FoodScore:
Exploring Health and Fast Food Access in Etobicoke, Ontario

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Background

Global Health Crisis

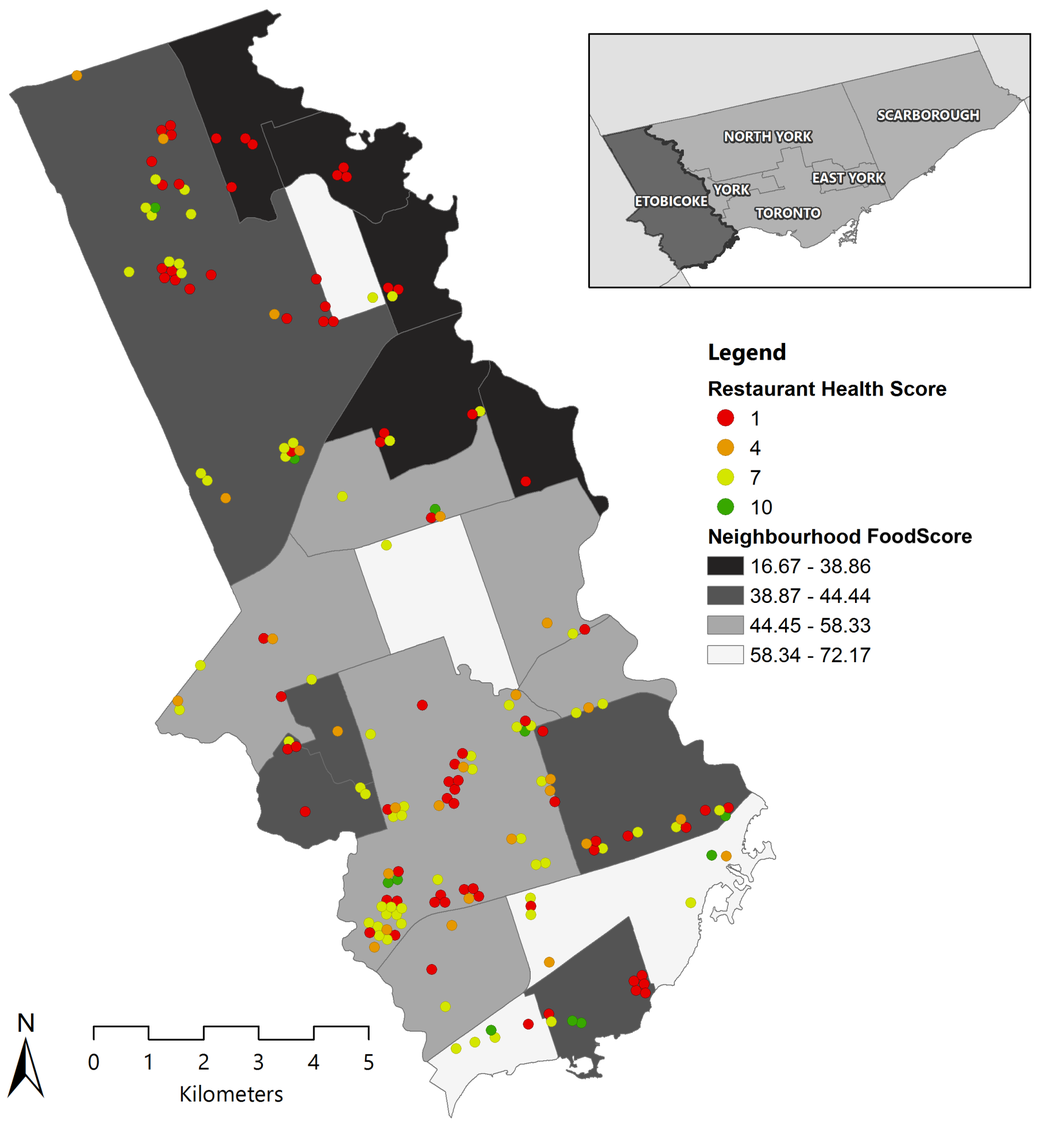
Public Health Canada recognizes that unhealthy diets and increased exposure to fast food have been linked with higher levels of obesity, a growing epidemic in Canada [1][2]. Obesity is directly linked to an increased risk of developing many non-communicable diseases, including heart disease, type 2 diabetes, thirteen cancers, mental health problems, and liver disease as well as premature death [3]. According to Public Health Canada, in 2017, 64% of adults and 30% of children aged 5 to 17 were considered overweight or obese in Canada [4]. Similarly, in 2018 Statistics Canada stated that 1 in 4 Ontarian adults were considered obese [5].

