

Mapping the way to Healthier Cities:
A Qualitative Case Study of Food Environment Mapping Tools

by

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A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Science
in
Public Health and Health Systems

Waterloo, Ontario, Canada, 2021

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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

Background: Evidence-based decision-making (EBDM) stems from evidence-based medicine (EBM) and involves integrating up to date, valid, and best available research into the decision-making process. Where EBM relies on scientifically rigorous studies such as randomized control trials, EBDM in public health often relies on cross-sectional or natural experiment study designs which is considered lower quality evidence. A growing body of literature suggests that the use of evidence in public health decision making is inconsistent at best. This is important, because within the EBDM model, there is little room for values, beliefs, politics, and current social issues, all of which are realities present in the decision-making process and may help to explain the inconsistent use of evidence in public health decision making.

One important form of evidence for decision making is spatial data displayed on interactive maps. Mapping public health data can increase the level of knowledge about an issue and produce evidence that can then be used to inform and generate policies. Interactive mapping tools and spatial data analysis techniques have been used for a variety of public health scenarios, such as for national health resource management in Poland, and food environments in the UK.

There is a historical closeness of planning and public health, both disciplines emerged out of concerns about the impact of rapid urbanization and industrialization of the 19th century on population health and well-being. Many factors outside the health care system, such as those related to planning in physical and social environments, determine the health and well-being of a population. Many planning theories or models have been developed over the last half century to explain the ways in which decisions are made and offer guidance on how to make better decisions. Using planning theory to provide additional context for public health decision making may be warranted, given the increasingly localized nature of public health, and the place-based, community decisions about complex and multi-sectoral issues frequently made by public health practitioners to improve health.

To ground the research in a current, contentious, and relevant public health issue, this research focuses on food environment decision-making in Canada. The retail food environment (RFE) may be an important determinant of dietary intake and as such has been a primary focus for both researchers and policy makers. Local, provincial, and federal government organizations are increasingly interested in place-based determinants of food choice (i.e., food environments), given that poor diet is responsible for the largest burden of morbidity and mortality. By addressing existing mapping limitations through the creation of a Canadian interactive food environment mapping tool using high quality business register data, interactive, online mapping tools could be a potentially useful form of knowledge translation (KT) and a form of evidence for public health practice.

Research Questions: This project involves the following three objectives, answered across two manuscripts:

- a. Use a contentious, place-based public health issue (food environments) to explore the extent to which and how planning theory might be able to provide additional context to public health decision making.
- b. Compare and contrast EBDM and planning theories as they relate to public health decision-making related to food environments.
- c. Explore how interactive maps are perceived by researchers and practitioners as an “evidence source” for place-based public health decision making related to food environments.

Methods: 25 participants were recruited from two groups, researchers and practitioners, through the method of snowball sampling. There were 10 researchers of the retail food environment interviewed. The remaining participants consisted of 15 practitioners, including representatives regional, provincial, and federal public health, representatives from nutrition organizations, policy makers, and provincial and federal nutrition leaders. Semi-structured interviews were conducted over the phone or video chat depending on participant preference and technological availability. Interview transcripts were analyzed using Meyer and Ward’s pluralistic approach, allowing comparison with theory as well as theory generation.

Results:

In Chapter 4, three main findings emerged:

1. Planning theory is a body of literature that can provide additional context for understanding place-based public health decision-making.
2. Researcher and practitioner groups had differences in terms of planning theory alignment with respect to food environment decision making.
3. Participants’ theoretical alignment was neither exclusive nor stable over time: changes to policy, multiple priorities in the decision-making process, and seniority and level of jurisdiction all seemed to influence participants’ theoretical alignment.

In Chapter 5, three main findings emerged:

1. A divide exists between researchers and practitioners on their perspectives of whether an interactive food environment mapping tool is something that would be useful.
2. There are many barriers to decision making faced by both researchers and public health decision makers.
3. Knowledge users provided an in-depth list of conditions of maps that make them more useful, this will inform the creation of an interactive food environment mapping tool.

Conclusion: Over the different chapters of this thesis, the principal objective was to investigate how food environment decisions are being made in Canada with a specific focus on the applications of planning theory and the role of evidence. The interdisciplinary research of the two studies offers a novel approach of planning theory to understand public health decision making, highlight the differences that persist between research and practice, and provide recommendations for the creation of a Canadian interactive food environment mapping tool.

Acknowledgements

First, I would like to thank my advisor Dr. Leia Minaker. I truly feel as though we have been on a great journey together between undergrad and now. When I came back to school after a five-year break, you were one of the first people that believed in me, and it has had a profound impact on my life path. Thank you for taking a chance on a spunky kid who randomly showed up in your class and asked you to supervise her undergraduate thesis. I think of you not only as a supervisor, but a mentor, friend, and my academic-mom. Thank you for helping me make sense of my frantic ideas and brain waves, for your encouragement, and for your kindness.

I would like to extend gratitude to my committee members, Dr. Michael Widener, Dr. Elena Neiterman, and Dr. Sharon Kirkpatrick, thank you for giving your time and energy to be on my committee. Your feedback has been invaluable, I have great respect for all of you, and it has been an honour to learn from you.

Thank you to all of my friends within the University of Waterloo, especially the MSc '18 cohort, first day best friends, the LHN office buds, and my supportive qual queens. We have laughed together, we have cried together, celebrated the highs, supported each other through the lows, and graduated during a pandemic! I cannot wait until we are all reunited again – probably just in time for a 5-year reunion. Socially distanced gathering at my place, BYOM (bring your own masks). I love you all and am thankful for the lifelong friendships we have made, no matter where in the world we end up, I know we will always remain close. Shift and persist, baby!

My fellow lab mates in the Minaker Lab – we have grown from a few stragglers into a whole team of likeminded, hilarious, intelligent, kind, and supportive women, plus Adrian. I am so thankful that Leia brought us all together. I love y'all.

To my team at the ALTUM health neurological program, Erin, Lindsey, Eric, and Ed – getting a concussion was not in my schedule for finishing this degree. There were points where I did not think I would ever get my brain back. You supported me, pushed me, called me out, and challenged me to grow over the six months we spent together. I learned so much about myself and about how I want to live my life, I will carry with me the lessons I learned here forever. Thank you from the bottom of my heart.

To my counsellor Raquel, I was scared to start therapy, but you made the transition feel easy and safe. I have faced a lot of challenges in the past year, going through this process would have been immeasurably more difficult without the skills I learned with you. Thank you so much for your support and empathy, I am so grateful you are in my life.

To my mother, Paula, and all my close friends – you have helped support me through this entire process. Even if you do not understand graduate school, I appreciate you all checking in and asking about my research. I love that you tell people that I research “food and the environment” or that I “do science”. Thank you for bragging about me to anyone who will listen, listening to me vent, believing in my strength and power, and reminding me there is life outside of school.

My baby sister, Rachel, thank you for bullying me into finishing my undergraduate degree. If I had not ended up going back, I never would have met Leia, and I never would have known how much potential I had or what I was truly capable of. You knew all along. I love you, best friend, and sismas – you're my inspiration.

Most importantly, I want to thank my fiancé and teammate Kyle. This degree is as much yours as it is mine. I would have been able to do this without you, but it would have been significantly more difficult. Thank you for all your hard work and sacrifice so that we were able to make my dream a reality. I am so thankful I chose you to be my partner in all things, you knew before I did, thank you for helping me see it too. And especially thank you for distracting Nymeria and Toto (our kitties) so I could work in the office in peace.

They say it takes a village; thank you to my village.

*“I want to thank me for believing in me, I want to thank me for doing all this hard work.
I want to thank me for having no days off. I want to thank me for never quitting.
I want to thank me for just being me at all times.”*

Snoop Dogg

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List of Abbreviations

CAHHM Canadian Alliance of Healthy Hearts and Minds

EBDM	evidence-based decision making
EBPH	evidence-based public health
FE	food environment
FEAT	Food environment atlas tool
GIS	geographic information systems
GPS	global positioning systems
iKT	integrated knowledge translation
KT	knowledge translation
LBS	location-based services
MAUP	modifiable areal unit problem
OPH	Ontario Public Health
RCT	randomized controlled trial
RFE	retail food environment
RS	remote sensing
USDA	United States Department of Agriculture

Chapter 1.0: Introduction

1.1 Problem Context

1.1.1 Evidence-based decision making in public health

Evidence-based decision-making (EBDM) stems from evidence-based medicine (EBM) and involves integrating up to date, valid, and best available research into the decision-making process (NCCMT, n.d.). EBDM in public health involves the development, implementation, and evaluation of programs and policies through the use of data and program planning models (Brownson et al, 1999). EBDM in public health draws on many related fields including epidemiology, biostatistics, health economics, and behavioural sciences (Brownson et al, 1999). Where EBM relies on scientifically rigorous studies such as randomized control trials, EBDM in public health often relies on cross-sectional or natural experiment study designs which is considered lower quality evidence (Borgerson, 2009; Evans, 2002). Additionally, public health studies face the issue that there is often a long time period between exposures and outcomes of interest (Brownson et al, 1999).

In this digital age, an overwhelming amount of evidence exists. Common sense would thus indicate that decisions for public health policy can rely on scientific evidence to maximize population health more than ever before. However, despite millions of scientific papers being published annually worldwide, a growing body of evidence suggests that the use of evidence in public health decision making is inconsistent at best (Kneale et al, 2017; Shaxson, 2019; Cairney et al, 2016). This is important, because within the EBDM model, there is little room for values, beliefs, politics, and current social issues, all of which are realities present in the decision-making process (Orton et al, 2011), and may help to explain the inconsistent use of evidence in public health decision making.

1.1.2 Planning theory to provide additional context for decision making

There is a historical closeness of urban planning and public health, both disciplines emerged out of concerns about the impact of rapid urbanization and industrialization of the 19th century on population health and well-being (Corburn, 2007). The most well-loved example is Dr. John Snow and his contributions to public health geography. He was able to link the devastating public health outcome of cholera to the planning issues of population density and the location of industrial land uses (Kochtitzky et al, 2006). However, the two professions diverged throughout the 20th century resulting in health disparities between urban and suburban populations and failure to see the connections between planning decisions and public health outcomes (Corburn, 2007). Currently, planning and public health are both practiced in public institutions and are increasingly collaborating to work toward their shared goals of population health (Kochtitzky et al, 2006). Indeed, many factors outside the health care system, such as those related to planning in physical and social environments, determine the health and well-being of a population (PHAC, 2020).

Many planning theories or models have been developed over the last half century to explain the ways in which decisions are made and offer guidance on how to make better decisions (Goetz & Szyliowicz, 1997). Some theories are explanatory and provide detailed descriptions of how decisions are made without aiming to be prescriptive (Goetz & Szyliowicz, 1997). On the other

hand, normative planning theories serve as blueprints for effective decision-making but are less effective in describing how decision-making actually occurs (Goetz & Szyliowicz, 1997). Of note, planning theory has not, to our knowledge, been applied to public health decision-making. Using planning theory to provide additional context to how public health decisions are made may be warranted, given the increasingly localized nature of public health, and the place-based, community decisions about complex and multi-sectoral issues frequently made by public health practitioners to improve health.

1.1.3 The retail food environment as a planning problem with public health outcomes

To ground the research in a current, contentious, and relevant public health issue, this paper focuses on food environment decision-making in Canada. The food environment is an element of the built environment, it encompasses the “physical, social, economic, cultural and political factors that impact the accessibility, availability, and adequacy of food within a community or region” (Rideout et al, 2015). In short, actions to improve the food environment seek to improve individuals’ and communities’ access to high-quality, affordable, nutritious, and culturally appropriate foods, and/or to reduce access to non-nutritious foods and beverages.

The food environment has been identified as a contentious topic stemming from the inconsistent results in food environment literature. Food environment literature still has room for development in order to improve the understanding of the relationships between interventions and dietary behaviours (Mah et al, 2019). A recent systematic review by Mah and colleagues found a high proportion of interventions examined had “mixed or null effects on diet” (Mah et al, 2019). Mah’s mixed findings have been echoed by other reviews (Dixon et al, 2021, Rahmanian et al, 2014). Another component which makes food environments contentious is rooted in the public perception of food environment interventions. Like other public health interventions, there are multiple avenues to take to promote health, and some are perceived to infringe on people’s liberties more than others. The federal Liberal sugar sweetened beverages (SSBs) levy proposed ahead of the 2019 election mirrors similar initiatives in place already in major U.S. cities, New York and Philadelphia. In particular, the “soda tax” is an example where there is aggressive public vitriol and a sentiment of “it’s not the governments place to tell me what to put in my body”, despite the overwhelming success of soda taxes reducing consumption of SSBs in the United States (Falbe et al, 2016; Kasangra et al, 2015). Additionally, when considering interventions such as a soda tax the interests and financial implications of private business must be considered – this is another component that makes the food environment a contentious issue. Industry maintains that SSB taxes will hurt local economies and that the taxation could spread across grocery items as a fear tactic and with very little evidence to support their points (Ponce et al, 2020). This in turn influences public perception.

The retail food environment (RFE) may be an important determinant of dietary intake and as such has been a primary focus for both researchers and policy makers (Caspi et al, 2012; Raine, 2005; Cobb et al, 2015). The RFE is complex and includes the type and location of food outlets in a person’s neighbourhood; often referred to as geographic food access, quality of food available, and affordability (Glanz et al, 2005). Current food environments have been described as “exploiting people’s biological, psychological, social, and economic vulnerabilities, making it easier for them to eat unhealthy foods” (Roberto et al, 2015). In urban settings in Canada, the food environment is predominantly characterized by *food swamps*, which are described as areas

with energy dense, nutrient poor, convenient, affordable food products (Chen & Gregg, 2017; Larsen & Gilliland, 2008; Luan et al, 2015; Minaker et al, 2016).

Local, provincial, and federal government organizations are increasingly interested in place-based determinants of food choice (i.e., food environments), given that poor diet is responsible for the largest burden of morbidity and mortality (Lang et al, 2018). Municipalities are paying attention to local food policies to improve Canadians' access to nutritious and sustainable foods, despite important gaps that currently exist (OPPI, 2011; PHAC, 2017). Food environment research is mixed, due in large part to the fact that inappropriate data sources are used alongside generally poor-quality data (Cobb et al, 2015; Feng et al, 2010, Lytle & Sokol, 2017; Holsten, 2008; Charreire et al, 2010; Kelly, 2011; Caspi et al, 2012; Jia et al, 2017; Minaker et al, 2016). Food environments are difficult to measure as there are many aspects to measure, and many different measures exist for different purposes. Food environments are also difficult settings in which to intervene because no one organization, ministry, or level of government is responsible for food environment decision making, policy, and oversight.

EBDM is valued for its ability to bring evidence into public health decision making. In light of complex issues like the food environment, EBDM may be insufficient in explaining public health decisions. Planning theory, which seeks to explain (often place-based) decisions, might help to shed light on how place-based public health decisions are made. This thesis uses the retail food environment as a place-based, complex public health issue to examine decision making, both through the lenses of planning theory and EBDM frameworks.

1.2 Study Purpose and Objectives

My goal in conducting this research is to examine how public health decisions around food environments are made in Canada. Research to date has not attempted to use planning theory to provide additional context to public health decision making. Applying planning theory to public health decision making related to the retail food environment will provide a new lens to understand decision making outside of EBDM and will incorporate values, beliefs, politics, and social issues. A secondary objective will be to examine the extent to which and how EBDM fits within planning theory, and explores researchers' and public health practitioners' perceptions of the value and use of interactive food environment maps as an evidence source in public health decisions making.

This project involves the following three objectives, answered across two manuscripts:

- a. Use a contentious, place-based public health issue (food environments) to explore the extent to which and how planning theory might be able to provide additional context for public health decision making.
- b. Compare and contrast EBDM and planning theories as they relate to public health decision-making related to food environments.
- c. Explore how interactive maps are perceived by researchers and practitioners as an "evidence source" for place-based public health decision making related to food environments.

The first manuscript (Chapter 4), *Planning Theory and its Applications for Public Health Decision Making*, is being prepared for submission to the Canadian Journal of Public Health. The second manuscript (Chapter 5), *Using Spatial Evidence in Public Health Food Environment*

Decision Making, Results from Existing Food Environment Maps, is being prepared for submission to Social Science and Medicine.

1.3 Thesis Overview

This thesis is organized into six chapters. The current chapter introduces the problem context, purpose, and objectives.

Chapter 2 provides a literature review aimed at documenting the scholarly literature written on food environments, evidence-based decision making in public health, planning theory, and interactive mapping and GIS. The research questions for this project are made concrete at the end of Chapter 2.

Chapter 3 extends the conversation on food environments, public health, decision-making, and evidence by establishing the research design. Meyer and Ward's pluralistic analysis approach is described (Meyer & Ward, 2014). This chapter provides details on the qualitative approach, which includes sections on recruitment, data collection, and data analysis. The chapter concludes with ethical considerations.

Chapter 4 presents the first manuscript, *Planning Theory and its Applications for Public Health Decision Making*, which uses the case study of food environments as a contentious, place-based public health issue to explore the extent of which and the potential that planning theory has to provide additional context to public health decision making. It showcases a novel approach for understanding public health decision-making and investigates differences between researchers and practitioner's decision-making alignment.

Chapter 5 presents findings related to how interactive maps are perceived by researchers and practitioners as an evidence source for public health decision making related to food environments in a manuscript titled, *Using Spatial Evidence in Public Health Food Environment Decision Making, Results from Existing Food Environment Maps*. This paper describes participants' perspectives on the types of data and evidence decision-makers wish they had, what they are currently working with, and the capabilities desired of an interactive mapping tool both technically and aesthetically.

Chapter 6 provides a summary of findings from each manuscript before informing a discussion on the maintained divide between research and practice, and the areas of opportunity for future research. Recommendations for policy and practice are provided, which are explicitly guided by participants' perspectives and commentary.

Chapter 2.0: Literature Review

2.1 Introduction

The following literature review focuses on a variety of interdisciplinary topics to describe the range of concepts and scenarios that relate to public health decision making and the use of evidence when measuring, intervening, assessing, and making decisions about the food environment. The review opens with a background on how decisions are made in public health and the influence of the medical field. Next, the major concept of the built environment as a social determinant of health is discussed as it relates to nutrition, food environments, the field of public health, and the field of planning. The review moves on to elaborate on the potential of planning theory to provide additional context to decision making in public health and concludes with exploring the role of mapping tools and maps as evidence within decision making processes.

2.2 Public Health Decision-Making

2.2.1 Evidence Based Decision Making

Evidence-based medicine is the use of the current best evidence for the decision making around individual patient care (Sackett, 1997). To practice evidence-based medicine means to integrate clinical expertise with the best available systematic research evidence, cost-effectiveness, and patient preference (Sackett, 1997; Brownson et al, 1999). Evidence-based decision-making (EBDM, also called evidence-informed decision-making) evolved from evidence-based medicine. EBDM involves integrating the most up to date, valid, and best available research evidence into the decision-making process (NCCMT, n.d.). EBDM has been adopted and extended to many disciplines such as public policy, social work, and public health (Li et al, 2019; Brownson et al, 1999). Also referred to as evidence-based public health (EBPH), the manifestation of EBDM in the public health context involves the development, implementation, and evaluation of programs and policies through the use of data and program planning models (Brownson et al, 1999). EBDM in public health draws on many related fields including epidemiology, biostatistics, health economics, and behavioural sciences (Brownson et al, 1999).

Evidence-based medicine relies on scientifically rigorous studies such as randomized control trials and systematic reviews (RCTs) and the same is true for EBDM in public health. However, EBDM in public health is often faced with the reality that the evidence available for some public health problems is primarily drawn from cross-sectional or natural experiment study designs which are typically considered “lower quality” evidence relative to RCTs (Burns et al., 2011). Additionally, public health studies face the issue that there is often an extensive period between exposure (for example diet-related health promotion programs) and outcomes of interest (e.g., diet-related non-communicable disease) (Brownson et al, 1999). Diet related non-communicable disease is a prime example of a serious issue facing public health decision makers that falls outside the realm of acute medical intervention.

