

## Perceived community environmental influences on eating behaviors: A Photovoice analysis

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### Abstract

People's perceptions of local food environments influence their abilities to eat healthily. PhotoVoice participants from four communities in Alberta, Canada took pictures of barriers and opportunities for healthy eating and shared their stories in one-on-one semi-structured interviews. Using a socioecological framework, emergent themes were organized by type and size of environment. Findings show that, while availability and access to food outlets influence healthy eating practices, these factors may be eclipsed by other non-physical environmental considerations, such as food regulations and sociocultural preferences. This study identifies a set of meta-themes that summarize and illustrate the interrelationships between environmental attributes, people's perceptions, and eating behaviors: a) availability and accessibility are interrelated and only part of the healthy eating equation; b) local food is synonymous with healthy eating; c) local food places for healthy eating help define community identity; d) communal dining (commensality) does not necessarily mean healthy eating; e) rewarding an achievement or celebrating special occasions with highly processed foods is socially accepted; f) food costs seemed to be driving forces in food decisions; g) macro-environmental influences are latent in food decisions. Recognizing the interrelationship among multiple environmental factors may help efforts to design effective community-based interventions and address knowledge gaps on how sociocultural, economic, and political environments intersect with physical worlds.

### Keywords

Canada; Eating behavior; Diet; Food; Environment; Photovoice; Community-based participatory research; ANGELO framework

## 1. Introduction

The rising overweight and obesity rates in developed and developing countries are associated with serious health implications (e.g., diabetes and cardiovascular diseases) and increased health care system costs (Di Cesare et al., 2016). Promotion of healthy eating is one response to this weight-related pandemic. Interventions targeting individual-level eating behavior changes (e.g., nutrition knowledge) have shown limited success with temporary

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positive effects on health (Sallis and Glanz, 2009). That is because eating behaviors are not individual choices disconnected from the environment where they are enacted (Brug, 2008). Rather, environment is a critical force that may restrict or increase people's abilities to make healthy eating decisions. Inherently of greater reach (Glanz et al., 2005; Sallis and Glanz, 2009), environmental strategies are more likely to produce sustainable changes, impacting risk factors and health outcomes by tackling the structural roots of unhealthy eating (WHO, 2004).

Socioecological approaches (Glanz et al., 2005; Sallis and Glanz, 2009; Story et al., 2008) are useful for researchers and policy-makers to better address (i) the complex, dynamic nature of the environment and (ii) people's interactions with and within the multiple and interdependent facets of that environment. Environmental barriers to healthy eating have been described by many quantitative studies (Brug, 2008; Caspi et al., 2012; Kamphuis et al., 2006; Sallis and Glanz, 2009). Specifically, limited availability of and poor access to neighborhood grocery stores (Raine et al., 2008), high prices of fruits and vegetables (Kamphuis et al., 2006), and influences of family contexts on children's energy expenditures and fat intake (Engler-Stringer et al., 2014; Sleddens et al., 2015) are some of the myriad of environmental determinants affecting unhealthy diet and obesity (Caspi et al., 2012; Lovasi et al., 2009). However, systematic literature reviews have shown mixed results regarding the association between environmental factors and healthy eating (Brug, 2008; Caspi et al., 2012; Kamphuis et al., 2006; Papas et al., 2007) (e.g., conflicting results for the relationship of dietary outcomes with accessibility (Caspi et al., 2012) or with seasonal influences (Kamphuis et al., 2006)), great variability in the operationalization of both diet- and environment-related measures (Caspi et al., 2012; Engler-Stringer et al., 2014; Kamphuis et al., 2006; Papas et al., 2007), and a lack of replication studies using validated instruments (Brug, 2008; Engler-Stringer et al., 2014). Inconsistent findings may also stem from studies that have not examined how interconnections between physical and non-physical environmental factors (Papas et al., 2007) shape people's abilities to adopt or maintain a healthy diet. Previous reviews reveal critical, but understudied ecological factors, for example, cultural influences on eating patterns (Kamphuis et al., 2006), and policy-related influences like hours of operation for local food outlets (Caspi et al., 2012).

Community-based participatory research (CBPR) methods can be used to address some of these knowledge gaps by shedding light on the complex nature of the food environment from community members' perspectives (Engler-Stringer et al., 2014). CBPR can help reveal environmental features relevant to people that may have been under-investigated, including delineation of proximal and distal environmental factors affecting their abilities to eat healthily. Building upon a collaborative, equitable partnership between communities and academics, CBPR is an approach that promotes active engagement of community members in all research phases for the development of effective, sustainable interventions that benefit the community (Israel et al., 2001). CBPR's goal of mobilizing the co-produced knowledge for social action is well-aligned with ecological, health promotion strategies targeting community health and well-being improvement (Nykiforuk et al., 2011; Wallerstein et al., 2011).

PhotoVoice is a CBPR, qualitative method grounded in the Freirian approach to critical consciousness, feminist theory, and community-based approach to documentary photography (Wang, 1999). In this relatively new participatory method (Foster-Fishman et al., 2005), community members take photographs of their everyday realities with the objective of sharing their perspectives with the researchers on a topic under consideration, revealing the meanings and significance behind each image. The visual images trigger reflection, dialogue, and empowerment for social change among participants (Foster-Fishman et al., 2005; Strack et al., 2010; Wang, 1999). Through the discussion of the visual representation (i.e., photo-stories), researchers can gain a better understanding of the community members' perceptions and experiences, by seeing what the insiders see and hearing about the meaning of those images in the participants' own words. This community understanding of the relationships between people and their surroundings is crucial for refining measures and methodologies used to estimate the impact of environmental factors on healthy eating, and to address the conceptual gaps in understanding about the fundamental, defining characteristics of a community food environment. Further, this community knowledge can bring local experience and expertise to the development of policies and practices (Foster-Fishman et al., 2005) that aim to enhance local food environments, thereby increasing potential for intervention uptake and success (Strack et al., 2010).

