

**Localizing Production of Culturally Diverse Crops to Fulfill
Cultural and Nutritional Deficiencies for Toronto Immigrants**

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Abstract

This literature review synthesises research on food insecurity experienced by low income immigrant communities in Toronto, Canada, with a focus on the availability and accessibility of culturally diverse crops. Research indicates that explicit relationships between culture and nutrition are key aspects to immigrant food insecurity but can also be integrated through crop planning to fulfill community needs.

1. Introduction

Food insecurity is an increasingly prevalent condition experienced by many families and communities in Canada. This is especially common among non-European immigrants with low income who experience both cultural and nutritional food insecurity at a 7.6% higher rate than born-citizens. Food that is culturally and financially accessible and simultaneously fresh or locally grown is rarely available or accessed by immigrant communities. The lack of consideration for both culture and nutrition in available food perpetuates immigrant food insecurity and increases risk for related mental and physical health effects. The first part of the review will synthesise literature and reported experiences to provide insight on how the four pillars of food insecurity are represented in immigrant foodways in Toronto. The second section will provide insight on how urban agriculture has proven to fulfill each of the pillars, identifying both significant features and current limitations. These will be concluded with a discussion on the integration of culture and nutrition through crop planning which can curate food production to consumer preferences and needs.

2. Food Security

According to the United Nations Food and Agriculture Organization (FAO), food security is the availability of safe, nutritious food of sufficient quantity that is physically, financially, and culturally accessible for all consumers to meet their dietary needs and preferences for a healthy lifestyle (FAO, 2009). The nuances of this definition have been broken down into four pillars. The first three were established by the FAO in 2009 and a fourth has since been added (Loring et al., 2013). These pillars can help us better understand the complex dynamics between distribution and consumption, which facilitate food (in)security. For this review each pillar will be explained in the context of immigrant food insecurity in Toronto, Canada. Throughout the literature there is some deviation across reported experiences and preferences in relation to the four pillars, so there is a focus on studies conducted in Toronto, and supporting or diverging experiences will be identified when significant.

2.1 Availability

The first pillar of food security is availability, which refers to the production and distribution of food. It requires an adequate quantity and quality of food to fulfill the hunger and health requirements of the consuming population (Moffat et al., 2017; Lamalice et al., 2018). Culturally familiar foods are available at large in Toronto due to the high proportion of immigrants in the population (46%) (StatCan). Foods are imported from all over the world and distributed in many supermarkets and grocery stores, often categorized by specific cultural or ethnic groups (Bond & Feagan, 2013). Due to necessary importation, the nutritional value of produce starts to deplete approximately a week following harvest, so the desired health benefits associated with the same products consumed locally in the country of origin, are not available (Paliyath, 2011). Fresh, locally grown crops however, may be restricted to the environmental capacity of the growing environment, although this can often be extended by the use of greenhouses (Adekunle et al., 2011). Toronto was originally settled as farmland so agriculture is prominent in the Greater Toronto Area, however this is often limited to European based crops (Adekunle et al., 2012). The current food available presents cultural and nutritional tradeoffs which are not sufficient to achieve food security. This gap does not go unseen by the consumers themselves as it has been commonly reported through interviews that both freshness and diverse crop selection must be made available to fulfill their needs (Moffat et al., 2017). A Toronto study from 2013 reports specific crops that were identified by three different ethno-cultural groups to be unavailable locally or even as imports to ethnic grocery stores (See Table 1.) (Adekunle et al., 2011).