2.3 Social Determinants of Health

2.3.1 Overview of Social Determinants of Health

The World Health Organization recognizes the fact that the concept of social and environmental factors influencing people's health is ancient (WHO, 2005). Campaigns for sanitation in the 19th century, among other works, reflected public health awareness of the influence that factors such as social position and living conditions had on their health outcomes (WHO, 2005).

Contemporary research has linked the built environment to health for over two decades (Jackson, 2003). However, the reality is that the built environment and health have been linked (much like their respective fields; planning and public health) since the late 19th century when advances in the provision of clean water, food, air, workplaces, and housing resulted in gains in life expectancy and improvement in the overall health of many (Jackson et al, 2013).

The built environment has been defined as human-made or modified characteristics of the physical environment in which human activity takes place (Handy et al, 2002). It is a multi dimensional concept that encompasses urban design, land use, and transportation systems as well as their corresponding dimensions (Handy et al, 2002, Rahmanian et al, 2014). The built environment is known to influence travel behaviour (Handy et al, 2002), physical activity (Townshend & Lake, 2017), and dietary intake (Rahmanian et al, 2014; Townshend & Lake, 2017), to name a few.

The potential exists for the built environment to be thoughtfully created or altered to support “positive” eating behaviours; for example, altering the ratio of grocery stores or farmers markets versus fast-food restaurants could potentially influence diet and eating habits (Dixon et al, 2020). Diet plays an important role in an individual's overall health, and as such there is much interest in understanding dietary behaviour (Ammerman et al, 2002; Glanz et al, 2010). Eating behaviours are extremely complex and are a result of multiple influences including the environment in which people live (Clary et al, 2017; Glanz, 2005; Townshend & Lake, 2017; Rahmanian et al, 2014). Since the 1980s, there has been a shift in research focus from individual level determinants (eg. attitudes, preferences) to population level determinants (eg. the built environment, the food environment) to reflect the significance of influence that more population level determinants have on the individual (Richard et al, 2011). In 2017, the Canadian government formally acknowledged that the built environment is an important determinant of health in Canada but acknowledged that there are many knowledge gaps related to the extent to which and mechanisms by which the food environment impacts dietary intake and, ultimately, health (PHAC, 2017).

2.3.2 Food Environments are a Social Determinant of Health

Efforts to improve public health nutrition are important given that poor diet quality is responsible for a substantial portion of overall global, as well as Canadian morbidity and mortality (Afshin et al, 2019; Lang et al, 2018; Ogilvie & Eggleton, 2016; Moubarac et al, 2013; Valee, 2017). An individual's food environment may constrain or support healthy diets at a population level, and represent physical features of the built environment (human-made environments where people live, work, play) and include the type, location, and number of food outlets in their area, as well as the accessibility of the food outlets (Glanz et al, 2005). This is also referred to as the

community food environment (Glanz et al, 2005). The retail food environment includes both the community food environment and the consumer food environment, where the consumer food environment encompasses food availability, affordability, and quality (Glanz et al, 2005). Current food environments are set up so that eating nutrient poor and calorie dense foods is often the easier and more affordable choice (Roberto et al, 2015).

The link between the food environment and dietary intake is a research area that has been burgeoning over the last decade with evidence suggesting that the food environment affects health through dietary consumption (Mah et al, 2016; PHAC, 2017; Townshend & Lake, 2017). However, research on this topic has yielded contradictory results when focused on methodological approaches and specific food environment features (PHAC, 2017; Townshend & Lake, 2017). The variation in results is cited to be due to issues with study design and a lack of comparison group, small and low power samples, the use of a wide variety of outcome measures (Caspi et al, 2012; Lytle & Sokol, 2017; MacMillan et al, 2018).

Policy is important for health promotion, and presents the opportunity to align other societal goals, such as social equity and food systems sustainability, with health considerations (Mah et al, 2016). Food environments are potentially an important source of diet-related risks, however they also hold great possibility for health promoting policies (Mah et al, 2019). Mah and colleagues present policy options for city-regions in their 2016 paper. One of the key policy options is identified as collaboration with the planning profession and the use of their unique policy tools (zoning policy, land use planning, and official plans) to create healthy food environments (Mah et al, 2016). In a 2019 systematic review of retail FE interventions on diet, Mah and colleagues identified that most interventions included in the review were led by public health (Mah et al, 2019). This is important because while the link between diet and FEs is a popular topic of conversation in public health, acting to improve FEs is often outside the scope of public health decision making: the ability to influence the built environment lies with planning and policy governance. Discussion around improving food systems have involved local and regional governments and the fields of both planning and public health from as early as 1999 (Pothukuchi & Kaufman, 1999; Mui et al, 2021). Unfortunately, the role of regional food planning remains understudied, and the two perspectives (planning and public health) often do not align on what can or should be done (Mui et al, 2021).

Actions to improve the food environment therefore may not fit neatly within the EBDM paradigm of traditional medical interventions found in public health, as planned and/or controlled experimental research designs are often not feasible or inappropriate to implement in the context of the FE (Crane et al, 2020). Moreover, the diversity in methods for measuring and quantifying all aspects of the food environment make it challenging to create a consistent evidence base, and FE studies are often observational and cross-sectional (Lytle & Sokol, 2017). It is extremely unlikely that there could be an RCT of a food environment intervention to improve diet as “attempting to understand and positively influence what people choose to eat is amazingly complex” (Lytle, 2009, p.140).

2.3.4 Canadian Context of FE's

Public health recommendations on food environments. In Canada, the public health community is working to influence the food environment at all levels of government. Federally, Health Canada released a guidance document in 2013 for how to measure the food environment with a detailed literature review that identifies gaps and suggests study design and measurement strategies (Health Canada, 2013). Additionally, in 2017 the Public Health Agency of Canada brought together public health and planning in a report on designing healthy Canadian communities (PHAC, 2017). The report identifies food environments as a priority area to bring attention to the link between dietary intake and food environments impact the health of Canadians (PHAC, 2017). Provincially, the British Columbia Center for Disease Control released a Healthy Built Environment Toolkit to support health considerations within community planning and design by providing evidence-based planning solutions and a focus on nutritious food (BCCDC, 2018). The Quebec Public Health Association also presents a document focusing on planning solutions for the food environment specifically focusing on nutritious foods within school zones (ASPQ, 2011). At the regional and municipal level, Ontario's public health units are governed by a set of standards which includes multiple references to the importance of built environments on health (MHLTC, 2018). In these examples, a pattern emerges of public health organizations discussing strategies to improve and encourage the considerations for health and nutrition with the planning profession and within the planning and design of communities.

Planning recommendations on food environments. At the federal level, the Canadian Institute of Planners released a Healthy Communities Practice Guide in 2012 that highlights the importance of food systems and the food environment (CIP, 2012). Here the emphasis is the importance of robust food systems to community sustainability and food security to ensure all community members have access to sufficient, safe, and nutritious food (CIP, 2012). The provincial planning body in Ontario is the Ontario Professional Planners Institute, which has a Planning for Food Systems call to action document with a similar focus on the importance of food systems for healthy communities and improved health outcomes (OPPI, 2011). At the regional and municipal level Official Plans are increasingly incorporating FE considerations into their "access to healthy foods" sections, most notably the Region of Waterloo and the City of London. Additionally, food policy councils are being established across the country. In these examples, planning for healthy food systems and healthy communities transcends nutrition and focuses on a more holistic vision in addition to the ways planners can use policy tools to improve community health.

Thus far, this literature review identifies the fact that in public health the standard practice is EBDM, which is based on medical evidence hierarchies (Sackett, 1997; Brownson et al, 1999). Also, public health recognizes social determinants of health, and one important example of how social determinants of health affects health is through the relationship between built food environments and population dietary intake (Dixon et al, 2020; Glanz et al, 2005; Rahmanian et al, 2014). The focus for public health is to improve these environments with a focus on nutrition, however changing the built environment is within the domain of planning and governance, not public health. Planning has also recognized the importance of food systems planning and the impact it has on population health, but planning moves beyond nutrition (e.g., economic development, sustainability, other social outcomes) (Mah et al, 2016). Therefore, EBDM may be limited way of understanding or promoting decision making in this area, given that food

environments (and their relationships with dietary intake) are complex, and that changes to FEs will require people outside of the field of public health (including planners) to make decisions. Fortunately, the field of planning and planning theory is rich and focuses on decision making (Goetz & Szyliowicz, 1997). Planning theory may therefore be able to provide additional context for the understanding of place-based public health decision making, a topic that will be explored in the next section.

2.4 Planning Theory

Planning is a ‘technique for guiding social progress’ as well as a profession which seeks to manage space and influence public policy (Gunder et al, 2017). Planning seeks to do the most good for the most people. Planning theory refers to the “theorization and contextualisation of spatial management practices often with an ethical or critical dimension” which offers an understanding into what planning is in addition to explaining the decision-making process (Gunder et al, 2017). Planning theories or models seek to explain the ways in which decisions are made and offer guidance on how to make better decisions and can be broadly categorized as descriptive and normative theories (Goetz & Szyliowicz, 1997). Descriptive theories are explanatory and provide detailed descriptions regarding how decisions are made without aiming to be prescriptive (Goetz & Szyliowicz, 1997). Normative theories serve as blueprints for good decision making but are less effective in describing how decision making occurs (Goetz & Szyliowicz, 1997). The fields of planning and public health have a shared history of responsibility for the well-being of populations, they are both public institutions, and are increasingly collaborating to work toward their shared goals of population health (Kochtitzky et al, 2006). As noted, public health decision making is becoming increasingly localized, and decisions about food, like decisions about planning urban areas, are inherently multi-sectoral in nature. Despite the potential applicability of planning theory to public health decision making, to my knowledge, no prior research has examined public health decision making using planning theory to provide a conceptual framework.

2.4.2 Six Planning Theories

The decision-making process within different planning theories involves balancing competing interests, values, and ethics, similar to public health. Given that policies aiming to create or sustain healthy places are indeed relevant to spatial management practices, planning theory may be able to help to elucidate how local actors make decisions about place and health. For this research project, planning theory will be considered during the analysis as a framework to guide the analysis around how public health actors make decisions. Planning theory evolves as time goes on and there are six overarching theories for planning: rational-comprehensive, incremental, transactive, advocacy, radical, and communicative (Brooks, 2002), each of which will be described in more detail below.

The *rational-comprehensive model*, also referred to as the synoptic model, is a normative planning theory in which the planner is viewed as an objective, value-neutral expert and decisions are made based on scientific knowledge, logic, and reason (Gunder et al, 2017; Brooks, 2002; Campbell & Marshall, 1999). Rational-comprehensive is focused on goal setting, policy alternatives, evaluating means against ends (cost-benefit analysis), and implementing decisions (Brooks, 2002; Hudson et al, 1979). This model often looks at problems through a systems thinking lens and relies on predominantly quantitative analysis (Hudson et al, 1979).

Where the rational-comprehensive theory analyzes problems in depth in order to assess all possible options and solutions, the descriptive *theory of incrementalism* suggests the opposite. Geared towards solving existing problems, incremental decisions are made without anticipating all consequences and is considered a pragmatic form of policy-making (Brooks, 2002; Campbell & Marshall, 1999). Decisions may not always be correct, but they can be fixed in the next round of incremental decision making. Incremental planning encourages the individual to pursue their own self-interests (Hudson et al, 1979). Incrementalists are less concerned with outcomes and place value on upholding a set of procedures which guide the decision-making process (Campbell & Marshall, 1999).

The descriptive *transactive planning* approach emphasises the value of personal contact and mutual learning between the planner and the people who would be affected by decisions. Contact between the planner and the people is relied upon to reveal which policy issues need to be addressed. Planning under this approach is considered to be embedded as a form of social action and empowers people to be more in control of the social processes that impact their lives.

Many groups are not adequately represented in societal discourse. The aim of the normative theory of *advocacy planning* is to address that fact through empowerment and challenging the traditional view of a singular public interest (Hudson et al, 1979). In advocacy planning, planners are viewed as individuals who can act, engage, and advocate based on their values or the values of others (Campbell & Marshall, 1999). In this perspective, planners should become advocates for the values of a subunit of a community and put forth multiple plans in the place of a singular plan. The concern here is for equity and fairness among all groups within the planning process, to infuse planning with social justice, and examine decisions for unintended side effects (Brooks, 2002; Allmendinger, 2002; Hudson et al, 1979).

Fifth, *radical planning* is a descriptive school of thought in which development is managed in an equitable manner through activism, self-reliance, and mutual aid (Brooks, 2002; Hudson et al, 1979). Under this theory, planning as it stood in the mid-70s was critiqued as being elitist and resistant to change (Brooks, 2002). A new paradigm was proposed based on decentralization, a communal society, and consideration for the environment where there is minimal intervention from the state, and higher participation of the people in decision making (Brooks, 2002; Hudson et al, 1979). More recently, radical planning takes a holistic look at social processes such as class structure, media influence, and social movements and how social issues arise from these processes (Allmendinger, 2002).

Finally, *communicative planning* (also referred to as collaborative planning) is another normative theory, focused on the interactive and interpretive aspects of the planning practice and does not consider scientific knowledge as superior to other forms of knowing (Brooks, 2002; Allmendinger & Twedwr-Jones, 2002; Campbell & Marshall, 1999; Watson, 2002). Communication through official plans and town hall meetings are seen both as a means of communication and as a reflection of institutional, political, and power relationships with the planner as the facilitator (Brooks, 2002; Campbell & Marshall, 1999). During exchanges between the planner and the public, the goal is to gradually create a collective sense of meaning where no one set of interests dominate (Brooks, 2002; Campbell & Marshall, 1999). The role of

the planner in this sense is to attempt to shape the understanding, expectations, hopes, and beliefs of the public (Brooks, 2002).

I will be using planning theory to explore how public health makes decisions about actions to improve the food environment. I will also further explore the role of evidence in decision-making in public health, focusing on mapping tools and maps as evidence.

2.5 Maps as Evidence

2.5.1 What is GIS?

One important type of evidence for public health decision making is quantitative evidence generated through GIS. Geospatial technology consists of several different technologies, such as remote sensing (RS), geographic information systems (GIS), global positioning systems (GPS), location-based services (LBS), in addition to computer mapping, spatial modeling, and data visualization (Sui, 2011). The acronym GIS has been variously used to describe Geographic Information Systems, Geographic Information Science, and Geographic Information Services. The constant terms are geographic and information, which is information about where something happens, what that something is, and frequently, when that something occurred or may occur in the future (Longley, 2015). GI systems perform location-based operations and analysis, which can involve anything from using your location to provide directions to referencing health records to their residential or postal code location (Longley, 2015). Distinguishing features of a GI system include: spatially referenced data, graphical and attribute data input and editing, selective spatial and attribute query, specialized spatial analysis tools, map and report generation. This document will use the acronym GIS to refer to Geographic Information Systems.

2.5.2 Mapping in Public Health

Mapping public health data can increase the level of knowledge about an issue and produce evidence that can then be used to inform and generate policies (Ramadan et al, 2017). GIS has been used to create and analyze evidence for a wide array of public health practices and research purposes including epidemiological surveys, implementation research, policy decision making, and information dissemination (Yasobant et al, 2018). An advantage of GIS is that maps provide an addition of the visual dimension to data analysis that can assist in identifying patterns and relationships as well as building an evidence base for policy making (Yasobant et al, 2018; Pineo et al, 2018; Sweeney, 2016). In this era of evidence-based public health decision making, the use of maps as evidence and a communication tool is increasing (Parrott et al, 2007). GIS methods and data visualization, whether through static or interactive maps or infographics, is an option to facilitate knowledge translation from GIS experts to policy makers (Monsivais et al, 2018; Ramadan et al, 2017; Schuurman & Bell, 2011; Sweeney et al, 2016). Mapping is a useful, and increasingly common, approach to understanding complex social, economic, and environment problems (Sweeney et al, 2016).

2.5.3 Mapping Food Environments

One of the complex social, economic, and environmental problems GIS, data visualization, and interactive mapping has been used for is better understanding the food environment. GIS has been a dominant tool for measuring the food environment for over 30 years (Lytle & Sokol, 2017). Food mapping (mapping the locations of different types of food outlets) is a commonly used form of food environment assessment (Health Canada, 2013).

Although web-based GIS can be a useful tool, there are limitations to their use including limited data analysis capabilities, data quality, and spatial scale and data relationships. First, there are limited data analysis capabilities in web-based GIS in public health practice (Nykiforuk & Falman, 2011; Luan & Law, 2014). The use of spatial statistics and modelling is vital to transforming raw health data to inform decision makers: without this, web-based GIS for public health will remain “data rich” but “information poor” (Luan & Law, 2014). Second, issues with data quality stem from the fact that data used for web-based GIS is generally from health care registries, administrative systems, or other government data. Because of this, there are ethical and confidentiality concerns that must be accounted for and often the data must be aggregated to protect individuals (Higgs, 2009; Luan & Law, 2014). The aggregation of data results in loss of detail and assumptions about the data, which then impacts any analysis undertaken by the researcher or public health decision maker (Higgs, 2009). Additionally, many population surveys are not collected for mapping purposes and can lead to clustering of data which is problematic as it does not accurately represent the geographic distribution of the data (Fletcher-Lartey & Caprarelli, 2016). Third, spatial scale and data relationships is known to geographers as the modifiable areal unit problem (Higgs, 2009). In short, existing data often allows the use of administrative boundaries based on census of postal codes to analyze the use of health services, whereas patients could be travelling outside of their area for treatment (Nykiforuk & Falman, 2011; Higgs, 2009).

2.6 Summary

This chapter has woven together scholarly literature from a variety of interdisciplinary topics including medicine, public health, planning, and geography. After reflecting on these knowledge gaps and recommendations this ultimately culminates in identifying the following research questions to guide this interdisciplinary research endeavour.

2.7 Research Questions

Based on the literature review, this study has identified research questions which will be addressed across two manuscripts. Multiple questions are being considered within each manuscript to explore relevant subtopics.

- *Planning Theory and its Applications for Public Health Decision Making*
 - To what extent is planning theory able to provide additional context for the understanding of public health decision-making?
 - Are there differences between researchers and practitioners in terms of how they understand public health decision-making?
 - If theoretical alignments exist between planning theory and perceptions of place-based public health decision-making, to what extent do these alignments seem to be stable or consistent within people and over time?

- Using Spatial Evidence in Public Health Food Environment Decision Making, Results from Existing Food Environment Maps

- To what extent and how do public health decision-makers use evidence in food environment policy making? What types of empirical evidence might be helpful for these decision makers to create or implement food environment policies?
- Of existing food environment maps, which ones do Canadian public health decision makers find to be most useful and why? How can they imagine using similar maps in a Canadian context?
- How have policy makers/advocates/researchers interpreted and used existing maps and map data for their food environments work? When are maps useful and when are maps less useful for knowledge users?

Chapter 3.0: Research Methods Overview

3.1 Introduction

This chapter describes the strategies chosen to conduct a case study of food environment mapping tools among Canadian food environment researchers and public health practitioners. It includes a description of theoretical orientations, the study setting, data collection methods, and the analysis strategy. The following methods section then details the qualitative tools applied to answer the research questions across two manuscripts.

3.2 Research Design and Theoretical Orientation

Qualitative research is used to explore “how” and “why” type questions as well as to offer insights into participant experiences and perceptions. Qualitative research is also able to be used to explore questions that cannot be answered with traditional experimental research designs (Bradbury-Jones et al, 2014). This thesis is explanatory in nature and attempts to explain the phenomena in question, rather than simply describe it (Given, 2008). The qualitative research methodology that informs the methods and data analysis plan for this thesis was the Meyer and Ward pluralistic approach proposed in their 2014 paper (Meyer and Ward, 2014).

In qualitative research, a case study is “an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system” (Simons, 2009, p. 21). A case study can be categorized as a design frame that incorporates any number of methods and selecting a case study design is a choice of what is to be studied (Simons, 2009). In this case, a case study was conducted focusing on interactive food environment assessment tools and those who could use them in their work. I asked participants to use the following tools: the Food Environment Assessment Tool (UK), the Food Environment Atlas (USA), and the Canadian Alliance for Healthy Hearts and Minds tool (CAN). The participant interviews will be used to inform the creation of an interactive food environment map and website, which Canada does not currently have.