The Photovoice literature on eating behaviors (Castellanos et al., 2013; Kramer et al., 2010) is small, but still growing. Few Photovoice studies (see, for example, Findholt (Findholt et al., 2011) and Watts (Watts et al., 2015)) have explored the interconnections between different environmental attributes, people's perceptions and food decisions in the light of socioecological approaches. This study builds upon the strengths of socioecological literature on food environment (Sallis and Glanz, 2009; Story et al., 2008; Strack et al., 2010) and reaps the multitude of benefits associated with the Photovoice method (e.g., critical dialogue allowing for in-depth exploration of issues (Castellanos et al., 2013; Foster-Fishman et al., 2005; Kramer et al., 2010; Wang, 1999); participants' empowerment (Foster-Fishman et al., 2005; Wang, 1999); and policy advocacy (Kramer et al., 2010; Wang, 1999)). By integrating both approaches, this study helps expand the current limited understanding of how multiple environmental factors are interconnected in shaping people's food decisions in order to inform health policies and programs. Thus, the purpose of this study was to identify the barriers to and opportunities for healthy eating among residents of four communities representing the heterogeneity of urban communities.

## 2. Method

Healthy eating data used in this study came from a larger PhotoVoice project that investigated residents' perceptions of how their community environment influenced their perceived abilities to be physically active and eat healthy food. This PhotoVoice project was the qualitative component of a three-year CBPR project, which aimed to examine the role of community environments in healthy behaviors and chronic disease prevention in different municipal contexts (Nykiforuk et al., 2011). Specific methods pertaining to the current analysis are described below. Ethical approval for the overarching project and PhotoVoice was granted by the Health Research Ethics Board (Panel B), University of Alberta.

## 2.1. Participants

Multiple purposive sampling strategies were used for participant recruitment from the general population, including advertisements in local newspapers, flyers posted in key community locations, and e-mails through local organization mailing lists. A total of 35 individuals participated across communities: 74.3% women; 11.4% were under the age of 24; 71.4% aged 25–64; 17.2% aged 65 or more; and 40% with household income of less than \$50,000 CAD per year (Nykiforuk et al., 2011). A \$30 CAD grocery store gift certificate was provided to each participant in appreciation of his/her participation. All participants provided informed consent.

## 2.2. Settings

Data was collected in four communities in the province of Alberta, representing a spectrum of urban communities as defined by Statistics Canada (Statistics Canada, 2012), which categorizes urban municipalities into small, medium, and large centers, depending on their population size. The Bonnyville and St. Paul are two small population centers (each with populations of about 5000). North Central Edmonton is a community located in the City of Edmonton, a large population center (population approx. 40,000). The Medicine Hat is a medium population center (population approx. 60,000). Detailed information about these municipalities can be found elsewhere (Nykiforuk et al., 2011). These four communities were chosen because of research team members' previous CBPR projects with these municipalities, which offered an opportunity to create sustainable health interventions (Nykiforuk et al., 2011). Their food environments differ from one another, particularly when comparing relative availability of fast-food restaurants to non-fast-food restaurants (e.g., family-run buffets and ethnic restaurants). Data (unpublished) obtained from the food environment audit tool used in the large CBPR project showed the fast-food restaurants represent 59.1% of the total food outlets in the medium population center. The diversity of the food environments in the studied small and large population centers is more evident, where fast-food restaurants account for only 22.4% and 12.6%, respectively.

## 2.3. Data collection

PhotoVoice activities were conducted between May and July 2009. Data gathering involved baseline and follow-up interviews interspersed with a photo-taking period. In the baseline individual semi-structured interview (prior to photo-taking), participants were asked to share their general perceptions of their community environment, and their physical activity and eating behaviors (e.g., “when you think of community, what does that bring to your mind?”). They then received instructions about how to use the digital camera and were given two weeks to take photographs on the general study topic, i.e., described as community elements that made it easier or harder for them to be physically active or eat healthy food. The photographic mission was not prescriptive; rather, participants were encouraged to freely interpret what community environment, physical activity, and eating behaviors meant to them and - critically - what images to capture in photographs to best portray those meanings, and the interrelationships among meanings.

After two weeks, the cameras were collected and the research team printed all photographs. In the follow-up individual semi-structured interview, participants were given copies of all

their photographs, and were asked to select the photographs most meaningful to them for in-depth discussion with the researcher. This interview was participant-driven: the participants discussed what promoted and hindered their physical activity and healthy eating by telling the stories associated with each of their “most meaningful” photographs (photo-stories). The follow-up interview guide contained questions and probes to encourage participants to share the stories behind of the photograph chosen, by telling their reasons for taking that photograph and what it represented to them (e.g., “why did you take that picture?”; “I’d be interested to hear your thoughts about that”; “does this picture raise any community issue for you?”).

Trained graduate research assistants conducted the interviews and an observer took notes. The baseline and follow-up interviews lasted 60 and 90 min, respectively. Interviews were digitally recorded and transcribed verbatim. A detailed description of the PhotoVoice methodology is provided elsewhere (Nykiforuk et al., 2011). Out of 1320 photographs taken (on average, 41 per participant; range 9–182), 457 of them were discussed in the follow-up interviews (on average, 13 per participant; range 8–30). In 20.4% of the discussed photographs, the topic raised by the participant was related to healthy eating.

#### 2.4. Data analysis

Only material from follow-up interviews on eating behaviors was analyzed in this paper: the baseline interview focused on general community environment and was extraneous to the specific research question addressed here. Findings on physical activity were published elsewhere (Belon et al., 2014, 2015). The photographs’ contents were not coded separately from the interviews that discussed them. In the PhotoVoice method, photographs are meaningless if not accompanied by participants’ voices; the photographs are the means to bring forward the participants’ stories and the meanings of the images to them (Wang, 1999).

In the thematic analysis, two researchers (APB and LMN) used an inductive approach and independently line-by-line coded the interview transcripts. The entire research team worked together to organize codes in themes; discrepancies were discussed until consensus was reached. Researchers identified all themes that contributed to addressing the research questions, rather than quantifying (or limiting analytic focus to) the most commonly occurring codes.

