	14	14
7 food outlets	33	22	19	32	32	8	33	33	33	19	19
8 food outlets	31	26	27	31	30	12	31	31	31	29	29
9 food outlets	5	5	5	5	5	5	5	5	5	5	5
Total	263	130	124	237	233	34	216	216	227	80	80

**Table 3: Frequency of various food establishments**

Since the question seeks to gain a description of what kinds of environments students are living in, the responses were further subdivided to identify how many food outlets are located on average to a student. As seen in Table 3, of the 259 responses (four participants did not answer this question), 88 of the students appeared to be living in areas that have up to six different types of food establishments. Amongst these types of outlets, all 88 students indicated being near a convenience store. The next most popular outlets were restaurants, with 84 students being near a dine-in restaurant, 83 near a take-out restaurant and 83 being near a fast food restaurant. In comparison, out of the six different food outlets, only 34 students were close to large grocery stores and only five students were able to walk to markets.

The data recorded also shows that three students only had access to one food outlet. Two of these students however claimed to be near large grocery stores, which means they would be able to access a wide variety of foods to maintain a nutritious diet. The third student indicated that they only had a convenience store nearby.

Only five students stated that they had access to all nine food outlets listed in the survey. The assumption can therefore be made that in terms of physical location, these students had food access and in



this context can qualify for being food secure. Going through the data in Table 3, one can observe a trend in most accessible food outlets being recorded. In the case of having just two food outlets nearby, the most common ones were convenience stores (two students could access one) fast food restaurants (three students could access one) and large grocery store (two students could access one). In scenarios where students have access to seven food outlets, 33 out of 33 students were near to coffee shops, dine in and take out restaurants and 32 students had access to both fast food restaurants and convenience stores.

### **4.3 Interaction with Healthy Foods**

The fifth question focused more on the specific types of food items that supported the perception of a fresh or healthier variety that were made available within close proximity to participants' residences. The food groups were listed and participants were asked to indicate which foods they were able to purchase nearby; the categories were as follows:

- Fresh Fruits
- Fresh Vegetables
- Freshly cooked meals
- Fresh meats
- Eggs
- Milk & Dairy products
- Cereals, Grains or Breads

An 'I don't know' option was provided for participants who would not be able to respond to this question accurately. Having an option for participants to say 'I don't know' also allowed for them to feel less obligated to guess their responses, thereby somewhat strengthening the accuracy of the data being collected.

The timeframe of one week was specifically chosen for a number of reasons. The first reason is that a week is a relatively easy timeframe to remember what one's activities entailed- it is a time frame

long enough that still allows for sufficient detail to be remembered in a specific group of tasks such as grocery shopping. In contrast, a 24 – 72 hrs period, while being more recent and thus a higher probability of being more accurate, would be too short of a time frame that would not provide enough information on the purchases made. A longer time frame such as two weeks might be too distant to think about, hence be more time consuming and discouraging to participants to answer; if participants were to answer, the level of detail in the responses has a possibility of being lower. Because food is an essential element to daily life, it is anticipated that within a one-week span of time, persons are likely to be directly involved in a food related transaction, which they can relay in the survey. However, the same cannot be said in a time frame of 24-72 hrs and in the case of considering a two-week time frame, the risk of having gaps in the data provided was not ideal for this collection of data.

The aim of this question was to identify if fresh, nutritious and/or healthy foods were available near to participants' residences, regardless of the infrastructure that comprised the food landscape they lived in. As such, another outcome of answering this question would be to begin identifying to what extent these goods and services were made available, be it scarcely, moderately or plentiful. In response to this question, 233 of the 263 students indicated they have access to cereals, grains or breads followed by 229 students having access to milk and dairy products (See Table 3). Fresh fruits and fresh vegetables were made available to 190 and 192 students respectively. The least most accessible item was fresh meat, which only 157 students claimed to have access to. Nine students were not able to identify any of the products and thus chose to say they do not know. So far, it appeared that the food landscape that surrounds the majority of students has a sufficient variety of fresh or nutritious items available. Table 4 provides a breakdown of how frequently these foods were found and which items in particular was most popular.

Students were asked to select the items that they were able to find within walking distance of their residence. While six participants did not respond and nine participants indicated that they do not know, a positive response from the data collected was 134 students indicated having all seven categories of foods

in walking distance to their residences. This was followed by 28 students identifying six of the seven products that they can access with just walking. The least accessible item in this scenario was fresh meats.

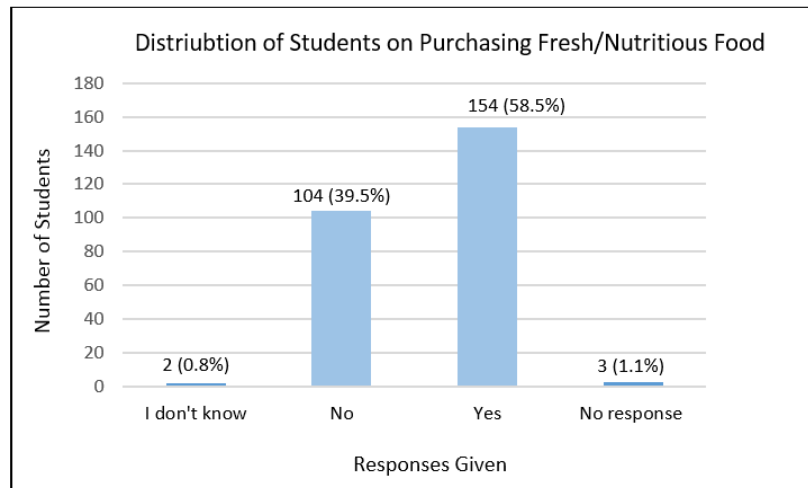
<i>Total # of items for sale</i>	<i># of students with items available nearby</i>	<i>Fresh Fruits</i>	<i>Fresh Vegetables</i>	<i>Freshly Cooked Meals</i>	<i>Fresh Meats</i>	<i>Eggs</i>	<i>Milks &amp; Dairy Products</i>	<i>Cereals, Grains or Breads</i>
No response	6							
I don't know	9							
1 food product	7	0	0	4	0	0	0	3
2 food products	11	1	1	7	2	2	3	6
3 food products	19	2	3	3	0	15	18	16
4 food products	24	9	6	18	1	19	22	21
5 food products	25	17	20	10	7	22	24	25
6 food products	28	27	28	18	13	26	28	28
7 food products	134	134	134	134	134	134	134	134
<b>Total</b>	<b>263</b>	<b>190</b>	<b>192</b>	<b>194</b>	<b>157</b>	<b>218</b>	<b>229</b>	<b>223</b>

**Table 4: Frequency of fresh/nutritious food products**

Twenty-five students indicated having just five out of the seven products available nearby, with the most popular food category available being cereals, grains or breads followed by milk and dairy products; again, fresh meats were the least accessible. In the case of having only one of these products available near to their residence, seven students found themselves in this scenario. Of the seven, four were able to access freshly cooked meals and the remaining three were able to access the cereals, grains or breads category.

As a means of finding out to what extent these products are accessible, participants were then asked if they purchased any of the fresh/healthy items they indicated being sold near to their residences within the last week. The answer options were simply yes, no and I don't know (see Figure 13). This question was also asked in order to identify if there are any certain food retail establishments utilised by students, as well as to understand what items are most purchased.

As Figure 11 shows, majority of the students did indeed purchase these items, with the total amounting to 154 students (58.5%). The next question in the survey asked participants to indicate which items in particular they have purchased within the last week. The list of options in Question Five is presented again and participants ticked all items that applied in order to indicate what they bought, as seen in a detailed breakdown of how many products and which types were purchased in Table 5.



**Figure 13: Responses from students regarding recently purchasing fresh/ nutritious foods**

The objective of this question was to begin gathering the data in order to compare not only what it is that participants would buy from nearby establishments, but what was available to be bought in the first place. The identification of these items can potentially paint a description of the food landscape of each student regarding what they have readily available nearby.

As it pertains to the food landscape Table 5 provides some values that allow insight into the types of products that students are able to access within walking distance. The response rate with this question was only somewhat high, approximately 42% of the participants did not respond to this question and one participant responded that he/she did not know. Twenty-eight students identified only having bought one food product within the past week, the most popular purchase was that of freshly cooked meals (17 persons made this purchase), followed by milk and dairy products (six persons bought these). Twenty

students stated that they had purchased two food products with the most popular product being fresh fruit (ten students purchased this) and fresh meats being the least popular product (one student purchased this).

<i>Total # of items for sale</i>	<i># of students that made purchases nearby</i>	<i>Fresh Fruits</i>	<i>Fresh Vegetables</i>	<i>Freshly Cooked Meals</i>	<i>Fresh Meats</i>	<i>Eggs</i>	<i>Milks &amp; Dairy Products</i>	<i>Cereals, Grains or Breads</i>
No response	111							
I don't know	1							
1 food product	28	2	0	17	1	0	6	2
2 food products	20	10	7	7	1	3	6	6
3 food products	21	14	12	4	5	5	13	10
4 food products	26	21	20	5	5	12	21	20
5 food products	29	25	29	5	12	21	26	27
6 food products	15	15	15	5	13	14	14	14
7 food products	12	12	12	12	12	12	12	12
<b>Total</b>	<b>263</b>	<b>99</b>	<b>95</b>	<b>55</b>	<b>49</b>	<b>67</b>	<b>98</b>	<b>91</b>

**Table 5: Breakdown of type and quantity of fresh/nutritious products purchased**

The highest number of products bought was five, with 29 students buying this number of items in the week prior to completing the survey. All 29 of the students purchased fresh vegetables, 27 students purchased cereals, grains or bread and 26 students purchased from the milk and dairy products category. In this frequency category, freshly cooked meals were the least popular option with only five students purchasing it. Only 12 students were able to purchase all of the products on this list within close proximity of their residence. The most popular item purchased was fresh fruits, with a total of 99 students buying this product in the span of a week. The table also shows that 98 students made purchases from the milk and dairy products category, making it the second most popular food item. In contrast, the least popular purchases made were by 55 students purchasing freshly cooked meals and 49 students purchasing fresh meat.

To further understand the purchases made, the next question was a follow up open ended styled question, asking participants to explain why it is they may or may not have purchased the items that are

available nearby. This would begin to indicate what the preferences, perceptions and factors that students take into consideration when purchasing food from places that were close to their residence. The responses were grouped and tabulated for simplicity in reading (see Table 6 and Table 7). It is important to note that some students, in their explanations, provided more than one reason for their purchases. The total count of responses does not reflect the number of students that answered.

The responses received when asking the students to explain what encouraged or discouraged them from making these purchases, were abundant in variety. For ease of reading and understanding, the open-ended responses were summarized and tabulated in order of most popular response to least popular response. This allowed the observance of the frequency of certain responses and how significant these factors play into the purchases being made by the students.

The most popular reason for purchasing foods within walking distance was that the price was affordable, that is, either it was a low-cost or the items were on sale. Responses similar to this one were popular: “I purchase the dairy and grocery from wholesale club which is 5min walk. The price is cheap and quality is good.”

Another student provided a condition in their purchasing: “Price, usually they are more expensive, therefore I'm selective what I buy.”

The second most popular reason was simply because students had the regular task of grocery shopping, that is, it was a scheduled trip to purchase groceries. Given that 130 students indicated being close to a large grocery store, and 124 students indicated being next to a small grocery store, it can be assumed that the stores were able to provide fresh/ nutritional food at a reasonable cost. This is the traditional pricing model of the large grocery stores.

<i>Reason</i>	<i>Count</i>	<i>Percentage</i>
Price e.g. low cost, items on sale	31	19.4%
Regular task of grocery shopping	24	15%
Convenience e.g. too busy, lazy	23	14.4%
Urgency e.g. hunger, last minute ingredients	19	11.9%
Being health conscious	16	10%
Close proximity to residence	11	6.9%
Budgeting by cooking at home	8	5%
Well-stocked grocery store(s) in vicinity	7	4.4%
Social setting e.g. dinner with friends	5	3.1%
Product appeal – e.g. visually, taste, smell	5	3.1%
High quality, fresh food/ingredients	4	2.5%
Want to support Local (farmers, produce, food)	3	1.9%
Special dietary needs e.g. gluten-free	2	1.3%
Indulgence (splurge)	2	1.3%

**Table 6: Reasons for students purchasing fresh/nutritious foods**

However, in the list of open-ended responses, 11 students stated that the produce/food was purchased because these items were in close proximity to their residences; seven students indicated that they had a well-stocked grocery store in the vicinity, and four students indicated having high-quality ingredients available nearby. An additional three students' reasons were that they wanted to support local produce and business. These numbers do not necessarily correlate with the number of grocery stores both large and small that are indicated to be nearby in Table 2. One response clarifies the lack of consistency: "The grocery store is far from my place (have to take the bus) so I often stop by shoppers to grab the essentials (fruits, veggies, dairy etc.) when I don't have time to go anywhere else"

Twenty-three students cited convenience as being the reason for buying foods in this category from nearby outlets. One student stated simply: "I needed food and the plaza is so convenient for quick meals"

<i>Reason</i>	<i>Count</i>	<i>Percentage</i>
Cost is too high at stores nearby	33	30%
Prefer to travel further to a better store	22	20%
Lack of fresh/high quality/local foods/ingredients	21	19.1%
No stores in 15 min walking distance	17	15.5%
Not scheduled to buy groceries	8	7.3%
Inconvenience of cooking	5	4.5%
Fresh produce does not have long shelf life	2	1.8%
Not a pleasant purchasing experience	2	1.8%

**Table 7: Reasons for students not purchasing fresh/ nutritious foods**

Figure 11 highlights that 40%, which accounted for 104 of the students, said no when asked if they bought any of the listed food products, from a food outlet that was nearby. The most common reasons for not making any purchases are listed in Table 7.

While some students are encouraged to buy fresh produce due to the cost, it was also a reason for some students not to purchase these items from nearby locations. Thirty-three students stated that the price was too high in stores nearby. One student explained her discouragement as: “They are a lot more expensive in comparison to the large grocery stores.”

Another student claimed: “Prices for eggs, milk, cereal is very high at convenience store, also very little selection”

Lack of selection presents itself as a reason under the preference to travel further to a better store, which 22 students expressed preference in doing.