3.2.1 Methodology - Meyer and Ward’s pluralistic method

In qualitative research there are broadly two schools of thought for the placement of theory in the research process according to Meyer and Ward. Meyer and Ward divide the camps into theory-driven (theory first/theory verification) and grounded theory (theory after/theory generation) (Meyer & Ward, 2014). Grounded theory, developed in the 1960s by Glaser and Strauss, sees the role of theory as something which is ‘grounded in the data’ rather than posited at the beginning of a new research project. Grounded theory uses an inductive approach to allow for categories to emerge from the data with the primary aim of developing a theory; theory has no place in research design (Meyer & Ward, 2014). In contrast, theory driven approaches uses theory to design the research in order to expand, test, or verify theory. Theory driven approaches involve using deductive logic (Meyer & Ward, 2014).

Meyer and Ward propose a pluralistic approach which starts with theory while also allowing for theory generation and suggests the following methodological approach (Meyer & Ward, 2014):

1. Conduct a systematic literature search to identify gaps and calls for further research that have not yet been followed up on.
2. Identify theories in your research area.

3. Analyze critically the theories of interest.
4. Develop a conceptual framework to operationalise the theory using appropriate research methods.
5. Design the research with the aim of investigating both empirical and theoretical gaps.
6. Collect data and analyze. This should be an iterative process with analysis taking up the bulk of this step. Meyer and Ward draw on the method of constant comparison (as discussed in relation to grounded theory). The analysis begins immediately following the first interview and I will compare the data to planning theory and see how and if it applies.

To ground the methodological approach to this study I employed Meyer & Ward’s pluralistic approach for data analysis. Following closely the pluralistic approach that Meyer and Ward have proposed I began by conducting a literature review of the multidisciplinary research area of public health decision making in food environments looking at research from the fields of public health, planning, and geography. I then identified theories within the research area including planning theory, EBDM, and iKT and analyzed said theories. I designed this research project to investigate both empirical and theoretical gaps using semi-structured interviews and compared the data generated through that process to the identified theories. I then collected and analyzed the data which will be discussed in more detail later in this chapter.

3.3 Study Setting

The current case study focused on interactive food environment assessment tools and decision-making around retail food environments. Case studies can provide detailed description and analysis to provide data to better understand the “how” and “why” of the phenomena being studied (Ridder, 2017). Participants were given the opportunity to explore, unguided, the Food Environment Assessment Tool (UK), the Food Environment Atlas (USA), and the Canadian Alliance for Healthy Hearts and Minds tool (CAN) in advance of their interview. In the table below a description and basic information about the three mapping tools is provided. Interactivity is defined by the number of indicators and the range of geographic scale the user can interact with.

Table 3.1. Comparison of interactive food environment mapping tools explored with knowledge producers and users in Canada.

	Food Environment Assessment Tool	Food Environment Atlas	Canadian Alliance for Healthy Hearts and Minds
Country of origin	United Kingdom	United States	Canada
Website	https://www.feat-tool.org.uk/	https://www.ers.usda.gov/data-products/food-environment-atlas/	https://cvcdcontextual.mcmaster.ca/
Geographic scale	County, Local Authority, Middle Layer Super Output Area, Ward, Lower	State, County	Postal code

	Layer Super Output Area, Postcode		
Purpose	Enables detailed exploration of the geography of food retail access across England, Scotland and Wales. Use it to map, measure and monitor access to food outlets at a neighbourhood level, including changes over time.	To assemble statistics on food environment indicators to stimulate research on the determinants of food choices and diet quality, and to provide a spatial overview of a community's ability to access healthy food and its success in doing so.	To improve our understanding of the impact of individual, socio-economic and other environmental factors leading to cardiac and vascular disease.
Indicator groups	<ul style="list-style-type: none"> • Food outlet types 	<ul style="list-style-type: none"> • Access and proximity to grocery stores • Store availability • Restaurant availability and expenditures • Food assistance • State food insecurity • Local foods • Health and physical activity • Socioeconomic characteristics 	<ul style="list-style-type: none"> • General • Tobacco • Grocery • Restaurants • Alcohol
Information from multiple years	YES	YES	NO

3.4 Sample and Recruitment Strategy

There are two populations of interest in this study, specifically, “researchers” and “practitioners”. The rationale for including these two groups was it was hypothesized they would have different opinions, wants, and needs and it was desirable to capture those differences and similarities. I recruited 10 representatives for researchers of the retail food environment, and 15 representatives from public health at the regional, provincial, and federal level, nutrition organizations, and federal or provincial nutrition leaders. The research team identified a primary group of key informants through their professional networks. The participants for this study were recruited through purposeful (or expert) sampling to act as key informants for their fields. Through purposeful sampling, participants are selected to study based on their experiences and personal knowledge (Sandelowski, 1995; Coyne, 1997; Patton, 1990).

3.4.1 Participants

Twenty-five participants were interviewed throughout the months of June, July, and August 2020. The interviews ranged from 38 to 120 minutes, with a median time of 56.2 minutes. Interviews were completed either virtually using a video chat, or via telephone based on participant preference and, in some cases, technological capabilities. Dates and times were chosen by the participant. Due to the SARS-CoV-2 global pandemic, participants were interviewed primarily from their homes. However, due to provincial differences in restrictions, some participants were interviewed from their work offices.

3.4.2 Snowball Sampling

Snowball sampling is a sampling and recruitment method where one participant gives the researcher the name and contact information of at least one more potential participant (Kirchherr & Charles, 2018). The referred participants then also give names and contact information, and the cycle continues (Kirchherr & Charles, 2018). The sample then grows (like a rolling snowball) if participants provide more than one referral (Kirchherr & Charles, 2018). Snowball sampling is often used to study the structure of social networks and is often employed as a valuable tool to explore and contextualize a central phenomenon as well as locating information-rich key informants (Kirchherr & Charles, 2018; Patton, 1990). In total there were six participants (4 researchers, 2 practitioners) used as the “seeds” of the snowball sample gathered from the research team’s professional networks.

Snowball sampling may sometimes be perceived as an informal or simple procedure (Noy, 2008) and has been criticized for the potential to underrepresent those with smaller networks and those least interested in cooperating (Kirchherr & Charles, 2018). It may also be labour intensive when building a sample from cold calls, which I did employ at times during the sampling period. Referrals were far more likely to yield an interview than cold calling. Of note, referrals and cold calls made to public health practitioners were often unfruitful due to the SARS-CoV-2 global pandemic, that population specifically was difficult to reach as many were reassigned to COVID response. Additionally, “unlike individuals in a random sample, individuals in a population of interest do not have the same probability of being included in the final sample”, and therefore any findings comprised from such a sample would therefore not be generalizable (Kirchherr & Charles, 2018).

However, snowball sampling as a method was chosen for a variety of reasons, including that it can produce valuable social knowledge. First, snowball sampling is a widely known and commonly employed sampling method in qualitative research within many disciplines, including the social sciences (Kirchherr & Charles, 2018). It was initially developed by Coleman (1958-1959) and Goodman (1961) to study the structure of people’s social networks (Heckathorn, 2011; Noy 2008). This method enabled me to sample and access new participants outside of previously known key informants. Noy (2008) argues, “when viewed critically, this popular sampling method can generate a unique type of social knowledge—knowledge which is emergent, political and interactional” (p. 327). The purpose of this research is to produce knowledge on evidence and decision making in Canadian food environment research and practice, making snowballing both suitable and effective (Kirchherr & Charles, 2018; Noy, 2008).

3.4.3 Interviews

The interview is a qualitative method used to provide a deeper understanding of social phenomena and detailed insights are required from individuals (Gill et al, 2008). The purpose of research interviews is to explore individuals' views, experiences, and beliefs about a specific matter, in this case how public health practitioners use and/or interpret evidence (and in particular, evidence from maps) to inform policy decisions around food environments (Gill et al, 2008). Due to the nature of this study and the desire to extract diverse views, experiences, and beliefs, semi-structured telephone interviews were selected as the most suitable method.

In-depth semi-structured interviews are a data gathering tool that can be described as a form of conversation combining structure and flexibility (Ritchie & Lewis, 2003; Green & Thorogood, 2018). Structure is drawn from the topics that the researcher intends to cover during the interview and flexibility allows for the researcher to investigate topics that may appear that are outside of the initial interview guide (Ritchie & Lewis, 2003). In the context of this study, telephone interviews (lasting approximately 60min) were chosen since the participants will be located all over Canada and internationally, it will be lower cost than interviewing face-to-face. Topics of discussion in interviews did not include sensitive topics where face-to-face interviewing methods are preferred (trauma experiences, for example) (Sturges & Hanrahan, 2004).

At the beginning of the recorded interview, participants were read the information from the consent form that they had previously received (Appendix D) and were asked to give verbal consent on the recording. After verbal consent was obtained the date, time, and time stamp in the interview will be recorded.

Interviews were audio-recorded using Otter.ai software which automatically transcribes the words of the participant and researcher and separates them. All recordings were lightly cleaned for audio quality and to de-identify the transcripts. Key informant characteristics (position, organization, jurisdiction) are noted in a header on each de-identified transcript. Transcripts were cleaned, verified against the audio recording, and compiled in an NVivo qualitative analysis software dataset.

3.5 Analysis Strategy

Interviews were recorded and automatically transcribed using Otter.ai software. As this is an imperfect process, after recording I went through the transcripts and cleaned any errors to match the dialogue more accurately. I coded the first 5 transcripts by hand to create the coding skeleton. I coded the rest of the transcripts using NVivo software and added new codes as I went through the remaining interviews and transcripts. Interview transcripts were re-read and the recorded interviews were re-played multiple times throughout the analysis and writing process to remain immersed in the data and to re-familiarize myself when necessary.

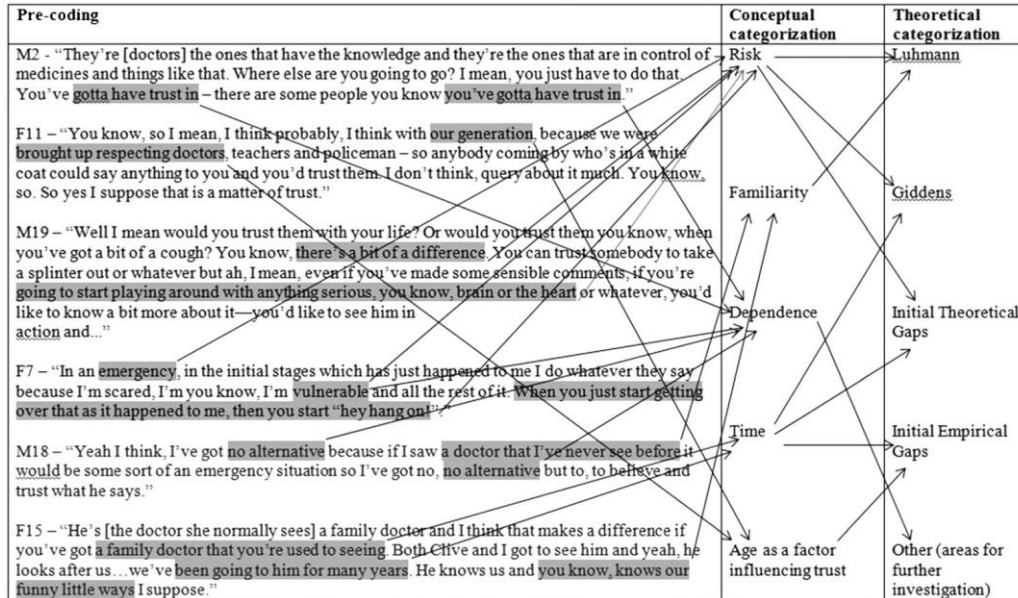
The following steps were taken to conduct my analysis of interview transcripts. Memo-writing is not included in the steps specifically because it will be practiced throughout the interview process as well as the analysis and referred to often.

Step 1 – Pre-coding: Line-by-line coding was done sticking closely to the data and coding for aspects of the data beyond the theoretical frame (Meyer & Ward, 2014; Belgrave & Seide, 2019). Meaning was assigned to each string of text. By coding at this level of detail, it ensures data not part of the original theory-derived, conceptual framework were included (Meyer & Ward, 2014). The first round of analysis was done through inductive pattern analysis and coding. Analysis will begin after the first interview and continue while data is being collected. Each line of the transcript is analysed as an individual, while also being compared to additional data collected (Meyer & Ward, 2014). Comparison of the data is driven by the research questions, as well as back to planning theory and the literature review (Meyer & Ward, 2014).

Step 2 – Conceptual and thematic categorisation: After the initial coding, I began focused coding where I combined the initial inductive codes and sorted them into conceptual and analytical categories which represented the main ideas from the data. Meyer and Ward (2014) draw on the constant comparative method discussed in relation to grounded theory. This step combines larger segments of data by comparing the inductive codes created in Step 1 and examine them from a conceptual or thematic perspective with the goal of exploring conceptual similarities, refine boundaries, and uncover patterns (Boeije, 2002; Meyer & Ward, 2014). Codes created in Step 1 are grouped into larger umbrella categories. Codes that do not fit with the conceptual model will be categorised as “other”.

Using the same transcript, I used deductive coding to match the key concepts from Step 2 with planning theories. For example, segments of text coded under the umbrella of “evidence” would be matched with the rational comprehensive planning approach which above all values scientific knowledge and quantitative analysis.

Step 3 – Theoretical categorisation: In this stage, there may be the opportunity to identify codes from the second step which require further empirical research or theoretical expansion (Meyer and Ward, 2014). Conceptual categories are again combined to create larger umbrella categories. This round of analysis was done using deductive coding and matching statements from participants to the six planning theories. This process is illustrated in the diagram below:



(Figure 1. Combining categories according to Meyer and Ward, 2014)

3.6 Ethics

I have completed the Tri-Council Policy Statement Course on Research Ethics (TCPS 2: CORE) online tutorial. This study was reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#42098).

Chapter 4.0: Planning Theory and its Applications for Public Health Decision Making

4.1 Introduction

Planning and public health have a shared origin story: both disciplines emerged out of concerns about the impact of rapid urbanization and industrialization of the 19th century on population health and well-being (Corburn, 2007). Indeed, many factors outside the health care system, such as policies related to planning in physical and social environments, determine the health and well-being of a population (PHAC, 2020).

Among decision makers and the public, there is a lack of clarity about what constitutes health policy. For example, it is well-established that planning policies that increase access to public transportation improve population health through reduced traffic-related injuries, better air quality, and higher rates of active transportation (Giles-Corti et al, 2016). Although these planning policies are not “health policy” per se, they have major impacts on population health. In the past two decades, research has begun to explore how planning related to food systems and food environments impacts population health and well-being (Giles-Corti et al, 2016). One aspect of this research examines spatial distributions of different types of retail food sources, and planning policy has attempted to modify residents’ geographic access to food, such as improving supermarket access in “food deserts” (Caspi et al, 2012; Glanz, 2009; Lytle & Sokol, 2017; Minaker et al, 2016).

There is also a lack of clarity among researchers about what is understood to be health policy. Typical understandings include various elements of decision-making, project implementation and evaluation, and service reconfiguration (Oliver et al, 2014). Perhaps unsurprisingly, there is also a lack of clarity about how evidence is used in public health decision making (Kneale et al, 2017). It is commonly believed that policy makers rely on peer-reviewed scientific evidence to inform their decision-making processes in order to maximize public good. However, various studies suggest that the use of scientific evidence in public health decision making is inconsistent at best (Kneale et al, 2017; Shaxson, 2019; Cairney et al, 2016). Due to these inconsistencies, questions remain about how health policy is created and implemented. Food environments are potentially an important source of diet-related risks, and also hold promise for health promoting policies (Mah et al, 2019). Collaboration between public health and planning, and the use of the unique policy tools planners have at their disposal (zoning policy, land use planning, and official plans) may create healthy food environments (Mah et al, 2016). As such, with a focus on food environments, the aim of this study is to investigate the use of planning theory to understand public health decision making, to explore whether there are differences between knowledge user groups’ perspectives on public health decision making, and to examine the stability of theoretical alignments between planning theory and decision making within people and over time.

4.1.1 Evidence-based decision-making

Evidence-based decision-making (EBDM) stems from evidence-based medicine, and this method has been recommended and adopted in clinical, public policy, social work, and public health settings (Li et al, 2019). EBDM has predominantly been examined as it relates to health policy and practice (Brownson et al, 2009), and has been the subject of many scoping and systematic

reviews (Dobbins et al, 2007; Jacobs et al, 2010; Orton et al, 2011). These reviews typically lead to similar conclusions: to achieve evidence-based decision-making in public health, it is necessary to reduce barriers (i.e., decision makers' perceptions of evidence) (Orton et al, 2011), the discordance between researchers and decision makers (Orton et al, 2011), competing interests in decision-making (Orton et al, 2011; Gavens, 2019), poor availability and access to research (Oliver et al, 2014), poor dissemination of results (Oliver et al, 2014; Kneale et al, 2019), and lack of research relevant to practice (Oliver et al, 2014; Kneale et al, 2019). Additionally, there is a need for increased facilitation in EBDM, which includes (1) collaboration between researchers and policymakers (Kneale et al, 2019), (2) decision-maker ability to access research (Peirson et al, 2012), and (3) improved dissemination of research (Oliver et al, 2014; Peirson et al, 2012). Many reviews on this topic assume that EBDM is better than alternative means of decision-making.

Kneale and colleagues (2017) identified that there is a gap in understanding how decision-making occurs within public health and what situations call for which types of evidence. There may be a disconnect between the type of evidence that decision makers require, and what is being produced in research (Kneale et al, 2017). Specifically, decision makers have been found to consult sources other than research evidence because of a lack of generalizability to their local context (Kneale et al, 2017). It is also noted that decision makers often lack access to the relevant information and may not have the knowledge, skills, or resources to seek out or conduct systematic reviews of research literature (Peirson et al, 2012). It is an issue if decision makers do not consult existing systematic reviews because these reviews exist, in large part, to provide synthesized summaries with decision makers as their target audience (Mulrow, 1994).

4.1.2 Planning theory and decision-making

Academics and practitioners in the field of planning have a long history of theorizing community decision-making related to city building (Whittemore, 2014). Planning theories or models seek to explain the ways in which decisions are made, and they offer guidance on how to make better decisions (Goetz & Szyliowicz, 1997). Some theories are explanatory and provide detailed descriptions of how decisions are made without aiming to be prescriptive (Goetz & Szyliowicz, 1997). On the other hand, normative planning theories serve as blueprints for effective decision-making, but they are less effective in describing how decision making actually occurs (Goetz & Szyliowicz, 1997). As noted, planning and public health have a shared history of responsibility for the well-being of populations, are both practiced in public institutions, and are increasingly collaborating to work toward their shared goals of population health (Kochtitzky et al, 2006). However, literature on EBDM fundamentally argues that decisions ought to be made by primarily relying on evidence, and thus fails to fully consider the role of values in the decision-making process (Orton et al, 2011). Considering values as only "additional sources of evidence" (Orton et al, 2011), this approach is contested by the field of planning, whose theory literature seeks to explain decision-making processes from diverse perspectives. Of note, planning theory has not, to the authors' knowledge, been applied to public health decision making. Given the increasingly localized nature of public health, and the place-based, community decisions about complex and multi-sectoral issues frequently made by public health units to improve health, this is a particularly strong literature gap that requires greater investigation.

The decision-making process within different planning theories involves balancing competing interests, values, and ethics, which is similar to public health practice, but not necessarily the bulk of EBDM literature (Krizek et al, 2009). As policies aiming to create or sustain healthy places are relevant to spatial management practices, planning theory may be able to help to elucidate how local actors make decisions about place and health. Planning theory evolved over time and there are six overarching theories for planning each of which is briefly described below in Table 2.

Table 4.1 Focus and views of the six overarching theories of planning.