Table 1. Ethno-cultural crops unavailable in Toronto, Canada (Adekunle et al., 2011)

Chinese	South Asian	Afro-caribbeans
Bamboo shoots Fuzzy melon Okra Snow peas	Cocoyam Drumstick Indian Squash Okro Pointed gourd	African eggplant Bitter leaf Cassava Cocoyam Okra

		Smooth amaranth
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2.2 Accessibility

The second pillar is accessibility which indicates how the production and distribution of the available food reflects the resources, preferences, and abilities of the consumer base (Moffat et al., 2017; Lamalice et al., 2018). Access is often a more accurate indicator of food (in)security as financial barriers for the consumer can outweigh attempted availability of fresh, culturally familiar foods. As it stands the existing European based crops that are grown and distributed locally are significantly more expensive for consumers, and are often sold in organic stores and farmers markets accessible to a higher income bracket (Bond & Feagan, 2013). The cultural and financial inaccessibility is reflected in the percentage of food accessed at a farmers market compared to a supermarket or ethnic grocery store (see Table 2) (Adekunle et al., 2011).

Table 2. Food Distribution Methods Accessed by Toronto Immigrants (Adekunle et al., 2011)

	Chinese	South Asia	Afro-Caribbean
My farm or garden	7.2%	5.6%	7.2%
Farmers market	11.6%	10.9%	17.2%
Supermarket	77.6%	76.6%	76.0%
Ethnic grocery store	81.5%	75.4%	48.0%

While the demand for culturally diverse foods is high (\$33 million per month), it remains a niche product on the market which is reflected in the higher price point (Adekunle et al., 2011). Even food banks, which lie at the other end of the financial scale, have been reported to have low access rates by immigrant families because the food available is highly processed, culturally inaccessible and unfamiliar in terms of preparation (Moffat et al., 2017). In this case the resources and appliances needed to prepare these foods are often unknown or unfamiliar to the consumer (Moffat et al., 2017). Specific reports from study

participants refer to being unfamiliar with preserved and canned foods and how to prepare them (Moffat et al., 2017).

2.3 Utility

This leads to the third pillar, which is utility. This encompasses the ability and understanding of how the food available and accessed can be purchased and prepared (Moffat et al., 2017; Lamalice et al., 2018). It also refers to the understanding of information that accommodates food and how that correlates with one's health. This includes listed ingredients, preparation instructions, and nutritional information (Moffat et al., 2017). Utility is often a barrier for people who are not familiar with western food packaging, recommended nutrient requirements, or the language used to communicate the information (Barrett 2010; Obamiro, Doppler, and Kormawa 2003; Power 2008; WHO 2015 as cited by Moffat et al., 2017). Many immigrants have also reported that their experience with grocery shopping and reading food labels in Canada goes beyond the language barrier, to the cultural variance in understanding of health and nutrition (Moffat et al., 2017). Food security then requires support and shared knowledge of how food can be read and understood, especially when the majority of foods sold in supermarkets and grocery stores in Canada are processed and packaged. Resources like this are also requested directly from immigrant families who note that there is more emphasis on nutritional education as an indicator for how food relates to health and prevention of illnesses (Moffat et al., 2017).

2.4 Stability

The last pillar of food security is stability, which was added by Loring et al., 2013, addresses the sustainability of food security and food systems. This refers to the behaviour and reliability of availability, access, and utility over an extended period of time (Lamalice et al., 2018). Stability, or *instability*, is most commonly apparent through fluctuations in market distribution based on environmental changes, which

are rapidly increasing due to climate change. Imported foods are often shorted or arrive in much lower condition due to droughts and storms that affect the growing season. The effects of climate change are also prevalent through local production as the growing season is shortened or delayed. Immigrants are likely unfamiliar with the food seasonal to a local area, and with the impending delays of seasonal supply, updated communication and educational resources are required to maintain stability. Additionally, when food availability is fluctuating due to environmental changes there is also correlating fluctuations in food prices. This requires resources for how consumers can adapt their selection of foods to maintain their nutrient intake and budget. Evidently, from a resource perspective, stability refers to the need for adaptive management and consistent communication with the consumer base.

