

A Census of Midsize to Large Supermarkets in Toronto: A Cross-Sectional Analysis of the Consumer Nutrition Environment

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ABSTRACT

Objective: Assess the consumer nutrition environment in midsize to large supermarkets by supermarket type and area-level socioeconomic variables.

Design: Cross-sectional census of 257 supermarkets using the Toronto Nutrition Environment Measures Survey in Stores.

Setting: Toronto, Canada.

Variables Measured: Availability; price and linear shelf space of fruits and vegetables vs energy-dense snack foods by supermarket type; after-tax, low-income measure; and neighborhood improvement area.

Analysis: Multivariate linear regression.

Results: There was a high availability of fruits (7.7 of 8) and vegetables (9.5 of 11). There was similar linear shelf space for fruits and vegetables vs energy-dense snack foods (ratio, 1.1 m). Adjusted fruit prices were lowest in quintiles 1 ($\beta = -\$1.30$; $P = .008$), 2 ($\beta = -\$1.41$; $P = .005$), and 3 ($\beta = -\$1.89$; $P < .001$) vs quintile 5 (lowest percentage of people living with low income) and in ethnic ($\beta = -\$3.47$; $P < .001$) and discount stores ($\beta = -\$5.64$; $P < .001$) vs conventional. Adjusted vegetable prices were lowest in quintiles 2 ($\beta = -\$1.87$; $P = .04$), 3 ($\beta = -\$1.78$; $P = .03$), and 4 ($\beta = -\$2.65$; $P = .001$) vs quintile 5 and in ethnic ($\beta = -\$7.10$; $P < .001$) and discount ($\beta = -\$5.49$; $P < .001$) stores. They were highest in other ($\beta = +\$3.08$; $P = .003$) vs conventional stores. Adjusted soda and chips prices were lower in discount ($\beta = -\$1.16$; $P < .001$) and higher in other stores ($\beta = +\$0.67$; $P < .001$) vs conventional.

Conclusions and Implications: Findings do not indicate inequities in shelf space, availability, or price across diverse neighborhoods. Practitioners can use findings to help consumers navigate supermarkets to make healthy choices.

Key Words: Canada, consumer nutrition environment, diet, food and nutrition, food availability, supermarket (*J Nutr Educ Behav.* 2017;■■:■■-■■.)

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INTRODUCTION

The determinants of healthy eating are complex and involve interrelated factors, including income, food literacy, and the

nutrition environment. Each of these is a modifiable and potentially impactful site for public health research and intervention aimed at healthy food access and healthy eating. Glanz et al¹ iden-

tified 4 types of nutrition environments: community, consumer, organizational nutrition, and information. Here, the focus is on the consumer nutrition environment, including what consumers are exposed to inside a food retail setting, such as store design, in-store marketing (including to children), prominence of food items, and availability, price, and quality of food items.¹ In Canada, the community nutrition environment (geographic access to various food sources) has been more extensively studied than the consumer nutrition environment,² which could be because of the ability to collect large-scale data on geographic locations or its availability.³ Canadian studies examining the community nutrition environment showed that marginalized

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neighborhoods tend to have geographic access to healthy food outlets that is equal to or better than that of less marginalized neighborhoods^{4,6}; however, findings from studies of the consumer nutrition environment in supermarkets in urban Canadian cities showed no differences in the availability^{7,8} or price^{7,9} of fruits and vegetables by area-level measures of socioeconomic status (SES). The exception was a study conducted in 24 large grocery stores or supermarkets in Saskatoon, which noted higher prices for fruits and vegetables in low-SES neighborhoods.⁸ There is limited objective evidence on consumer nutrition environments in Canada and the degree to which they support healthy food choices.² This research gap is relevant for public health policy and practice; identification of inequities in the availability and price of nutritious food in supermarkets will enable nutrition to be addressed as a social determinant of health.

To address these evidence gaps for policy and practice, the researchers conducted an in-store assessment of the consumer nutrition environment in Toronto supermarkets as part of a multifaceted project aimed at identifying opportunities to facilitate food purchasing in supermarkets to support long-term nutritional well-being. The objectives of this study were to assess the consumer nutrition environment in midsize to large supermarkets in Toronto and to identify differences in features of the consumer nutrition environment by type of supermarket and area-level socioeconomic variables.