	Focus	Views
Rational comprehensive model	Goal setting, policy alternatives, cost-benefit analysis, implementing decisions.	The decision maker (planner) is objective. Decisions are made based on scientific knowledge, logic, and reason. Problems are approached through systems thinking and relies predominantly on quantitative analysis.
Incrementalism	Solving existing problems, decisions are made without anticipating all consequences, pragmatism.	Encourages individuals to pursue their own self interests. Outcomes are of lesser concern; value is placed on upholding a set of procedures to guide the decision-making process.
Transactive planning	Decision makers contact with the public is relied upon to reveal which policy issues need to be addressed.	Emphasizes the value of personal contact and mutual learning between the decision maker and the public. The public is empowered to take social action and be in control of the social processes which impact their lives.
Advocacy planning	Addresses that many groups are not adequately represented in societal discourse. Promote equity and fairness for all, social justice, and examine decisions for unintended consequences.	Decision maker is viewed as an individual who can act, engage, and advocate based on their values and the values of others. They should advocate for underrepresented communities.
Radical planning	Decentralization, a communal society, and consideration for the environment with minimal intervention from the state, and higher public participation in decision-making.	Recently began to take a holistic look at social processes such as class structure, media influence, and social movements and how social issues arise from these processes.
Communicative planning	Does not consider scientific knowledge as superior to other forms of knowing. During exchanges with the public, the goal is to gradually create a collective sense of meaning where no one set of interests dominate.	Communication through bureaucratic means is seen as a means of communication and as a reflection of institutional, political, and power relationships. The role of the planner is to attempt to shape the understanding, expectations, hopes, and beliefs of the public.

4.1.3 Objective

The food environment is an element of the built environment, and it encompasses the “physical, social, economic, cultural and political factors that impact the accessibility, availability, and adequacy of food within a community or region” (Rideout et al, 2015). In short, actions to improve the food environment seek to improve individuals’ and communities’ access to high-quality, affordable, nutritious, and culturally-appropriate foods, and/or to reduce access to non-nutritious foods and beverages. Over the past decade, decisions about improving the food environment to support Canadians’ health have been discussed and recommended at federal (PHAC, 2017; Health Canada, 2013), provincial (OPPI, 2011; Drayton et al, 2013), and municipal/regional (ASPQ, 2011; Halifax Regional Municipality, 2020; Karbasy et al, 2019) levels. To the author’s knowledge, planning theory has not yet been applied to public health decision making, which is an important gap given the localized nature of public health, and the place-based, community decisions that public health units make to improve health and address complex problems. Addressing this gap may help bridge the divide between what is recommended in EBDM literature and how decisions are made in practice (Jacobs et al, 2012). The objective of this paper is to examine the extent to which planning theories can provide additional context for the understanding of public health decision making for food environments. To ground the research in a current, contentious, and relevant public health issue, this paper focuses on food environment decision making in Canada. The current paper seeks to address the following research questions:

1. To what extent is planning theory able to provide additional context for the understanding of public health decision-making?
2. Are there differences between researchers and practitioners in terms of how they understand public health decision-making?
3. If theoretical alignments exist between planning theory and perceptions of place-based public health decision-making, how do these change throughout the interview process when discussing past and current experiences?

4.2 Methods

4.2.1 Participants

Recruitment for this study began by using purposeful sampling to identify key informants from the research team’s professional networks in the food environment field in the areas of both research and practice. A total of twenty-five stakeholders were recruited from diverse backgrounds through the approach of snowball sampling. Participants were recruited from two identified groups: 10 researchers from the retail food environment and 15 representatives from municipal planning, public health practitioners, and provincial/federal nutrition leaders. Eligibility criteria were peoples who worked in the fields described above and who had experience in working with food environments. Unfortunately, participants from the planning field were unable to be recruited. Individuals were selected and contacted for study participation if the research team believed them to be decision makers in public health with experience in food environments, food environment policy, nutrition, etc., as determined through the research teams’ networks, Google searches, and self-report from the participants in the initial contact email. Participant characteristics are further described in Table 2 in the Results section. The

study was reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#42098).

4.2.2 Data collection

Data collection occurred from June 2020 to August 2020 and consisted of one hour, in-depth telephone or video interviews with each study participant. Semi-structured qualitative interviews were conducted based on an interview guide tailored for researchers or practitioners. The interview guide provided a common set of open-ended questions and explored the key informants’ perceptions about the role of evidence and how decisions are made about food environments. The interview guide was pre-tested with one researcher and one practitioner prior to its use in the study. Changes to the interview guides were made based on comments from the pilot tests, as well as the overall experience of the interviewer.

4.2.3 Data analysis

The data were transcribed using Otter software (Otter, version 2.1.21; Los Altos, CA: Otter.ai 2020) and were cleaned for accuracy by the first author. Research data were analyzed using Nvivo 12 Pro (NVivo, version 12) using Meyer and Ward’s pluralistic approach. Meyer and Ward (2014) draw on the constant comparative method. In this way, analysis began after the first interview and continued while data was being collected, and each sentence was analyzed alone, while also being compared to additional data collected (Meyer & Ward, 2014). Comparison of the data was driven by the research questions, as well as back to planning theory and the literature review (Meyer & Ward, 2014). Respondents were not directly asked about planning theory; participants were asked about decision making in their current and past roles. These statements about decision-making were then examined in terms of their alignment with one (or more) of the six planning theories described previously, and they were then matched by the first author based on key concepts and ideals.

4.3 Results

In total, 25 individuals (10 researchers and 15 practitioners) participated in an interview. Table 2 describes key characteristics of participants. Results described below are presented in order of the research questions above.

Gender	
Woman	20
Man	5
Education	
Post-secondary degree	3
Graduate degree	12
Multiple graduate degrees	10 (all researchers)
Researcher	10
Academic Institution	8
Government	2

Practitioner	15
Municipal / Regional	7
Provincial	5
Federal	3
Length of time in current role (practitioner only)	
< 1 year	3
1-3 years	2
3-5 years	5
5+ years	5

4.3.1 The ability of planning theory to provide additional context for understanding place-based, public health decision-making.

While discussing public health decision-making related to the food environment, participants’ statements most strongly reflected similarities to advocacy planning theory (n=15 participants), transactive planning theory (n=12 participants), and the rational comprehensive model of planning (n=11 participants).

Advocacy planning theory was reflected in statements by 15 participants. Quotes reflecting advocacy planning approaches identified the normative approach of improving equity, fairness, and social justice in food environment policy. For example, a practitioner at the provincial level discussed how two intersectional social justice topics, poverty and income inequality, should be considered in food environment policy:

The issue is that there's a lot of people out there who can't afford healthy food... either because it... costs too much to transport it, that there isn't anything within a reasonable distance to access, or they don't have enough income. So, we need to put that on the table as well. *Practitioner. Provincial level.*

Access to affordable, healthy foods is vital when considering the nutritional needs of the public and the public health issues that may stem from poor diet. Poverty, income inequality, physical access, and financial access are social justice concepts related to diet and nutrition, and they are linked to the state of the food environment.

Transactive planning approaches to food environment decision-making were mentioned by 12 participants. These approaches prioritized mutual learning and public consultation and engagement to reveal which policy issues need to be addressed. For example, one provincial practitioner noted the value of stakeholder consultation and collaboration:

So, we use a systematic process, ... in order to identify a need, using information from... surveillance data, etc. And consultations with stakeholders to identify a need... Once we have identified that need or a problem to solve. ... We then identify and consult with stakeholders in that topic in order to start to zero in on what type of strategies might be most effective in our setting, and in our environment. *Practitioner. Provincial level.*

Statements that aligned with the rational comprehensive approaches were made by 11 participants. They focused on strategic planning and goal setting, evaluating a means against an end, and emphasis on evidence-based decision-making. All three of these main tenets of the rational comprehensive approach are discussed in the following quote,

Okay, so we need to ... refer to the evidence right. So, what is emerging evidence in terms of the key issues of concern? What is the impact on health? How does it align? We always need to ensure that it aligns with our division strategic plan. The strategic plan and the strategic priorities. We need to ensure that there is like some kind of political appetite. Oftentimes we need to look at, you know, we are often needing to do work with no additional new funding ... So, is this something that we can actually address without significant investment of resources? *Practitioner. Provincial level.*

Although aspects of advocacy planning, transactive planning, and the rational comprehensive model were more frequently mentioned than the other three planning theories described here. However, communicative planning theory (n=6 participants, n=7 mentions), radical planning theory (n=3 participants, n=3 mentions), and incremental planning theory (n=1 participant, n=1 mention) were all described during the interview process. Thus, all six theories were reflected at least once.

Communicative planning theory was reflected in statements by 6 participants. The communicative planning approach does not consider scientific knowledge to be superior to other forms of knowing, and instead, aims to gradually create a collective sense of meaning where no one set of interests dominate. Additionally, the goal is to shape the expectations and beliefs of the public. For example, one provincial practitioner expressed the need to communicate to stakeholders why having a healthy population matters for them, to shape expectations, and to create a collective sense of meaning:

We need to be clear on it, why would this be important to them, like what those things that mean. It's very easy for our external stakeholders to say well that's not my problem ... that's somebody else's problem you know. ... So what we need to do is to connect the dots for them. *Practitioner. Provincial level.*

Radical planning theory was reflected in statements by 3 participants. Radical approaches include an emphasis on minimal intervention from the state, higher participation of the people in decision making, and looking holistically at social processes (i.e., class, media, and social movements), and how social issues arise. For example, one researcher expressed the importance of looking holistically at the different parts of the food environment that a consumer encounters:

What that consumer might identify as food environment features might be able to tell you about their choice of going to this store or this restaurant. But also what is that level of governance, right, what is that food policy? Because I think that that all those layers interact with each other between the individual and the policy. We can't just have; this is what the grocery store looks like without understanding the policy context. Because ...

we would want stronger information as to how our food environments are impacting or populations locally. *Researcher.*

Statements that aligned with incrementalism planning approaches were made by 1 participant. Incrementalism focuses on making incremental decisions without anticipating all possible consequences. Value is placed on upholding procedures to guide the decision-making process, and this focus on procedures as a guide to the gathering of evidence is discussed in the following quote,

So we did an evidence review, looking at the literature on urban agriculture and health outcomes. We have a set and rigorous process at [municipality/region] public health to do that. ... And then the policy scan was really looking at Ontario municipalities. ... We did the whole environmental scan and we talked to our key informants and we looked at the literature, and we looked at the themes that came out, and then we sort of put each theme through a priority setting process based on the strategic plan. *Practitioner. Municipal / Regional level.*

In all cases, when participants spoke about food environment decision making, tenets of at least one of the planning theories were reflected. Therefore, it appears that planning theories are able to provide additional context to how researchers and practitioners understand and experience place-based public health decision making. Matching participant statements with planning theories helps to understand the ways decisions are being made, where scientific evidence best fits, and identifying opportunities for partnership and collaboration between researchers and practitioners.

4.3.2 Researchers vs Practitioners

Though researchers and practitioners both made statements that alluded to the broad range of planning theories, researchers' statements more frequently aligned with transactive approaches while practitioners' statements more frequently reflected advocacy approaches. Researchers most commonly spoke about food environment decision making in terms of transactive planning approaches (n=4 researchers) and advocacy planning approaches (n=4 researchers). Two researchers did not speak about decision-making processes, and thus were not coded as aligning with a particular planning theory.

Researcher statements reflecting transactive planning approaches emphasized the importance of collaboration and knowledge translation between the researcher and the public to discover which policy issues are most important to public health.

Yeah, so everything we do, we take an integrated knowledge translation approach. So, for example, ... often when we have an idea we then speak to the policymakers and we get them on, usually on an advisory panel. ... So...we consult the people right away, like we don't do anything if we don't know who's gonna use it. *Researcher.*

Researcher statements aligning with the advocacy planning approach in public health and food environment research often discussed how the current state of food environment literature needs to move forward in addressing poverty.

The reality is that people don't have money to spend on food period, healthy food, not healthy food, there just isn't very much money to spend on food at all. ... I certainly understood that the problem is poverty. The problem isn't necessarily a food access problem, the problem is a poverty problem...That really kind of brought that home in a really serious way. *Researcher*.

Whereas researchers seemed to be evenly split between transactive and advocacy approaches, the majority of practitioners aligned with advocacy approaches (n=11 practitioners). In particular, *inequity, unfairness, and a lack of social justice with respect to food systems and food access* were described.

For the vast majority of people experiencing food insecurity, the economic barrier or the lack of income is the biggest barrier to them having food that they need. ... The bottom line for a lot of these people, particularly folks experiencing severe food insecurity, is that they don't have money to buy food. *Practitioner, Federal level*.

For practitioners, specific types of practitioners value a more rational comprehensive approach currently or previously, which will be discussed more fully in the following sections.

4.3.3 Stability of theoretical alignment

As described in previous sections, statements that were considered to “align” with a planning theory were those that reflected decision-making priorities/approaches advocated or described by the six planning theories. Interestingly, participants’ decision-making perspectives and practices – their “planning theory alignment” – seemed dynamic. In particular, many practitioners (1) alluded to policy developments that had changed their planning theory alignment, (2) frequently reflected multiple theoretical alignments at once, and (3) may have altered their planning theory alignments with their level of seniority and jurisdiction.

a. Evolution of Ontario practitioners’ theoretical alignment

Several practitioners from the province of Ontario noted how their own and their colleagues’ decision-making processes changed over time as a direct result of higher-level policy changes. Specifically, Ontario municipal/regional practitioners’ theoretical alignment for decision-making changed from the rational comprehensive model to transactive planning approaches following changes to the Ontario Public Health Standards (OPH) in 2018. Changes to the OPH Standards in 2018 required practitioners to move away from an emphasis on analyzing surveillance data, monitoring trends, and dictating who practitioners should collaborate with and for what causes, and instead move towards community collaboration and consultation with consideration based on community-identified local needs. Here, a provincial policy change was perceived to substantially influence local public health practice in Ontario.

Right. Okay, so, the Ontario Public Health Standards used to, like, explicitly say “you're going to work in retail”, “you're going to work in schools”, “you're going to work in workplaces”, “you're going to work with municipalities”. ... Since 2018, there was a change in the Ontario Public Health Standards, ... and so the priority now is you identify what's important to your community and then you support them. ... So now, just because

there's been a change in direction ... our health unit is really heavily involved in a number of community agencies. ... I'd say that that's really heavily what our community has asked us to do we did a stakeholder consultation, and we heard a lot about different agencies requiring our assistance. *Practitioner, Municipal / Regional level.*

b. Alignment with multiple planning theories.

Many participants' perspectives on decision-making aligned with more than one planning theory. There seemed to be differences between researchers and practitioners in terms of how frequently the different groups of participants made statements that aligned with multiple theories. For example, three of the ten researchers made statements reflective of two or more theories, while 11 of 15 practitioners made statements aligning with two or more theories. Notably, practitioners frequently and concurrently discussed three theories: advocacy, rational comprehensive, and transactive; a similar trend did not exist in the researcher group. The following three quotes come from the same practitioner at the municipal/regional level and demonstrate alignment with advocacy planning theory, the rational comprehensive model, and the transactive planning approach.

In response to a question about experience with decision making for program planning, a practitioner responded in a way that aligned with both rational comprehensive (reliance on evidence) and advocacy (focus on adequate income to support dietary health) approaches:

I do think that we'll probably look at evidence and probably should be looking at more evidence around what types of programs actually help people with the affordability of food recognizing people may have adequate incomes but things like the basics, vegetables and fruit grains that sort of thing may still really be not affordable for people. *Practitioner. Municipal/Regional level.*

As part of the response to the same question, the same practitioner responded in a way that valued scientific evidence, which showed further alignment with rational comprehensive approaches,

All the program planning we do is really looking at the evidence and identifying best practices. *Practitioner. Municipal/Regional level.*

Additionally, this practitioner responded with emphasis on mutual learning between the decision maker and the stakeholders/public, demonstrating alignment with transactive approaches,

So that's one thing that I, that we think about is that that partnership building piece, but also ... who can we work with to advocate for policies that are going to say a healthy food environment is really important in these settings. *Practitioner. Municipal/Regional level.*

Again, researchers differ from practitioners by having no trend in overlap between the theories. The following are quotes from a researcher discussing perspectives which aligned with communicative and transactive theories.

In response to a question about the types of evidence used to support the intervention the participant was currently working on, the researcher responded in a way that aligned with the communicative planning theory, where scientific data is not seen as superior to other forms of knowing (e.g., participant stories):

Obviously getting perceived food environment information is also important. We have done some interviews. Photo based interviewing around food and marketing, which is quite interesting again to get a sense of their perception. So it really depends on you know what exactly you're trying to use. What we do find is stories sometimes are quite ... useful for policy makers. *Researcher*

Later in the interview, the same researcher responded to a question about what their role was in the decision-making process in a way that aligned with transactive planning theory, where the emphasis is on mutual learning and contact between the decision maker and the public to determine which issues to address:

There were lots of actions that were decided upon by individual recreation facilities ... in which we built capacity to change their food environment. So, after baseline we provided them with a report and some training ... After they received that information about what was happening and what they could do. There were decisions made around what type of food environment feature do we want to change, and who needs to be involved. ... And then we supported them. *Researcher.*

c. Practitioner seniority and theoretical alignment

A final factor that appeared to be related to practitioners' theoretical alignment was seniority and working at a higher jurisdictional level (e.g., federal vs. provincial or municipal). In particular, participants with more seniority or working at a higher jurisdictional level seemed to align more closely with a blend of rational comprehensive and communicative approaches relative to participants with lower seniority or working at lower jurisdictions. Practitioners with high seniority in higher levels of government were found to put more emphasis on the value of scientific knowledge and "value-neutral" cost-benefit analysis to justify policy and expenditure decisions. Practitioners at the municipal/regional level and some provincial practitioners made similar claims about their federal colleagues needing to empirically justify their decisions more stringently than themselves. In addition, higher-level practitioners recognized the value of assessing political appetite of publicly elected officials to create a collective sense of meaning among the public, and this lends itself well to the communicative approach, which values creating a collective sense of meaning.

We did a lot of international scanning, so we looked at international health organizations like the WHO ... the options, they were all widely recognized as interventions that could be cost effective, and would have the most impact on people's diets. ... We also looked at OECD work on cost effectiveness. ... so I mean we did, we did what one usually does you know consult the literature look at what international organizations are saying. *Practitioner. Health Policy. Federal level.*

In response to a question about barriers faced when working to achieve priorities, one provincial public health practitioner spoke about the importance of empirically demonstrating outcomes, reflecting the rational comprehensive approach.

Well one of the main things is the government always likes to see indicators and outcomes right, they want to know that anything they're putting their money towards, they can show an impact. Usually a cost saving impact so unfortunately with healthy eating, it's, you know, 20, years, years down the road you may see changes. ... The government's going to want to evaluate any policy decision they make, whether it's giving money or spending, you know, providing a program. They always want to see what those outcome indicators are. And I think public health is realizing more and more we need to have better indicators to measure the success or even the change in the status quo. *Practitioner. Provincial level.*

Finally, in response to a question about how they made the decision to focus efforts on specific interventions over others, one federal-level public health practitioner displayed the communicative planning theory approach:

Certainly, what the different parties were interested in played into our recommendations because of course as a public servant, you can't just propose things that make sense you have to propose things that started from a scientific perspective and you have to look at the political context and understand what might be acceptable to the leaders of the day. ... So it just makes sense from a practical perspective if you want your initiative, move forward as a policy analyst, you have to look at what's likely to be of interest to the people who are in charge of and have been voted in by the public. *Practitioner. Health Policy. Federal level.*

4.4 Discussion

The current study examined whether planning theory was able to provide additional context or insight into place-based public health policy decision making given the currently conceived limitations of EBDM, especially as it is understood within food environment policy. Three key findings emerged. First, planning theory was indeed able to provide additional context for the understanding of food environment decision making. Second, there were differences between researchers' and practitioners' perspectives on food environment decision making. Finally, "theoretical alignment" – the extent to which statements aligned with one particular planning theory or another – was neither exclusive nor stable over time. Each of these key findings is described in greater detail below.