The emergent themes were then organized (deductive approach) according to a socioecological framework developed to dissect obesogenic influences in the environment, well-known as the Analysis Grid for Environments Linked to Obesity (ANGELO) framework (Swinburn et al., 1999). The framework divides environmental influences on physical activity and eating behaviors into two levels (macro and micro) and four types of environment (physical, sociocultural, economic, and political). The macro-environmental sector refers to broad infrastructure (e.g., food advertising and health systems), whereas micro-environments encompass local settings (e.g., workplaces and homes). Concerning the types of environment, (1) physical environment is characterized as available resources in the environment (e.g., soft-drink vending machines in worksites); (2) sociocultural environment refers to values, attitudes, and beliefs towards (un)healthy behaviors (e.g., peer pressure to

eat in fast-food restaurants); (3) economic environment is defined as costs related to (un)healthy behaviors (e.g., high cost of fruits and vegetables in convenience stores); and (4) political environment includes policies and formal and informal rules (e.g., lack of household rules for children concerning food behaviors). The main advantages of the ANGELO framework are its simplicity and succinctness, as well as practicality for targeting interventions (Raine et al., 2008). QSR International's NVivo 10 software was used to code, organize, and analyze the data.

Finally, for a better understanding of the interrelationships between themes organized according to ANGELO framework, the research team used meta-coding techniques. Meta-coding allows for teasing out the relationships between the themes previously identified in order to create a small number of overarching meta-themes, which are presented in the Discussion section.

### 3. Results

The physical, sociocultural, economic, and political environmental influences reported by the participants are summarized in Fig. 1. These emergent themes were similar across the different demographic groups and communities, contributing to broad insight on the general nature of community food environments. For this reason, results are not disaggregated here. It is noteworthy that, when reflecting on their own experiences, some participants shared their perceptions of how other community members may interact with and within the local food environment.

While photographs portrayed physical infrastructure of the food environment (e.g., grocery stores and restaurants), participants' photo-stories transcended availability- and accessibility-related topics. The photographs served as gateways for discussion of more intangible aspects of the food environment, such as social interactions (sociocultural), fast-food prices (economic), and food regulations (political).

All themes refer to micro-environment, unless otherwise indicated, as this is consistent with what was shared by participants. The themes for each type of environment are shown in separate subsections to facilitate the presentation of findings. Themes were also interconnected, revealing the complex relationships among environmental types and levels. For instance, a participant noted that, while the availability of food outlets in his community (physical) plays a role in his family's eating behaviors, it also matters if grocery stores have fresh, healthy product selection (physical) (Fig. 2). Aligned with the availability of food outlets (physical), a participant explained that restaurants create a food consumption destination that attracts locals and outsiders to their community (sociocultural) (Fig. 3). Another participant reinforced her preference to support local, small businesses (sociocultural) closer to her home (physical) over paying less in large chain supermarkets (economic) (Fig. 4). Yet another participant stated that, despite the easy access to a local farmers' market (physical), she is deterred from shopping there due to its limited hours of operation (political) (Fig. 5).



### 3.1. Physical environment

Three themes were classified in the physical environment: availability of food outlets; availability of (un)healthy options in food outlets; and accessibility to food outlets. While many participants discussed the importance of having food retailers in their communities, some described how community members have coped with the lack of local grocery stores. For example, a participant explained that: “[People in her community] go to the dollar store and a lot of shopping is done there [...] There is nowhere else to shop [...] There is no place to buy fresh vegetables [...] [dollar store is] filling the need right there.”

Availability of food outlets and the availability of healthy options within them were considered equally influential. However, many participants were skeptical about whether people actually purchase healthy food when it is available. A participant pondered: “You can’t get anything healthy at [fast-food restaurants], you can still make some healthier choices at [another fast-food restaurant], but I mean, I think their salads are like 5% of their sales or something. I mean you can make healthier choices there, but I don’t think people typically do.”

Food outlet accessibility was discussed by most participants in terms of distance from home to the food outlets and availability of public transit, and also relative to the existence/lack of signs to make people aware of community amenities like farmers’ markets and greenhouses. A participant, for instance, complained that: “They don’t have a sign right by their farmers’ market as you come in saying ‘farmers’ market’, and it is a big building and there [are] a lot of things going on. I mean, somebody just coming in wouldn’t realize this was a farmers’ market. So, I think that is something they should look at.”

### 3.2. Sociocultural environment

Six themes were identified as elements of sociocultural environment: social and cultural preferences; growing your own food; social importance of food outlets in the community; support to local food businesses; social interactions; and fast-food advertising. In the social and cultural preferences theme, most participants described why they go (or not) to some food outlets, particularly fast-food restaurants. Participants often reflected on their own experiences in the context of other people’s (un)healthy food practices. Time constraints caused by busy schedules was identified as rationale for eating out, as can be seen in this quote: “I think one of the biggest barriers is time [...] if I get out of here at 6:00 p.m., I don’t feel like going home and making stir fry or a big salad. [...] I think families are, mom works late and it’s ‘oh I will pick up a bucket of chicken’, right? Or ‘let’s order pizza tonight’, so I think that time is a barrier for sure.”

Novelty and reward seemed to influence food decision-making in the face of time constraints. Some participants explained that they wanted to treat themselves to something they could not duplicate at home, as exemplified here: “[...] when you go out, you want to pick something off the menu that you can’t, you don’t normally make at home. Nothing tastes like say a [...] burger from [fast-food restaurant].” Another participant said: “I know that [fast-food restaurant] try to offer healthier options now, which is fine. But I don’t want to go to a fast-food place and have something healthy. I am not interested that way. If I am

going there, I am going for something greasy [...] if I want healthy, it is easier to go make something myself, right.” Another participant shared the same opinion: “Well, if you really want to eat healthy, you stay home and make your food yourself.”

Growing their own food was closely connected with personal values as well as the integration of a healthy diet into some participants’ lives. When showing a photograph of garden tools, a participant said: “[...] my wife does some gardening. [...] last year she grew a lot of vegetables [...] the carrots were a big hit with the kids last year, they loved them.” Having a chemical-free vegetable garden also appeared to be appealing, as described by another participant: “[...] you are always kind of worried about all the toxic stuff in your food, so it is much safer to grow your own food. At least, we know we don’t put chemicals on it.”