The lack of freshness and quality is the fourth most quoted reason for not buying products nearby according to 21 student responses. This could very well be a factor that encourages them to travel further to larger grocery stores as well, as indicated by this student’s reason: “I prefer to shop at a grocery store so I know the produce is fresh, rather than a Shopper's”. This is substantiated by another student’s response, stating: “Groceries from stores within a 15-minute walk are overpriced and not very fresh... There are much better grocery stores within a 10-15-minute bus ride”



The fourth most popular response was the most surprising, as 17 students claimed that there were no proper stores within a 15-minute walking distance from their residence to purchase these foods. The idea of purchasing groceries from more abundantly found convenient stores was not a welcomed one. One student stated: “I have to drive to my local grocery store. There are none within a 15-minute walk. I don't want to buy cereal at the convenience store. “

With similar reasoning, another student stated: “I just have one sushi restaurant within 15 minutes' walk, and I do not purchase food from convenience store. I prefer to travel further either by walking (20-25 minutes) or taking the bus to a large grocery store”

Transportation played a significant role in the acquisition of fresh/nutritious foods by the students. Even though many students preferred to travel further than a 15-minute walk, there is a hesitance to conduct the travelling due to the dissatisfaction with the transportation services. One student explained her scenario: “The options are not good, most of the supermarkets where I am use to getting things like fresh fruit is a driving distance away. Bus would have helped, but with all of the construction and such, it severely inconveniences this process. Other factors include financial costs (the areas close are relatively more expensive than the larger super markets). Time commitment is another factor, it takes a lot of planning and such to go and buy groceries via bus (I do not have a car here), now with all of the construction right on King and Victoria, the bus routes are about 50% longer than it used to be, making it a very time consuming endeavour.”

Another student had a similar complaint: “A lot of the places are far, and fresh groceries can be heavy to carry on the bus. They also don't travel well.”

Apart from the physically challenging task presented, some students displayed reluctance in purchasing fresh produce not only because of transportation woes but the fact that the shelf life might be short, as well as the inconvenience of having to cook. Seven students stated these concerns as their reason, one of which explained: “The price of fresh food is often expensive, and, since they can go bad fairly quickly, sometimes it's just not convenient enough to buy in comparison to cheaper foods that will stay

and do not take a lot of time to prepare. Since I don't own a car, I only ever buy what I can bring back and in bulk, so that limits the amount of fresh food I buy. I probably buy fresh meat and vegetables twice every four months, though grains and eggs are ones I purchase quite often.”

The least popular discouraging reason was stated by two students who did not like shopping in the stores near their residence due to a lack of a pleasant purchasing experience. One student described his/her closest store as “sketchy”.

#### **4.4 Interaction with Processed Foods**

Continuing with the trend of asking students about their recent food purchases, the ninth question of the survey listed items that were considered items that were more processed and unhealthy in nature. Participants were asked to indicate to the best of their knowledge, which of these items were available within walking distance of their residence from the list of following items:

- Frozen fruits
- Frozen vegetables
- Pre-packaged frozen meals
- Pre-packaged fast-cooked meals (e.g. Uncle Ben’s Rice, Instant Ramen Noodles)
- Packaged foods (e.g. chips, chocolate bars)
- Fast-cooked meals (e.g. fast food)
- Frozen meats
- Condiments (e.g. ketchup, mustard)
- Bottled beverages

Following the structure of the previously asked questions, an ‘I don’t know’ option was provided for participants who could not recall the purchases they may have made accurately. The objective of this question was to begin obtaining a comparison of the fresh and processed foods landscapes that tend to be

close to the residential areas where students are living. Table 8 provides an overview of the information obtained regarding these food options.

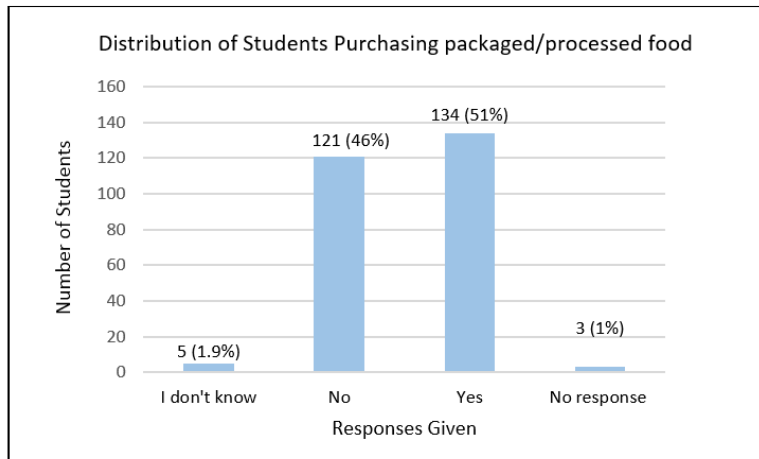
In order to achieve a comparison of the different food landscapes that present themselves, Table 8 will be compared with Table 3. Looking at the availability of fresh fruits and vegetables vs. frozen fruits and vegetables, it was a positive note to see that fresh fruits and vegetables were more readily available. Processed and pre-packaged foods allowed for a wider variety of meals to be offered at different price points and different levels of preparation; while 194 students claimed that they could find freshly cooked meals within walking distance of their residence, the same number of students were able to find pre-packaged frozen meals alone, not considering the pre-packaged fast cooked meals and fast cooked meals. Pre-packaged fast cooked meals refer to items that require very little preparation and can be bought and then eaten at a later time, for example, Ramen Noodles. Fast cooked meals refer to those foods that are typically known as 'fast food', for example McDonald's. Pre-packaged fast cooked meals are made available to 216 students in the vicinity of their residence, while fast cooked meals can be easily accessed by 212 students. Packaged foods such as chips and cookies can be located within walking distance for 226 students. Other additional foods such as condiments and bottled beverages can also be easily found, with 209 and 229 students being able to find each respectively close by to their homes.

Total # of items for sale	# of students with items nearby	Frozen Fruit	Frozen Vegetables	Pre-packaged Frozen Meals	Pre-packaged Fast-cooked Meals	Packaged Foods	Fast-cooked Meals	Frozen Meats	Condi-ments	Bottled Beverages
No response	9									
I don't know	7									
1 food product	3	0	0	1	1	1	0	0	0	0
2 food products	9	1	0	2	0	3	2	1	1	8
3 food products	13	1	2	3	5	8	6	2	3	9
4 food products	14	1	3	4	9	10	8	1	9	11
5 food products	26	4	6	11	20	23	21	4	19	22
6 food products	22	4	7	16	22	22	18	5	18	20
7 food products	10	2	6	9	10	10	8	5	10	10
8 food products	18	11	15	16	17	17	17	9	17	17
9 food products	132	132	132	132	132	132	132	132	132	132
Total	263	156	171	194	216	226	212	159	209	229

**Table 8: Frequency of pre-packaged/processed food products found**

Only three students had limited access to these food types, with only one product being available to them. One student had access to pre-packaged frozen meals, one had access to pre-packaged fast cook meals, and one to just packaged foods. The most popular scenario was students being able to find all nine food products within close vicinity of their residences, with a total of 132 students. The second most popular scenario was the availability of five of these food products, made to 26 students. Of the 26 Students, 23 were able to have access to packaged foods, 22 to bottled beverages, and 21 to fast cooked meals. Frozen fruit and frozen meat were the least available items. In the case of having six food products nearby 22 students were able to have this availability. All 22 students had access to pre-packaged fast cooked meals, as well as packaged foods.

Participants were once again asked to indicate whether or not they had purchased any of these items. This was to begin understanding the frequency of purchases of these items. As Figure 14 shows, 51% of the responses indicated that these purchases were made. This percentage has a representative value of 134 responses.



**Figure 14: Responses from students regarding recently purchasing processed/pre-packaged foods**

Participants were then asked to indicate from the same list of items, the ones they had purchased within the last week. Based on the answers that were selected or avoided, participants were asked, like the previous section of questions, to explain the reasoning for the purchases they did or did not make. The purchases made by students are recorded in Table 9.

The data for this question was a little less reliable due to 123 students not responding. Of the remaining responses, the most popularly bought food products were packaged foods, as recalled by 68 students. Following this, 58 students purchased bottled beverages and 55 students purchased fast cooked meals. The least bought item were frozen meat, followed by pre-packaged frozen meals.

Students tended to purchase just one product making it the most popular scenario with a total of 47 students. Thirteen of these students purchased fast cook meals and ten purchased packaged foods. Following this, the second most popular scenario was a total of 36 students purchasing two products in total. Of the two, the highest purchases were those of bottled beverages, followed by packaged foods. Only two students purchased eight of the nine products and another two students purchased all nine products within the week span. There were no students recorded purchasing seven items within the

span of the week they were recollecting. It is interesting to note in comparison, that there were 12 students purchasing all the fresh/nutritious products in Table 4, and 15 students purchasing almost all.

TOTAL # of items purchased	# of students with products available nearby	Frozen Fruit	Frozen Vegetables	Pre-packaged Frozen Meals	Pre-packaged Fast-cooked Meals	Packaged Foods	Fast-cooked Meals	Frozen Meats	Condiments	Bottled Beverages
No response	123									
I don't know	4									
1 product	47	4	3	3	1	10	13	2	3	8
2 products	36	6	7	4	4	15	11	3	5	17
3 products	27	6	7	4	6	21	12	3	5	17
4 products	14	7	5	5	5	11	8	4	6	5
5 products	5	1	1	3	3	4	4	2	3	4
6 products	3	1	1	1	2	3	3	3	1	3
7 products	0	0	0	0	0	0	0	0	0	0
8 products	2	2	2	2	2	2	2	1	1	2
9 products	2	2	2	2	2	2	2	2	2	2
Total	263	29	28	24	25	68	55	20	26	58

**Table 9: Frequency of fresh/nutritious products available**

After asking students to highlight any products they would have purchased, they were again invited to answer an open question asking what encouraged or discouraged their decisions. Table 10 highlights what influenced their purchases and Table 11 summarised what discouraged them from purchasing these items.

For this open ended question there were 188 responses recorded. The most popular reason for students having to buy these items was for convenience. Convenience manifested itself in the form of 49 students stating they were too busy or described themselves as lazy. Students stated many reasons: “didn’t have time to cook my own dinner”; “easy to cook and time saving”; “quick way to have a meal and more affordable than dining”.

<i>Reason</i>	<i>Count</i>	<i>Percentage</i>
Convenience e.g. too busy, lazy	49	45.8%
Price e.g. low cost, items on sale	17	15.9%
Close Proximity to residence	14	13.1%
Long shelf life of product	8	7.5%
Urgency e.g. hunger, last minute ingredients	7	6.5%
Product appeal – e.g. visually, taste, smell	6	5.6%
Social setting e.g. dinner with friends	4	3.7%
Indulgence (splurge)	2	1.9%

**Table 10: Reasons for Students purchasing pre-packaged/ processed foods**

One student explained their reasoning, which entailed more than one factor to consider: “Since I am not in the vicinity of good restaurants, I like to purchase frozen meals on occasion for days when I am too tired to cook a meal. I usually prefer frozen vegetables over fresh because they are cheaper and easier for me to incorporate into meals. I purchase chips and other snack foods regularly. I never buy bottled beverages.”

Another student however placed more emphasis on the role of school with this rationale: “Fast food is the easiest option for students who see time as a valuable resource. Being able to receive your food in less than five minutes is a huge benefit when you are on a busy schedule.” The busy schedule associated with school played a significant role in the choices that students were making. Many school related reasons were given in this open ended section. This student states: “Again, convenience. As a student I don't have the luxury of time so whatever is moderately healthy and close by is my best option.”. The word luxury as a description for time should be noted. This statement is compounded by another student's response: “As an engineering student I need meals that are simple to cook” and by another with a similar school-related reason: “The quality of food in the area does not affect pre-packaged foods. Also as a student, I rarely seldom see myself cooking near exam period.”

Cost was the next important factor cited by 17 students, as they chose to buy these food options mostly because they were inexpensive. Not only do they intentionally purchase low cost food items for budgetary reasons, but responses show that many of the students ‘noticed a sale’ in some way and that encouraged them to make a purchase. For example, this student states: “there was a sale on chocolate so I took the opportunity to buy a few, although that was not my original intention of purchase.”

Some students capitalised on the proximity of these establishment to their residences;14 students shared similar thoughts. One stated: “Places are very close to campus and to my place of residence. Grabbing food when I'm coming back from class is easy.”

There were some perceptions by the participants that the frozen fruits and vegetables were still healthy, and thus were considered a good purchase not only for their nutritional aspect, but also the conveniently lengthy shelf life they maintained once they remained in a frozen state. One student reasoned: “Frozen veggies are just as good as fresh so I opted to buy more of those.” Another reason supporting this notion came from another student: “One reason given for purchasing these items was: “fresh food has a tendency to spoil, I buy frozen veggies and fruits so I don’t have to do groceries every week.”

Other encouraging factors included the food being appealing to the students as well as a social setting; one student justified their purchase by saying: “We were hosting a bbq so I bought oreos and chips because they were on sale and they were the kinds of snacks that are convenient to serve at a bbq. I am usually discouraged from making packaged food purchases because they don't align with my values or health objectives.”



<i>Reason</i>	<i>Count</i>	<i>Percentage</i>
Attempting to be healthy	25	24.5%
Prefer fresh foods/produce	15	14.7%
Items were not needed	15	14.7%
Prefer to travel further to a better store	14	13.7%
Cost is high	14	13.7%
Regular task of grocery shopping	7	6.9%
Lack of appeal e.g. taste, visual	7	6.9%
Lack of selection	3	2.9%
No stores in 15 min walking distance	2	2.0%

**Table 11: Reasons for students not purchasing pre-packaged / processed foods**

While there were reasons that students agreed on to support the purchasing of pre-packed and processed products, there was a 46% response rate for students who did not purchase these items. This percentage amounts to 121 students out of the total population sample.