3. The Healthy Immigrant Effect

The Healthy Immigrant Effect is the result of gaps between immigration policy and current health and food systems. Canada's immigration policy establishes health expectations for incoming residents that are not sustained by our food system or healthcare, upon their arrival (Sanou et al., 2013). This is most prevalent in terms of adapted foodways, also referred to as dietary acculturation, which is the process of changed behaviour and customs that reflect the host country (Sanou et al., 2013; Mazur et al., 2003). While most immigrants are reportedly healthier than the Canadian-born population upon arrival, the forced adaptation to a new food system causes increased consumption of refined sugar and grains, sodium, and saturated fats that are prominent in western foods (Mazur et al., 2003). This leads to an increased risk of chronic disease, the most commonly reported being obesity and type II diabetes (Mazur et al., 2003; Adekunle et al., 2012). Resulting health issues become increasingly prevalent among generations following first arrival (Mazur et al., 2003). Effects also extend to mental health, specifically feelings of destabilization, isolation, stress and anxiety which are common amongst first and second generations (Moffat et al., 2017). Not only is this then a health risk for families and communities, it is a contradiction and flaw in the health and economic systems in the country. The cause and effect of this

reality can be identified as the cultural and nutritional aspects of food security that are rarely present simultaneously in consumers foodways.

3.2 Malnutrition

Nutrient deficiencies relating to dietary acculturation have not yet been studied among immigrants in Toronto, however there is related literature that can be used to inform this context. One study done in the United States compared the nutrient deficiencies between Hmong children whose families had immigrated to the USA, with the nutrient deficiencies of those born and raised in Laos (Mulasi-Pokhriyal et al., 2012). Results confirmed a positive correlation between acculturation and nutrient deficiencies and specified micronutrients that were prominently lacking amongst the US born children (Mulasi-Pokhriyal et al., 2012). Across the population studied there were deficiencies in Calcium, Iron, Vitamins A, D, P and fibre. US-born children showed higher intake of sodium, fats, oils and sweets and had higher BMI compared to children of the same age born in Thailand or Laos (Mulasi-Pokhriyal et al., 2012).

4. Urban Agriculture as a means to Food Security

4.1 Localizing Food Production: Current Practices and Barriers

Due to the various health effects that are symptoms of food insecurity, there is high demand for locally grown, fresh produce that is culturally accessible and affordable for immigrants (Adekunle et al., 2011). Currently there are many examples of urban agriculture initiatives in the GTA that are growing culturally diverse foods, at varying scales of yield. Spaces such as Black Creek Community Farm, Albion Hills Community Farm, and the Living City Farms as well as countless community gardens within the city, provide communal spaces and diverse crop selection to make fresh food affordable. These initiatives are also often operated and accessed by people of colour in lower income areas. There were no case studies or reports found on the crops and cultivation practices of these farms so there is a gap in the knowledge of applied production in an academic context. Despite this it has been indicated through a market study that many vegetables of high preference are able to grow from transplant, greenhouses, or

direct seed sowing (Adekunle et al., 2011). Out of the study population 22.3% of participants grew crops which they indicated unavailable or inaccessible in stores (see Table 3).

Table 4. Crops grown in home gardens in Toronto (Adekunle et al., 2011)

Chinese	South-Asian	Afro-Caribbean
Tomatoes Fuzzy melon Bitter melon Basil Chilli pepper	Chilli Pepper Eggplant Okro Tomatoes bittermelon	Okro Smooth amaranth Chilli pepper Tomatoes African eggplant