Some participants emphasized the social importance of local food establishments, such as cafeterias and farmers’ markets, as a defining element of their community’s identity. For example, when describing a photo of a local corner store, a participant highlighted that, although it is “just a corner store, it is one of those things that completely solidifies the physical boundaries or destinations that make up your community.” Further, the intrinsic value of local food was central for some participants, especially those who emphasized the importance of supporting local businesses, regardless of food prices. A participant explained “[...] you try to give some business to the people there [farmers’ market] [...] it [is] like a little bit more [expensive] than the store, but I am going to buy some there all the time, because I want them to stay here in our area.”

In addition to the satiety and food rewarding elements, the motivation to eat out seemed to be driven by the opportunity to socialize with family members and friends. Local, small food outlets and, more frequently, fast-food restaurants (particularly in the middle-sized population center), were seen by most participants as gathering places facilitating social interactions. One participant explained: “[Fast-food restaurant] is actually a nice meeting place. When I walk down there, I meet all sorts of neighbors in the summertime [...] seniors walk over there for ice cream.” Another noted that: “If any of the kids have dance recitals, or soccer games, we would typically go to that [fast-food restaurant] and meet up as a family and all go there and have like an ice cream together.”

The influence of food industry, and its association with obesity trends, did not go unnoticed. Several participants commented on the deceitful nature of fast-food advertising and promotion strategies, which are a macro-level environmental factor. A participant, for instance, noted: “There [are] weight issues in our society and it seems to be more and more of a problem. You see the advertisements saying come down and get your kids a healthy meal and they can play in the park [...] I would bet their [children’s] meal, even though it has apple slices, it also comes with caramel sauce and I am sure their grilled cheese sandwiches [...] are probably jam packed with whatever to make them taste a little bit better than just making a grilled cheese at home [...] I think they misrepresent their food as healthy.”



### 3.3. Economic environment

Affordability and fast-food prices were the two themes classified in the economic environment. Many participants revealed how financial cost plays an important role in people's decisions of where to buy groceries and eat out. When asked about how busy a fast-food restaurant was, a participant answered: "Places like that, that are cheap, you are always going to get lots of people, here, because I think cost in [town] is a big factor, in terms of some of the eating spaces that you would see. I don't think health is a big factor at all. I think it is cost that makes a difference in terms of how busy places are." Food costs were also implicated in the description of the grocery shopping behavior of another participant: "I shop at [warehouse club] [...] it is typically the cheaper [...] I do stop at the [local grocery store], for kind of last minute stuff [...] I will go and pay the extra for the milk." Some participants also discussed the higher costs of vegetables, fruits, milk and other healthy items, often leading themselves and other people in their community to consume more unhealthy food. A participant said about a fast-food restaurant chain: "their food is cheap, right? And we are in financial difficulties right now, and you know healthier food seems to be more expensive, sometimes."

A few participants also emphasized that the pricing strategies at fast-food restaurant chains – a macro-environmental factor – often encourage people to eat more unhealthy food for a lower price, as reported here: "We all eat there, when we get those coupons, you know the two for one coupons [...] You can tell when those have come out in the mail, because everyone on the block is taking their little coupons down to [fast-food restaurant] [...] I never eat at [fast-food restaurant] except for, 'oh I got these coupons'." The pricing strategies at these chain restaurants also concerned some participants as creating competition for local, small food businesses: "[Food at fast-food restaurant] is so cheap [...] and they are all fast-food places that are corporations [...] so they have a chain thing. The ones that have failed are the individual businesses."

### 3.4. Political environment

Five key themes were considered part of the political environment: family food rules; school rules and nutrition; food outlet rules; community projects encouraging healthy eating; and food regulations. Some participants shared their family rules with respect to eating out (sociocultural); rules were often related to fast-food restaurants. A participant explained how fast-food restaurants were associated with celebratory occasions: "We don't eat out fast-foods very much. You know, we have the special deals [...] probably father's day my kids take me out or something, or mother's day." For others, fast-food venues were politicized as locations where foods embodied ethical stances that could be discordant with family values. This was illustrated with the behaviours of another participant who would not shop for ice cream in a fast-food restaurant because she did not "want [her child] to think that it is okay to always eat out at fast-food [restaurants]." For this participant, so pervasive is fast-food that obtaining ice-cream in this kind of food outlet could lead to "always" eating at fast-food venues, and efforts must be made to avoid that outcome.

School rules, school nutrition policy, and education were seen by a few participants as having a positive impact on healthy eating practices among children. A participant

highlighted the impact of school-based nutrition education on children's dietary practices in the long term: "Actually a school program having kids learn organic gardening. [...] [students] mix the compost in with the dirt, and they plant their seeds and they water them, and they tend to them until they grow up. And they have food at the end of it [...] That is starting really young [...] it was probably necessary, because at the 20-something, if they are not gardening now, they probably won't." While the previous quote refers to a local school policy (i.e., micro-environmental setting), other participants described school policies guided by the provincial government (i.e., a macro-environmental sector), for example: "Well [schools] have that new thing, oh that is a provincial thing, there is no more like pops or candy bars and stuff in the schools, in elementary schools or whatever, so they can't just buy junk [...] whatever they have at the office is healthy stuff. They are not regulating what you are allowed to bring in the school or not, but I know in the grade one class they have to eat their sandwich before they can eat anything else that they have."

When availability of fresh produce in local food outlets was not an issue (physical), hours of operation seemed to limit people's access to healthy food, particularly in the local grocery stores and farmers' markets. This participant's quote illustrates many other participants' complaints: "It makes it impossible for me [to get to farmers' market on Fridays]. My wife might go at lunchtime if she can get away. But it would be a way better thing for a Saturday I think, myself personally." The existence of community projects encouraging healthy eating emerged as another theme. An example was given by a participant: "I know [local project is] involved with the [community organization], and I know they funded some bags to help people get their food stuff home [...] My kids like the [food from the community organization]."