The most popular reason for not buying the food products listed was due to trying to be healthier; 25 students provided this as a reason. In addition to this, another 15 students specified that they prefer fresh foods and produce. One student stated as a reason: “I don't buy packaged stuff or frozen stuff because I prefer fresh and healthier food.” Others saw the detriment in eating fast cooked food and preferred to stay away from it, one of the student responses stated: “Trying to cook my own meals instead of eating out”. The next most popular response was that the items listed were simply not needed. Students’ responses indicated that they do not regularly eat the items that are provided in the list of categories; one student mentioned the displeasure in consuming pre-packaged or processed foods: “I don't have open access to a kitchen or microwave. Additionally, I do not enjoy the feeling associated with eating pre-packaged food consistently.”.

Rather than purchase the items listed in the survey question nearby, 14 students stated they would rather travel further to a better store which would have better options for them to choose from, be it for

reasons related to cost or nutritional quality. The least quoted reason for not purchasing any of these items was due to not having any stores within walking distance that would sell them. Two students indicated this scenario as their reasoning for making no purchases. This observation can be compared to the 17 students who did not have stores nearby selling fresh/nutritional foods (Table 6). This comparison can imply that it is much easier to find packaged and processed foods than it is to find fresh/nutritious foods.

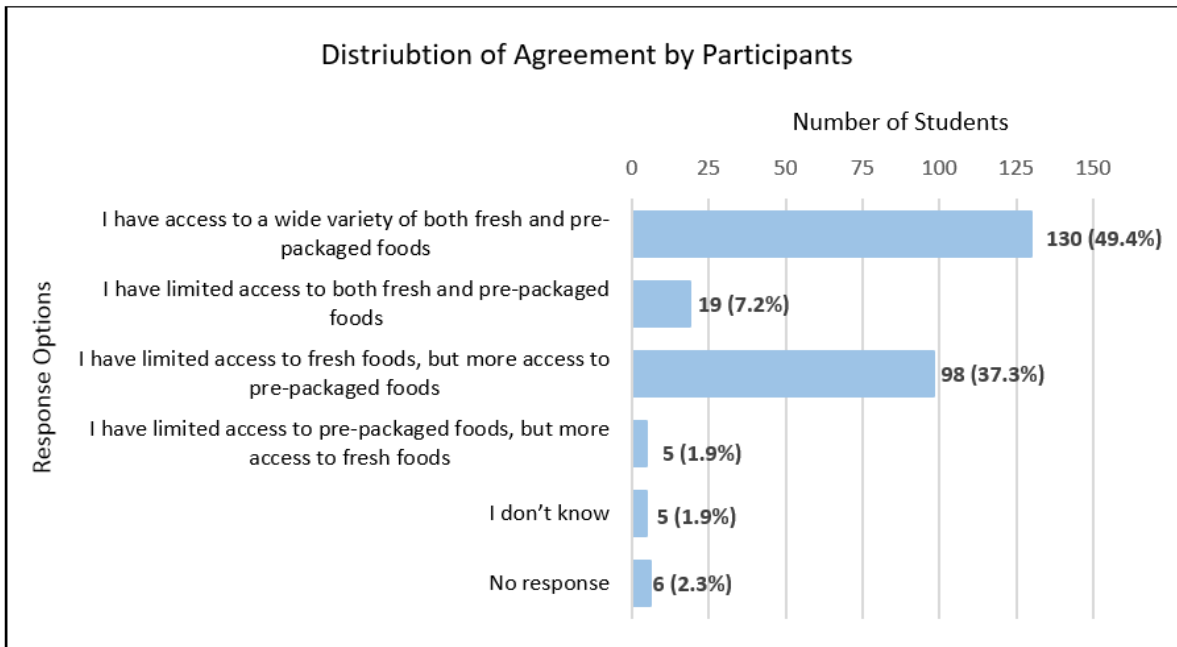
The next section of questions no longer focused on the items that were accessible in close proximity to residences, but more on the overall perception of food landscapes that are potentially accessible. The 13<sup>th</sup> question provided a list of prepared responses in the form of a multiple choice, and participants were asked to select the statement that they most agreed with (see Figure 15). The statements were as follows:

- I have access to a wide variety of both fresh and pre-packaged foods
- I have limited access to fresh foods, but more access to pre-packaged foods
- I have limited access to pre-packaged foods, but more access to fresh foods
- I have limited access to both fresh and pre-packaged foods
- I don't know

These phrases were very simple but is the one question of the survey that captured the essence of the research: are students living in food swamps? Do they have access to fresh food and if so, to what extent? This question received 257 responses. The most popular agreement was that participants perceived to have access to both fresh and pre-packaged foods in close proximity to their residences. Of the options, 49.4% (130 responses) of the participants agreed with this statement.

At a first glance, this is a positive indication that food swamps are not necessarily prevalent; it can imply a positive and rounded food landscape for students to be residing in/near, being able to access both fresh and pre-packaged foods. However, the remaining statements garnered significant popularity as well; 37.3% (98 responses) of participants agreed to having limited access to fresh foods nearby, and 7.2% of participants (19 responses) stated they had limited access to both fresh and pre-packed foods. These two

responses both reflected a deficiency in the access to healthy foods, thereby producing a total of 44% participants in agreeance. This outweighs the consensus that there was ample exposure to both categories of foods in close vicinities to students’ residences. Having 44% of the student responses indicate that they are lacking the presence of fresh foods is strong indication of the presence of food access issues, particularly that of food swamps.



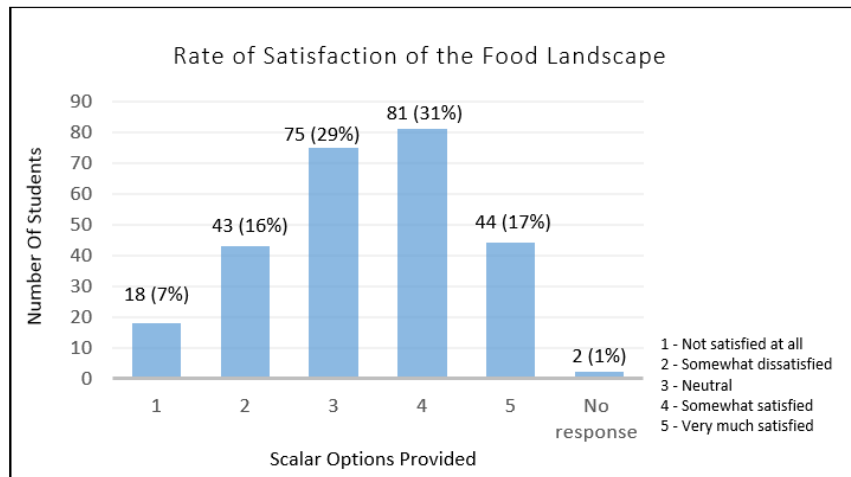
**Figure 15: Frequency of agreement with statements related to food access**

#### 4.5 Students and the Holistic Food Environment

The last three questions aimed to obtain more information regarding the perception of participants on the aspects of food that were of value to them. Students were asked to rate their satisfaction on a scale of one to five, one being not at all and representing the lowest value that could be given, and five represented very much, or the highest value that could be given in response to a question. The values of the entire scale were considered as follows:

- 1- Not satisfied at all
- 2- Somewhat dissatisfied
- 3- Neutral
- 4- Somewhat satisfied
- 5- Very much satisfied

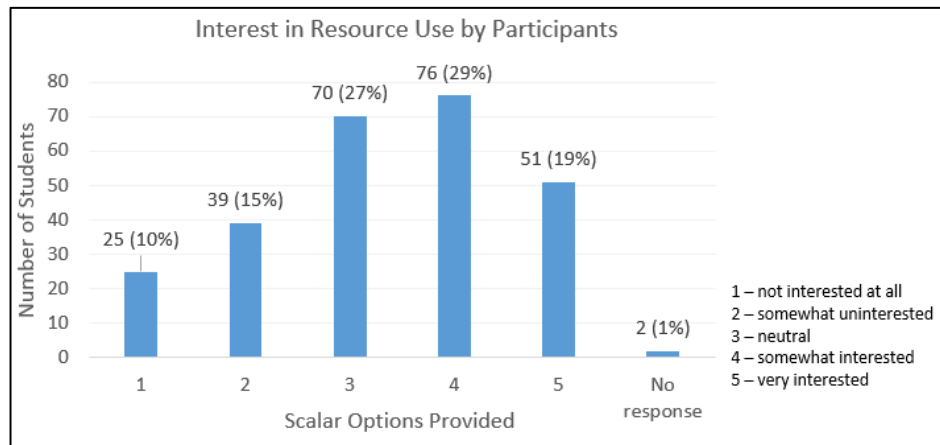
Their satisfaction was being rated with regards to how they felt about the food landscape that surrounded their residence. Figure 16 shows a breakdown of the responses.



**Figure 16: Level of satisfaction with the food landscape close to students’ residences**

There was a total of 261 responses to this question. The highest rated response was four, indicating that 81 students were somewhat satisfied with the food landscape that they resided in. Following this was a neutral response from 75 students. Forty-three students indicating a level of dissatisfaction with the food landscape and 18 students were dissatisfied entirely. This question was intended to provide insight into how students felt about what they can obtain close to where they live. In retrospect, more insight should have been acquired by adding a follow up open ended question asking why they have that level of satisfaction.

What seemed to be case, despite, was that students are relatively satisfied with the food landscape that surrounds their residence. Only 18 students mentioned that they were not satisfied. However, this does not determine whether the food outlets near students are making most of the right foods available. For example, having a plaza of take-out restaurants may be ideal for one, but not for the other.



**Figure 17: Level of interest in food resource use**

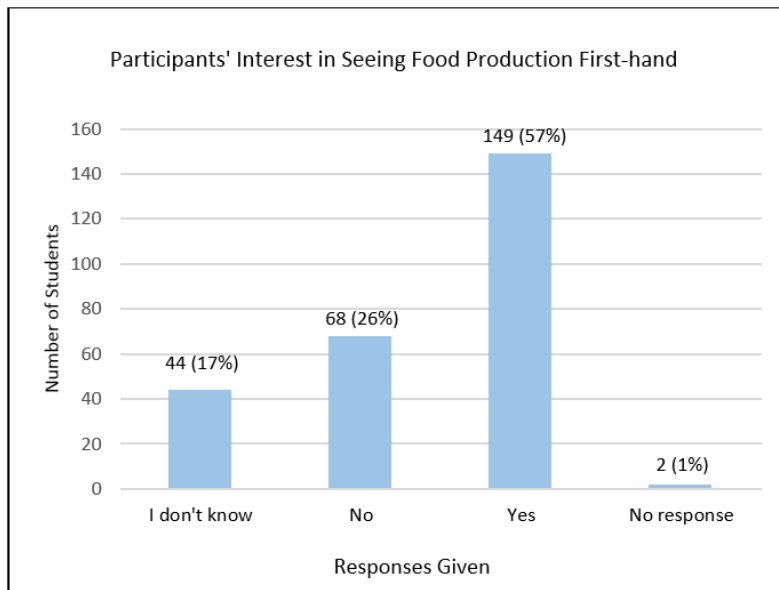
The next question, Question 16, also scalar, asked participants to rate how interested they would be in the resources utilised to produce the foods that they purchased (See Figure 17). A similar scale of values one to five were given as choices, with each value indicating as follows:

- 1 – not interested at all
- 2 – somewhat uninterested
- 3 – neutral
- 4 – somewhat interested
- 5 – very interested

The highest response was once more four- the scale that would suggest ‘somewhat interested’, with 76 students agreeing with this level of interest. The second highest response was neutral, similarly to the previous scalar question. The objective of this question was to observe to what extent participants are interested in food beyond their purchases and their consumption. This question also acts as a preface and

supplementary data for the questions further in the survey regarding how interested students would be in visiting a site of food production.

Students were then asked to indicate whether they would be interested in visiting a farm or facility to see where food is grown and/ or processed. To this question, there were a total of 260 responses, (see Figure 18) with a count of 149 answering ‘yes’ (57% of the total), followed by 68 responses indicating ‘no’ (26%) and 44 responses indicating ‘I don’t know’ (17%). While this is a very simple question and can only skim the surface of understanding the depth at which students cared about the food system. This, coupled with the previous questions, provides a high level view of what their position is on the matter. The responses to this question are supplemented by Question 17 of the survey where they are prompted to provide a reason for their answer (See Table 12).



**Figure 18: Students’ responses regarding seeing food production first-hand**

<i>Reason</i>	<i>Count</i>	<i>Percentage</i>
Curious/interested to know /learn how food is grown/processed and where it comes from	79	53.4%
Acquisition of fresh, local and/or organic produce straight from the farm	19	12.8%
Possibly visit if it were conveniently timed/organised/located	14	9.5%
Personal enjoyment/familiarity with this environment & expanding on this experience	12	8.1%
Interested in food security, community development, local food, sustainability and similar social and environmental concerns	12	8.1%
A fun/cool experience to take part in	12	8.1%
For the betterment of consumer choices	4	2.7%

**Table 12: Responses by students who are interested in seeing food production sources**

For the participants that responded yes to the previous question (implying that they were interested in visiting a farm or facility) there was a variety of reasons that such a visit interested them. The most common response, given by 79 of the students, was that they were curious about the process, had interest in learning how food was grown and processed, and ultimately where food came from. They were all variations of a similar statement, such as: “I think it would be a cool opportunity to go visit a farm and see how things are processed.”. Another such response was: “It would be interesting to see the process that actually occurs since in everyday life, we just see the product appearing conveniently before us.”

A lot of the responses also acknowledged the importance of learning how food is sourced and the extensive distance food processing goes beyond a meal on a plate or a purchase in a store. One of the responders noted: “I think it's important to know where our food is coming from, and to understand some of the impacts related to food export vs. local farming”

Another interested student commented: “I try my best to maintain a very healthy lifestyle and as a consumer that is living in an urban setting, I feel very disconnected from the food system, production and

supply chains. I would be curious to see how food arrives at the grocery store in the plaza next to my house, to know how food is produced/packaged/preserved/transported and so on. I am also wary of fresh produce because it's often coming from Mexico or other countries where I am unsure of what chemicals are being applied to them.” These are suggestive statements implying that students are indeed interested in the value of food processing.

A lot of the interest was focused on topics that have been popular and controversial in the past and continue to be so in the present. One student pointed out many that are well known sensitive matters: “I would want to know how the fruits and/or vegetables are grown/processed (e.g. are there a lot of pesticides or unwanted chemicals being used?). I would also want to know how the animals are being treated. Are they being treated well and given a good life? I would avoid seeing how the meats are processed (i.e. slaughter house), but I would want to know how the animals are killed (are they killed via a non-painless/humane method?)”. Issues such as chemical usage in plant growth, humane treatment of animals, transportation of produce for export – these are all very important aspects of food growth, and can all contribute towards a sustainable food system as well.