First, given that all participants made statements that aligned with at least one planning theory, the authors suggest that planning theory is a body of literature that can provide additional context in understanding place-based public health decision making. In public health, EBDM is the focus and gold standard in supporting the creation of policy to improve health outcomes, which comes from the evidence-based medicine movement and the hierarchy of evidence that defines evidence quality (Parkhurst & Abeyasinghe, 2016). The concept of EBDM has been influential in the way public health thinks about evidence to support action and intervention (Ogilvie et al, 2019) and has translated to discussions on how evidence is used to formulate public health policy

(Parkhurst & Abeysinghe, 2016). However, evidence-based policy has been criticized for the failure to acknowledge social, political, and values behind the production of evidence (Krizek et al, 2009).

Moreover, public health's preeminent focus on "high quality evidence" may actually *hinder* the understanding of public health decision making. In the typical "hierarchy of evidence," randomized controlled trials (RCT) are regarded as the highest form of evidence under evidence-based medicine to guide clinical practice, placing non-experimental methods as less useful forms of intervention research (Parkhurst & Abeysinghe, 2016). However, traditional hierarchies of evidence may have reached their limit, may not always produce the best guidance for action, and may ignore valuable insight from qualitative endeavours (Tate, 2020). For example, RCTs do not produce the best results for *generalized* treatments (Tate, 2020). Moreover, complex systems are poorly represented in the linear medical evidence hierarchy, which is relevant to both planning and public health as both fields focus on complex systems that are subject to many influences, including local politics, values, context, and social influences (Tate, 2020). While public health strives for decisions to be made based on rigorously established, objective evidence, issues in the implementation of EBDM have persisted for decades (Dobbins, 2004; Ogilvie, 2019). Public health and planning are both political fields where choices about which evidence is used and how it is synthesized is subject to power imbalance and political appetite (Tate, 2020). Thus, planning theory offers perspectives on how gaps, such as research accessibility and a lack of locally applicable evidence, can be overcome (Krizek et al, 2009). Planning theory can also help provide context for place-based decision-making as it incorporates components like values, beliefs, social influences, context, and politics, which impact the way individuals make public health decisions, as well as how the public perceives evidence.

Second, this study found that researchers and practitioners had differences in "planning theory alignment" with respect to food environment decision-making. Researchers were typically guided by *both* transactive and advocacy approaches, while practitioners' statements aligned primarily with advocacy approaches, advocating for community values, and concerning themselves with equity, fairness, and social justice. The divergence between researchers and practitioners is consistent with the call from the World Health Organization Commission on Social Determinants of Health to embed public health advocacy into both practice and research (WHO, 2008). Advocacy in public health can create systemic change by addressing social determinants of health (Blenner et al, 2017). However, this is in opposition to the fact that public sector employees in Canada are not supposed to be advocating (or be seen advocating) on any topics, as their role is to provide high quality evidence to decision-makers. Despite the differences, the shared advocacy approach between the two may be an opportunity to facilitate collaboration and partnerships between the two groups. Further, given that practitioners as public sector employees are unable to openly advocate, these partnerships may represent a means by which this becomes possible.

Integrated knowledge translation (iKT) is a model of collaborative research characterized by researchers working together with knowledge users (clinicians, managers, policy makers) with the goal of engaging in a research project that is mutually beneficial to support decision-making in practice (Kothari et al, 2017; Gagliardi et al, 2016). Knowledge users bring their expertise and contextual knowledge where researchers bring methodological and content expertise.

Collaboration between researchers and knowledge users often results in better science, more relevant and actionable research findings, increased uptake of findings in policy or practice, and mutual learning (Kothari et al, 2017; Gagliardi et al, 2016). Only one researcher specifically mentioned that they make use of iKT, an approach that itself aligns well with the mutual learning valued in the transactive approach. Although this study was not specifically designed to address iKT, this is somewhat surprising, given the frequency with which statements aligning with transactive approaches were made, and also the increasing importance of iKT as identified by Canada's federal health research funding agency (CIHR, 2004). While other researchers mentioned knowledge exchange and working with stakeholders, both of which link nicely to transactive approaches, they did not explicitly mention iKT. If iKT has value in formalizing and guiding implementation of the transactive approach to decision making between researchers and practitioners, it may be worthwhile to promote iKT strategies among both researchers and practitioners. Future qualitative research could be directed at assessing the use of iKT from the perspectives of researchers and public health decision makers in Canada.

During the interview process, many researchers spoke of their collaboration with stakeholders in public health, but very few of the public health practitioners mentioned collaborating with researchers. Findings from this research support a call for increased use of iKT and collaboration between researchers and practitioners to support more effective policy and decision-making. However, it is important to address potential barriers to iKT. Practitioners may lack capacity to seek out researchers with whom to collaborate. Second, during the interviews, some researchers mentioned repeatedly collaborating with the same practitioners, which could indicate that once a researcher finds a practitioner or a group of practitioners to collaborate with, they do not extend further than that. The interaction between researchers and practitioners is important because researchers may be producing evidence that is inaccessible or does not fit with what practitioners need. If communication between researchers and practitioners improved, practitioners could communicate their needs and receive evidence that is significantly more tailored to the needs of their communities. On the other hand, researchers listening to the needs of practitioners could prompt new lines of inquiry, leading to new projects and increased funding, which may lead to better outcomes for both researchers and practitioners.

The current study offers evidence that researchers and practitioners have different approaches to, and understandings of, public health decision making. Academic institutions are often seen as knowledge producers, where practitioners must make decisions based on the data and evidence available to them. The literature indicates that academics favour the creation of generalized knowledge (i.e., applicable to many places and situations), and practitioners seek to solve problems for their specific contexts (Krizek et al, 2009). Understanding the differences in theoretical alignment between researchers and practitioners in the way these two groups make decisions is valuable to support research that is mutually beneficial for both research and practice. For example, if decision-making processes were understood more fully, communication between researchers and practitioners could be facilitated. In turn, better communication could mean that researchers would produce tailored evidence that is needed by their local, provincial, and federal decision-makers. Ultimately, if decision making is better understood, federal and provincial data collection could be streamlined so that decision can be made more effectively using data that is appropriate, timely, and consistent.

Third, participants' theoretical alignment was neither exclusive nor stable over time. Changes to policy, multiple priorities in the decision-making process, and seniority and level of jurisdiction all seemed to influence participants' theoretical alignment. As a first example, Ontario municipal/regional practitioners' theoretical alignment for decision-making changed from rational comprehensive to transactive following changes to the Ontario Public Health Standards in 2018. This provides evidence that a policy changes significantly influenced practice in the field of public health in Ontario. Participants described how the Ontario Public Health Standards prior to 2018 were prescriptive and took a top-down approach to governing how public health units operated, which aligns well to the rational comprehensive approach where decisions are made with reliance on quantitative analysis and where scientific knowledge is the most valued form of knowing (Brooks, 2002). In the previous iteration of the Ontario Public Health Standards 2008, revised in 2014, this is apparent. Under the Chronic Diseases and Injuries section, where the food environment would fall, the emphasis is on analyzing surveillance data and monitoring trends, as well as dictating to practitioners who to collaborate with and on what topics (MHLTC, 2008). After 2018, Ontario Public Health Standards changed to emphasize collaboration and consultation with stakeholders, and much less prescription of how public health units should operate, demonstrating the transactive approach where dialogue between the "expert" (in this case the public health practitioner) and the public is relied upon to decide which issues to address. In this newest iteration of the Ontario Public Health Standards, under the Chronic Disease Prevention and Well-being section, emphasis is placed on collaboration and consultation with a variety of stakeholders, and direction to consider topics based on local needs (MHLTC, 2018).

Although researchers' statements typically aligned with one or two perspectives, practitioners' statements typically aligned with multiple perspectives, even within the same conversation. This phenomenon might be explained by practitioners coordinating and balancing multiple priorities in their decision-making processes, where researchers could mostly be focused on their niche area of research. Additionally, it could mean that an individual decision-maker is considering multiple perspectives and perhaps even considering the outcomes for multiple groups of people during their decision-making process. Participant alignment with multiple perspectives may shed light on the types of evidence that practitioner's value, which is important for evidence production by researchers as well as how evidence synthesis results are presented.

As a final example of participants' theoretical alignment not being exclusive or stable, it appeared that seniority and working at a higher jurisdictional level (e.g., federal or provincial rather than municipal) was associated with an increased reliance on rational comprehensive and communicative approaches among practitioner participants, highlighting the different kinds of evidence valued by public health decision makers at different levels of influence. These differences are contextual factors and are important when attempting to translate scientific evidence to practice or policy. The ability to align different jurisdictional levels of practitioner with different planning theories helps to see how these different groups value evidence and what their goals are. The jurisdiction of a practitioner and their theoretical alignment impacts the approach that one would use when communicating with each group, and the compelling arguments that you would make to seek policy change. For example, at the municipal/regional level it would be important to find a local champion when advocating for policy at a more local level, where this tactic may not be as effective in a national conversation about policy

(Brownson, 2009). However, an effective strategy at the national level would be to come prepared to discuss the current state of the evidence in literature and international best practices (Brownson, 2009).

4.5 Strengths and Limitations

A strength of the current project is that, to the authors' knowledge, this is the first to explore planning theory in a public health decision-making context. The number of qualitative interview and the breadth of the different types of participants was another strength of this study as twenty-five participants with varying ranges of jurisdictional influence from across Canada were interviewed.

A limitation of this project is that academics and the authors perceived public health practitioners as decision makers, where the practitioners viewed themselves as policy influencers rather than final decision makers. Instead, practitioners viewed politicians at the different levels of government as the final decision makers, while they provided politicians with high quality evidence to make decisions.

4.6 Conclusions and Future Research Directions

The current project used the food environment as a case study to understand how place-based public health policy decisions are made. The goal of this study was to investigate if planning theory/theories could help provide additional context to public health decision-making. The findings showed that both public health researchers and practitioners decision-making processes can be aligned with different theories from the field of planning. Future research into planning theory and public health decision-making should repeat this process with the elected officials who have the final influence over public health policy decisions.

The struggle to introduce evidence-based policy and the many barriers to it could be due to the limitations of traditional evidence hierarchies. Planning theory should be further explored to see if it can enrich this process by considering the realities that many practitioners face when presenting research evidence and data, namely values, beliefs, politics, social issues, etc, to politicians.

Chapter 5.0: Using Spatial Evidence in Public Health Food Environment Decision Making, Results from Existing Food Environment Maps

5.1 Introduction

Evidence-based medicine is the use of the current best evidence for decision making around individual patient care (Sackett, 1997). To practice evidence-based medicine means to integrate clinical expertise with the best available systematic research evidence, cost-effectiveness, and patient preference (Sackett, 1997; Brownson et al, 1999). Evidence-based medicine led to evidence-based decision-making (EBDM). Also referred to as “evidence-informed decision-making” and “evidence-based public health,” EBDM involves integrating the most up to date and high quality research evidence into the decision-making process (NCCMT, n.d.). EBDM has been adopted and extended to many disciplines such as public policy, social work, and public health (Li et al, 2019; Brownson et al, 1999).

The manifestation of EBDM in the public health context involves the development, implementation, and evaluation of programs and policies using data and program planning models and draws on many related fields including epidemiology, biostatistics, health economics, nutrition, and behavioural sciences (Brownson et al, 1999). Whereas evidence-based medicine relies on scientifically rigorous studies, such as randomized control trials, EBDM in public health often relies on cross-sectional or natural experiment study designs, which are typically considered “lower quality” evidence (Burns et al., 2011). Additionally, public health studies face the issue that there is often an extensive period between exposure (for example, diet-related health promotion programs) and outcomes of interest (e.g., diet-related non-communicable disease) (Brownson et al, 1999).

Public health policy is important for health promotion, and presents the opportunity to align other societal goals, such as social equity and food systems sustainability, with health considerations (Mah et al, 2016). Food environments are potentially an important source of diet-related risks, however they also hold promise for health promoting policies (Mah et al, 2019). The link between the food environment and dietary intake is a research area that has been burgeoning over the last decade with evidence suggesting that the food environment affects health through dietary consumption (Mah et al, 2016; PHAC, 2017; Townshend & Lake, 2017). Efforts to improve public health nutrition through changes to the food environment are important given that poor diet quality is responsible for a substantial portion of overall global, as well as Canadian morbidity and mortality (Afshin et al, 2019; Lang et al, 2018; Ogilvie & Eggleton, 2016; Moubarac et al, 2013; Valee, 2017).

In the Canadian context, the practice of EBDM is a priority for public health units. However, despite the promise of EBDM, public health units face difficulties in implementing EBDM best practices due to a variety of factors outlined in many scoping and systematic reviews on the topic (Orton et al, 2011; Peirson et al, 2012). Barriers to achieving EBDM in public health include decision makers' perceptions of research evidence, the lack of direct communication between researchers and practitioners who make decisions, the culture in which decision makers operate, competing influences on decision making, and other practical constraints (Orton et al, 2011;

Peirson et al, 2012). Several ways to overcome barriers related to evidence-based decision making have been proposed, including conducting research targeted at the needs of decision makers; clearly highlighting the key messages of research products; and capacity building between research and practice (Orton et al, 2011). Specific recommendations for practitioners who make decisions include increasing communication with researchers, training to appropriately interpret research outputs, and improving access to literature (Orton et al, 2011; Peirson et al, 2012). Suggestions for researchers include communication and support to be able to produce evidence that is useful for policy makers, guidance in presenting findings in a clear and accessible way, and increased dissemination of materials to the relevant audiences (Orton et al, 2011; Peirson et al, 2012).

One important form of evidence for decision making is spatial data displayed on interactive maps. Mapping public health data can increase the level of knowledge about an issue and produce evidence that can then be used to inform and generate policies (Ramadan et al, 2017). With EBDM in mind, the use of interactive tools for aggregating and presenting public health data to use as evidence and as a tool for communication has increased over time (Parrott et al, 2007; Pineo et al, 2018). Pineo and colleagues note the value of visualizing and displaying data through maps, observing that interactive maps are a powerful source of information for decision-makers (Pineo et al, 2018). Data visualization, data-based tools, and interactive mapping are emphasized as an important means to support decision making and inform policy and practice in public health (Monsivias et al, 2018; Pineo et al, 2018).

Interactive mapping tools and spatial data analysis techniques have been used for a variety of public health scenarios, such as for national health resource management in Poland, and food environments in the UK (Holecki et al, 2018). Public health officials use mapping tools and GIS for disease surveillance, risk analysis, health access and planning, and community health profiling (Maclachlan, 2007, Nykiforuk & Falman, 2011). Interactive mapping tools have also been used to research, visualize, and assess the food environment in multiple countries, most notably the UK Food Environment Assessment Tool (FEAT) and the USA Food Environment Atlas (FEA) (ERS USDA, 2011; FEAT, 2016).

Although web-based GIS can be a useful tool, there are limitations to their use including limited data analysis capabilities, data quality, and spatial scale and data relationships. First, there are limited data analysis capabilities in web-based GIS in public health practice (Nykiforuk & Falman, 2011; Luan & Law, 2014). The use of spatial statistics and modelling is vital to transforming raw health data to inform decision makers: without this, web-based GIS for public health will remain “data rich” but “information poor” (Luan & Law, 2014). Second, issues with data quality stem from the fact that data used for web-based GIS is generally from health care registries, administrative systems, or other government data. As such, there are ethical and confidentiality concerns that must be accounted for, and often the data must be aggregated to protect individuals (Higgs, 2009; Luan & Law, 2014). The aggregation of data results in loss of detail and assumptions about the data, which then impacts any analysis undertaken by the researcher or public health decision maker (Higgs, 2009). Additionally, many population surveys are not collected for mapping purposes and can lead to clustering of data which is problematic as it does not accurately represent the geographic distribution of the data (Fletcher-Lartey & Caprarelli, 2016). Third, spatial scale and data relationships is known to geographers as the

modifiable areal unit problem (Higgs, 2009). In short, existing data often allows the use of administrative boundaries based on census of postal codes to analyze the use of health services, whereas patients could be travelling outside of their area for treatment (Nykiforuk & Falman, 2011; Higgs, 2009). An aim of this research is to address the limitations of web-based GIS through the creation of an online Canadian interactive food environment tool using high quality Statistics Canada business register data. By soliciting feedback from knowledge users the functionality of this mapping tool will be informed by the ideal end-users.

5.1.1 Objective

The objective of the current paper is to examine how evidence, in particular, spatial evidence displayed through maps, is used for an important public health issue in Canada: nutrition policy (specifically food environment policy). Given that EBDM typically requires both “evidence makers” (i.e., researchers”) and “evidence users” (i.e., practitioners), we report findings from a series of 25 qualitative interviews (10 with researchers and 15 with practitioners). Specifically, the goal of this research is to answer the following questions:

1. How and to what extent do public health decision makers use evidence in food environment policy making? What types of empirical evidence might be helpful for decision makers to create or implement food environment policies?
2. Of existing food environment maps, which ones do Canadian public health decision makers find to be the most useful and why? How can they imagine using similar maps in a Canadian context?
 - a. Using a case study of widely used food environment maps:
 - i. Food Environment Assessment Tool from the United Kingdom (FEAT)
 - ii. Food Environment Atlas from the United States (FEA)
 - iii. Canadian Alliance for Healthy Heart and Minds from Canada (CAHHM)
3. How have policy makers, advocates, and researchers interpreted and used existing maps and map data for their food environments work? When do maps work, and when do they not work for knowledge users? How can this information be used to inform the creation of an interactive food environment mapping tool in Canada?

By addressing these limitations through the creation of a Canadian interactive food environment mapping tool using high quality business register data, interactive, online mapping tools could be a potentially useful form of knowledge translation (KT) and a form of evidence for public health practice. Promising frameworks to help researchers and practitioners understand and improve KT efforts have been developed. Kramer and Cole developed a Conceptual Framework for Research Knowledge Transfer and Utilization in 2003 that has since been cited, adapted, and reworked by several authors over the last two decades. To date, this framework has primarily been applied to workplace interventions and occupational health and safety (Kramer and Cole, 2003; Kramer et al, 2004; Kramer et al, 2013; Kramer et al 2015; Kramer et al, 2017). In 2013, Allen and colleagues adapted the framework to promote the adoption of public health knowledge and evidence-based information related to chronic disease prevention (Allen et al, 2013). These two frameworks are discussed in more detail below.

5.2 Methods

5.2.1 Conceptual Framework

Kramer and Cole’s framework (see Figure 2) suggests four main aspects of knowledge translation: 1) the actual knowledge and credibility of the source; 2) the context of the organization that is the knowledge recipient or where the recipient is employed; 3) the nature of collaboration between the knowledge broker and the organization or employee; and 4) the mechanisms for evaluating knowledge use (Kramer and Cole, 2003).