4.2 Crop selection

The market study conducted in Toronto in 2011 provides a comprehensive list of culturally diverse crops in highest demand by three different ethno-cultural groups (see Appendix). Of these Bok choy, chinese Broccoli, and Eggplant were of highest demand for the Chinese population; okro, eggplant, and bitter melon for the South Asian population; and okra, African eggplant, and smooth amaranth from the Afro-Caribbeans (Adekunle et al., 2011). Additionally crops that were most consistently listed across all three populations include tomatoes, spinach, eggplant, green beans, carrots, cilantro, okra, cabbage, bittermelon, and bitter gourd (Adekunle et al., 2011). A resource by the FAO displays how to plan crops according to cultivation as well as nutrient requirements (FAO, n.d.). All of the crops used by the FAO are also included in the list of highly preferred crops. This can be used as a preliminary indicator of how to organize crops that are complementary while fulfilling some of the nutrient deficiencies referred to above. This resource can also be adapted by swapping out specific crops that may be of the family, for example variants of squash or beans are transferable. Beyond this resource, the integration of culturally diverse crops and regard for local nutrient deficiencies was an apparent knowledge gap.

Table 3. Nutritional Information Corresponding with Crops (FAO, n.d)

Energy	Protein	Vitamin A	Vitamin C
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Cassava Sweet potato Taro Root Yam	Black Eyed peas/Cowpea Yardlong bean	Amaranth Cassava Sweet potato Taro Water spinach	Tomato
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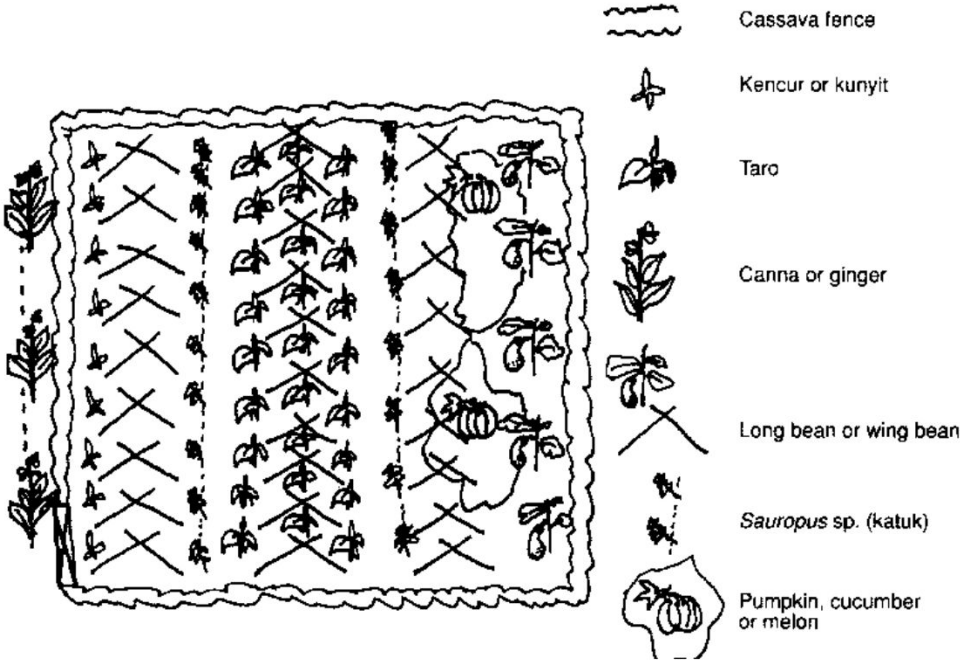


Figure 1. Cultural and Nutritional Crop Planning (FAO, n.d)

4.3 Educational Resources

A study on the cultural sustainability of farmers markets found reluctance amongst farmers to experiment with culturally diverse crops as they were not familiar with the cultivation practices required (Bond & Feagan, 2013). As indicated in the above table it is evident that diverse crops can and are being grown by people with primary knowledge. Urban Agriculture projects can provide hyperlocal, accessible growing spaces that facilitate knowledge sharing to fill gaps among farmers as well as expand the yield of crops beyond that of individual home gardens. This also provides an example of how utility can extend beyond the consumer in this food system and be of use to established farm, so that production can better accommodate preferences.