The second most popular reason for visiting these facilities was to be able to gain access to fresh, local and/or organic products from the farm itself. Students expressed interest in being able to acquire fresh ingredients, which makes one wonder how often are such goods made available to students within their regular schedule. One student listed their reasons for preferring a farm visit for produce: ‘ My parents buy products from the farm because it is more fresh, not injected with GMO and we can pick it ourselves (strawberries, apples)’.

It should be noted that the University of Waterloo houses a farmer’s market when seasonally feasible, allowing students to have farm grade produce (UW Food Services, 2016). That being said, despite this setup, one of the students noted: “Feds do a farmers’ market but I find the prices to be inflated and overall the selection to be poor. It's also at a very inconvenient time and location for me to drag my



groceries from campus to home. “Another student highlighted the disadvantage of cost as well; “I want fresh produce and local farms would usually sell them cheaper”.

The third most popular response was a conditional one, with 14 students saying they were willing to go but only depending on the timing and the organisation of the trip. These students display interest but prioritise their time.

Other common reasons for showing interest included visiting just for the fun experience, as well as because it is of personal enjoyment due to familiarity with the environment. These responses in particular were from students who had been to a farm before or had grown up on one and were generally interested in that type of environment. The least popular reason was stated by four students, who indicated that they would visit so that they could improve their consumer based purchasing decisions. One student stated: “I am interested to know where my food comes from so I can make more informed choices”

On the other hand, there were a handful of students who indicated that they were not interested in visiting places such as a farm or a processing plant (See Table 13). Twenty-six students indicated a general lack of incentive, motivation or interest to pay a visit to places such as this, also citing their busy schedule as a hindrance to this prospect. One student stated: “It would depend on my time constraints, etc. I already have a basic understanding of where food comes from and I am quite indifferent about the prospect of visiting a farm.” Another student stated simply that: “I don't have enough interest to spend that time”. There was also a predisposition from some students that this kind of activity would not be interesting; according to one student: “It would probably be informative, but potentially boring or preachy.”

Another discouragement for students not to visit such facilities was the pre-existing knowledge that some students already had having already been to a farm or lived on/near one, thus these students already feel a sense of understanding the goings on with food production. One student explained: “I grew

up on a dairy and beef farm. We also grow some fruit. I feel I have enough of a grasp of my food's origins.” Another student stated: “My cousins are farmers; I've seen lots of farms.”

<i>Reason</i>	<i>Count</i>	<i>Percentage</i>
Lack of motivation/incentive/general interest	26	32.9%
Will not learn anything new/have already been to a farm	24	30.4%
Too busy to visit	12	15.2%
Indifference to where food comes / not priority to learn about	10	12.7%
Would hinder conscience when consuming certain products	4	5.1%
Prefer another medium e.g. reading, documentaries	3	3.8%

**Table 13: Responses by students who are not interested in seeing food production sources**

Twenty-four students were categorised for their reasoning of ‘not going to learn anything new’. This also included students who expressed that they will not learn anything of value, like this response for example: “I don't think the time trade off would be worth it for the benefit I would receive.” Another student stated: “I feel like I'm already well aware of how it is produced and processed.” It can be said that there is a tendency to believe that a trip such as this one will go a certain way such as boring or repetitive, by persons who have not experienced this environment. There were a few responses that the reasoning was based on this kind of predisposition. One student stated: “I feel I am mostly aware of the reality” and another similarly stated: “I feel like I'm already well aware of how it is produced and processed.”

The next most common reason was mentioned by 12 students declaring they simply had no time to visit and were too busy. Perhaps the most honest reason for not being interested was given by ten students, who stated they are indifferent about food related matters. One student said: “I don't care for sustainability and the like - I just want cheap and relatively healthy food.” Another student stated that:

“personally does not matter to me as the final user/consumer of the product”. Another student identified their priorities in his reason: “I have more important things to worry about e.g. school and coop”.

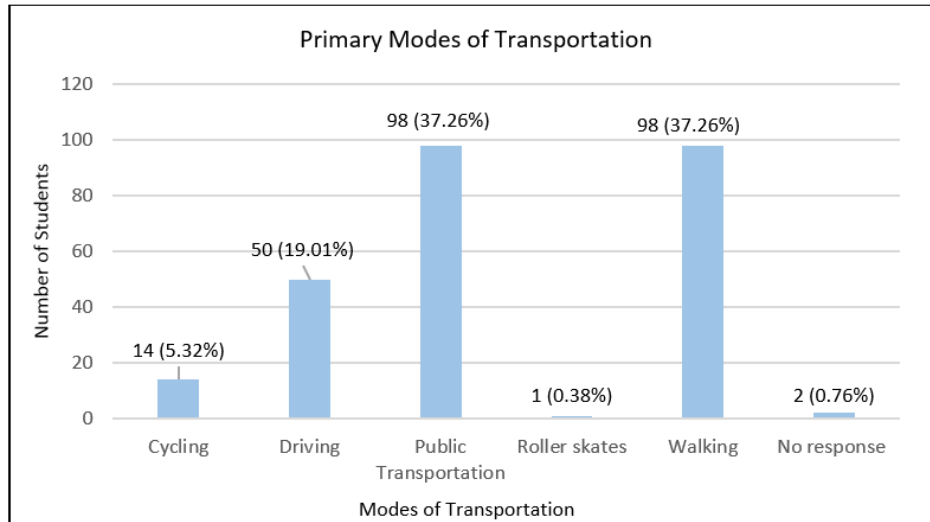
A small handful of four students indicated that they would not be interested in visiting places where food was processed as it would hinder their conscience when consuming certain products such as meat. It is also interesting to note that three of the students, although not interested in visiting the facilities, would much rather learn about these facilities and procedures through a different medium such as a documentary or through reading.

Overall, while some students had valid reason not to show interest in this kind of activity, due to already having previously existing knowledge, it stood out quite clearly that a lot of the disinterest stemmed from assumptions made regarding the level of knowledge and interest already achieved about these topics.

For the final question of the survey, participants were asked to identify their most frequently used mode of transportation, and out of 263 participants, 261 responded to this question. (See Figure 19) The most common mode of transportation amongst the students appears to be walking, having a total of 98 (37.26%), as well as public transportation at 98 also (37.26%). The next commonly used modes of transportation were driving (50 responses, 19.01% of the total), and then followed by cycling at a count of 14 (5.32%). One student identified their transportation mode as roller skates (0.38% of the total).

The fact that many students actively walk in order to reach their destinations, emphasises the need to have food landscapes that are comprised of outlets that make healthy foods available. Noting that the second most popular mode of transportation is public transportation, this is an especially challenging time for students as Waterloo Region undergoes heavy construction that ultimately creates shifts in the bus schedules (Region of Waterloo, 2016c). Driving was accessible on a regular basis by only 50 students, but in comparison to the total sample number, it was one fifth of the students, which translated to a

significantly large portion of the population relying on private transportation in order to gain proper food access.



**Figure 19: Modes of transportation frequently utilised by students**

#### **4.6 Limitations of Study**

Throughout the research there were some limitations which were recognised that, if not prefaced, could potentially provide erroneous assumptions and results. The following limitations are those that have been recognised by the researcher; however, it cannot be concluded that they are the only limitations.

##### **4.6.1 Sample size**

The outcome of the data recruitment resulted in the valid responses totalling 263. Although this data may have the capability to show significant trends and projections, it cannot necessarily be representative of the entire student population of the University of Waterloo. Due to lack of a strong incentive to participate in the survey, the results did not reach the target of 500 and more, and leaves room for the conclusions made in this research to be studied further.

Another limitation may be the incentive provided to the students in exchange for their participation. The one in 500 chance in winning a \$25 gift card could have been odds that were not worth pursuing in exchange for participating in the survey.

#### **4.6.2 Accuracy of data**

Even though measures were put in place to encourage accurate results from the data collection, there were some errors that questioned the accuracy and validity of the survey responses collected.

##### **4.6.2.1 Student Title and Where They Live**

While this survey was intended for students who attended the University of Waterloo, there were no questions that ensured the validity of participants claiming to be students. In addition to this requirement being mentioned in advertising material, it was also mentioned in the cover letter of the survey that it was intended for University of Waterloo students, and there is a question that asks them to identify which level of study they are currently undergoing. However, these cannot confirm that all participants who took the survey are from the University of Waterloo. For example, if a student of another university came across the survey posted on public sites such as Reddit and did not comply with the written conditions, they could still potentially answer the survey as they would be able to answer which level of study they are currently pursuing.

Although this is unlikely since relevant emails, hashtags and tags that were utilised were all directly related to University of Waterloo students, staff and social media management, it is still a possibility and thus a minute limitation, if this data were to be considered for use in a case study specific to the University of Waterloo.

Another limitation that can be considered is the unbalanced perspective this research may provide of Waterloo Region. With majority of the students living in the cities of Kitchener and Waterloo, the data

would not provide an accurate representation of the entire Waterloo Region; however, it would still be valuable for the cities of Kitchener and Waterloo in particular.

#### **4.6.2.2 Possibility of Biased Responses**

When data distribution was carried out, all outlets of social media utilised were accessed through a private account. This encouraged the viewing of the survey link by a network of acquaintances and friends. If they completed the survey, there is a possibility that the answers provided were induced with bias, as a means of personally encouraging positive results for the research. This type of audience was also encouraged through the posting of the link to public social media groups where topics such as food security are popular (e.g. the Facebook group ‘Geography and Environmental Management’), thus again inviting bias to the answers.

Due to the convenience approach taken to access the sample population, the possibility of bias within the answers reduces the ability to use this data for generalisation. That is, the results identified from using this population sample cannot be extrapolated to represent the entire student population of the University of Waterloo. However, the trends can be categorised as observing a subset of the intended population sample, and can still be referred to as an initial study conducted in the investigation of urban food security and students.

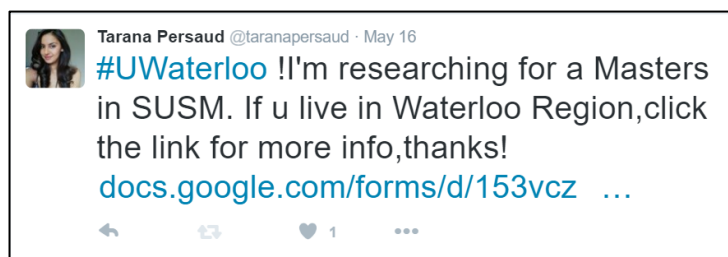
#### **4.6.3 Technical Malfunction**

Due to a technical malfunction in the editing of the survey while it was made available to the public, for an extremely short period of time the first three questions of the survey were not made available to the participants. One of the questions was the mandatory controlling questions that ensured participants can only answer the survey if they were a student and resided in Waterloo Region. The second was also mandatory, asking the students to indicate their level of study and the third questions was optional, asking participants to indicate their identifying gender. These categories are considered important for the research in order to identify any particular trends that may become apparent with the

data. Since these were not obtained, as a result, 14 of the 294 responses were not eligible for data analysis based on not being able to confirm that the participants reside within Waterloo Region and what level of studies they were pursuing. Since this information could not be double checked or re-asked in any way, it was decided that including these 14 responses could risk compromising or skewing the data results, and were thus removed from the data spreadsheet.

#### 4.6.4 Social Media Limitations

Social media is a popular medium to relay instant information, and this includes condensing content into short quickly readable or viewable forms of information. However, this may have been more of a disadvantage when utilising social media in order to scout for survey volunteers. In the instance of Twitter, the social media platform allows a maximum of 140 characters per tweet, which does not allow enough detail to be provided about the survey and the research. While the condensed message may have captured the interest of curious Twitter users, it can also be easily dismissed due to the shorthand form of writing used and the lack of useful and interesting information (see Figure 20). For example, if persons were not familiar with the full meaning of ‘SUSM’, this could be potentially discouraging.

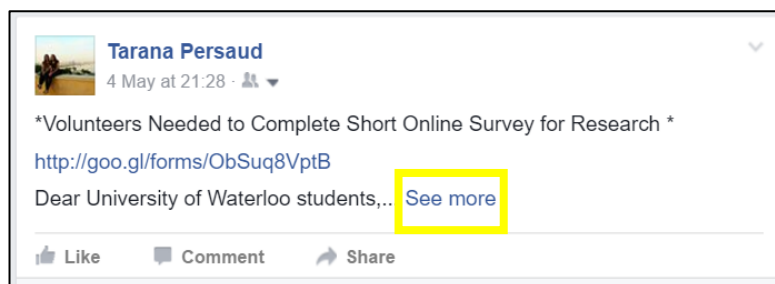


**Figure 20: shorthand tweet utilised to recruit volunteers**  
(Source: <https://twitter.com/taranapersaud>)

In the instance of Facebook, while this platform allows for very long statuses, a paragraph of introductory statements was used instead in an attempt to capture the interest of potential volunteers. However, Facebook only allows the first few lines to be viewed and the remaining lines of text of a comment, post or status are hidden with the option of clicking ‘see more’ button to read the rest of the

information posted (see Figure 21). This would mean that readers would not have instant access to all of the information and this could be a discouraging factor from them displaying interest in the research. In the instance of Instagram, the limitation identified was the lack of insight into the imagery used for the advertising of the survey.

For this social media platform, images that were related to food and were considered generally humorous were utilised in order to capture the attention of potential participants, and the caption of the images provided ample information and directions on where to find the link to the survey. In retrospect, the image section should have been utilised to not only post eye-catching pictures, but to also display information regarding the survey in the way a traditional poster would. This way, the caption of the image would be much shorter and more appealing to the platform users.