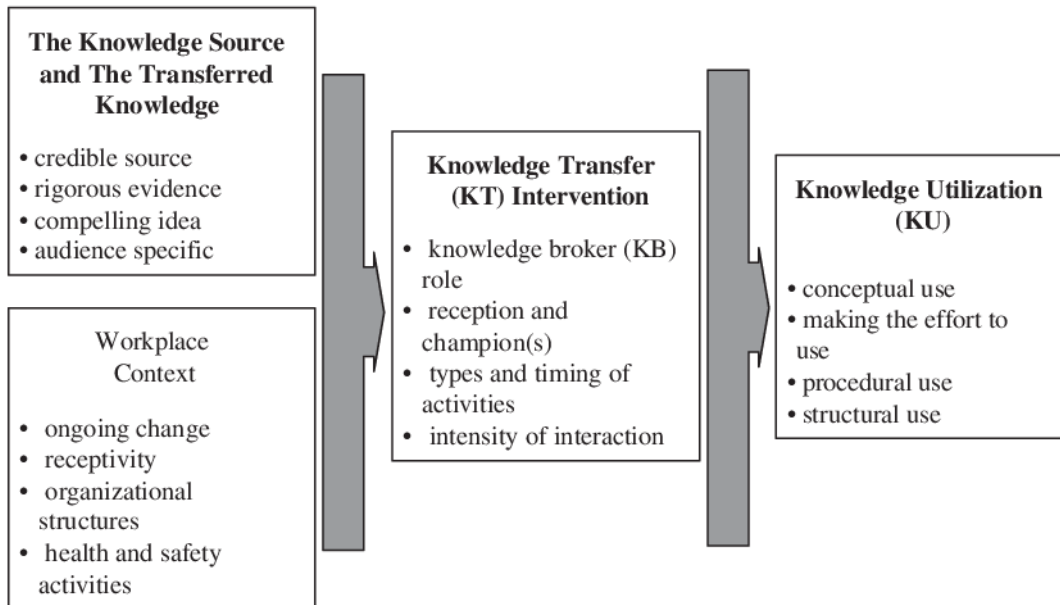


Figure 2. Kramer and Cole’s Conceptual Framework for Research Knowledge Transfer and Utilization (Kramer and Cole, 2003)

A second promising framework centres on the *online* nature of the information source in KT. In 2004, Morville developed a “honeycomb model,” which seeks to explain how the design and usability of web-based information in particular may hinder or facilitate knowledge uptake among end-users (Morville, 2004). The honeycomb model takes into consideration usability testing, which is widely applied in web design to discover areas of improvement and as an observational experiment to understand why users’ interactions with a website succeed or fail (Morville, 2004). It includes seven facets of the users’ experience, including findability (are users able to find what they are looking for?), accessibility (are there barriers to gaining access, is it accessible for those with accessibility needs?), usability (how easy is this product to use?), usefulness (does this product have practical value for the user?), credibility (is the user able to trust the product?), desirability (is this something the user wants?), and value (does this product advance the mission of those behind it?) (Morville, 2004). Positive user experiences are important in allowing end-users to access and query data, no matter their skill level (Luan and Law, 2014)



Figure 3. The honeycomb model of user experience designed by Peter Morville
https://semanticstudios.com/user_experience_design/

The conceptual model presented in Figure 3 adapts Kramer and Cole’s (2003) and Morville’s (2004) conceptual models to organize thinking around how user experiences might interact with aspects of KT to suggest how an interactive mapping tools related to food environments might be experienced and used by a group of knowledge users in Canada. Elements of the honeycomb model are considered within the “knowledge transfer intervention” box, with the “credibility” aspect being considered within the “knowledge source” box of Kramer and Cole’s framework as well. The conceptual model has been altered to reflect that an intervention is not being conducted, but that the “intervention” undertaken in this study is to catalogue knowledge user experiences with the three interactive mapping tools. The knowledge utilization section is altered to reflect that the information collected during participant interviews will be used to inform the creation of an interactive mapping tool.

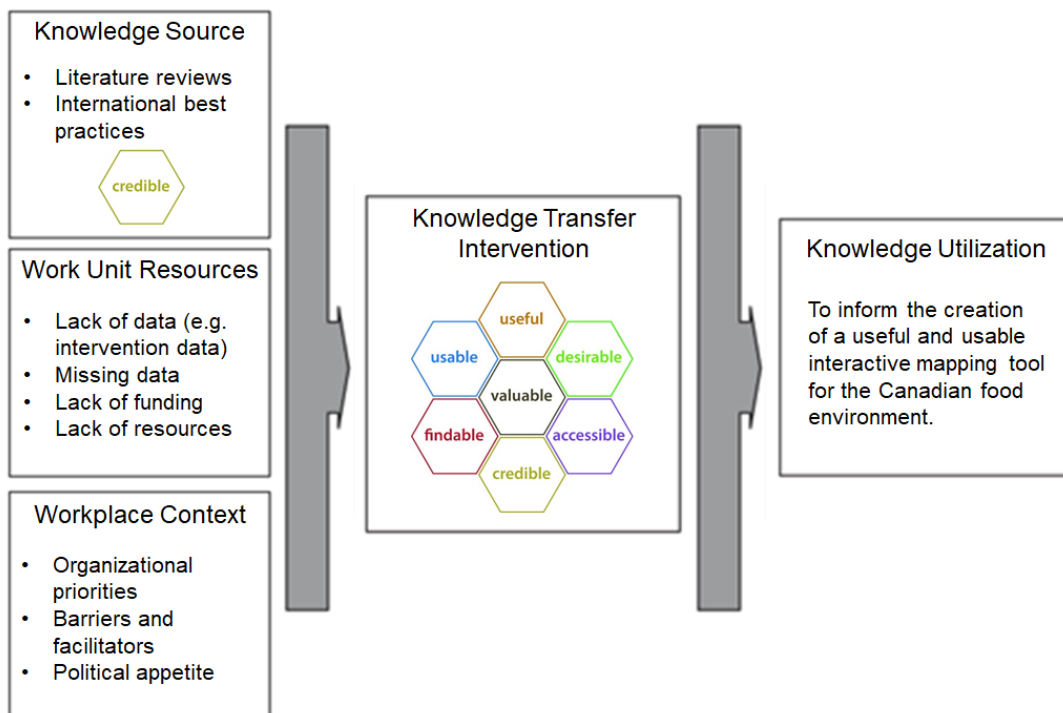


Figure 4. Adapted framework of Knowledge Transfer and Utilization.

5.2.2 Study Setting

In qualitative research, a case study is “an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system” (Simons, 2009, p. 21). The current case study focused on interactive food environment assessment tools and decision-making around retail food environments. Participants were given the opportunity to explore, unguided, the Food Environment Assessment Tool (UK), the Food Environment Atlas (USA), and the Canadian Alliance for Healthy Hearts and Minds tool (CAN) in advance of their interview. These interactive mapping tools provide a hub for data related to the food environment, with the ability to look back in time and see how the food environment may have changed, they allow the user to interact with the data and create unique visualizations online. They are for use by researchers, practitioners, as well as available to the public. The rationale for including these three existing interactive mapping tools is that the UK and USA examples both focus on food environments – the USA being well established and the UK being relatively new. The CAN speaks to the Canadian context and is more broadly related to food environments and other health outcomes. The current study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#42098). In Table 5.1 below, a description and basic information about the three mapping tools are provided.

Table 5.1 Comparison of interactive food environment mapping tools used.

	Food Environment Assessment Tool	Food Environment Atlas	Canadian Alliance for Healthy Hearts and Minds
Country of origin	United Kingdom	United States	Canada
Website	https://www.feat-tool.org.uk/	https://www.ers.usda.gov/data-products/food-environment-atlas/	https://cvcdcontextual.mcmaster.ca/
Geographic scale	County, Local Authority, Middle Layer Super Output Area, Ward, Lower Layer Super Output Area, Postcode	State, County	Postal code
Purpose	Enables detailed exploration of the geography of food retail access across England, Scotland and Wales. Use it to map, measure and monitor access to food outlets at a neighbourhood level, including changes over time.	To assemble statistics on food environment indicators to stimulate research on the determinants of food choices and diet quality, and to provide a spatial overview of a community's ability to access healthy food and its success in doing so.	To improve our understanding of the impact of individual, socio-economic and other environmental factors leading to cardiac and vascular disease.
Indicator groups	<ul style="list-style-type: none"> • Food outlet types 	<ul style="list-style-type: none"> • Access and proximity to grocery stores 	<ul style="list-style-type: none"> • General • Tobacco

		<ul style="list-style-type: none"> • Store availability • Restaurant availability and expenditures • Food assistance • State food insecurity • Local foods • Health and physical activity • Socioeconomic characteristics 	<ul style="list-style-type: none"> • Grocery • Restaurants • Alcohol
Information from multiple years	YES	YES	NO

5.2.3 Participants

Recruitment for this study began by using purposeful sampling to identify key informants from the research team’s professional networks in the food environment field within the areas of both research and practice. A total of 25 stakeholders were recruited from diverse backgrounds through the approach of snowball sampling. Participants were recruited from two identified groups: 10 representatives of researchers interested in the retail food environment, and 15 representatives from municipal planning, public health practitioners, and federal or provincial nutrition leaders. Participants were identified as eligible for the study if they worked in the fields described above and had experience in working with food environments. As eventual end-users of the food environment mapping tool, the participants were considered to be key informants on food environment topics as well as on evidence use, decision making, and map usability. Participant characteristics are further described in Table 2 in the Results section.

5.2.4 Data collection

Data was collected from June 2020 to August 2020 and consisted of approximately one hour telephone or video interviews with each study participant. Semi-structured qualitative interviews were conducted based on interview guide tailored for researchers or practitioners. The interview guide provided a common set of open-ended questions and explored the key informants’ perceptions about how evidence is used when making decisions about food environments and views of when maps work and when do they not work for knowledge users. At least one week prior to the interviews participants were sent links to three different interactive mapping tools and asked to look through them. They were aware that they would be providing their thoughts on these tools during the interview process.

5.2.5 Data analysis

To begin analysis, data were transcribed using Otter (Otter, version 2.1.21; Los Altos, CA: Otter.ai 2020), a recording and transcription software. Data were cleaned for accuracy by the first author. Research data were then analyzed using Nvivo 12 Pro (NVivo, version 12) employing Meyer and Ward’s pluralistic approach which begins with theory while also allowing for theory generation. Meyer and Ward (2014) draw on the constant comparative method

discussed in relation to grounded theory. Analysis began after the first interview and continued while data was being collected. Each sentence was analyzed alone, while also being compared to additional data collected (Meyer & Ward, 2014). In this approach, comparison of the data is driven by the research questions, as well as back to the literature review (Meyer & Ward, 2014).

After the analysis of the first few transcripts was completed, line-by-line coding was done for all transcripts assigning meanings to each string of text. After the initial coding, I began focused coding where I combined the initial codes and sorted them into conceptual and analytical categories which represented the main ideas from the data. Larger sections of the data were combined by comparing the initial codes created and examining them from a conceptual or thematic perspective. The first author compared issues using the interactive maps provided that the participants faced with the elements of the conceptual model presented in Figure 3. Findings were sorted into the seven user experience categories from the honeycomb model by re-reading the transcript and evaluating which of the seven categories best fit each finding. From the honeycomb, the facet of findability was not assessed as the three specific websites that were part of the interview process were provided to the participants. Additionally, the facet of accessibility was not assessed because it was beyond the scope of this project.

To illustrate the findings, the adaptation of the Kramer and Cole Conceptual Framework for Research Knowledge Transfer and Utilization will be used (Kramer & Cole, 2003). The honeycomb model will be embedded in the framework under the Knowledge Transfer Intervention. The intervention is the proposed interactive food environment mapping tool for Canada and the honeycomb will be used to assess the user experience of current interactive food environment mapping tools.

5.3 Results

In total, 25 individuals (10 researchers and 15 practitioners) participated in an interview. Table 2 describes key participant characteristics. For the first research question, results described below are presented in an adapted version of Kramer and Cole’s dissemination conceptual framework. Research questions 2 and 3 were organized within the framework and by the facets in Morville’s honeycomb of user experience.

Table 5.2 Key characteristics of participants

Gender	
Woman	20
Man	5
Education	
Post-secondary degree	3
Graduate degree	12
Multiple graduate degrees	10 (all researchers)
Researcher	10
Academic Institution	8
Government	2

Practitioner	15
Municipal / Regional	7
Provincial	5
Federal	3

The four aspects of the adapted model are knowledge source, work unit resources, workplace context and knowledge transfer intervention. Knowledge transfer intervention contains the honeycomb model.

Knowledge Source

When asked about the types of evidence participants consulted most often to inform and justify interventions and new policies, participants characterized their most used knowledge sources as literature reviews such as scoping reviews and systematic reviews, as well as best practices nationally and globally (n=14 participants). There were differences between researcher and practitioner groups. Consulting the evidence and international best practices were mentioned by 10/15 practitioners and only 4/10 researchers, as evidenced in the quote below. Of the utmost importance to participants was the credibility of evidence in terms of methods and how the data is represented. Credibility will be discussed further under Knowledge Transfer Intervention.

Mostly literature review... let me see. There was so much international consensus and national consensus ... yeah, so I mean we did, we did what one usually does you know consult the literature look at what international organizations were recommending.
Practitioner. Federal level.

Work Unit Resources

When asked if the data they needed were readily available to them, participants often indicated challenges, including missing data, poor data accessibility, and infrequency of data collection (n=20 participants). Researchers cited a lack of intervention-related data (n=4 researchers), which was echoed by practitioners (n=12 practitioners). Several practitioners reported a lack of funding to collect good quality data before, during, and after an intervention (n=8 practitioners). One of the public health practitioners explained the challenges faced when trying to address food environment issues in the following way:

If you had an ongoing surveillance, that if you had an intervention or had a change somewhere it would be easier to understand, did that experiment or did that change, make a difference? ... Because really on the ground the public health unit, it's so hard for them to show impact because they don't have good data before or after or during. So it's hard for them to rationalize to keep doing things. *Researcher.*

The following quote was also in response to the same question about data availability and touches on the lack of data, specifically data that is missing or inaccessible.

So really you're looking at your risk factors for dietary intake and your outcome. None of that information is readily available so you rely on a lot of research that's produced by researchers and whatnot. ... The biggest thing is understanding what population is like most affected, so they can understand impacts of interventions are doing planning of

interventions to ensure that they are reducing health and inequity, and dietary and inequities. And it's hard to find that. *Researcher.*

The following quote provides context for limitations in data access faced by practitioners.

Oh huge. It's absolutely huge. ... There is not a lot of data on eating, there isn't any for nutrition at all. And we don't have good data on health status. *Practitioner. Provincial level.*

Workplace Context

Most participants made it clear that they did not view themselves as the ultimate decision makers (n=20 participants); others did not mention whether they perceived themselves as a decision maker. The people who were perceived to be the *actual* decision makers were cited by practitioners to be their superiors, or elected officials. It was indicated that superiors and elected officials use evidence as only one part of the decision-making process and that there are other factors involved such as the priorities of the organization, current political climate and political appetite, and additional barriers and facilitators. When asked about the role of evidence in decision-making, one practitioner summed up their frustrations with this quote.

It feels like we're at a huge disadvantage as nutrition professionals because we just keep expecting that if I present you with good quality evidence, then the change is going to go my way, and it can be very frustrating for us when the decisions that are made are not based on that evidence but are based on the value system or the financial realities or even the limitations of the food distribution system. *Practitioner. Regional level.*

Knowledge Transfer Intervention

In this section, research questions two and three are discussed, addressing answers to the perceived usefulness of an interactive food environment mapping tool for the Canadian context as well as when maps work, and when they do not work for knowledge users. The main findings are summarized in Table 2 and are described more fully below.

Table 5.3 Main findings for Q2 and Q3, organized by the facets of the honeycomb user experience model.

Findability	Not evaluated – websites were given to participants.
Usability	Unfamiliar locations (US, UK) and indicators caused confusion among some participants. Lack of summaries or explanations of indicators. When do maps work for knowledge users?
Credibility	Users wanted clarity in terms of methods. Concerns about accuracy in how the data is represented. Researchers concerned about non-spatial thinkers using spatial data. Participants felt that if certain conditions were met this tool would be perceived as highly credible.
Usefulness	Researchers and practitioners do not agree on the usefulness of an interactive food environment mapping tool for Canada.

	<p>Researchers perceive a lack of capacity amongst practitioners. Valuable as a communication tool – knowledge dissemination. Telling a story visually. Supporting and rationalizing a point – difficult to argue with government created data.</p>
Desirability	<p>Sites seemed overwhelming at first to some. Participants were divided on whether this was something they wanted.</p>
Value	<p>Felt that a Canadian version could act as a gold standard for food environment data in Canada.</p>
Accessibility	<p>Not evaluated – outside the scope.</p>

Usability

Lack of clarity around indicators

In the websites provided, food environment indicators were presented geographically. It was commonly cited that their definitions and explanations of indicators, and how they were assessed were lacking, which caused confusion among participants. Participants (n=10 participants) frequently stated that the indicators seemed like they would be useful, but they wanted more information about what they were, how information was collected, and what they could be used for.

Some of them [maps] they have... definitions of what the indicators are that's super helpful, but also if we can get more information. *Researcher.*

When do maps work for knowledge users?

Both researchers and practitioners came up with a variety of functions that would make a proposed Canadian interactive food environment mapping tool most useful. There was no consensus about which of the 3 map options was the “best” as elements from each were appreciated by some and criticized by others, although there were more positive comments about USDA and FEAT relative to the CAHHM map. The following table includes recommendations for a useful and usable map aggregated from all interviews that indicates which group of participants is asking for which features.

Table 5.4 Recommendations for a useful and usable mapping tool.

	Request from participant group
1. Present data at different geographic scales	
<ul style="list-style-type: none"> • Availability of different boundaries (post code, region, ward, LHIN, etc) 	Researchers and practitioners.
<ul style="list-style-type: none"> • Ability to compare areas 	Researchers and practitioners.
<ul style="list-style-type: none"> • Metrics provided at the lowest possible unit 	Practitioners.
2. Additional analyses	

<ul style="list-style-type: none"> • Ability to do multivariate analysis/statistically manipulate in the tool (instead of raw count be able to combine variables, ratios, etc.) 	Researchers.
<ul style="list-style-type: none"> • Standardize variables per 1000 – comparable data across categories 	Researchers and practitioners.
<ul style="list-style-type: none"> • Ability to download raw data 	Researchers and practitioners.
<ul style="list-style-type: none"> • Ability to link to other datasets 	Researchers and practitioners.
<ul style="list-style-type: none"> • Up to date data with historical data available – ability to see change over time 	Researchers and practitioners.
3. Presentation of maps and data	
<ul style="list-style-type: none"> • Clear data source and methods – regularly collected, when is it updated, by whom? 	Researchers and practitioners.
<ul style="list-style-type: none"> • Intuitive – similar legend schema – low to high – light areas lower counts, dark areas higher counts 	Practitioners.
<ul style="list-style-type: none"> • Variety of data available but limit the amount of data per page – having a map series? 	Practitioners.
4. Additional features	
<ul style="list-style-type: none"> • Up to date data with historical data available – ability to see change over time 	Researchers and practitioners.
<ul style="list-style-type: none"> • Standardize by outlet type or population 	Researchers and practitioners.
<ul style="list-style-type: none"> • Data quality is high and consistent across the country 	Researchers and practitioners.

Credibility

Clarity

Clarity in methods was a common concern. Researchers and practitioners (n=15 participants) wanted a publicly available and clear methodology that they could download and read before using the data found within an interactive mapping tool. The clarity of methods was a high priority in terms of the credibility of the proposed tool.

Yeah, I mean the biggest piece for me is and this probably comes as a researcher is like, I need a downloadable publication of the methodology. ... So making sure that the methods are so clear would be really important ... These are the years, this is how we did it, this is the data that was missing, and all those caveats that impact interpretation is really important. *Researcher.*

Accuracy

Somewhat related to clarity, accuracy was also a common concern. Accuracy in representing the data lies with the ability to be transparent about how information is gathered and represented. This practitioner was concerned about the CAHHM map,

But again, like there's nothing about the methods, the way the data was collected. So it's kind of missing some of those key pieces of information ... about how the individual indicators were created. *Practitioner. Regional level.*

Spatial data

Several researchers (n=5 researchers) expressed their concerns about practitioners and the public using spatial data without thinking about the way spatial data behaves compared to epidemiological data that they may be more familiar with using.

What a lot of the epi people don't really care about the same thing that's that geographers do as you know I worry about the edge effect, I worry about the ecological fallacy, the modifiable areal unit problem. I worry about the fact that postcode centroids can be in the rural areas can be like 10 kilometers off of the actual house with that same postal code. ... But it's giving spatial data to someone that they ... may have no clue what it actually means they're not even thinking about the behavior of that. *Researcher.*

Conditional support

Returning to some of the points covered in “when do maps work for knowledge users” participants indicated that if criteria, such as clear data sources and methods, high and consistent data quality, and the ability to download the raw data are available, then this tool has the potential to be perceived as highly credible.