Past Research

Peer reviewed literature indicates that 83% of studies focusing on demographics concluded that fast food restaurants were more prevalent in areas with higher concentrations of visible minority groups. They also noted that 60% of studies found that those living in areas with increased exposure to fast food were more likely to be overweight or obese and, thus, at an increased risk of developing further diseases [6].

Research Objectives

1. Develop a method for scoring access to fast food options for individual addresses to promote healthier choices among fast food restaurants.
2. Identify relationships between socioeconomic factors and health, based on the locations of fast food restaurants.



Methods

Healthy vs. Unhealthy Foods

Healthy	Unhealthy [7]
Fruits and vegetables	Empty calories
Whole grains	High sodium
Protein rich foods	High sugar
Natural and unprocessed	High saturated and trans fats

Selecting Restaurants & Assigning Health Scores

Fast food restaurants are defined as restaurants where customers are served at a cash register before eating and have no table service [8]. A list of these restaurants was created and a score from 1-10 was assigned to each based on the food options available, with healthier options receiving a higher score.

Data Sources

The FoodScore model relies on the City of Toronto's open address and pedestrian network data, including trails and sidewalks [9]. The neighbourhood analyses used the City of Toronto's open neighbourhoods data, demographic data from Wellbeing Toronto, and health information from Toronto Community Health Profiles [10][11].

