



How do changes in the daily food and transportation environments affect grocery store accessibility?



Michael J. Widener, PhD ^{a,*}, Leia Minaker, PhD ^b, Steven Farber, PhD ^c, Jeff Allen ^a, Brigitte Vitali ^a, Paul C. Coleman, PhD ^d, Brian Cook, PhD ^d

^a Department of Geography and Planning, University of Toronto - St. George, 100 Saint George St., Toronto, Ontario M5S 3G3, Canada

^b Propel Centre for Population Health Impact, University of Waterloo, 200 University Avenue West, Waterloo, Ontario N2L 3G1, Canada

^c Department of Human Geography, University of Toronto - Scarborough, 1265 Military Trail, Toronto, Ontario M1C 1A4, Canada

^d Toronto Public Health, City of Toronto, 277 Victoria St., Toronto, Ontario M5B 1W2, Canada

ARTICLE INFO

Article history:

Received 31 August 2016

Received in revised form

3 March 2017

Accepted 19 March 2017

Keywords:

Food environments

Accessibility

Time geography

Transportation

Grocery stores

ABSTRACT

A healthy food environment is an important component in helping people access and maintain healthy diets, which may reduce the prevalence of chronic disease. With few exceptions, studies on healthy food access in urban regions typically ignore how time of day impacts access to food. Similarly, most extant research ignores the complexities of accounting for the role of transportation in spatial access. Examining healthy food access is important, especially for populations whose day-to-day schedules do not align with a typical work schedule. This study profiles novel methods that can be used to examine the daily dynamics of food access in Toronto, Ontario, using grocery stores as a case study to examine the changing geographies of food access over a 24-h period, and the impact of a changing public transit schedule on food access. Walking and automobile travel times are also reported. Results indicate that access to grocery stores is severely diminished for large parts of the city in the late night and early morning, and that public transit travel times are higher and more variable in the early morning hours. Ultimately, this research demonstrates the need for further study on how residents with nonconventional schedules experience, and are affected by, the dynamic food and transportation environments. Future research should build upon the methods presented here to include a broader range of food retailers.

© 2017 Elsevier Ltd. All rights reserved.

1. Introduction

Geographic access to retail sources of nutritious, affordable food is an important factor in maintaining a nutritious diet, which in turn influences a wide range of health outcomes (Caspi, Kawachi, Subramanian, Adamkiewicz, & Sorensen, 2012). At a minimum, individuals must have the economic means, spatial access, and adequate food knowledge to truly have “access to healthy foods.” Over the past decade, researchers have begun to integrate these factors into their analyses, allowing for a nuanced understanding of healthy food access. This progress is important as previous conceptualizations of access, often represented by the “food desert”

metaphor, tended to emphasize the spatial component of healthy food accessibility and all but ignored temporal and spatial dynamics in the food and transport systems (Cummins & Macintyre, 2006).

Despite this progress, the dynamics of spatial access to healthy food (i.e. how the healthy food landscape changes over time) are still understudied (Widener & Shannon, 2014). In an urban context and on a daily temporal scale, these dynamics are driven primarily by a person's transportation options (Farber, Morang, & Widener, 2014; Fuller, Cummins, & Matthews, 2013), their daily mobility patterns and activity spaces (Burgoine & Monsivais, 2013; Kestens et al., 2012; Widener, Farber, Neutens, & Horner, 2015), and the opening and closing hours of healthy food retailers (Chen & Clark, 2013, 2016). These dynamics are important to understand since vulnerable sociodemographic groups may be disproportionately affected by these factors. For example, shift workers, whose schedules do not correspond to a typical Monday through Friday, 9-to-5 workday, are likely exposed to different food landscapes than

* Corresponding author.

E-mail addresses: michael.widener@utoronto.ca (M.J. Widener), lminaker@uwaterloo.ca (L. Minaker), steven.farber@utoronto.ca (S. Farber), jeff.allen@mail.utoronto.ca (J. Allen), brigitte.vitali@mail.utoronto.ca (B. Vitali), pcolema@toronto.ca (P.C. Coleman), bcook@toronto.ca (B. Cook).

those who have evenings and weekends off. Likewise, a person with an atypical schedule who owns a car may have different food retail opportunities than a person who relies on public transit or walking.

Using grocery stores as a case study to demonstrate the novel methods we employ, this research examines how these two often-neglected dynamics (changes in the food and transportation environments over the course of a day) affect food access in the large and dense city of Toronto, Ontario, where many residents utilize a wide range of transportation modes (Toronto Transit Commission, 2016a). To address this aim, two primary objectives are pursued. First, the grocery store landscape is measured at multiple times of day, accounting for the open hours of these stores, allowing for a more accurate representation of what healthy food opportunities are available as the day progresses. Second, public transit, automobile, and walking travel times are measured at different times of day, while considering the aforementioned changes in the grocery store landscape, to demonstrate how changes in the transportation network (e.g. changes in public transit frequency) also influence access. Beyond describing the dynamics of the geography of grocery stores and how travel times vary over a 24-h period, this paper also demonstrates the differential impacts both of these dynamics have on various sociodemographic groups and urban environments.