**Figure 21: shortened status on Facebook during volunteer recruitment**

(Source: <https://www.facebook.com/tarana.persaud>)

#### **4.6.5 Misunderstanding of Survey Questions**

Although re-written and revised multiple times, the misinterpretation of the survey questions proved to be inevitable. While this occurrence did not happen often enough to create flaws and inaccuracies in the data collected, there were some instances where it was suspected to have occurred

##### **4.6.5.1 Possible Misreading of Questions**

It was of particular interest that for the survey Question eight, where students were asked to identify what fresh produce/foods they had purchased within the last week *within a 15-minute walk from their*



*residence* that 24 students identified the reason for their purchases as ‘a scheduled weekly trip to purchase groceries’ (See Table 6). Based on this high number of identical reasons for purchasing these foods, it is suspected by the researcher that participants may not have considered whether these purchases were made within a 15-minute walking distance, but may have answered the question while recollecting their regular grocery trips. An approach that could have clarified the circumstances in which to answer the questions would have been to utilise capitalisation of the important criteria to consider (in this case “within a 15-minute walking distance from your residence” would be capitalised) in order to attract the attention of participants in order to increase the chances of receiving accurate data. Another approach rectifying this limitation would have been to ask participants to identify their geographical whereabouts more specifically than just the city/township that they reside in. An example of a more specific geographical location would be a major intersection closest to their residence, or the first three values of their zip code. Had this information been pursued, mapping of the areas would have been possible, thus confirming the relative accuracy of their answers for this research.

#### **4.6.5.2 Ambiguity in Food Categories Listed**

Throughout the questionnaire there were two list of food categories that students were asked to select items from that they purchased recently or that were available to them in walking distance. There were seven food products listed for the healthy/nutritious foods and nine food products listed for the processed and pre-packaged foods. To keep the list concise that food items would fall into, each category was somewhat generalized. For example, milk and dairy products implied items such as milk, cheese and yogurt; however, milk products also include items such as ice cream which is not necessarily a healthy item. Another category that may have been too ambiguous is that one title freshly cooked meals. While it was the intention of the researcher for this to mean meals that were cooked in a manner that incorporated fresh ingredients, such as at a restaurant and minimal use of processed food, it is suspected that students may not have considered certain foods to fall in the same category, for example a grilled meat wrap (like shawarma, for instance) would qualify as a freshly cooked meal as the vegetables are fresh and the meat is

usually being cooked on site. However, a similar item such as a sub-sandwich also as fresh vegetables available but the meat is processed or pre-cooked.

Both of these items could easily be seen as fast food due to quick preparation involved, despite the total number of fresh/nutritious ingredients used. As a result, there may be some misunderstanding with what the food categories imply. Ideally, it would have been much more thorough to list as many subcategories of foods as possible, however the list would be extremely lengthy and more than likely discouraging for participants take part in the survey. As a result, some summarizing has to be done and this could potentially skew the data due to some of the categories being open to interpretation.

## **Chapter 5 – Discussion and Conclusions**

### **5.1 Observing Data Trends Using the Social-Ecological Model**

To further analyse the information gathered in Chapter 4, this section of the research draws on the key points identified in the literature review and compares these to the trends observed from the data collected from the students in Waterloo Region.

To assist with the organisation of the key points that stand out from the research conducted, the results were segregated with the assistance of the social-ecological model (SEM). This model illustrates multiple levels of influence (see Appendices D and E), starting from the individual level all the way to the policy level (Colorectal Cancer Control Program, 2015). The SEM shows the various levels of influence within one another to represent the complexity in the factors that can influence an action (Centers for Disease Control and Prevention, 2015), in this case, the purchasing of food and the relationship students appear to be maintaining with the food system. The results were analysed under the five tiers outlined in the diagram in Appendix D. The SEM also facilitates the identification of preventative measures that can be considered at each level, after aiding in pointing out which factors are influencing the population at that level (Centers for Disease Control and Prevention, 2015). While preventative measures are not considered in the analysis conducted in this chapter, the outcomes assisted with the identification of appropriate recommendations to consider.

The data trends observed in the research were supported with the use of quoted responses given in the survey by students. These assisted in providing depth and context to the data trends being observed, allowing clarity and better comprehension of the trends. The nature of exploratory research emphasises more on the improvement of understanding the characteristics of a problem, rather than providing concrete solutions (Dudovskiy, n.d.). The analysis, coupled with the literature review, allowed for many observations to be made, with varying depths (Singh, 2007). Any correlations found with the key

elements previously highlighted within the scope of this research were also discussed utilising the analysis conducted on the data collected.

Following this discussion, the three research questions are re-visited and discussed, along with the extent to which the hypothesis was fulfilled. Finally, to conclude this research write-up, a closing argument was made and recommendations, or best approaches, to establish based on the findings, are outlined.

### **5.1.1 Individual Level**

This level of the SEM model identifies observations that have a correlation with personal factors that can influence change in behaviour, age being one of them (Centers for Disease Control and Prevention, 2015). The distribution of students by level of study highlights that the most responses came from students undergoing their Bachelor's degree. The average age of university students undertaking this level of study in Canada is approximately 17 to 21 years (Statistics Canada, 2010), thereby having the youngest segment of the population sample being the most represented in the results. As Angler-Stringer et al. (2016) point out, there is potential strength in understanding the perspective on food from various age groups. This research allows for input to be provided from not only younger adults, but from the student demographic in its entirety, which still provides some insight into a subset of the general demographic.

#### **5.1.1.1 Food Knowledge Lacking in Students**

Knowledge of food products is a measure at the individual level that provided additional depth to the data recorded. It is of interest to observe that students were both buying and avoiding some of the same or similar items listed in the survey, in the interest of better health. For instance, some students thought that purchasing frozen fruit and vegetables was, in essence, the same as buying them fresh. Conversely, some students refused to purchase these items due to their frozen nature and belief that they were unhealthy. This provided an insight into the lack of knowledge regarding food preservation and

nutrition; this scenario would be alleviated with an increased knowledge about the nature and outcomes of food preservation. This corresponded to the points made by Breneman et al. (2009), Hill & Peters (1998) and Czarnecki (2011) regarding the need for food and nutrition related knowledge. Food education on a more public awareness level would be a useful tool, especially for students. The responses in favour of trying to get healthy showed that some students were paying significant attention to obtaining a healthy diet. On the other hand, some students displayed very little interest or regard for what they were eating and what form it took, be it fresh or frozen. As long as it fulfilled the task of alleviating hunger and having some taste without being expensive, those were enough selling points for the foods chosen.

Even though students may have their ideals set in striving to accomplish nutritional balance, the food choices were able to speak for themselves. One of the student's responses to the open ended question of what encouraged or discouraged them from purchasing pre-packaged/processed food was:

“I try to have a balanced diet but also not spend too much in the kitchen, sometimes frozen foods such as chicken or fish are easy and quick to prepare, and that is convenient for me. Fast food I usually get for the same reason as it is fast, but I try to pick healthier options such as fish and chips. I would never buy frozen fruits or vegetables as I do not perceive them as healthy. I prefer to buy fresh fruits or vegetables.”

This reasoning was one that brought to light a few interesting insights about the situations that students can be left in. Based on this response, and some of the collected responses from the research data, some students make health a priority, but equally do not neglect education. These two forces are seemingly unable to complement each other, leaving students to find a compromise such as the insertion of frozen foods into cooked meals so as to save time and energy. Students also prioritised their academic endeavours by purchasing quick meals such as fast food, or fast cooked meals that allows them to allocate more time to other aspects of their schedule.

These findings painted a discouraging image for the well-being of students, especially since many of them cited being too busy with school to focus on acquiring nutritional meals; there was no consideration that the food choices being made could be detrimental to their academic outcome. What also seemed to be compromised was the lack of nutritional information and knowledge, since there was a variety of assumptions made about the nutritional content of frozen produce, whether it diminishes or remains the same. Along with the fact that this particular quoted student classified 'fish and chips' as healthier alternative, there is an indication of students lacking appropriate nutrient information, as well as about food and the best ways to eat.

In order to understand the extent and angles from which a sustainable food system would need to be promoted in order to be viable, students were asked to give their opinion on the sourcing of their food and their level of interest in learning about it first-hand. Majority of the students expressed being somewhat interested in learning about this (See Figure 18). This was encouraging to see; as indicated in Table 12, 79 students were curious or interested to learn about where and how food is grown/produced. Fourteen students also expressed interest, but only if it were conveniently timed or organised. This brings attention back to students having both health and academic success as their priorities. In contrast, 26 students did not seem to be interested or have any motivation to learn about these processes, while an additional 12 cited being too busy for such an activity. Only ten students indicated that they have no interest these processes; this accounts for only 3.8% of the population sample. It is relieving that this number is not bigger.

Another interesting observation was that three students stated they would prefer to learn through another medium such as reading or watching a documentary. Although the value is quite small and only accounts for 1.1% of the sample, it presents the idea for taking a different approach to educating students about the food industry. While using multimedia is more convenient and appealing, can it replace a physical visit to a production or farming site? This small observation creates a platform for a discussion regarding how to engage students with the food system.

### **5.1.1.2 Individual Influence on Connecting with the Food System**

The level of interest in resource use and learning about food production was compared in relation to their level of study, which could be utilised to represent average age ranges. Fifty-three percent of students obtaining a Bachelor's Degree were interested in learning more about food production first hand. Similarly, high numbers were found across the varying levels of academia: out of the total number of Master's Degree pursuers, 62% was interested in learning more. Similarly, 66% out of the total sample of Doctorate Degree students expressed interest in learning about food production first hand. The percentage values showed an increase in interest being directly proportional to higher levels of academia. This highlighted students having an eagerness for more awareness/knowledge about food production and/or to increase their access to farm-sourced produce. This also indicated that more availability of farm produce and education on production is warranted.

Within the responses explaining why some students were not interested in observing food production first hand, 24 students stated that they either grew up on or had access (at some point in time) to a farm and had already known what the processes entailed to some degree. However, many students expressed an interest in learning about the processes; although these views do not necessarily represent those of urban residents (not all students originate from an urban neighbourhood despite living in one for school purposes), they still strengthen the argument presented by Haysom (2015) and Czarnecki (2011) to some degree, that (urban) residents tend to be disconnected from their food environments.

Based on the data collected, it would appear that 36.4% of the students were fortunate to reside near to a large or small grocery store or a market. These students would be able to satisfy their individual nutritional needs, since such close proximity allows for their purchases to be made based on cost and desire. Other students, majority of which either walk or use public transportation have to factor in higher amounts of time and effort allocation to achieve nutritious food. This trend can also be considered a trend influenced at the community level, due to the built environment allowing for the placement of grocery stores. The lack of large or small grocery stores/markets to more than half of the remaining students can

discourage them from expending their resources to acquire such goods. This lack of availability also encourages a disconnect, as students move closer towards foods more efficient to obtain and consume.

### **5.1.2 Interpersonal Level**

At the interpersonal level of influences, the roles of social networks and relationships with others, as well as with similar groups, are considered as primary components in the behavioural change being observed (Centers for Disease Control and Prevention, 2015). Due to the nature of the survey questions, there were not any questions that centred on relationships the students may have had with other peers or groups of people. As such, there were no significant observations to support influential exchanges at the interpersonal level, holding some of the responsibility for the survey outcomes.

### **5.1.3 Community Level**

The community level of the model observes the influences that come from interactions and relationships with the surrounding environment (Centers for Disease Control and Prevention, 2015). In this case, the overarching environment was the study area i.e. Waterloo Region, but there are more environments to consider such as the University of Waterloo, and student's residential environments.

#### **5.1.3.1 Nutritional Output of Coffee Shops**

An unexpected value that arose from the research was the number of students who indicated having access to a coffee shop. Although coffee shops generally focus on caffeinated beverages, it is not uncommon for these shops to sell pastries and quick meals. Based on the nutritional content of the majority of the food it sells, a coffee shop can also be classified as a food retail outlet that contributes to food swamp occurrence. Similar to the research conducted by Ortega et al. (2015) where the researchers correlated the food swamp categorisation with the high sugar and fat content in the foods being served in the Mexican/Latino neighbourhood; coffee shops predominantly sell pastries and beverages that incorporate a lot of sugar and fat. This observation is noted not only on the community level, but is



influenced by the organisational policies that run these establishments. This observation can equally be categorised as an influence at the environment enabling level, as it is assumed that coffee shop establishments are popular amongst students.

### **5.1.3.2 Accessibility of Fresh and Processed Foods by Students**

When asked about what fresh and/or nutritious products are available in walking proximity to students, an average 71.9% of the sample indicated being able to access fresh fruit, fresh vegetables, fresh meat and eggs within walking distance of their residence. This is a positive indication that more than half of the sample have access to fresh food items. In comparison, when students were asked about the density of processed/pre-packaged foods they were able to access in walking vicinity of their residences, the numbers recorded for each food outlet were significantly higher, indicating a higher level of access made available to students. An average 85% of the students had access to bottled beverages, packaged foods, and pre-packaged fast cooked meals. Frozen meats, fruits and vegetables were the items with the lowest availability recorded. Even though these items are not fresh, they have a higher balance of the nutritional value as compared to the other food items within this category. To see that they were the least available items indicates that students who could not afford or have access to fresh foods were also limited in access these foods in the frozen variety. This lack of access provides more evidence indicative of food swamps occurring.

When asked how much access they have to both fresh and packaged foods, a total of 46% of students indicated that they have access to both. Totalling the responses of those who are not believed to have access to fresh foods, 44.5% of students were seen to be making this claim. Even though this is a small population sample, these results are still eye-catching. One must wonder how it is that 117 students are stating they have limited access to fresh foods, some even having limited access to packaged foods as well. Coupled with the ratio of various retail food outlets found near students' residences, as well as the high rate of availability of processed and pre-packaged foods being present in these areas; this

measurement added evidence to the earlier claim made that students are living in areas that are characteristic of food swamps.

With regards to the purchasing of pre-packaged/processed foods, 49 students found that purchasing these food types was convenient with respect to time and energy put into meal acquisition, while 17 students were encouraged by the cost. Twenty-five students stated that they avoided these foods in an attempt to stay healthy and 15 students preferred to purchase their foods freshly harvested/made. Almost twice as many students were omitting focus on their health and well-being through the food choices being made. These responses presented two attitudes that came forth very strongly from the data collected during the research. There were some students who operated on efficiency and focused on appeasing their academic well-being, while there were others who focused on trying to improve their own lifestyle and well-being. It can be noted here that individual behaviours such as laziness and level of interest in food issues can complement the community level push factors.