4.4 Sustainability & Resilience

The necessity for climate resilience and reduced greenhouse gas emissions in our food system has been affirmed by many researchers throughout literature which frames urban agriculture as a means to food security (Lamalice et al., 2018). Sustaining communities and the environment simultaneously is fundamental to upholding food security. Urban agriculture is an effective way of localizing food production with low environmental impact. When researching how different food production methods can prolong growing seasons or provide adequate growing environment for crops that are native in southern climates there is consideration for the resources and energy used in running facilities. For example a case study on community greenhouses in Indigenous communities in the Canadian Arctic, studied the energy output of the new infrastructure in comparison to the transportation of food imported from the south (Lamalice et al., 2018). This can be replicated in Toronto to moderate the extent to which greenhouse or other growing technology should be used to extend food production throughout the year in relation to the transportation from home countries.

5. Conclusion and Further Research

The literature on the cultural and nutritional aspects of food insecurity are frequently fragmented across areas of study as well as in practice. However there are common themes in experiences reported by researchers that provide an understanding of how availability, accessibility, utility, and stability relate to immigrant food insecurity in Toronto. The consistent barriers presented here can direct the approach to further research and applied projects in urban food production. Additionally studying the social and nutritional benefits being cultivated at existing urban farms in Toronto would broaden the understanding of how the crops in high demand grow in the Southern Ontario Climate. From this the nutritional availability of these crops, as well as the nutritional deficiencies prevalent among the communities present would inform further applications to food security.

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Appendix

Highly Preferred Vegetables Reported by Adekunle et al., 2011

Highly Preferred Vegetables by Chinese Canadians

1. Bok Choy/Pak Choy/Baby bok choy (*Brassica rapa* sub-specie: *chinensis*): Chinese cabbage-bok choy (cantonese), Xiao bai cai/ Bai cai (Mandarin), Taiwan Bok Choy
2. Chinese Broccoli (*Brassica oleracea* : Alboglabra group) Gai lan/Kai lan/Gai lon, Chinese Kale
3. Eggplant (*Solanum melongena*) Aubergine, Brinjal - various varieties based on colour and shape identified
4. Chinese greens (Choy sum) (*Brassica rapa* sub-specie: *chinensis*): Chinese Cabbage – Yu choy [You cai, Cai hua (Mandarin), Yai tsoi (Cantonese)] , Cai xin, Hokkien chai sim, Flowering Chinese Cabbage
5. Tomatoes (*Solanum lycopersicum*, syn. *Lycopersicon lycopersicum* & *Lycopersicon esculentum*)
6. Napa Cabbage *Brassica rapa* subsp. *pekinensis*): Chinese Cabbage – Wong nga pak (Cantonese), Da bai cai (Mandarin)
7. Green Beans (*Phaseolus vulgaris*) – Phalli (India), Chinese green beans
8. Celery (*Apium graveolens* var. *dulce/rapaceum*) – Chinese variety
9. Spinach (*Spinacia oleracea*) – Palongshak (Bengali)
10. Carrots (*Daucus carota*) – Gajja (India)
11. Bitter Melon/Bitter Gourd (*Momordica charantia*) - Karela (India), Kugua (China), Carilla, Balsamino, Saraseed (Caribbean)
12. Broccoli (*Brassica oleracea*: Italica Group)
13. Lettuce (*Lactuca sativa*) – Romaine Lettuce, Red Lettuce

Highly Preferred Vegetables by Afro-Caribbean Canadians

1. Okro (*Abelmoschus esculentus*) – Lady finger, Bhindi (India), Ila (SW Nigeria), Huang Sukui (China), Gumbo (Swahili)
2. African Eggplant – Garden Eggs (*Solanum melongena* – *Solanum aethiopicum*, *Solanum gilo*, *Solanum olivaire*, *Solanum pierreanum*) – Ngilo (Swahili), Nakasuga/Nakati (Uganda), Njilu (DRC), Gboma (Togo), Ikan/Igba/Igbo (SW Nigeria), Ntorowa/Ntrobu/Yaduwa (Ghana).
3. Smooth Amaranth (*Amaranthus* sp.) – Efo tete (SW, Nigeria), Bitekuteku (DRC), Callalou/Kallaloo (Jamaica), Yin choi, Chinese spinach (China), Thotakura, Cheera (India), Mchicha (East Africa),