The last political environment-related theme was food regulation, which belongs to the macro-environmental level. Few participants questioned the role of the government in regulating family farms and farmers' markets, as illustrated by this quote: "I think the thing that has been a problem for all of Alberta's farmers' markets and vendors of that nature is food safety [...] to have a separate kitchen which is the requirement, sometimes it is – it is too difficult for them. That is too bad [...] Is it any safer than eating in some of our restaurants? I don't know if it is or not [...]. Why should that be a restriction on whether you can make and sell something at the farmers' market?"

#### 4. Discussion

This study reveals community-derived insights about the influences of community micro and macro physical, sociocultural, economic, and political environments on healthy eating. Although themes were classified separately for analytical purposes, the photo-stories revealed the reported influence of community environment factors as interrelated. The influence may also be additive when there are multiple facilitators or barriers for health eating (e.g., non-automobile ownership and poor public transit limit people's access to distant grocery stores). In an effort to better describe how the environmental factors seem to be interconnected within and across participants' photo-stories, the emergent themes were combined into overarching meta-themes, which are presented below.

#### 4.1. Availability and accessibility are interrelated and only part of the healthy eating equation

While availability and access to food outlets influence people's eating behaviors (Caspi et al., 2012; Findholt et al., 2011; Papas et al., 2007; Raine et al., 2008), this study showed a myriad of other, non-physical elements in the environment that interplay with one another, reinforcing findings in recent literature (Brug, 2008; Cannuscio et al., 2014; Smith and Cummins, 2009). Participants' decisions about what, when, and where to buy and consume food were initially shaped by what was available in their community environment, but then nuanced by considerations of cost, social and cultural contexts, and by the rules and policies in place.

Consider, for example, the intersection of multiple environmental influences in poor/limited grocery store availability. Many participants described the insufficient number of grocery store options close to their homes, where they could find a variety of low-cost and good quality food, including fresh produce. While most participants felt affected by the poor access to affordable and fresh foods in local communities to some extent, some of them explained that they usually drive outside of their community to chain grocery stores or warehouses to purchase that kind of food. However, transportation, marked by poor access to public transit (if available at all) or no private vehicle, were considered by few participants as a barrier limiting their and other people's food purchases and, consequently, food choices. For those people, grocery shopping would involve biking long distances to chain grocery stores or walking to nearby convenience stores (or even dollar stores), which usually sell energy-dense food and have limited healthy food items available, typically at a high cost (Dean and Elliott, 2012; Findholt et al., 2011; Fleischhacker et al., 2011; Lovasi et al., 2009; McDermott and Stephens, 2010; Smith and Cummins, 2009). Although household income inequalities were not the focus of this study, these findings raise questions about the accessibility to healthy and affordable food options by low-income families living in communities with a precarious food environment and deficient public transportation system (Caspi et al., 2012; Darmon and Drewnowski, 2008; Patrick and Cheesbrough, 2012). Critical, here, is the influence of the macro-political environment on the accessibility to food outlets in the community. It is often municipal policies that restrict (or allow) certain food outlets from opening in different areas of the community through zoning or restrictive covenant agreements. The macro-political environment influences people's accessibility to a variety of food outlets in their own community environment, defining the relative ease or difficulty of obtaining food and ultimately shaping people's eating behaviors.

Macro- and micro-environmental policies that affect accessibility to healthy food illustrate the interrelationship between physical and non-physical environmental attributes; i.e., what is available in the community may not be necessarily accessible (Dean and Elliott, 2012; Glanz et al., 2005; Sallis and Glanz, 2009; Story et al., 2008; WHO, 2004). For instance, community food projects (e.g., local food box programs) and farmers' markets were seen as examples of opportunities to access healthy food. However, participants also noted that local food rules (e.g., business hours) and regulations and policies (e.g., new federal inspection regulations affecting local, family cattle farmers' businesses) serve as impediments to community residents' ability to purchase local, healthy food. Limited hours of operation of

food outlets were reported to preclude people from purchasing healthy food at both local grocery stores and farmers' markets. Limited hours of operation for food outlets is of concern because past research suggests a relationship between limited hours and lower fruit and vegetable consumption (Caspi et al., 2012).

#### **4.2. Local food is synonymous with healthy eating**

A desire to support local food outlets (e.g., farmers' markets and family-run food establishments), affiliation with community food initiatives (e.g., food box programs), and growing food (either in community gardens or backyards) all contribute towards people's food consumption decisions (Blake et al., 2010; Castellanos et al., 2013; Findholt et al., 2011). The different themes that emerged in this study revealed that the meaning of local food is constructed relative to physical and social boundaries of the community environment: "local food" represents food that is grown, produced, or prepared within and by the community. Healthfulness is a secondary - and intrinsically related - meaning attached to the idea of local food. The "local" component of local food seemed to enhance food proprieties and health benefits for participants; therefore, consuming local food seemed to qualify eating as healthy.

Some participants described their choice to patronize locally-owned food outlets and local food projects even when they have to sacrifice price and proximity. Participants also said they consume locally grown produce and homemade foods because they are healthy ("safe and tasty too"). In this way, anti-consumerism (Autio et al., 2013; Monteiro et al., 2015) ideals seemed to play little role on their decisions; the emphasis was on the intrinsic value of the local food to the participants. Similarly, participants' decisions to grow their own food seemed to be strongly shaped by their perceptions of the health and nutrition benefits, safety, sustainability, quality, and tastiness of the fresh produce.

These study findings add to the current literature showing that food provenance has become a factor of increasing concern and interest (Autio et al., 2013; Blake et al., 2010). Social movements and civil society organizations have advocated for local food to encourage healthy eating, while also supporting local, family farming communities. Supporting local farmers is frequently viewed as a critical component to maintaining vibrant communities, while also preserving local food cultures and food security. Additionally, supporting local foodways can be seen as a means of protecting environmentally sustainable food systems (Autio et al., 2013; Monteiro et al., 2015). All of these discourses advocating for the consumption of local food among participants seemed to be anchored in the idea of avoiding globalized foods and food practices – a synonym of unhealthy eating. In this context, local food emerges as an alternative, albeit frequently expensive (Blake et al., 2010), healthy food.