### **5.1.3.3 Diets of Students Expressing Interest in Food System Dynamics**

It was of interest was to observe if the students who responded being interested in food and resource sustainability, or wanted to make improved consumer choices, were showing interest in their food purchases. There were 12 students who indicated interest in food security, community development, local food, sustainability and similar social and environmental topics, as well as four students who were interested in making better consumer choices. The responses of these 16 students were then compared to the food purchases that they cited making in the week prior to completing the survey. These two sets of data allowed for observing whether the students who cited interest in food and sustainability related issues, reflected this interest in the food purchases they claimed to make.

For this analysis, only six students answered all the relevant questions – which were to identify what fresh and processed foods they purchased and why, as well as their interest in learning about food production first hand. For these students in particular, four out of six purchased more fresh/nutritious

produce than pre-packaged/processed foods. One student pointed out a compromise that was made: “Items not as fresh as from the farmers’ market, but affordable and convenient”. The only purchases that were made from the selection of pre-packaged/processed foods were frozen fruits, frozen vegetables and bottled beverage. This shows that these students in particular were eating a larger proportion of what can be considered ‘healthy’ foods. The remaining two out of six students were those wanted to learn about food production in order to make better consumer choices; both of these students bought freshly cooked meals and no pre-packaged/processed foods. One student stated a preference: “I don't buy packaged stuff or frozen stuff because i prefer fresh and healthier food”. Here, it is seen once more the way individual level impacts influence the decisions made at the community level.

#### **5.1.4 Organisational Level**

At the organisational level, influences involve the role of organisations and institutions that implement regulations for how services are provided (See Appendix E). In this assessment, the interpretation of this description directly correlates with institutions such as grocery stores (be it small or large), which would have regulations in the selling and adverting of products. This categorisation also encompasses the food items that are traditionally sold within chain grocery stores.

##### **5.1.4.1 Unclear Advertising of Nutritional Content**

When asked about what fresh and/or nutritious products are available in walking proximity to students, the responses although high, still suggested evidence of nutrient imbalance being created. The highest frequency of occurrence were cereals, grains and breads (see Table 4), followed by milk and dairy products. Although these food items are a regular part of a standard suggested diet, these are items that can be high in calorie value. Reflecting on the limitations highlighted in Section 4.6.5.2, the categories identified may have caused some ambiguity. For example, cereals are available in many varieties; while some are focused on nutritional value, others market their appeal with additional flavourings and colourings. While the dairy and milk products category aimed at identifying products such cheeses and

milks, items such as ice cream is also a milk product, and thus falls into this category. These small discrepancies highlight the ambiguity that can be found with the nutritional content information provided by manufacturers, which can ultimately affect the decision making process undertaken by students.

When students were asked to identify which of these items were purchased in the last week, the results showed that cereals, grains or breads, milk, eggs and dairy products, and fresh fruits were the highest purchased items. While some students made their purchases based on low costs, more students remarked about high costs in stores near to them that discouraged them from making these purchases. Students who preferred not to purchase fresh/nutritious items from stores near them commented on the lack of quality or freshness that the fresh foods purported to provide. Considering the high cost and the poor maintenance of fresh foods, these can be considered deterrents, discouraging the purchase of fresh/nutritious foods. Food retail outlets that do not honour these obligations add to the expansion of food swamps.

Cost of fresh foods were perceived to be higher than frozen, processed or pre-packaged foods. This was highlighted as many of the students bought fresh fruits, vegetables and meats due to a cost reduction (i.e. being on sale). Access to markets are limited, thus students would not be able to frequently compare the cost of local products and imported products. This is a cause for concern as it is not necessarily true, thus allowing certain products to be less popular due to the perceived high costs. The need for educating students is stressed once more, along with the need to promote local food and the benefits of a sustainable food system, one which includes better access to better quality food; the access in this case refers to the cost associated with fresh/nutritious foods.

### **5.1.5 Policy/ Enabling Environment Level**

The last tier of the SEM model focuses on the local to global policies that are implemented; these guidelines are what encourage the creation and regulation of the built environment (See Appendix E). These policy driven factors represent what happens at the community level of influence, but on a much larger scale.

According to the data recorded there is an extremely high level of students living in close proximity to fast food restaurants, convenience stores and takeout restaurants. These results (extrapolating from Table 3) imply that an average of 88.3% of the sample indicated living near these establishments. In comparison, an average 36.4% of the sample recorded being in walking distance from large grocery stores, small grocery stores and/or markets. There were only a few instances where students had limited access to any kind of retail food outlet. Based on the trend of occurrence, the circumstances coincide with the description outlined by Rose et al. (2009) and Minaker et al. (2016) for areas that are characteristic of food swamps. The two average percentages identified, provide evidence to suggest that fresh/nutritious foods are not as easily as accessible as processed or packaged foods, thereby implying that students are living in areas that can be considered food swamps.

Overall, utilising the SEM model allowed for the observations to be categorised based on the varying levels of influence, in order to understand not only the nature of the issues, but also sources from which to draw from for solutions or preventative measures. In tandem with the SEM model, the data showed that many of the decisions were based on individual preferences, as well as influences encouraged at the community, and policy/ enabling environment level. These categorisations are not absolute, and more research is necessary to understand the extent of influence caused by these various levels.

## **5.2 Answering Research Questions and Hypothesis**

So far, two methods of analysis have been utilised to observe the trends in the data collected. The first was straightforward comparative analysis, which focused on observing the trends in the responses collected. The second method was by aggregating the various outcomes of the research based on the social-ecological model, which assisted in identifying responsibility for the various challenges being met regarding food access and nutrition. These two methods also assisted in answering the research questions and reflecting on the hypothesis outlined.

### **5.2.1 Research Question 1**

The first question defining the scope of this research was: What types of retail food outlets predominate in close proximity to where students of the University of Waterloo live, within the Waterloo region?

A total of 259 responses were recorded for this question; of this total, 237 were able to easily access convenience stores, 233 were within walking distance of fast food restaurants and 227 students were close to a take-out restaurant. These were the most common food outlets. Also discovered was that 216 students had access to coffee shops as well as dine-in restaurants. In comparison, 130 students stated being able to access a large grocery store, 124 students a small grocery store and 80 students were close to a speciality store. The least common food retail outlet that was accessible by walking was a market, be it permanent or temporarily set up. Based on these values, majority of the students are living in areas that can qualify as food swamps.

### **5.2.2 Research Question 2**

The second research question was: Are students making food purchasing choices based on what is in close proximity to where they reside?

The results pertaining to this question presented mixed results. Students avoided making purchases from these food outlets nearby due to the high cost a convenience store places on fresh/nutritious foods, as well as the questionable quality of the food, despite it being advertised as fresh. Many students also cited

their concern for their own health and wellbeing as deterrents from making purchases of items frequently found nearby. However, students that made purchases from places nearby did so for two distinct reasons – either they were living next to the grocery store and so had the ease and convenience of shopping there and being walking distance from their residences; or they purchased from the food retail outlets out of necessity and convenience. Many students admitted to being busy, lazy or requiring last minute ingredients or meals. This was compounded by the low cost usually accompanying these products. Twenty-five students in total cited making their purchases simply due to the close proximity of the food retail outlets to their residences, for both fresh/nutritious foods and processed/pre-packaged foods.

In summary, students made purchases from food retail outlets that were in walking vicinity usually in a moment of necessity or convenience. Thirty-six students opted not to make purchases from near their residences and prefer to travel further to a food retail outlet that had more variety. This implies that proximity does not necessarily solve the problem of food access if other factors such as quality, cost and variety are not considered. Although location is important, it is not the only factor that influenced the decisions of the students when making their purchases. Other students mentioned trying to maintain a good standard of health as their reason for not making purchases from food outlets near their residences. This statement does support the relationship between location and health, highlighting that if fresh/nutritional foods were sold more, health conscious students would be able to benefit from the ease of access.

### **5.2.3 Research Question 3**

The final research question that answers were sought for was: Are students discouraged from understanding the value of a holistic and sustainable food system, and thus disconnected from the food system?

There were a variety of responses regarding the purchases within different categories of foods near students' residences. While some supported the need for healthier options to be made more available,

some students did not necessarily put extra consideration into the food choices that were being made. Many students identified not having fresh and nutritious food sold in close proximity as challenging, due to the lack of transportation and subsequent hassle of fetching groceries, as well as the lack and of time and energy to make the effort to purchase these items.

With regards to understanding and learning about food growth and production, it is unclear whether the food landscape played a direct role in discouraging students from understanding the value of a sustainable food system. While some students solely sought low-cost ingredients, regardless of the method of farming or production implemented, many students expressed interest in wanting to learn and understand the origin of their food. There is a lack of this type of information within the food landscape, and it can be hypothesised that the lack of any encouraging factors can, in itself, be discouraging enough for students. There was also a lack of evidence to indicate whether students sought out sustainable means of purchasing food; in the survey, only three students identified their wish to support local food production.

However, the information gathered encouraged the need for a sustainable food system, as both the food landscapes and the students stand to benefit from a network of strategies aimed at improving the access and quality of food being made available.

#### **5.2.4 Justifying the Research Hypothesis**

Ultimately, the intention of this research was to verify the hypothesis, as well as providing answers for the research questions identified in Chapter 3. This research hypothesised that food swamp occurrence posed a potential risk to students' health and relationship to the food system, thereby hindering the progress of developing a sustainable food system. Gathered from the data collected, there was a high occurrence of processed and pre-packaged foods readily being made available to students, with Bachelor's Degree pursuing students making the highest rate of purchases from this group of foods. Also noted was that 44.5% of students stated having limited access to fresh/nutritious foods. Food swamp



existence is highly suspected in the city of Waterloo, where the largest segment of the population sample resided. This complements the findings of the NEWPATH research held previously within Waterloo Region.

Comparing the rate of support given to pre-packaged/processed foods and the level of interest in learning about food production first hand, there appears to be little correlation. The most popular response students gave was an interest in learning about food production first-hand, regardless of the types of food they purchasing. Their interest was independent of their purchasing decisions, which were more affected by factors such as cost, free-time from studies and health awareness. Interest in developing a sustainable food system is existent, as majority of the students displayed interest to some extent in the resource input used to produce the foods they purchase. However, the easy and frequent access to processed foods discourages the built environment to play a part in the sustainable food system development, and the role of urban landscape and its associated planning guidelines, should be revised for a more holistic approach to food distribution.

### **5.3 Recommendations**

In light of the findings observed from the literature reviewed as well as the data collected from the research, there are recommendations suggested regarding these shortcomings. Within this context, the recommendations highlighted in this section are aimed at future efforts to improve urban food security and to minimize the prevalence and negative impacts resulting from food swamps. The urban planning sector needs to consider food access as part of its responsibility (be it sole or shared). Also highlighted is the need to students with healthier eating knowledge, especially when it comes to nutrition in their food purchases. These suggestions would be beneficial both to the students as well as to the urban environment.

#### **5.3.1 Increased Involvement from Urban Planning**

“We’re realising more the need for holistic planning to go beyond the built environment; social issues like food are related to the built environment.” (Pothukuchi & Kaufman, 2000)

Gathering from the data collected and the literature review, evidence pointed towards urban planning having a role in the development of calorie-dense environments and an omission of food distribution regulation within the traditional agenda of urban planning (American Planning Association, 2007; Cassidy & Patterson, 2008; Pothukuchi & Kaufman, 2000). Even though it has the capacity to facilitate food access, urban planning is not involved as much as it could be. The role of urban planning should be revised and considered for integration into modern, as well as future, food access conversations, in order to improve the availability of fresh/nutritious goods to urban spaces. In this case, it is of particular importance for students to be able to access nutritious food, which is not as common as their being able to access processed packaged food.

While urban planners have been responsible to a certain extent for recommending commercial spaces for food outlets such as grocery stores and restaurants (American Planning Association, 2007), the data retrieved from this research indicates that Waterloo Region, especially in the city of Waterloo, has been able to successfully exercise these kinds of recommendations in order to facilitate a balance in food outlet access. Urban planners have been highlighted as having the ability to promote the reality of healthy cities. Planning authorities also have the ability to regulate the density of food retail outlets such as fast food near critical areas such as transit stops and school zones (Cassidy & Patterson, 2008); through the use of policy implementation, retail food environments can be restructured in order to promote healthier consumption (Mah et al., 2016).

An industrialised food system is not one that will be seeing scarcity anytime soon, and even though they are more than likely to remain dominant, an increase is being seen in communities taking action by developing sustainable food systems (American Planning Association, 2007). There are arguments that planners cite in their defence that at the end of the day, the choice of what to eat is a personal one, and there is only so much a governing body would be able to do (Cassidy & Patterson, 2008; Mah et al., 2016; Pothukuchi & Kaufman, 2000). Many sectors are finding ways to become more involved with the creation

and promotion of healthy foods environments, such as the public health sector and non-governmental organisations in Canada (Minaker et al., 2016). However, urban planning can still be utilised to encourage the knowledge and awareness surrounding food consumption (Cassidy & Patterson, 2008). Further research and investment into understanding the role of urban planning in food security is recommended as a follow up to the results acquired from this explorative research.

### **5.3.2 Educating Students**

One of the interesting results of the research was the constant misconceptions of foods that were sold both in fresh and frozen forms, such as fruits, vegetables and meats. Students cited a difference in taste as well as a difference in nutritional content and additives if produce was purchased frozen. Given that some students believed there were differences between the two forms of produce, and some students stated confidently that there was no difference of any kind- this highlights a lack of information that could otherwise be assisting students in better eating habits.

Circulating nutrition information and awareness of ways to improve the grocery shopping experience could encourage students to invest in buying better (nutrient) quality food items. Spreading information regarding storage, preparation, shelf life and uses of fresh produce could be encouraged through the use of social media. Based on the successful acquisition of survey responses for this research utilising social media as one of the sharing platforms, this route is recommended due to its frequent use by students and ability to have information shared and stored easily.

Another role where education could be encouraged is with educating students about food production first-hand. As highlighted in the research, many students were interested in learning about the processes behind food growth and production, while a significant subset claimed they could not afford the time for this type of activity. Considering this setback, it can be considered to make these visits subsidised and part of the curriculum at the University of Waterloo. One such approach has already been implemented, as the Faculty of Environment offers courses that focus on the topic of Food Security and Sustainability such as “Urban Food Security” and “Food Systems and Sustainability” (University of Waterloo, 2016). The

University of Waterloo has also helped with initiatives such as the St. Paul's Community Garden, which allow for students to volunteer tending to locally grown produce which is then used to feed the residents of St. Paul's University College (Salt, 2014). Increasing awareness of these courses and opportunities would allow students to satisfy their interest in learning about food production, while not compromising their schedule greatly; advantages such as a discounted price or academic credit would make these options more favourable.