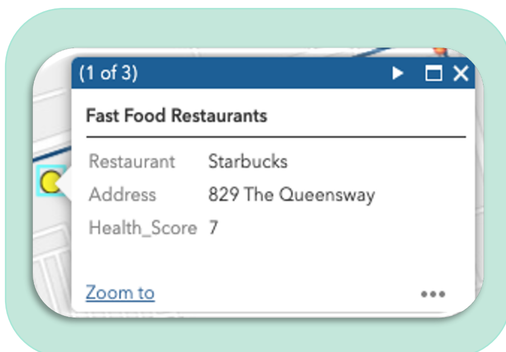
FoodScore Model & Web Application

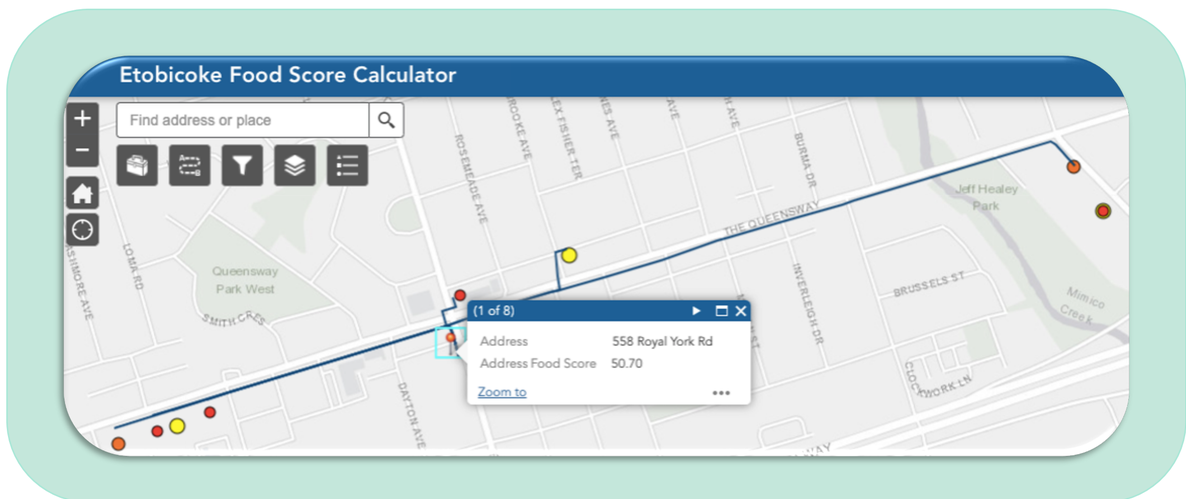
The FoodScoring tool is based on a model developed in ArcMap. The model creates a service area polygon of a 10-minute walk time using the network dataset around the inputted address. Then the closest route from the address to each restaurant within the service area is found. The FoodScore for each restaurant is calculated by summing the health score and the convenience score, which is calculated based on a restaurant's distance from the address. These scores are averaged to find the overall food score for the address, with the highest possible score being 100. This model was uploaded to a server and the data was uploaded to ArcGIS Online to create the FoodScoring tool in Esri Web AppBuilder. Necessary widgets were added, and map edits were made to ensure the app functioned properly.

Results

FoodScore of a Specific Address

Users can input any address to see what is nearby and to see how healthy their options are. Although the application has not been tested publicly, the idea is that when the user obtains their food score, it will make them more aware of how healthy the fast food options near them are. Users can also select nearby restaurants to show what it is and what health score it received. This goal is to encourage them to be more conscious of the food choices they make and how the environment they live in could be shaping those decisions.