The remainder of the paper is broken down as follows. The next section provides an overview of previous research on transportation impacts on access to grocery stores, with a focus on research that considers travel time and other temporal factors. With the context established, the data and methods used in this paper are discussed in the third and fourth sections. Results from the analyses are presented in the fifth section and are discussed in depth in the sixth section. Finally, concluding thoughts, limitations, and future work are all presented in the last section.

2. Background

It is widely recognized that spatial access to healthy foods is an important component of maintaining a healthy diet (for a comprehensive review, see (Caspi, Sorensen, Subramanian, & Kawachi, 2012; Kirkpatrick et al., 2014; Minaker, 2016; Walker, Keane, & Burke, 2010)), but developing measures that allow researchers to quantify and compare this access in a way that relates to actual food shopping behaviours has proven challenging (Glanz et al., 2016). Over the past few decades, research on food environments has evolved past simple conceptions of spatial access, often represented through food desert maps, and increasingly accounted for complex social and behavioural factors that better reflect people's opportunities (Chen & Kwan, 2015). For example, transportation modes, which can greatly impact how accessible grocery stores are for a person, are now often explicitly considered (Widener et al., 2015; Widener, Farber, Neutens, & Horner, 2013). Similarly, economic and neighbourhood contexts are more commonly considered, as these factors can influence which, and how many, stores are used for food shopping (Shannon, 2015, pp. 1–17).

Most relevant to the research presented in this paper is recent work that incorporates time into describing food access. Generally, this work can be broken up into two distinct categories. The first category includes research that uses GPS traces of people over one or more days to understand how movements influence the food shopping behaviours of populations of interest (Christian, 2012; Shannon, 2015, pp. 1–17; Zenk et al., 2011). The second category of work seeks to integrate temporal patterns (e.g. changing public transit schedules, commuting flows) into accessibility indices that

describe the general level of effort needed to shop for healthy foods (Burgoine & Monsivais, 2013; Farber et al., 2014; Widener et al., 2015; Widener et al., 2013).

Widener and Shannon (Widener & Shannon, 2014) provide a high-level view of why integrating time into food accessibility and food environment studies is important, noting the various ways it can affect an analysis. For example, on yearly and weekly time-scales, the food environment is affected by the appearance of farmers' markets (Lucan, Maroko, Sanon, Frias, & Schechter, 2015; Widener, Metcalf, & Bar-Yam, 2011). On a daily time-scale, road congestion or public transit schedules can change the time required to get to healthy food stores (Farber et al., 2014). Similarly, opening and closing hours of food stores impact the availability of healthy food retailers on the daily scale (Chen & Clark, 2013, 2016). It is crucial to study these dynamics, especially at the daily scale, and how they affect shopping behaviour, as certain populations with limited time could experience the food environment rather differently than a person with fewer constraints on their time budget.

To demonstrate the importance of examining spatiotemporal variations in the healthy food retail environment, consider the case of shift workers. About one third of the Canadian labour force is engaged in shift work – working primarily outside of normal daytime working hours or on a different schedule than the standard working week (Vyas et al., 2012; Williams, 2005). Shift work is associated with increased risk of stroke (Proper et al., 2016), diabetes (Gan et al., 2015), metabolic disorders (Amani & Gill, 2013; Proper et al., 2016), cancer (IARC Working Group on the Evaluation of Carcinogenic Risks to Humans International Agency for Research on Cancer, 2010), and poor nutrition (Nea, Kearney, Livingstone, Pourshahidi, & Corish, 2015). Dietary habits appear to be affected by shift work: shift workers eat more frequently, have poorer quality diets, and irregular distribution of energy intake over a 24 h period compared to non-shift workers (Nea et al., 2015). Moreover, associations between shift work and diet differ by gender, with male shift workers less likely to consume fruits and vegetables compared to non-shift workers, and female shift workers more likely to consume saturated fat compared to non-shift workers (Hemiö et al., 2015). The proportion of women engaged in shift work has been increasing over time (Williams, 2005), which is important given the gendered nature of household food procurement (Allen & Sachs, 2012) and the relationship between household food purchasing patterns and dietary and weight-related outcomes (Minaker et al., 2016).

Several studies suggest that shift-workers' diets are influenced by their food environments, which is implicitly linked to their mobility and transportation options. For example, a qualitative study of Australian paramedics revealed that restrictions in both spatial access and temporal access to healthy food were perceived to affect dietary intake while working a shift (Anstey, Tweedie, & Lord, 2016). Participants reported needing to procure food from where they were stationed (spatial access) at unpredictable times, which depended on workload and time available to eat (temporal access). Often, spatial and temporal access did not align with healthier dietary intake (Anstey et al., 2016). A recent review found that one of the commonly reported barriers to healthy eating during shift-work was poor food selection, inadequate cafeteria opening times, lack of time and tiredness due to long working hours (Nea et al., 2015). While the health of shift workers is one motivation for examining the dynamic food environment, many other populations may also be affected by irregular and more constrained schedules. For these reasons, a closer examination of the food environment over a 24-h period is necessary.

Download English Version:

<https://daneshyari.com/en/article/4759036>

Download Persian Version:

<https://daneshyari.com/article/4759036>

[Daneshyari.com](https://daneshyari.com)