#### **4.3. Local food places for healthy eating help define community identity**

Local food businesses (e.g., restaurants and farmers' market stalls) and community-based food initiatives (e.g., food box programs and community gardens) were linked with the idea of healthy eating and seemed to evoke a common, shared (and desirable) community identity. Buying and consuming healthy food that is grown, produced, and prepared locally

was seen as a way to promote connectedness with the community – as if it consolidated food shopping destinations and increased the quality of life in the communities.

In the participants' photo-stories, the location of food outlets within the community territory revealed attached meanings and social values, thereby transforming food outlets into food *places*. The food places seemed to be instrumental in both identification of community-territory boundaries and creation of a singular identity for the community, contributing to the definition of social fabric of the community.

#### 4.4. Communal dining (commensality) does not necessarily mean healthy eating

Social interactions are an important element in people's food environments (Cannuscio et al., 2014). Commensality has been emphasized as part of healthy eating because it evokes the ideal of sharing meals with others (Watson, 2006) and the practice of eating at a slow pace in a suitable environment (Brazil, 2014). The culture of eating in company of others also carries emotional and symbolic values that foster conviviality and quality of life (Brazil, 2014; Watson, 2006); importantly, homemade meals are central in the art of eating together. An example of this comes from an innovative approach (Monteiro et al., 2015) adopted in the Brazilian Dietary Guidelines (Brazil, 2014) that takes the sociability of eating behaviors into account when discussing opportunities for healthy eating, especially in home settings. In addition to the focus on meals instead of nutrients, this guideline highlights the importance of preparing and enjoying meals with family and friends as part of a strategy to promote healthy eating behaviors.

However, the current study findings reveal a sociocultural preference for eating fast-foods together in fast-food restaurants. Indeed, fast-food restaurants seemed to have become a favorite place for people to socialize, acting as a location for strengthening social connections among family members and friends. This preference may be driven by fast-food restaurants' low costs (Powell et al., 2013) vis-à-vis local restaurants' prices, as well as the use of high-energy foods as rewards and treats (Findholt et al., 2011) – a topic discussed in detail below. While socializing in fast-food restaurants is associated with high socioeconomic status in developing countries (Watson, 2006), in these four Canadian communities they were merely treated as places for entertaining family and cementing social bonds at a low financial cost. It is worthy to note that family food rules (political) and preferences (sociocultural) are illustrative of personal values that, in turn, reflect (and resist) hegemonic societal norms, regulations and political environments. Fast-food restaurants can be places where families celebrate special occasions and perform their social identities. For example, some families may consume food at venues that illustrate the social location they aspire to, while others choose venues that reflect their knowledge and comfort with the social location they inhabit (Beagan et al., 2015; Watson, 2006).

Not only families, but older adults were also socializing at fast-food restaurants, because they get discounts, receive free coffee refills, and can spend unlimited time visiting with their peers without being strongly pressured to leave. While part of restaurant marketing (a macro-economic factor), this strategy also strengthens social ties among older people in the community. The drawback, however, is that the elderly population – a generation who were less exposed to fast-food's influences – may begin consuming more processed unhealthy

foods. Taken together, these two findings are concerning: fast-food incentives combined with a friendly atmosphere for socialization may be adversely affecting people's food behaviors, particularly among seniors and families.

Participants often drew on photo-stories of positive school food policies in their communities such as replacing ultra-processed food and drink products with healthier options in school cafeterias. These policies were seen as essential to comprehensive, effective interventions to support the younger generation in healthy eating practices that may help revert the increasing trend of frequently consuming ready-to-eat foods and eating out in fast-food restaurants with peers. Participants also suggested the incorporation of gardening activities and mandatory cooking lessons into formal school curriculum. School policies regarding food availability and sales (Raine et al., 2008; Sallis and Glanz, 2009) and gardening activities (Findholt et al., 2011) have been recommended elsewhere as strategies to encourage children and families to increase their consumption of produce and home-prepared and -cooked meals.

#### **4.5. Rewarding an achievement or celebrating special occasions with highly processed foods is socially accepted**

Study findings revealed that use of highly palatable, but high-energy foods (especially foods bought at fast-food restaurants) as a "reward" (for self or others) seemed to be common place. Apart from costs (Dean and Elliott, 2012; Findholt et al., 2011; Lofink, 2012; Smith and Cummins, 2009) and convenience of such foods fitting into busy schedules (Castellanos et al., 2013; Darmon and Drewnowski, 2008; Dean and Elliott, 2012; Findholt et al., 2011), people also reported celebration of important events (Watson, 2006) and tastiness (Castellanos et al., 2013; Darmon and Drewnowski, 2008; Glanz et al., 2005; Lofink, 2012) as reasons for using these high-energy foods as rewards. In the photo-stories, participants clearly portrayed the health risks of consuming ultra-processed foods, but that seemed to play a minor role in their food decisions related to special occasions (e.g., birthday parties and sport events) or when they want to treat themselves with something they could not duplicate at home. When talking about parental rules, participants defined those circumstances when eating out with their children, particularly in fast-food restaurants, may be allowed. That differs from previous studies showing family food rules were more related to encouraging healthy eating habits in home settings (Dean and Elliott, 2012; Lofink, 2012; Watts et al., 2015). Rewarding children and adults with highly processed foods, even if only at special occasions, is concerning: it attaches positive emotional and symbolic values to consumption of nutritionally poor foods and may send a wrong message about food intake.

#### **4.6. Food costs seemed to be driving forces in food decisions**

Food costs can be considered a key factor in people's decision of what, when, and where to purchase and consume food (Cannuscio et al., 2014). Most participants described healthy items as costing more than unhealthy items; they also mentioned that fast-food restaurants would have a competitive advantage over local, small restaurants because of coupons, promotions, and the comparatively low cost of fast-food preparation. These findings corroborate recent literature showing that prices of unhealthy foods, such as sodas and pizzas, have reduced over time (Duffey et al., 2010) as well as relatively high price



differences between healthy and less healthy food-based diet patterns per person a day (Fleischhacker et al., 2011; Powell et al., 2013; Rao et al., 2013). This combination of an increase in healthy food prices and real reduction of unhealthy food prices (Darmon and Drewnowski, 2008; Powell et al., 2013) seemed to have important implications for people's dietary behaviors.