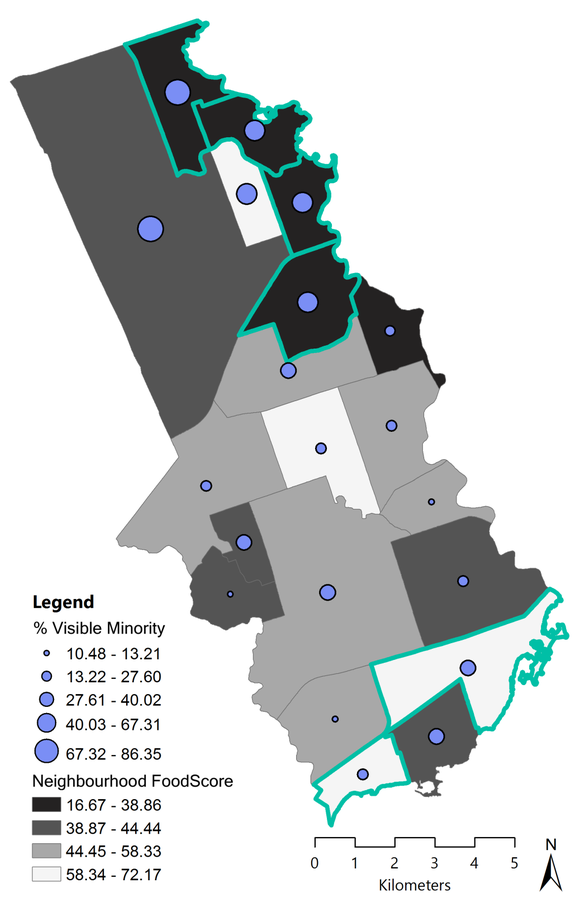


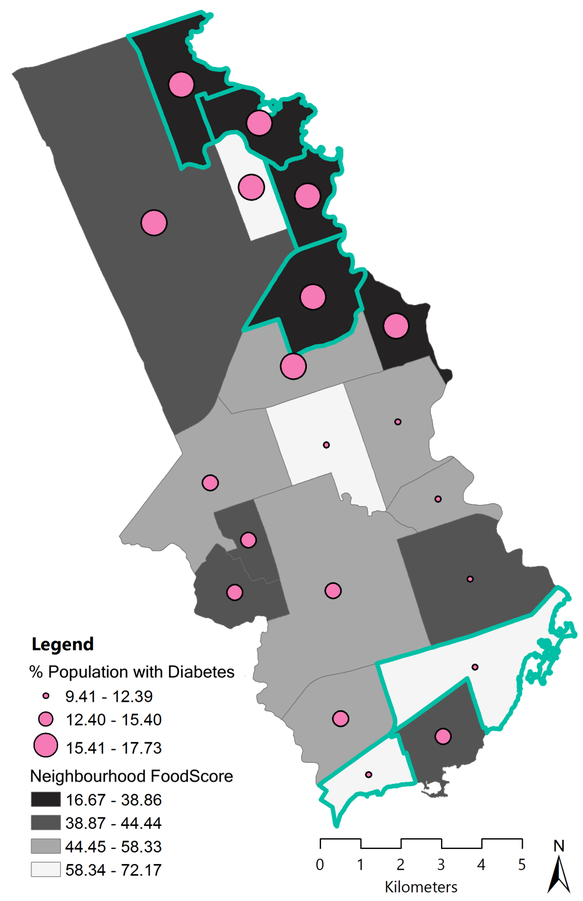


Neighbourhood FoodScores

When restaurant health scores are aggregated in neighbourhoods that have at least two restaurants, interesting patterns emerge when examining the highest and lowest neighbourhood FoodScores. For example, low FoodScores are found in four neighbourhoods in northeast Etobicoke (outlined in turquoise below). Wellbeing Toronto and Community Health Profiles Toronto data indicates that 60% to 86% of the populations in these neighbourhoods self-identified as visible minorities and some 16% to 18% had diabetes, for an average of 69% and 17%, respectively. In contrast, two neighbourhoods in south Etobicoke with high FoodScores (outlined in turquoise below) have lower percentages of visible minorities (23% and 31%) and diabetes (12%)., with an average of 27% and 12%. This results in an average difference of 42% in percentage of visible minorities and 5% in percentage of diabetes between the high scoring and low scoring neighbourhoods.

Neighbourhood	Health Score	# of Restaurants	% Visible Minority [12]	% Pop with Diabetes [13]
Humber Heights-Westmount	16.67	1	25	18
Thistletown-Beaumonde Heights	16.67	3	63	18
Mount Olive-Silverstone-Jamestown	16.67	4	86	17
Elms-Old Rexdale	35.17	3	67	16
Kingsview Village-The Westway	38.87	5	60	17
Mimico	60.31	7	31	12
Long Branch	66.67	5	23	12
Rexdale-Kipling	72.17	1	51	17
Princess-Rosethorn	72.17	1	19	12





Acknowledgments & Sources

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Sources: [1] Fleischhacker, S. E., Evenson, K. R., Rodriguez, D. A., & Ammerman, A. S. (2011). A systematic review of fast food access studies. Obesity Reviews, 12(5). [2] Public Health Agency of Canada. (2018). Tackling Obesity in Canada: Obesity and Excess Weight Rates in Canadian Adults. [3] Pi-Sunyer, X. (2009). The Medical Risks of Obesity. Postgrad Med, 121(6), 21–33. [4] Public Health Agency of Canada. (2018). [5] Statistics Canada. (2019). Overweight and obese adults, 2018. [6] Fleischhacker et al. 2011. [7] Government of Canada. (2020). Canada's Food Guide. [8] Fleischhacker et al. 2011. [9] City of Toronto Open Data. (). [10] Wellbeing Toronto. (2016). [11]. Toronto Community Health Profile. (2012). [12] Wellbeing Toronto. (2016). [13] Toronto Community Health Profile. (2012).