### **5.3.3 Regulating Frequently Accessed Food Outlets**

One of the observations made while analysing the survey responses was that amongst the highest accessible food outlets, coffee shops were the fourth most popular food outlet out of the nine options provided, with 216 students having access to one within walking distance of their residence. Students appear to frequently visit and make purchases from coffee shops due to the assumed quick service and convenient foods and beverages sold, as well as the physical space that encourages social gatherings or study sessions. Given that these factors may encourage the appeal of coffee shops, it is recommended that revisions should be made for the menu items, especially for coffee shops that are in close proximity to the university. Due to the nature of the typical menu, which includes often times includes sugary beverages, along with pastries or sweet treats, it is recommended that a clause be considered that ensures coffee shops make available some degree of nutritious items, for example fresh fruit or freshly made calorie-conscious food items. Albeit a small insertion, this could encourage a better food environment for students to access.

While it may be difficult to make such changes on a regional scale, research such as this can be brought to the attention of policy developers of the university, encouraging food availability at the university, where students would frequent. This could, in turn, discourage the consumption of less healthy foods, once it is made affordable and appealing to the student population.

## 5.4 Conclusion

By the second half of the 20th century, more than 60% of the world population will be urban dwellers (Jennings et al., 2015). Communities are changing in location and structure, with populations moving away from agricultural farmlands when given the opportunity to migrate to towns and cities. As a result of these dynamics, the food demands are also shifting, with cities increasingly consuming greater quantities of high calorie, processed foods. The consequent industrialization of the food system, and in particular, the shift to a higher protein diet, has significant negative environmental impacts. Within the local, urban food system, it is the physical environment itself – coupled with the drive of the retail sector – that is resulting in both food deserts and food swamps, as highlighted in this research. As argued in this thesis, while urbanization and increased food availability go together, food insecurity remains a challenge in both developing and developed world contexts. In Waterloo Region, and other urban spaces in Canada, there is access to both healthy and unhealthy foods; however, there is a higher percentage of unhealthy foods marketed and available for purchase. Thus a new term, ‘food swamps’, has made its way into the food insecurity conversation.

There is a significant student population in Waterloo Region, especially in the cities of Kitchener and Waterloo due the location of two large universities. Students can be seen as a vulnerable subset of the population with their own challenges, the primary one being their successful academic endeavours. Research is not conducted enough to understand if food security has an impact on the health and well-being of students. Research on food security within urban spaces is also a more recently researched topic. Recent studies show that urban food insecurity is more prevalent than is recorded, and that it is not restricted to rural areas alone.

Based on the data collected, while 46% of the students surveyed indicated having adequate access to both fresh and packaged foods, 44.5% indicated that they had limited access to fresh food, as well as limited access to both fresh and packaged foods. For 44.5% of the sample to not have access is not a positive indication of sufficient food landscapes surrounding students. This research recorded a high

occurrence of easy walkability to convenience stores, fast food restaurants and take out restaurants. One of the challenges identified was the lack of cohesive integration of food regulation and policies with the urban planning sector, which have the potential ability to regulate food so that there is a healthy balance provided. A suggested follow up to this research was to investigate the role of urban planning further and how it can be integrated into the development of a holistic and sustainable food system. Places such as coffee shops need to be revised for their contribution to the food landscape, as the majority of their products do not maintain positive nutritional value.

Students, in an attempt to excel in school, are dismissing food security concerns (necessity, busy, buying fast food etc.) in the interest of focusing on school or school related programs such as co-op terms. However, the relationship between food security and academic success does not seem to be a linkage for students; that is, they do not realise that by providing more attention to the nutritional input from their food, they could be improving their well being, which in turn can assist with a positive academic experience. Instead, they are reducing time and energy spent on food and food related decisions in an attempt to focus more on their academic endeavours.

It is important, therefore, to increase the means of educating students about food security and the various means by which to be food secure. Many students also showed a lack of knowledge regarding the nutrition of their food as well as the methods of food growth and production. This information deficiency highlights the importance of implementing successful ways to educate students about food production and smart consumption, especially those who maintain busy schedules.

This research has provided an overview of some of the shortcomings that are observed with the food landscape made accessible to students in Waterloo Region, especially in the City of Waterloo. The students surveyed have more access to stores such as fast food restaurants and convenience stores that typically sell processed and pre-packaged foods. In this specific case, the role of urban planning has the potential to be an influential force in the improvement of the food system in order to provide a more balanced food landscape to students. Through this means of action, the improvement of the food

landscape can also become incorporated into the agenda of a sustainable food system. An implementation of this kind of food system would assist both urban and rural areas, encourage the consumption and support of less processed food and the reduction in some environmental and resource degradation. Because the survey sample was chosen through convenience approaches, the data collected cannot be utilised to make a generalised statement regarding the student well-being at the University of Waterloo. However, the results recorded allow for insight into the food-related trends within this population demographic. It also allows for the creation of a platform on which to build research on this particular angle of food security challenges. The research being exploratory in nature, also allows for the familiarisation with the new dynamics of food security that are being presented, specifically in urban spaces, and assists with creating a foundation of data for future research within this scope. The findings of this research are able to provide an argument in favour of an investigation into the re-evaluation of the food landscape accessed by students. These findings are also able to support the beneficial outcomes that can result from the development of a holistic and student-inclusive sustainable food system.

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## **Appendix A - Online survey for volunteer students to complete**

Project Title: Observing the Frequency of University of Waterloo Student Interaction with Food Swamps and Investigating its Correlation to a Sustainable Food System

Dear Students,

My name is Tarana Persaud and I am a student in the Master's in the Sustainability Management Program at the University of Waterloo, under the supervision of Dr Bruce Frayne from the department of International Development. My research looks at if the food landscape that is close to students' residences strongly influences their food purchasing decisions, as well as how food is seen in relation to sustainability.

**As part of my study, I invite you to participate in an online 10- minute survey, which will be submitted anonymously. As a token of appreciation for your time and input, you will have the chance to enter a draw for a \$25 gift card to Amazon Canada upon completion of the survey.**

The questions focus on what kind of stores and restaurants you may have near to your residence, and what foods you may have purchased recently. Participation in this study is voluntary and you can decline answering any of the questions. You can also withdraw your participation by not submitting the survey. There are no known or anticipated risks from participating in this study.

The odds of winning are based on the number of individuals who participate in this study, which is expected to be 500. Information collected to draw for the prizes will not be linked to the study data in any way, and this identifying information will be stored separately, then destroyed after the prize have been provided. The amount received is taxable. It is your responsibility to report this amount for income tax purposes.

All of the data collected will be summarized and stored on a password protected computer database with restricted access, and will be erased after two years. When information is transmitted over the internet privacy cannot be guaranteed. University of Waterloo practices are to turn off functions that collect



machine identifiers such as IP addresses. The host of the system collecting the data such as Google Forms, may collect this information without our knowledge and make this accessible to us. We will not use or save this information without your consent. If you prefer not to submit your survey responses through this host, please contact me at [tarana.persaud@uwaterlo.ca](mailto:tarana.persaud@uwaterlo.ca) so you can participate using an alternative method such as through an e-mail or paper-based questionnaire. The alternate method may decrease anonymity but confidentiality will be maintained.

The completed study will be presented to a thesis committee and ultimately made publically accessible to the University of Waterloo as well as the Waterloo region. Should you have any questions about the study, please either contact me via email, or Dr Bruce Frayne at [bfrayne@uwaterloo.ca](mailto:bfrayne@uwaterloo.ca) or 519-888-4567, ext. 38479. Further, if you would like to receive a copy of the results of this study, please contact either investigator.

This project has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. However, the final decision about participation is yours. Participants who have concerns or questions about their involvement in the project may contact Dr. Maureen Nummelin, the Chief Ethics Officer at 519-888-4567, Ext. 36005 or [Maureen.nummelin@uwaterloo.ca](mailto:Maureen.nummelin@uwaterloo.ca).

Thank you for considering participation in this study for my research!

Kindest Regards,

Tarana Persaud

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

- I agree to participate
- I do not wish to participate (please close your browser)

By indicating your consent, you are not waving your legal rights or releasing the investigators or involved institution from their legal and professional responsibilities

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1) Waterloo Region is municipality that encompasses the cities of Waterloo, Kitchener and Cambridge as well as the townships of Woolwich, Wellesley, Wilmot and North Dumfries. If you currently live in Waterloo Region, either temporarily or permanently, please indicate which township or city you currently reside in:

- Waterloo
- Kitchener
- Cambridge
- Woolwich
- Wellesley
- Wilmot
- North Dumfries
- None of the Above

2) What level of study are currently pursuing at the University of Waterloo?

- Diploma
- Bachelor's Degree
- Master's Degree
- Doctorate
- Other: \_\_\_\_\_
- Prefer not to say

3) Please state your gender:

- Male
- Female
- Other: \_\_\_\_\_
- Prefer not to say

4) The following questions will be focused on the 'food landscape' near your residence. To your knowledge, within the radius of an average 15-minute walk from your residence, what kinds of food outlets would you observe on your walk? Please select all that apply

- Grocery Store - Large (e.g. Walmart, Sobeys)
- Grocery Store - Small (e.g. Dutchie's Fresh Market)
- Convenience Store (including gas stations and mini marts)
- Fast Food Restaurant
- Market (including temporary farmer's markets)
- Coffee Shop
- Dine-in restaurant
- Take-out restaurant (limited seating)
- Specialty Store (e.g. butcher, bakery, health food)
- I don't know

5) To your knowledge, within the radius of an average 15-minute walk from your residence, what items from the list below are you able to find for sale? Please select all that apply

- Fresh Fruits
- Fresh Vegetables
- Freshly cooked meals

- Fresh meats
- Eggs
- Milk & Dairy products
- Cereals, Grains or Breads
- I don't know

6) **Within the last week**, have you purchased any of the items selected above from food outlets located within an average 15-minute walk from your residence?

- Yes
- No
- I don't know

7) If your answer is Yes, please indicate which items you purchased.

- Fresh fruits
- Fresh vegetables
- Freshly cooked meals
- Fresh meats
- Eggs
- Milk & Dairy products
- Cereals, Grains or Breads
- I don't know

8) Please explain what encouraged/discouraged you from these purchases. You are encouraged to be specific

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9) To your knowledge, within the radius of an average 15-minute walk from your residence, what items from the list below are you able to find for sale? Please select all that apply

- Frozen fruits
- Frozen vegetables
- Pre-packaged frozen meals
- Pre-packaged fast-cooked meals (e.g. Uncle Ben's Rice, Instant Ramen Noodles)
- Packaged foods (e.g. chips, chocolate bars)
- Fast-cooked meals (e.g. fast food)
- Frozen meats
- Condiments (e.g. ketchup, mustard)
- Bottled beverages
- I don't know

10) **Within the last week**, have you purchased any of the items selected above from food outlets located within an average 15-minute walk from your residence?

- Yes
- No
- I don't know

11) If your answer is Yes, please indicate which items you purchased.

- Frozen fruits

- Frozen vegetables
- Pre-packaged frozen meals
- Pre-packaged fast-cooked meals (e.g. Uncle Ben's Rice, Instant Ramen Noodles)
- Packaged foods (e.g. chips, chocolate bars)
- Fast-cooked meals (e.g. fast food)
- Frozen meats
- Condiments (e.g. ketchup, mustard)
- Bottled beverages (e.g. energy drinks, pop)
- I don't know

12) Please explain what encouraged/discouraged you from these purchases. You are encouraged to be specific:

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13) Please select the statement that you think best applies to the food landscape that is in close proximity to your residence:

- I have access to a wide variety of both fresh and pre-packaged foods
- I have limited access to fresh foods, but more access to pre-packaged foods
- I have limited access to pre-packaged foods, but more access to fresh foods
- I have limited access to both fresh and pre-packaged foods
- I don't know

14) On a scale of 1 to 5, 1 being not at all and 5 being very much, how satisfied are you with the food landscape that is in close proximity to your residence?

- 1
- 2
- 3
- 4
- 5
- I don't know

15) On a scale of 1 to 5, 1 being not at all and 5 being very much, how interested are you in the resources used to produce the foods you purchase?

- 1
- 2
- 3
- 4
- 5
- I don't know

16) If you were given an opportunity to visit a farm to see where fruits, vegetables, grains and/or meats come from and how it is processed, would you take this opportunity?

- Yes
- No
- I don't know

17) Please explain the reasoning for your answer:

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18) What is your most used form of transportation?

- Walking
- Cycling
- Public Transportation
- Paid transportation (e.g. taxi)
- Driving
- Other: \_\_\_\_\_

19) In exchange for the time taken to complete this survey, you are eligible to enter in a draw for a \$25 gift card to Amazon Canada. If you would like to enter, please leave your email address:

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**Thank You!**

for participating in my survey! Your feedback is extremely valuable.

If you participated in the draw, the anticipated date for the draw is the 1<sup>st</sup> of July, 2016 after the data collection period has ended, and the winner will be contacted via email.

If you are interested in viewing the results of this survey, please contact me at [tarana.persaud@uwaterloo.ca](mailto:tarana.persaud@uwaterloo.ca) and I will be able to send you a copy of the results when published.

If you have any general comments or questions related to this study, please contact Tarana Persaud at [tarana.persaud@uwaterloo.ca](mailto:tarana.persaud@uwaterloo.ca)



I would like to assure you that this study has been reviewed by, and received ethics clearance through a University of Waterloo Research Ethics Committee. If you have any concerns regarding your participation in this study, please contact Dr. Maureen Nummelin, the Director, Office of Research Ethics, at 1-519-888-4567, Ext. 36005 or [maureen.nummelin@uwaterloo.ca](mailto:maureen.nummelin@uwaterloo.ca).

**Alternative Message if Participants do not qualify/ decline to complete the survey:**

Your response has been recorded. If you chose not to participate or do not live in the Region of Waterloo, you may close your browser now.