Participants confirmed findings from other studies that showed the lower prices of unhealthy items purchased away-from-home (Castellanos et al., 2013; Duffey et al., 2010) would make these types of ultra-processed foods even more appealing. On the other hand, pricing strategies of fast-food restaurant chains and manufacturers of highly processed food products (e.g., lowering prices and offering discounts and promotions) are heavily advertised through multiple media (Glanz et al., 2005) and that may influence people's perceptions of food cost even when a fast-food-based diet is more expensive than a healthy diet (McDermott and Stephens, 2010). Price regulation and policies subsidizing healthy food (e.g., fresh produce and dairy products) would be effective in the reduction of economic barriers faced by families, particularly those with low income (Glanz et al., 2005; Smith and Cummins, 2009; WHO, 2004), and could help decrease the socioeconomic inequalities in diet (Darmon and Drewnowski, 2008; Lovasi et al., 2009).

#### **4.7. Macro-environmental influences are latent in food decisions**

Across photo-stories, participants focused more often on micro-environmental attributes of their communities than those of the macro-environment. Yet, macro-environmental attributes played a foundational role in participant perceptions as implicated in a number of photo-stories, e.g., about strict government regulations (macro-environment) to farmers' markets that imposed barriers to family businesses (micro-environment).

Although macro-sociocultural environments are well-known for simultaneously shaping and mirroring people's beliefs and attitudes toward eating behaviors (Brug, 2008; Glanz et al., 2005; Smith and Cummins, 2009), findings showed that participants were more aware of the influences exerted by families, community environments, and other immediate surroundings (micro-environment). Participants perceived only the fast-food industry and municipal, provincial, and federal governments as directly influencing the nature of people's opportunities to eat healthy food. Fast-food advertising strategies (sociocultural) and prices (economic) were seen as shaping both food consumption and eating modes, whereas governmental regulations for community-based food initiatives (political) and provincial school nutrition policies (political) were perceived affecting the availability and accessibility of food outlets in each of the community environments.

This is of concern considering people's greater exposure to persuasive commercial advertisement on food and eating practices (Story et al., 2008). Indeed, the effects of this exposure were reflected in the participants' descriptions of their own and other people's eating practices. Some participants, for instance, when showing pictures of a fast-food restaurant chain, repeatedly and unintentionally mentioned its slogan to indicate that was a place for eating fresh food and, therefore, associated with a healthy diet. Although the present study did not focus on the meanings of healthy eating (Beagan et al., 2015), this is

clear evidence of the nuanced power of food advertising and marketing in shaping people's food beliefs, including their interpretations of what a balanced, healthy diet is.

While providing people with knowledge on diet is an important element of health promotion, raising awareness about the macro influences of media advertising and TV shows may be more effective as people are frequently exposed to aggressive advertisements on food and eating practices (Dean and Elliott, 2012; Monteiro et al., 2015; Story et al., 2008; WHO, 2004). Important steps taken in this direction are the food media literacy initiatives led mostly by non-profit organizations (Dietz, 2013) and the inclusion of food-industry advertising strategies in food guidelines (Brazil, 2014) to support informed decision-making for healthy eating. In this way, people are encouraged to think critically about seductive food marketing and advertising strategies. Additionally, international and government agencies should take the lead in the regulation of food marketing, including the application of advertising restrictions (Dietz, 2013; WHO, 2004). An example is the Canadian province of Quebec that in 1980, instead of relying on food industry self-regulation, banned commercial advertising targeting children under the age of 12 (Raine et al., 2013). Given the lack of studies on overall macro-level sociocultural environment, and particularly on food marketing and advertising in the socioecological literature (Brug et al., 2008; Kirk et al., 2010), more research should be done to better inform population-wide strategies for supportive food environments.

This study brings important findings to the literature on food environments and dietary behaviors. First, it enhances the discussion of the broad influence of environment on people's dietary behaviors by identifying various domains of environmental barriers to and opportunities for healthy eating and revealing that the food environment is made up of a diverse range of attributes of physical, sociocultural, economic, and political environments. Second, it addresses an important knowledge gap in the literature by showing that, through community's perspectives, the environmental attributes are not separated factors affecting independently and unrelatedly eating behaviors. In contrast, this study reveals the interplay of environmental factors shaping how people interpret and interact with their food environments. The coupled use of PhotoVoice as a data collection method with ANGELO framework as a conceptual tool for data analysis was instrumental to capture these environmental interactions influencing eating behaviors. While physical attributes of the spaces are more easily portrayed, the stories revealed by the photographs transcended the availability- and accessibility-related topics. By dissecting each facet of the environment, while examining the interrelationships between environmental types and levels at once (Dean and Elliott, 2012), the framework helped reveal the complex nature of the food environment. Third, this study shows that some environmental features (e.g., the desire of supporting local food businesses) are missing in socioecological studies investigating food environments.

#### 4.8. Limitations and strengths

Common to many in-depth qualitative CBPR studies, the limitations of this research are related to the localized data collection, purposive sampling, and participant self-selection, all which may limit the findings' transferability. The present findings may be specific to the

Canadian urban communities and their general population (i.e., from which current study participants were recruited). Different environmental factors influencing eating behaviors may emerge from similar studies conducted in other geographic contexts (e.g., African American neighborhoods or Canadian indigenous communities) and/or with specific demographic groups (e.g., low-income single seniors or immigrant families with toddlers). The age and sex imbalance in the sample did not result in different perceptions of barriers and facilitators for healthy eating. Themes were similar across demographic groups and data saturation was reached. However, despite the efforts to recruit participants from across the entire population, some groups (e.g., visible minority immigrants) did not take part of this study; therefore, their perceptions may not be represented here.