4. African spinach, Indian spinach, Bonongwe (Malawi), Thepe (Botswana), Grins/Hondi(Sierra Leone), Alayyafu/Alefu (Hausa – West Africa), Madze/Efan/Muotsu, Swie (Ghana), Lalshak (Bengali)
5. Tomatoes (*Solanum lycopersicum*, syn. *Lycopersicon lycopersicum* & *Lycopersicon esculentum*)
6. Yams (*Dioscorea batatas*) – Yellow Yam, White Yam
7. Pumpkin/Squash (*Cucurbita* sp.) – Kaddu (South Asia), Chinese Squash
8. Plantain (*Musa paradisiaca*)
9. Cocoyam leaves/corm (*Colocasia esculenta/Xanthosoma sagittifolium*) – Taro, Dalo (Fiji), seppankizhangu (Tamil), Gabi (The Philippines), Pindalu, Karkalo (Nepal), Nduma (Kikuyu –Kenya), Ala (Maldives), AmaDumbe/Madumbi (Zulu – South Africa), Dasheen, Eddoes (West Indies/Caribbean), Coco (Nigeria), Kontomire (Ghana), Kachu/Kochu (Bengali), Ghuiyan (Hindi), Arvi (Hindi), Macabo (Cameroun), Yu tou/ Yu nai (China), Wuh tau (Hong Kong), Arrow roots.
10. Yardlong Bean (*Vigna unguiculata* subsp. *sesquipedalis*): Cowpea – Long-podded cowpea, Asparagus bean, Snake bean, Chinese long bean, Dau gok (Cantonese), Jiang dou (Mandarin), Bora (West Indies), Borboti (Bengali). And Black-eyed pea {beans} (*Vigna unguiculata* subsp. *unguiculata*): Cowpea – Ewa (Nigeria), Kunde (Swahili), Thattapayru (Tamil), Me-karak (Sri Lanka).
11. Cassava (*Manihot esculenta*) – Yucca, Sombe-leaves (Central Africa), Ege, Akpu (Nigeria), Mhogo (Swahili), Mushu (China).
12. Sweet Potato (*Ipomoea batatas*) – Leaves and roots
13. Cabbage (*Brassica oleracea*: Capitata Group) Spinach (*Spinacia oleracea*) – Palongshak (Bengali)

Highly Preferred Vegetables by South-Asian Canadians

1. Okro (*Abelmoschus esculentus*) – Lady finger, Bhindi (India), Ila (SW Nigeria), Huang Sukui (China), Gumbo (Swahili)
2. Eggplant (*Solanum melongena*) – Aubergine, Brinjal – Various varieties based on colour and shape identified.
3. Bitter Melon/Bitter Gourd (*Momordica charantia*) - Karela (India), Kugua (China), Carilla, Balsamino, Saraseed (Caribbean)
4. Spinach (*Spinacia oleracea*) – Palongshak (Bengali)
5. Tomatoes (*Solanum lycopersicum*, syn. *Lycopersicon lycopersicum* & *Lycopersicon esculentum*)
6. Cauliflower (*Brassica oleracea* : Bortrytis Group) – Gobi (India)
7. Potato (*Solanum tuberosum*)
8. Cabbage (*Brassica oleracea*: Capitata Group)
9. Cilantro - Coriander (*Coriandrum sativum*) – Yun tsai (China), Chinese parsley
10. Onions (*Allium cepa*) – Baby/Small
11. Carrots (*Daucus carota*) – Gajja (India)
12. Green Beans (*Phaseolus vulgaris*) – Phalli (India), Chinese green beans
13. Chilli (green or red) (*Capsicum* sp.)