## **Appendix B - Email to various administrative departments at the University of Waterloo**

Subject: Volunteer Recruitment for Master's Research at University of Waterloo

Dear Administrator,

My name is Tarana Persaud and I am a 2<sup>nd</sup> year Masters in Sustainability Management student at the Faculty of Environment at the University of Waterloo. I am currently conducting my research under the supervision of Professor Bruce Frayne of the Department of International Development. I am looking for voluntary participants who would be willing to answer a short online survey in order to assist me with my research "Observing the Prevalence of Food Swamps through Student Interaction with the Food Landscape in their Residential Areas, and its Correlation to a Sustainable Food System". As a token of appreciation, they will have a chance to enter a draw for a \$25 Amazon Canada gift card.

I am writing to ask if it is possible for the department to share the survey link with the student body of your program? If you have any questions or concerns, please do not hesitate to contact me at [tarana.persaud@uwaterloo.ca](mailto:tarana.persaud@uwaterloo.ca) or my supervisor at [bfrayne@uwaterloo.ca](mailto:bfrayne@uwaterloo.ca) or by phone at 519-888-4567 ext. 38479. Please note that this project has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee.

Please see below the preface and survey link I am requesting to be shared.

I thank you in advance for your time and assistance with my research

Yours sincerely,

Tarana Persaud

This email is being sent on behalf of the researchers:

Dear University of Waterloo students,

I am currently conducting research for my Master's Degree in Sustainability Management under the supervision of Dr. Bruce Frayne at the Faculty of Environment. The title of my project is "Observing the Prevalence of Food Swamps through Student Interaction with the Food Landscape in their Residential Areas, and its Correlation to a Sustainable Food System". If you are currently a student at the University of Waterloo and live in Waterloo Region, I kindly ask that you consider volunteering to complete a short online survey to assist in my research. As a token of appreciation, you will have a chance to enter a draw for a \$25 Amazon Canada gift card.

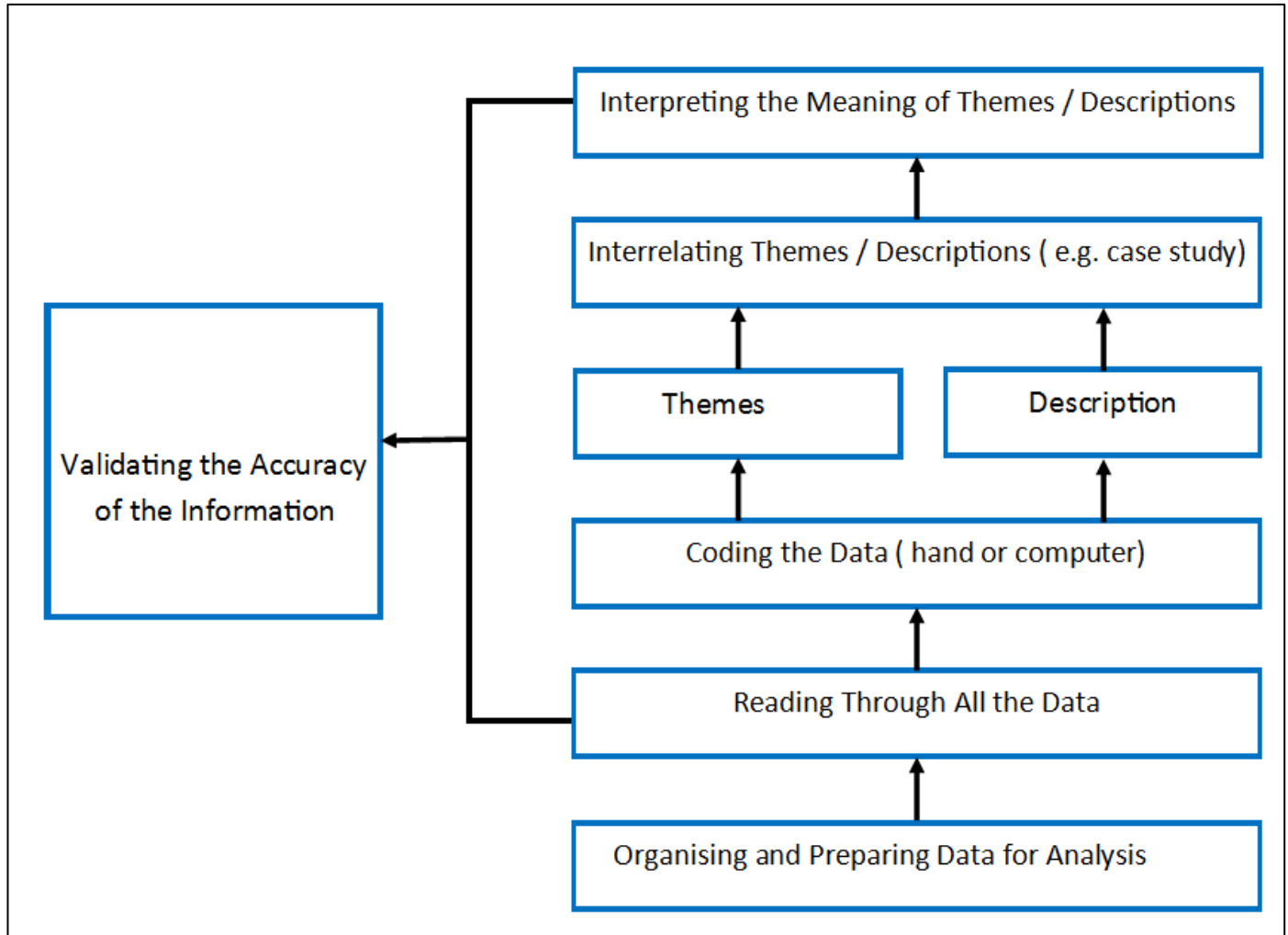
If you are interested in learning more, please click the link below!

<http://goo.gl/forms/TyRHCj3q1xMRZkLf2>

Thank you for your interest with my research! ☺

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

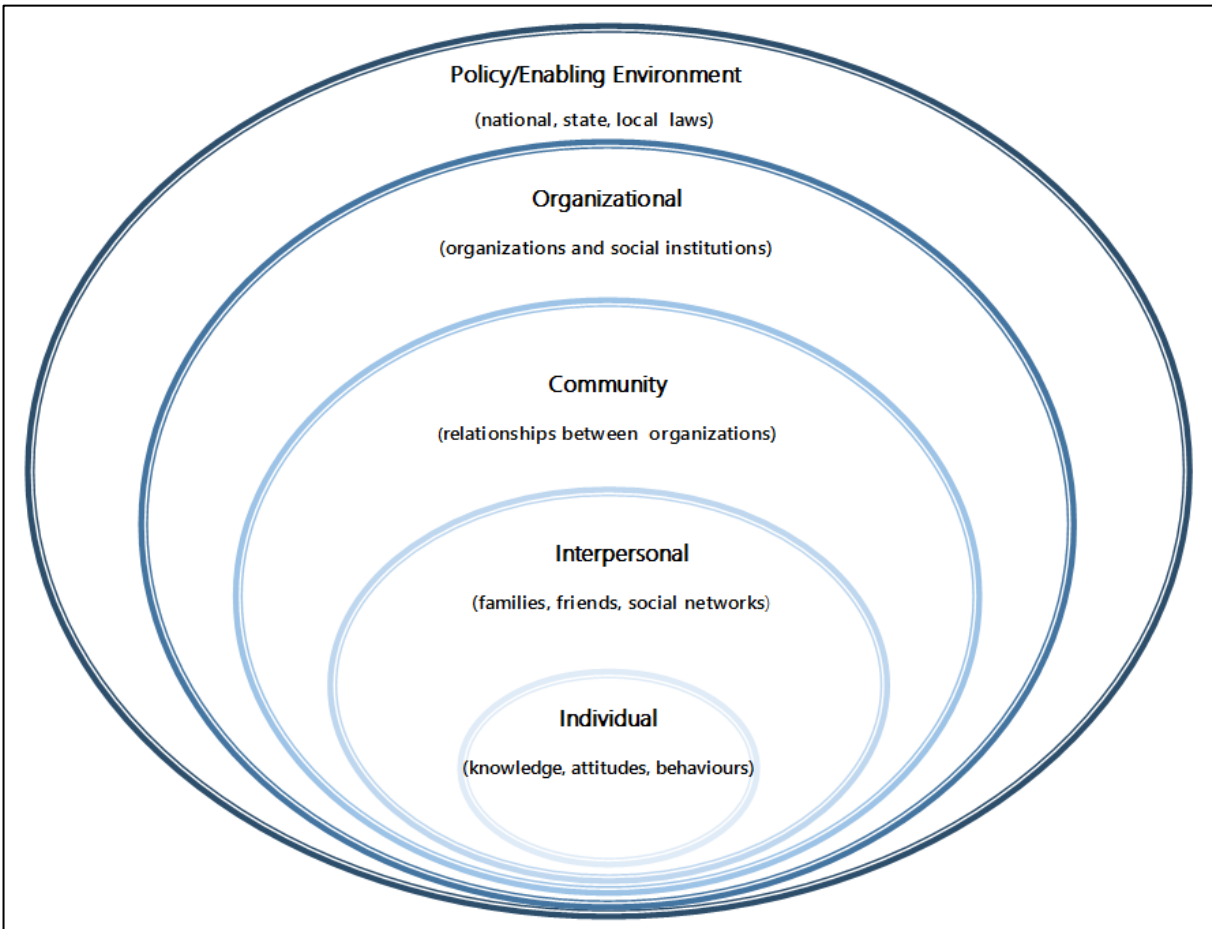
## Appendix C - Method for Qualitative Data Analysis



Flow chart showing procedure for qualitative data analysis

(Source: Adapted from Creswell, 2014 pg. 197)

## Appendix D - Structure of the Social- Ecological Model



**Diagram showing the layout of the social-ecological model**

**(Source: adapted from UNICEF, n.d.)**

## Appendix E - Detailed Description of Social- Ecological Model

<b>SEM Level</b>	<b>Description</b>
<b>Individual</b>	Characteristics of an individual that influence behaviour change, including knowledge, attitudes, behaviour, self-efficacy, developmental history, gender, age, religious identity, racial/ethnic identity, sexual orientation, economic status, financial resources, values, goals, expectations, literacy, stigma, etc.
<b>Interpersonal</b>	Formal (and informal) social networks and social support systems that can influence individual behaviours, for example: family, friends, peers, co-workers, religious networks, customs or traditions.
<b>Community</b>	Relationships among organizations, institutions, and informational networks within defined boundaries, including the built environment (e.g., parks), village associations, community leaders, businesses, and transportation.
<b>Organizational</b>	Organizations or social institutions with rules and regulations for operations that affect how, or how well, services are provided to an individual or group.
<b>Policy/Enabling Environment</b>	Local, state, national and global laws and policies, including policies regarding the allocation of resources for services, restrictive policies (e.g., high fees or taxes), or lack of policies

**Table showing additional detail for each tier of the Social- Ecological Model**

(Source: adapted from UNICEF, n.d.)

## **Glossary**

**Coffee Shop** - A type of restaurant that serves beverages such as coffee and tea, as well as light foods and pastries (COBUILD Advanced British English Dictionary, 2016).

**Convenience Store** - A small store that is stocked with high-convenience items that people tend to need quickly such as microwavable food items, prepared foods, bottled beverages and toiletries. This type of store also tends to have longer working hours than a grocery store (Payne, n.d.).

**Dine-in Restaurant** – Also known as a ‘sit-down restaurant’; a restaurant that offers table service.

**Fast Food** – Food that can be prepared and made available quickly; there is less emphasis placed on nutritional value.

**Food Landscape** - A high-level view of what kinds of food related establishments exist and their relative locations to other aspects of the built environment.

**Fresh Food** – Food that has remained in its natural state after harvest, with no thermal changes or preservative additions to the product.

**Grocery Store** - Large stores that sell a variety of food products, general merchandise items and health and beauty products (Payne, n.d.).

**Junk Food** - Food that contains a high number of fats, sugars and overall calories but a low amount of nutritional value (Merriam-Webster, 2016a).

**Market** - An area dedicated for the coming together of people to engage in the trading and purchasing of goods (Merriam-Webster, 2016b); in the context of food, a market will have fresh or minimally processed foods available. Markets such as farmers’ markets allow access to food products directly from the farm sources.

**Nutritious Food** - Food that has qualities that are beneficial to consumption and promote health and proper growth (Merriam-Webster, 2016c).

**Obesity** - A result of having weight that is higher than average for a specified height that may be detrimental to health (Centers for Disease Control and Prevention, 2016). Obesity can be identified through the use of the Body Mass Index measuring tool (World Health Organisation, 2016).

**Obesogenic Environment** - Environments that promote unhealthy eating habits, as well as discourage exercise (BBC News, 2014).

**Pre-Packaged Foods** - Foods that are sold in a sealed container such as a bag, can or box (Eat Right Ontario, 2016).

**Processed Foods** - Foods that have had a deliberate change made to it before it is available for consumption (International Food Information Council Foundation, 2010).

**Specialty Store** - A small retail outlet that specialises in the knowledge and selling of a particular product and associated items. A specialty store also tends to provide a higher quality of service and premium prices of the product being sold (BusinessDictionary.com, 2016)

**Sustainability** – The ability to create and continue maintaining an action or condition into the future; in the context of environmental studies, sustainability is the process of maintaining conditions for humans and nature to continue thriving harmoniously into the future (US Environmental Protection Agency, 2016).

**Take-out Restaurant** – A restaurant that sells cooked food that is then taken by a customer and consumed at another location (Merriam-Webster, 2016d).

**Urban** – A descriptive term related to, being in, or being characteristic of a city or town (Dictionary.com Unabridged, n.d.).

**Urban Planning** – the creation and upkeep of services for residents, including land use regulation, transportation, communication networks, development and enhancement of both the urban and natural environment (McGill University, n.d.).



**Urbanisation** – the economic, social and environmental transition of the built society from a rural area into a town or city, hosting a large population moving away from agricultural related work and towards the industry and service related fields (Tacoli, 2012).

**Zoning** – segregation of the land into areas of specified activity. In this context, land use zoning facilitates permissible development of the land for various purposes such as residential, agricultural and industrial (The City of Edmonton, n.d.).