Usefulness

Researcher and practitioners divided

Researchers and practitioners consistently differed in terms of their perceived usefulness of an interactive food environment mapping tool for Canada. Researchers (n=6 researchers) did not believe that other researchers would use this tool, as evidenced in the following quote,

However, the real barrier is, if you are a researcher, and like I think most of them are geared towards public or decision maker audiences, so that you already have kind of some specific questions in mind and then you would kind of play with the data and play with the interactive components to try and get a picture, but the interactive mapping tools are never going to be enough for researchers who are specific like specialists in that area because they will always want to have access to the original data sets and do their own analysis. *Researcher.*

Further, researchers typically did not believe that practitioners and the public would use an interactive mapping tool properly or to its full potential, as shown below with this quote from another researcher,

But usually, the way that these tools work is that you take what you see here and then you create the interpretations yourself. And I'm just not convinced there's that many people that are going to take that next step. And so, that's I think where they're where they become kind of limited in terms of their utility. *Researcher.*

On the other hand, practitioners (n=11 practitioners) reported wanting an interactive food environment mapping tool as they believed it would help them in their work, and it could be used at multiple levels of public health decision making.

Yes, I think it would be helpful. ... The work that I do here is very sort of like focused on my area, and my area is very small. But I think that kind of map would be valuable at the federal or provincial level as well as the smaller sort of municipal level, but I think I will definitely use it because, it's a way for you to justify things. *Practitioner. Regional level.*

For municipalities, it can be a great lobbying tool, an advocacy tool to show where changes needed in a community say there's an over abundance of food outlets, near the high schools you could you could make a point that this is contributing to children's unhealthy eating patterns. So, locally, it's a very valuable tool. *Practitioner. Provincial level.*

I would think that some kind of a mapping tool like this could help us to better understand, you know, where are the pockets where the highest amount of vulnerable population groups that are facing the most significant food insecurity. Both during COVID but also just under normal circumstances. And that would inform the development of the policy framework. *Practitioner. Provincial level.*

Certainly tools like that help us out when they pull the most up to date and relevant information into one frame. If it allows us to compare across regions, if it allows us to do data exports or visualization exports from it, so that we can just look into it. *Practitioner. Federal level.*

Communication and visualization tool

Most participants (n=11 participants) felt that the proposed Canadian interactive food environment mapping tool would be useful as a communication and visualization tool. Several researchers who expressed that they *would not* use a tool like this for their own research indicated that they *would* use a tool like this in their classroom to teach and help their students understand the food environment. Practitioners indicated it would be useful for communicating with community partners and stakeholders, as shown in the quote below,

This interactive map would help us to have our own understanding, but it would also be able to be used as a communication tool with our stakeholders to say, this is a picture of your community right now. *Practitioner. Provincial level.*

Support and rationalization

All practitioners acknowledged the usefulness of tools like these for supporting a stance, for example when justifying a policy or intervention to their constituents or their superiors.

I think it is used like the rationalization right, so you always have to argue your point. So much so, you can't argue too much with a credible, you know, researcher or government funded source of data. So I think that helps that rather than local public health practitioners going out and doing some data collection with limited resources.

Desirability

Most participants expressed interest in this type of interactive online mapping tool. However, concerns were raised by some researchers (n=6 researchers, n=11 mentions) about knowledge users lacking the necessary skills to be able to appraise spatial data appropriately.

It's making data available to people who have never thought about the problems that I've mentioned, the MAUP, ecological fallacy, edge effect. And people who don't think spatially, so it's giving spatial data to someone that they can put into a model. They can just grab it and they can throw that extra column, and they include it as a variable, and they have no clue what it actually means. *Researcher.*

For some participants (n=6 participants), the amount of information available on the websites provided was overwhelming.

The USDA one I found a little bit overwhelming with all of the information and indicators like it was just, I don't know, it just didn't seem as intuitive to me. *Practitioner. Regional level.*

Value

Most participants acknowledged the shortcomings of the current approaches of conducting food environment research. Currently, the options are going out and conducting costly and resource-intensive primary research or analyzing public health inspection databases that often house out-of-date and inconsistently collected and catalogued data. Researchers and practitioners are divided about the value this tool could add – however, practitioners were very supportive as shown above.

5.4 Discussion

The current study examined how evidence is used in public health through a case study of an important and contentious health issue in Canada: food environment policy. Three key findings emerged. First, there is a divide between researchers and practitioners on their perspectives of whether an interactive food environment mapping tool is something that would be useful for food environment monitoring and/or policy development in Canada. Second, there are many barriers faced by both researchers and public health decision makers that deserve attention. Finally, we were able to elucidate when do maps work, and when do they not work for knowledge users, which can help to inform the creation of an interactive food environment mapping tool. Each of these key findings is described in greater detail below.

First, a divide seems to exist between researchers and practitioners. Their perspectives on the usefulness of an interactive food environment mapping tool consistently differed, with researchers typically reporting that such a tool would be less useful compared to practitioners. The main concerns from researchers revolved around a perceived lack of capacity of end-users to have the time or skills to appropriately use the interactive mapping tool, which grouped public health practitioners and the public together as end-users. Several researchers commented that practitioners and the public were more likely to jump to conclusions about what area level measures mean for those living in that area (ecological fallacy). Moreover, they believed that practitioners and the public would have difficulty understanding spatial data and geographical

concerns such as the edge effect, the modifiable areal unit problem, and errors that can be caused by post code centroids (i.e. geographic vs. population-weighted centroids). These concerns are similar to the limitations of interactive mapping tools considered in the literature (Higgs, 2009; Luan & Law, 2014; Jia et al, 2017; Nykiforuk & Flaman, 2011; Yasobant et al, 2018). Several researchers were also concerned about providing spatial data to people who may not be familiar with spatial analysis or thinking about the way spatial data behaves. One researcher went so far as to suggest that as a trained geographer, they themselves would think differently than a public health epidemiologist. In addition to concerns about the capacity of end-users, researchers also raised points around whether a tool like this would be of use for specialists as it would not compare to primary data collection for specific food environment concerns.

On the contrary, while researchers maintained a perspective of concern, public health practitioners at all levels of jurisdiction, from small municipalities to the federal level, overwhelmingly agreed that an interactive food environment mapping tool would be incredibly useful and the data housed within it could become a gold standard for food environment data. Gold standard is referred to in the sense that the tool could be reliable, valid, and timely data is available and ready to download. Practitioners indicated that the tool would make their jobs easier and had the potential to increase their ability to get things done, as well as provide a strong source of evidence so that they could make a compelling argument about their food environment interventions to their superiors. Despite these different perspectives, both researchers and practitioners agreed that an interactive food environment mapping tool would be useful for educational purposes, for visualizing data to make a point, and as a tool for communicating with stakeholders and the public.

Our study confirms divided perspectives between research and practice, a divide which has been well documented over past decades (Orton et al, 2011; Peirson et al, 2012). This presents a barrier to the advancement of food environment policy and improvements in Canada's food environment landscape (Mahendra et al, 2017). Knowledge translation maintains that the engagement of practitioners in research will increase communication and produce research outputs that are significantly more useful for practitioners (Kothari et al, 2017; Gagliardi et al, 2016). Several questions remain. Further research is warranted to bridge the divide between researchers and public health practitioners, and to identify the reasons why researchers do not perceive practitioners as capable end users. Consequently, this information may guide changes to lead to integrated knowledge translation across stakeholders. This project provides justification for further research into perspectives researchers hold about public health practitioners, and the application of integrated knowledge translation.

Second, researchers and practitioners both indicated that scarce resources, such as lack of time, money, and data, naturally create difficulties when it comes to performing their roles to advance food environment policy and practice – this is consistent with what is seen in the literature (Orton et al, 2011; Oliver et al, 2014; Peirson et al, 2012). The lack of data is of most interest to the current project as it was repeated by participants in both groups, and both researchers and practitioners expressed frustrations about this issue. Researchers made clear that when it comes to food environments research, there is a wealth of material characterizing Canada's urban food environments and noting that they are "ubiquitously poor". Researchers indicated that there is a lack of data on how food environment interventions affect relevant outcomes, which was echoed

by practitioners. Researchers hypothesized that this was because food environment interventions are typically expensive and require buy-in from multiple sectors and disciplines. Practitioners echoed that finances were an issue from their perspective, given the lack of funding and human resources to collect high quality data before, during, and after an intervention. The lack of food environment intervention related data has been documented in the literature, of note, it is also indicated that what intervention data does exist has methodological limitations making it difficult to draw conclusions (Caspi et al, 2012; Roy et al, 2015). Without quality evidence about successful interventions, it is difficult to provide evidence-based support for policy decisions. As a result, many practitioners felt as though they were in cycles of not having enough funding to gather data, rendering them unable to provide good evidence for their intervention, which then in turn makes it difficult to make a case for increased funding for interventions. Even when financing is made available it can remain difficult to collect robust intervention data. All municipal/regional level practitioners mentioned the Healthy Kids Community Challenge as a successful recent intervention where the Ontario government provided funds to improve children's health by promoting healthy behaviours (PHO, 2021). Despite provincial government funding and political momentum, not all practitioners were able to collect the data they needed.

The issue remains that food environments are notoriously difficult to measure and assess, and they are described as “messy” by many participants. Food environments span multiple areas of government: public health, planning, finance, transportation, agriculture, etc. (Mah et al, 2019). There can be many inputs of information and the sheer amount of information can become overwhelming and paralyzing, and decision-makers become reluctant to decide on a course of action. Moreover, food environment changes can take years, and associations with outcomes can take decades. Combined with a typical political cycle in Canada of four years, this means there may be very little incentive to take on wide-scale, challenging projects that require high investment up-front investment and provide long-term rewards.

Third, information about when maps work vs. do not work for knowledge users were determined, which will help inform the creation of an interactive food environment mapping tool. Both researchers and practitioners came up with a list of components that they would like to see in the tool. In particular, participants wanted clear, transparent, and flexible map-based data. Of note, despite the differences in the perceived usefulness of an interactive food environment map for Canada as well as researchers' perception of practitioners' limited ability to interpret and use the data correctly, both researchers and practitioners had similar suggestions for an effective tool. These suggestions included: presenting data at different geographic scales; the ability to conduct additional analyses using raw data; clear and transparent data sources, methods and maps, and; additional features (e.g., historical data, standardized data by outlet type or population). By involving knowledge users in the development of an interactive online food environment mapping tool we will be able to create a tool that is useful and usable by a variety of stakeholders for a plethora of applications (Kothari et al, 2017; Gagliardi et al, 2016). This is a great representation of knowledge translation at work as recommended by Canada's federal health research funding agency (CIHR, 2004).

5.5 Strengths and Limitations

A strength of this study is the number and variety of end-users who participated. Responses from 25 participants ranging from academic institutions, government research, public health practice, dietetics, and geography from across Canada and operating at various jurisdictional levels who have several diverse needs, opinions, and interests will enable the research team to create an accessible, usable, and valuable interactive mapping tool.

A limitation of this study was that each participant did not complete a specific task with the interactive mapping tools provided. Participants were asked to open the maps and explore them as they saw fit, which resulted in some participants spending very little time on the websites, while others provided detailed notes and explanations. The research team could have provided clearer instructions pertaining to a suggested amount of time using the maps and a prompt for specific feedback. Additionally, unfortunately, we were unable to recruit any participants from the planning field.

5.6 Conclusions and Future Research Directions

The current qualitative investigation used the food environment as a case study to explore the types of evidence used by public health decision makers, when do maps work for end-users, when do they not, and why, and what elements of existing food environment maps they like/dislike, and why. The findings from this study will be used to inform the creation of a Canadian gold standard interactive food environment mapping tool using Statistics Canada business register data.

The current findings revealed that there is (1) a divide between researchers and practitioners on their perspectives of the usefulness of an interactive food environment mapping tool, (2) scarce resources, including lack of data, impacts researchers and practitioners, and finally, (3) there are several considerations that are necessary to inform the creation of an interactive food environment mapping tool that works for its end-users.

Future research should investigate the perspectives researchers have about practitioners in their corresponding fields, especially as it pertains to using an interactive map. Additionally, future studies should elucidate how knowledge translation can effectively bridge the gap between research and practice, as well as the impact of increased financing and political will on regional food environment project momentum. Together, this information can aid in determining how multiple areas of government can work together to create positive policy change.

Chapter 6: Thesis Conclusions

6.1 Summary of Main Findings

The primary goal of this research was to examine how public health decisions are made in Canada using a case study of food environments and existing food environment mapping tools. This project involved three main objectives, answered across two manuscripts:

- a. Use a contentious, place-based public health issue (food environments) to explore the extent to which and how planning theory might be able to provide additional context for public health decision making.
- b. Compare and contrast EBDM and planning theories as they relate to public health decision-making related to food environments.
- c. Explore how interactive maps are perceived by researchers and practitioners as an “evidence source” for place-based public health decision making related to food environments.

Interviews with food environment researchers and public health practitioners at the regional, provincial, and federal level including dietitians, policy makers, and representatives from nutrition organizations provided data to answer the overarching research questions across two manuscripts. The main results organized by manuscript are presented below.

In Chapter 4, three main findings emerged:

- d. Planning theory is a body of literature that can be used to understand place-based public health decision-making.
- e. Researcher and practitioner groups had differences in terms of planning theory alignment with respect to food environment decision making.
- f. Participants’ theoretical alignment was neither exclusive nor stable over time: changes to policy, multiple priorities in the decision-making process, and seniority and level of jurisdiction all seemed to influence participants’ theoretical alignment.

This manuscript offers explanation as to why public health decisions frequently do not align with EBDM principles. Participants indicated that evidence was only one part of their decision-making process and things like political appetite and public perception of issues were equally, if not more, important. There are more factors other than just evidence which go into decision making that EBDM does not adequately acknowledge (Sackett, 1997; Brownson et al, 1999). The field of planning has many theories of decision making (Goetz & Szyliowicz, 1997), which may be applicable to the public health context. The first author was easily able to match participant responses to the planning theories they reflected. This manuscript provides evidence that planning theory can provide additional context for public health decision making, thus broadening the understanding about how decisions are made if they are not solely based on evidence by bringing in other factors such as values, beliefs, politics, and social issues. Additionally, researchers and practitioners were found to have differences in approaches to (and understandings of) public health decision making through differences in researcher and practitioner theoretical alignment. Awareness and acknowledgement of this divide may allow for better communication and collaboration in the future, contribute to improved iKT, and support research that is mutually beneficial for both research and practice (Kothari et al, 2017; Gagliardi et al, 2016).

Observing that theoretical alignment is impacted by external and internal factors such as changes to policy, multiple priorities in the decision-making process, and seems related to level of seniority and level of jurisdiction is another valuable finding. This finding speaks to the different kinds of evidence valued by public health decision makers at different levels of influence and these differences are contextual factors and are important when attempting to translate scientific evidence to practice or policy (Brownson, 2009). The ability to align different jurisdictional levels of practitioner with different planning theories helps to see how these different groups value evidence and what their goals are (Brownson, 2009).

In Chapter 5, three main findings emerged:

4. A divide exists between researchers and practitioners on their perspectives of whether an interactive food environment mapping tool is something that would be useful.
5. There are many barriers to decision making faced by both researchers and public health decision makers.
6. Knowledge users provided an in-depth list of conditions of maps that make them more useful, this will inform the creation of an interactive food environment mapping tool.

This manuscript provides further evidence that the divide between research and practice continues to persist, in this case on perspectives of whether an interactive food environment mapping tool would be useful for food environment monitoring and policy making in Canada (Orton et al, 2011; Peirson et al, 2012). The divide in perspectives between research and practice is common (Mui et al, 2021). Researchers expressed concerns about the perceived lack of capacity among end users (including public health practitioners), including lack of understanding about how spatial data behaves and other geographical concerns. While researchers expressed concern, a varied sample of public health practitioners overwhelmingly agreed that an interactive food environment mapping tool would be incredibly useful, make their jobs easier, and provide a strong source of evidence to make compelling arguments (Monsivias et al, 2018; Pineo et al, 2018). Both groups of participants indicated that scarce resources naturally create barriers when it comes to performing their roles. Most cited were a lack of time, lack of money, and overwhelmingly a lack of data to advance food environment policy and practice – consistent with what is seen in the literature (Orton et al, 2011; Oliver et al, 2014; Peirson et al, 2012). The lack of data is of most interest to this project, was repeated by participants in both groups, and both researchers and practitioners expressed frustrations about this issue. Within this manuscript knowledge users provided an in-depth list of conditions and capabilities that make interactive mapping tools useful. By asking the knowledge users what they want from an interactive online food environment mapping tool we will be able to create a tool that is useful and usable by a variety of stakeholders for a plethora of applications (Kothari et al, 2017; Gagliardi et al, 2016).

These manuscripts come together to challenge the broad acceptance of EBDM in public health and to provide support to the fact that evidence is not the only facet of decision making (Dobbins, 2004; Ogilvie, 2019; Tate, 2020). EBDM is not the only school of thought in terms of public health decision making. We have found that planning theory is also applicable and provides the necessary room to consider other facets of decision making such as values, beliefs, politics, and social justice. Additionally, we provide evidence through both manuscripts that maintains there remains a divide in perspectives of researchers and practitioners.

6.2 Contributions of Thesis

This study to our knowledge is the first of its kind to apply planning theory to the context of public health decision making in food environments policy and as an alternative to EBDM. Our findings showed that both public health researchers and practitioners decision-making processes can be aligned with different theories from the field of planning. We were able to gather twenty-five participants with varying ranges of jurisdictional influence from across Canada – the number of qualitative interview and the breadth of the different types of participants is a strength of this study. Participants were from academic institutions, government research, public health practice, dietetics, and geography from across Canada and operating at various jurisdictional levels. Having several diverse needs, opinions, and interests will enable the research team to create an interactive mapping tool which will be accessible, usable, and valuable.

This work displayed continued strain and misalignment between academia and practice in the context of food environment decision making in Canada consistent with what has been found in the literature (Orton et al, 2011; Peirson et al, 2012). Our findings showed that there is a divide between researchers and practitioners on their perspectives of the usefulness of an interactive food environment mapping, scarce resources including a lack of data impacts both groups, and finally, there are several considerations to informing the creation of an interactive food environment mapping tool that works for its end-users.

The struggle to introduce evidence-based policy could be due to the limitations of traditional evidence hierarchies where RCT's are the gold standard. Our findings were able to show that planning theory is applicable to public health decision making concerning the food environment. Planning theory should be further explored in other public health topic areas to see if it can enrich this process by considering the realities that many practitioners face when presenting research evidence and data to politicians, namely things like values, beliefs, politics, social issues, etc.

6.3 Limitations

This study is not without limitations, a limitation of this project is that the researchers interviewed perceived public health practitioners as decision makers. The practitioners, when asked, viewed themselves as policy influencers, rather than final decision makers. Politicians at the different levels of government were cited to be the final decision makers, and the practitioners described their role as providing their superiors, including politicians, with high quality evidence to make decisions. Additionally, each participant did not complete a specific task with the interactive mapping tools provided. Participants were asked to open the maps and explore them as they saw fit, which resulted in some participants spending very little time on the websites, while others provided detailed notes and explanations. The research team could have provided clearer instructions pertaining to a suggested amount of time using the maps and a prompt for specific feedback. This study was undertaken during the summer of 2020 during the time of the COVID-19 pandemic across Canada. Due to the pandemic, some practitioners and researchers who were identified as key informants were not available to participate in this study due to the burden of the pandemic, including issues with childcare, because they had been reassigned to COVID response teams, or they were overwhelmed.

6.4 Implications for Policy and Practice

Diet plays an important role in an individual's overall health, and as such there is much interest in understanding dietary behaviour (Ammerman et al, 2002; Glanz et al, 2010). Eating behaviours are extremely complex and are a result of multiple influences including the environment in which people live (Clary et al, 2017; Sallis & Glanz, 2006; Townshend & Lake, 2017; Rahmanian et al, 2014). Food environments are potentially an important source of diet-related risks; however they also hold great possibility for health promoting policies (Mah et al, 2019). The aim of this research was to understand decision making in public health related to food environments and to then provide information on the types of evidence that different kinds of decision makers need to more effectively influence food environments to improve health outcomes. Altering the food environment through changes in policy may encourage people to eat healthier and this improve outcomes such as those of diet related non-communicable diseases (Mah et al, 2016; Mah et al, 2019).