METHODS

Setting and Study Design

The researchers conducted a cross-sectional census of midsize to large supermarkets in Toronto, Canada. Toronto is a large diverse city, home to almost 2.8 million people, approximately half of whom are foreign-born.¹⁰ Over one third of Toronto residents (37%) hold a bachelor's degree or higher.¹¹ Approximately 23% of all people¹² and 29% of children¹³ in Toronto (aged 0–17 years) live in households with low incomes (based on the after-tax, low-income measure [AT-LIM]¹⁴).

Midsize to large supermarkets were identified using the following crite-

ria: (1) store size over 3,000 ft,² (2) ≥ 15 full-time employees, or (3) ≥ 40 total employees. Member-based stores not open to the general public (eg, Costco) were excluded. Stores were identified through the Centre for the Study of Commercial Activity's Greater Toronto Area Store database,¹⁵ the Toronto Employment Survey,¹⁶ and the Toronto Healthy Environments Information System database.¹⁷ The final store list was validated using websites of the major grocery store chains.

Instrument

The researchers conducted in-store surveys using the Toronto Nutrition Environment Measures Survey in Stores (ToNEMS-S),¹⁸ which was adapted from the original NEMS-S, a validated tool developed by Glanz et al¹⁹ to measure food availability, price, and quality. The NEMS-S tool demonstrated high interrater reliability ($\kappa = 0.83$ – 1.00) and test-retest reliability ($\kappa = 0.83$ – 1.00) for the availability measures, strong face and construct validity, and discriminatory ability for food measures between low- and high-income neighborhoods and grocery and convenience stores. Details are discussed elsewhere.¹⁹ Additional in-store factors that influence supermarket food purchases, informed by an evidence review, were assessed, including the presence of soda or candy at checkout aisles, sugary cereals at children's eye height, information about food displayed on end caps (ie, end of aisles), and linear shelf space of fruits and vegetables and energy-dense snack foods.

The ToNEMS-S data collection tool was adapted from a paper format to a smartphone application. Data were collected over 2 months in spring, 2015 (from March 30 to April 27, and from May 19 to 25). The cross-sectional design of this study measured fruit and vegetable availability and price at 1 point in time, which precluded control of seasonal effects. This limitation was mitigated by selecting a midseason period. Ten trained field researchers conducted the in-store assessments after a 2-day training session. Preliminary fieldwork was conducted during the training session and debriefing sessions with raters were completed to ensure interrater agreement. Previous

work done by the team using the same training methods found interrater reliability for the shelf space methods to range from good (intercorrelation coefficient [ICC] = 0.858) for canned fruit to excellent (ICC = 0.996) for fresh vegetables, with excellent reliability across items (ICC = 0.940).²⁰ The ToNEMS-S included ethnocultural food items for use in Toronto¹⁸ and showed high interrater reliability for availability ($\kappa = 0.91$), price (ICC = 0.964), ethnocultural accessibility (ICC = 0.981), and overall store score (ICC = 0.991). Although interrater agreement of the adapted measure was not tested, because the same tools and training methods were used, high interrater reliability was expected. Ethics approval was not required by the Research Ethics Review Board at Toronto Public Health because no human participants were involved in this study. Permission from stores was not required because publicly available information was collected. A letter with study details was provided to store managers or owners upon request.

Measures

The ToNEMS-S tool was used to measure characteristics of the consumer nutrition environment objectively in supermarkets, including availability, price, quality, and measured shelf space dedicated to healthy (fruits and vegetables) and less healthy (energy-dense snack) foods. These outcomes were analyzed by type of supermarket and area-level SES variables.

Outcome variables. Shelf space was measured in linear meters using a measuring wheel that was rolled on the floor alongside the shelves. Depth, height, and number of store shelves were not taken into consideration, consistent with previous research.²⁰ Shelf space was assessed using the ratio of linear meters of shelf space dedicated to fruits and vegetables (eg, fresh, frozen, and canned fruits and vegetables) to linear meters of shelf space dedicated to energy-dense snack foods (eg, salty snacks, cookies and crackers, candy, and doughnuts). The availability of 8 fruits, 11 vegetables, and a soda and chips combination (2-L bottle of Coke and 235-g bag of Lays Classic Potato Chips) were measured.

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