The framing of the study purpose as “about healthy eating in your community” to participants during recruitment may have inadvertently focused their attention on micro-environment attributes, which were more predominant in the photo-stories than were macro-environmental attributes. The macro-environment was implicated as a latent factor in several topics discussed by participants, and may have been elaborated had a third interview been added to the data collection protocol. Conversely, if participants had been introduced to and asked specifically to talk about the various macro-environmental factors relative to healthy eating (rather than a focus on their community and this behavior), a different pattern may have emerged from the PhotoVoice data. This possibility creates a new opportunity to conduct a similar study with a specific photography mission that encourages participants to explore each category within the ANGELO framework while taking pictures in their community.

The use of PhotoVoice to reveal community insight and experience with their food environments is the main strength of this study. The combination of photographs and stories produced a rich qualitative dataset that would not be captured otherwise. Collecting community members’ voices evoked by their portraits of food environment revealed the real and experienced environment where dietary behaviors are enacted. A deep understanding of the concrete reality where people make food decisions and how they interact with and interpret their surroundings may be useful to practitioners for tailoring community-based healthy eating interventions. By revealing neglected environmental attributes in the current literature and the complex environmental interrelationships shaping eating behaviors, study findings may contribute to critical investigation of the food environment and determine the extent of the environmental influences.

## 5. Conclusions

This PhotoVoice study revealed community members’ perceptions of the environmental influences on their healthy eating behaviors. It showed that physical environmental features are only one of the driving forces of food environment. A myriad of interrelated environmental factors seem to shape people’s abilities to purchase and consume healthy food and may eclipse the influences of what and where the (un)healthy food is available in the community environment. Further research on complex dynamics of the local food environment and how it influences people’s dietary behaviors is warranted. ANGELO

framework can be a useful tool to reveal the broad range of environmental factors influencing eating behaviors.

Interventions targeting specific barriers in each environmental type one at a time are important; however, the complexity of food environments, as shown in this study, also critically needs to be addressed in order to increase the likelihood of population-level interventions to produce long-lasting effects. Health promotion strategies should be anchored in the understanding that people's behaviors are products of their interactions with their environment, recognizing that multiple forces seem to shape people's abilities to make healthy eating decisions. For example, bringing a farmers' market (physical) to a community where low-income working families are supportive of local food businesses (socio-cultural) is only one step to promote healthy eating. Affordable food options (economic) and convenient hours of operation (political) must complement the strategy. In another example, schools may ban sales of highly processed foods in their premises and incorporate food literacy activities into curricula (political). However, if students are not educated to critically interpret food marketing messages (sociocultural) in places lacking food marketing regulation (political), they may not adopt healthy eating behaviors.

Recognizing the multitude of the environmental factors as well as the sociocultural context of eating may help explain the failure or unexpected impact of community-based interventions that have narrowly focused on one or two environmental factors. The present findings and future work in this area can inform the design and implementation of tailored and culturally relevant community-level interventions for supporting the adoption of healthy eating behaviors.

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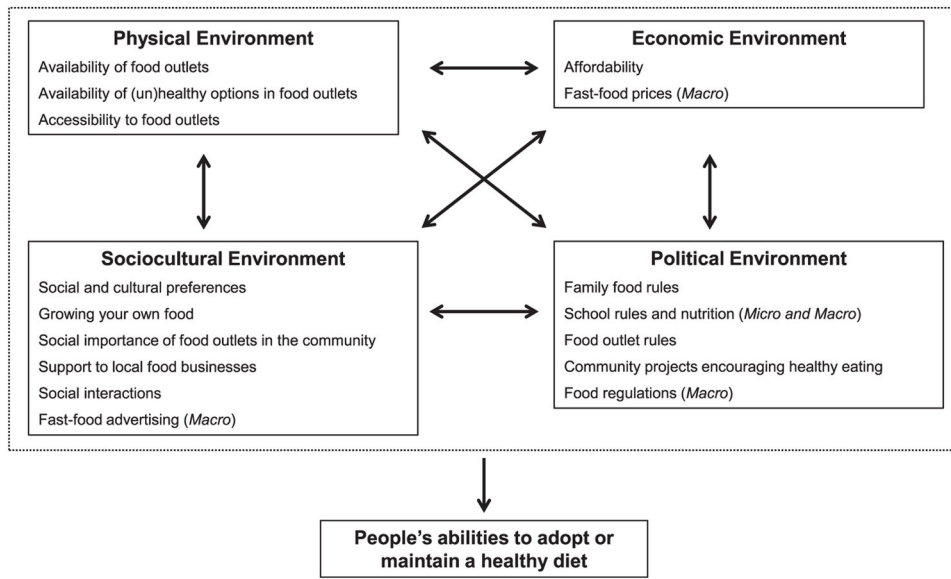
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**Fig. 1.** Participants' PhotoVoice themes on eating behaviors, according to ANGELO Framework.



"I think of, on the flipside of that, that is great to have a grocery store within a few blocks of home. The flipside to that both [supermarket chains] tend to have limited selection of a lot of good things [...] You don't get a lot of the good fresh produce, the selection is limited compared to other stores. So we may end up actually to have to drive farther away from home to get the food that we are looking for."

**Fig. 2.** Accessibility to food outlets (physical) and availability of (un)healthy options in food outlets (physical).



"[Having ethnic restaurants in the community] makes me really enjoy it more [...] and that I can bring other people to my community and let them experience it. It is just not always the same, you know, and so there is a ton of variety and that is really exciting."

**Fig. 3.** Availability of food outlets (physical) and its social importance in the community (sociocultural).



"It is like an old fashioned butcher, so like they bring fresh meat in. [...] it is really good quality meat, and we don't mind it is a little more expensive than [supermarket chain] might be. [...] But it is all fresh and you are supporting a local businessman [...] this is much more convenient for us, it is right in our community."

**Fig. 4.** Affordability (economic), support to local food business (sociocultural), and availability of food outlets (physical).



"Farmers' market does a pretty good job of putting up signs. They put up sandwich boards on the roads and stuff [...] They don't always have it at the right time of day. I think because they are sort of targeting an older market, I suppose. They tend to have farmers' markets during the day and I can't always go."

**Fig. 5.** Accessibility (physical) and rules limiting access to food outlets (political).