First, from Chapter 4, planning theory can provide additional context for differences in the types of evidence practitioners at different levels require and value. These evidence preferences are of use to researchers undertaking food environments research so that they can produce evidence that is useful for differing levels of practice. Using this knowledge may help facilitate the advancement of food environment policy and positively influence the food environment landscape (Mahendra et al, 2017).

Secondly, from Chapter 5, participants were able to offer their perspectives on the different capabilities and options they would like to see in an interactive mapping tool to characterize it as useful to them. The capabilities and options include aspects such as the ability to compare areas, standardized variables, the ability to download the raw data, and clear data sources and methods, etc. These perspectives are valuable for informing the creation of an interactive food environment mapping tool for Canada that is useful and usable for a wide variety of end-users and is a good example of how knowledge transfer can result in more useful research products for practitioners (Kothari et al, 2017; Gagliardi et al, 2016). Additionally, this chapter offers further evidence of a divide between research and practice to add to the decades of literature on the topic.

6.5 Recommendations for Future Research

Our study confirms divided perspectives between research and practice, a divide which has been well documented over past decades (Orton et al, 2011; Peirson et al, 2012). This presents a barrier to the advancement of food environment policy and improvements in Canada's food environment landscape (Mahendra et al, 2017). Knowledge translation maintains that the engagement of practitioners in research will increase communication and produce research outputs that are significantly more useful for practitioners. Several questions remain. Further research is warranted to bridge the divide between researchers and public health practitioners, and to identify the reasons why researchers do not perceive practitioners as capable end users. Consequently, this information may guide changes to lead to integrated knowledge translation across stakeholders. This project provides justification for further research into perspectives researchers hold about public health practitioners, and the application of integrated knowledge translation. Additionally, future research could investigate the perspectives researchers have about practitioners in their corresponding fields, ways knowledge translation can effectively

bridge the gap between research and practice, the impact of increased financing and political will on regional food environment project momentum and analyzing how multiple areas of government can work together to create positive policy change.

Based on the limitations identified, future research into planning theory and public health decision-making that is undertaken could repeat this process outlined herein with the elected officials who were identified by participants as having the final influence over public health policy decisions. This research could also be repeated with the inclusion of specific tasks to complete during participants' time spent working with the interactive mapping tools. Additionally, the inclusion criteria could be altered to capture participants with more specialized experience working with mapping tools in order to describe more specific recommendations for interactive mapping tools.

6.6 Concluding Remarks

Over the different chapters of this thesis, the principal objective was to investigate how food environment decisions are being made in Canada with a specific focus on the applications of planning theory and the role of evidence. Before commencing the research process, a literature review was undertaken to summarize and weave together the scholarly literature from a variety of interdisciplinary topics including medicine, public health, planning, and geography. Among other findings, there was a lack of understanding about how public health decisions are made. EBDM is emphasized in public health, however the literature states that in public health decisions are not always made based on evidence. From the gaps in the literature the first study is focused on applying planning theory to public health decision making, and the second study complemented that work by examining how evidence is used in public health using a case study of food environment policy. When exploring the application of planning theory to the context of public health decision making, the findings of Chapter 4 suggest that planning theory can be used to provide further explanation to public health decision making processes. Understanding the differences in theoretical alignments of decision makers may facilitate better communication and potentially iKT since evidence is provided that different levels of practitioner value different types of scientific evidence (Kothari et al, 2017; Gagliardi et al, 2016). The analysis in Chapter 5 reveals a further divide between research and practice on their perspectives of whether an interactive food environment mapping tool is something that would be useful. Researchers expressed a perceived lack of capability of practitioners to appropriately use the interactive mapping tool, while practitioners emphatically agreed that an interactive mapping tool would be incredibly useful to them. Additionally, recommendations are provided for what knowledge users desire in an interactive food environment mapping tool. The interdisciplinary research of the two studies offers a novel approach of planning theory to understand public health decision making, highlight the differences that persist between research and practice, and provide recommendations for the creation of a Canadian interactive food environment mapping tool.

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Appendices

APPENDIX A – RECRUITMENT EMAIL

Title: Mapping the way to Healthier Cities: A Qualitative Case Study of Food Environment Mapping Tools

Researcher: Dr. Leia Minaker (lminaker@uwaterloo.ca)

ORE#42098

You are invited to participate in a research project titled, “Mapping the way to Healthier Cities: A Qualitative Case Study of Food Environment Mapping Tools” conducted by Dr. Leia Minaker (Faculty of Environment, Faculty of Applied Health Sciences, University of Waterloo). This study investigates individuals’ perceptions, attitudes, and current familiarity with geospatial data visualization in the form of an online interactive mapping tool for food environment assessment. As a participant, you will be given the interactive mapping tool created by our research team to experiment and explore for a period of no less than one week. You will then participate in a telephone interview where your answers will be recorded. You will be asked about your perceptions of the tool, your familiarity with geospatial data visualization, and some basic information about your current role.

This study takes place from the comfort of wherever you choose, as interview will be done by telephone. The session will take approximately 60 minutes, in addition to how much time you spend exploring the interactive mapping tool.

If you are interested in participating and/or would like more information on this project, please contact Dr. Leia Minaker (lminaker@uwaterloo.ca).

APPENDIX B – PRACTITIONER INTERVIEW GUIDE

Introduction, information, and consent

Hi <NAME> - thank you so much for agreeing to participate as one of our key informants. This process should take about an hour.

Is this still an okay time to talk? [CONFIRM OR REBOOK]

Great, as you know this interview will be recorded. I am going to turn on the recorder and then provide you with some information and record your consent. Then we will begin the interview proper. Are you okay if I turn on the recorder now?

[TURN ON RECORDER]

[READ VERBATIM]

Your participation in this study is voluntary. The interview process should take approximately 60 minutes. You may decide to leave the study at any time by communicating this to either Amanda Parker or Dr. Leia Minaker. Any information you provided up to that point will not be used. You may decline to answer any question(s) you prefer not to answer. You can request your data be removed from the study up until 10 days after your interview date, as it is not possible to withdraw your data once it has been de-identified. Your identity will be kept completely confidential. Your data will be de-identified and assigned an alphanumeric alias.

Do you consent to and agree to participating in this study? [LOG TIME]

Do you consent to the use of anonymous quotations in the final documents produced? [LOG TIME]

Thank you, <NAME>

INTERVIEW

Lead in and Expertise

The goal with these interviews is to explore how decisions are made in public health settings, particularly related to the food environment. I know there are a lot of policy and program options that can be implemented to improve population-level diet or food access. What I’m specifically interested in here is policies that are related to both food and place. The retail food environment – places where people buy food – are usually places like grocery stores, restaurants, convenience stores, but increasingly people are using farmers’ markets, ethnic food stores, non-traditional food stores like dollar stores. I’m mainly interested in the places where people buy food or sell food, rather than food charities like food banks or school lunch programs.

Area	Question	Probe	Additional Probes
Role, experience, organizational policies & constraints.			
First, I’d like to ask you about your role and experience, and about the organization you work for.			
Role, expertise, and experience	Can you tell me about your current role?	How long have you been in your current role?	
		What were you doing before?	
		What is your background in terms of qualifications and training?	
		What level of government do you work for (if any)?	Do your decisions impact rural or urban communities? Approximately how many people?
	What kind of experience do you have in decision making in food policy / food environments / healthy eating?	Is there a reference document available for PROJECT you just mentioned that I can look up to learn more?	
		What was the project about?	
		What types of data or evidence did you use?	

		What kinds of decisions were made?	
		How did you come to those decisions?	
		What was the target population?	
		What were the intended outcomes?	What were the outcomes that you didn't anticipate?
		Has an evaluation been done on the PROJECT?	
Organizational/personal policies/values affecting them.	Can you tell me about the priorities of your organization specifically related to food, and how they inform your work?	Do you have specific aims?	
		Where do these priorities/aims come from (eg. External organizations).	
		How have your aims changed over recent years?	Funding, leadership, technical expertise, etc. Have any political changes altered aims in the recent past?
Organizational constraints.	What are the potential barriers to achieving these priorities?	Are there competing priorities?	
		What are they?	
		Who or where do they come from?	
		What limitations in data access do you experience?	
Use of tools: Food Environment Assessment Tool, Food Environment Atlas, Food Access Research Atlas. Moving onto interactive mapping tools for the food environment, I'd like to ask more detail about your use of these products within your current role.			

First use / use over time.	Have you had a chance to take a look at the links I sent you?	In terms of ease or difficulty of use, how did you initially find the use of these tools?	What initial difficulties did you encounter? What initial barriers were there to your use?
	How did you first hear about interactive mapping tools?	When have you or your team used similar tools before?	Would you say that you're an experienced user of these kinds of tools?
Regularity and type of use.	IF THEY HAVE USED IT BEFORE	Can you tell me how you use interactive mapping tools in your work?	
		How often would you say you use these tools?	
		What do you use the tools for?	What is a typical example of the way you use these tools?
			Is the way it is used dependent on the audience or context?
		What features of the tools do you most often use?	
		Are there features you wish you could have for these tools?	Does it not exist?
	Do you not have access?		
IF THEY HAVE NOT USED IT BEFORE	When you used the three existing tools, what did you think about them?		
Decision making / impact.	In general, how do you think interactive mapping tools can fit within the decision-	What effect (if any) has the tool had in your organization?	

	making processes in which you engage?		
	Are there any specific ways that interactive mapping tools could help you make decisions related to food or food policy?		
	Is there one tool you prefer over another?	Which one, and why	

Decision making.

Current work.	What kinds of food policy or food environment work are you or your organization currently working on?		
	What kind of data would you need to support the issues you are currently investigating?	Is that data readily available to you?	
		Is there any data missing that would provide a more complete picture for you to tackle this issue?	
		In a perfect world, what would the data look like to support the issues you are currently investigating?	

Future work.	Are there policy areas related to the food environment that are lacking the data required for research/assessment	Which areas do you think are lacking data?	
		What kind of data is lacking?	
		What missed opportunities are there in terms of vulnerable populations that	Children – schools -- equity -- nursing homes

		are missing out on research/policy because data is unavailable?	
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APPENDIX C – RESEARCHER INTERVIEW GUIDE

Introduction, information, and consent

Hi <NAME> - thank you so much for agreeing to participate as one of our key informants. This process should take about an hour.

Is this still an okay time to talk? [CONFIRM OR REBOOK]

Great, as you know this interview will be recorded. I am going to turn on the recorder and then provide you with some information and record your consent. Then we will begin the interview proper. Are you okay if I turn on the recorder now?

[TURN ON RECORDER]

[READ VERBATIM]

Your participation in this study is voluntary. The interview process should take approximately 60 minutes. You may decide to leave the study at any time by communicating this to either Amanda Parker or Dr. Leia Minaker. Any information you provided up to that point will not be used. You may decline to answer any question(s) you prefer not to answer. You can request your data be removed from the study up until 10 days after your interview date, as it is not possible to withdraw your data once it has been de-identified. Your identity will be kept completely confidential. Your data will be de-identified and assigned an alphanumeric alias.

Do you consent to and agree to participating in this study? [LOG TIME]

Do you consent to the use of anonymous quotations in the final documents produced? [LOG TIME]

Thank you, <NAME>

INTERVIEW

Lead in and Expertise

As mentioned, the goal with these interviews is to explore how decisions are made in public health settings, particularly related to the food environment. I know there are a lot of policy and program options that can be implemented to improve population-level diet or food access. What I'm specifically interested in here is policies that are related to both food and place. The retail food environment – places where people buy food – are usually places like grocery stores, restaurants, convenience stores, but increasingly people are using farmers' markets, ethnic food stores, non-traditional food stores like dollar stores. I'm mainly interested in the places where people buy food or sell food, rather than food charities like food banks or school lunch programs.

Area	Question	Probe	Additional Probes
Role, experience, organizational policies & constraints. First, I'd like to ask you about your role and experience, and previous and current projects .			
Role, expertise, and experience	Can you tell me about your current role?	How long have you been in the role?	
	Can you tell me in about 30sec how your research is related to the food environment?	What is your background in terms of qualifications and training?	
	Organizational/ personal policies/ values affecting them	Can you tell me about some of your past projects and publications related to the food environment / food policy / public health?	
What was the project about?			
What kind of data or evidence did you use?			
What kinds of decisions were made?			If no decisions were made or implemented, ask about calls for action, so collecting more information, doing more research, etc.
			Did collecting more information, or doing more research happen? Where did that lead, if anywhere?

			So then, what happened? (Did a program, policy, etc come out of it?)
What are you working on currently?	Is the data you need readily available to you?		If no, what barriers are you facing specifically?
	Is there any data missing that would provide a more complete picture for you to tackle this issue?		In a perfect world, what would the data look like to support the food policy/food environment issues you are currently investigating?
			If you had your ideal dataset, what could you do with it that you're not able to do right now?
How have your priorities changed over recent years?			
Are there policy areas related to the food environment that are lacking the data required for research/assessment	Which areas do you think are lacking data?		
	What kind of data is lacking?		
	Are there vulnerable populations that research/policy is missing out on because data is unavailable?		Children – schools Equity Nursing homes

	Is there any data not currently available or accessible to you that you specifically would want as a researcher?		
Constraints	What are the potential barriers you face when conducting research?	Funding, leadership, technical expertise, etc.	
	Where do you find data?		
	Where have you used data?		
	Is this data valid and reliable? Have you validated it?		
Use of tools: Food Environment Assessment Tool, Food Environment Atlas, Food Access Research Atlas. Moving onto interactive mapping tools for the food environment, I'd like to ask more detail about your use of these products within your research.			
Usage	Have you looked at the links to the food environment tools that I sent you?	Once you got onto the website, did you find the tool easy or difficult to use?	Initial difficulty?
			Barriers?
			Have you or your team used similar tools before?

		Could you tell me about any training or support you received for working with these tools?	Who did you receive training or support from?
Regularity and type of use.	Have you used these kinds of interactive spatial data visualization tools in your prior or current food environment / food policy / public health research?	IF YES	If yes – how do you use these tools in your research?
			If yes – how often would you say you use these tools?
	IF NO	If no – what data have you used previously?	
	Would you say that you're an experienced user of these kinds of tools?	IF YES	Thinking about the last few times you used any of these tools, what did you do?
			Which features did you find useful?
			Is there anything you would like to see in these kinds of tools?

		IF NO	Were you aware that these kinds of tools existed?
			When you were looking at the links I sent you, which features did you find useful?
			Was it easy for you to use? Why or why not?
			Was there anything you felt was missing that would be helpful?
			Do you think you would use these tools in any future research now that you are aware of them?

Decision making / impact.			
	In general, how do you think that interactive mapping tools can fit within the decision making processes that you engage in?		
	Are there any specific ways that interactive mapping tools could help you make food-related decisions? (or decisions related to food policy)?		
	When you are doing your research projects, who are you working with that isn't a researcher?	What level are they at? (government)	
		What kinds of policies are they/can they consider implementing?	
		How do you think they might use these tools?	
		How do you frame your research so its relevant for practice or policy?	

	<p>How would you make the decision to characterize a bad vs good food environment?</p>	<p>If people get stuck, ask for an example of what they have done on a previous project.</p> <p>OR</p> <p>What are the components you would use that would help you decide how to characterize good vs. bad (data, populations of interest)</p>	<p>How do you think urban vs rural need to be categorized differently?</p>
	<p>How do you derive measures for characterizing the food environment?</p>	<p>If people get stuck, ask for an example of what they have done on a previous project.</p> <p>OR</p> <p>What are the components you would use that would help you decide how to characterize good vs. bad (data, populations of interest)</p>	<p>Your personal context.</p>
			<p>Can you give me some examples of what you've previously done?</p>
			<p>What would help you decide what to use?</p>
			<p>Data availability?</p>
			<p>Who you're working with?</p>

APPENDIX D – INFORMED CONSENT STATEMENT

Title: Mapping the way to Healthier Cities: A Qualitative Case Study of Food Environment Mapping Tools

Researcher: Dr. Leia Minaker (lminaker@uwaterloo.ca)

INFORMATION

You are invited to participate in a research project titled, “Mapping the way to Healthier Cities: A Qualitative Case Study of Food Environment Mapping Tools” conducted by Dr. Leia Minaker (Faculty of Environment, Faculty of Applied Health Sciences, University of Waterloo). This study investigates individuals’ perceptions, attitudes, and current familiarity with geospatial data visualization in the form of an online interactive mapping tool for food environment assessment. This study takes place from the comfort of wherever you choose, as interview will be done by telephone. The session will take approximately 60 minutes, in addition to how much time you spend exploring the interactive mapping tool.

BENEFITS AND RISKS

The benefits that may be expected from the study are: (a) enjoying discussing with colleagues how to improve a tool that may end up being helpful for decision making in your current or future role, (b) an opportunity to contribute to scientific research aimed at understanding the decision-making process. The research team does not anticipate any risks to participating in the study.

PROCEDURE

In advance of the interview, you will be given access to the interactive mapping tool for a period of time no less than one week. A telephone interview will be scheduled at your convenience and is estimated to be approximately 60 minutes in duration. Your responses will be recorded.

CONFIDENTIALITY

Your data will be kept completely confidential. Only the research team will see your full responses. Hard copy data and consent forms will be stored in a locked cabinet and electronic data will be stored on a password protected computer in a locked lab at the University of Waterloo. The de-identified data will be maintained for 5 years after publication and then will be deleted and/or destroyed by Dr. Leia Minaker. During this time, the data may be analyzed as part of a separate project. Your personal data will be assigned a numeric identification code and will be stripped of identifying information. General trends, poignant de-identified quotes, and recurring themes will be discussed in publications.

CONTACT

If you have any questions at any time about the study or the procedures (or you experience adverse effects as a result of participating in this study), you may contact the researcher, Dr. Leia Minaker (lminaker@uwaterloo.ca). This project has been reviewed and approved by the University of Waterloo Research Ethics Board (ORE#42098). If you feel that you have not been treated according to the descriptions in this form, or your rights as a participant in research have

been violated during the course of this project, you may contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

PARTICIPATION

Your participation in this study is voluntary. You may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study, every attempt will be made to remove your data from the study, and have it destroyed. You have every right to omit any question(s) and/or procedure(s) you choose.

FEEDBACK AND PUBLICATION

The findings from this project may be published in peer-reviewed journals, presented at academic conferences, and made available through Open Access resources. A summary of the results should be available by July 2020. You may request an electronic copy by emailing the researchers.

CONSENT

I have read and I understand the above information. I have received a copy of this form. I agree to participate in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

APPENDIX E – LETTER OF APPRECIATION

Dear PARTICIPANT,

I would like to thank you for your participation in the study, “Mapping the way to Healthier Cities: A Qualitative Case Study of Food Environment Mapping Tools” undertaken for my thesis to fulfil the requirements of a Master of Science in Public Health and Health Systems at the University of Waterloo. The head researcher on this project is Dr. Leia Minaker. As a reminder, the purpose of this study is to investigate individuals’ perceptions, attitudes, and current familiarity with geospatial data visualization in the form of an online interactive mapping tool for food environment assessment.

The data collected during interviews will contribute to a better understanding of this topic and will be used to inform researchers and policy makers on how the use of online interactive mapping tools can be improved and used effectively for decision making.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#42098). If you have any questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

For all other inquiries please contact Dr. Leia Minaker (lminaker@uwaterloo.ca).

Please remember that any data pertaining to you as an individual participant will be kept confidential. Once all the data are collected and analyzed for this project we plan on sharing this information with the research community through seminars, conferences, presentations, and journal articles. If you are interested in receiving more information regarding the results of this study, or would like a summary of the results, please provide your email address, and when the study is completed, the information requested will be sent to you. If in the meantime you have any questions about the study, please do not hesitate to contact me by email as noted below.

Thank you.

Amanda Parker
University of Waterloo
Applied Health Sciences

Contact e-mail:
amparker@uwaterloo.ca