Promoting Community Food Security Ecosystems to Address Inadequate Fruit and Vegetable Consumption in Urban Populations

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ABSTRACT
This paper identifies challenging factors that influence diet and nutritional health trends faced in developed countries and it highlights a variety of effective community food ecosystems in place in urban areas of Canada, Germany, and the United States. Further, recommendations for health education initiatives and future research, as well as community actions to develop environmentally sustaining systems that will enable adequate intake of fruits and vegetables by all community members, including disadvantaged populations, are outlined. Some cross-cultural comparisons are made among Canada, Germany, and the United States. It concludes that sharing community food system research and best practices at all levels, locally, regionally, nationally, and internationally will help to broaden the application of successful education campaigns, programs, practice, and policy to empower individuals to eat, grow, and purchase fruits and vegetables and ultimately, to adopt a healthy diet.
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Introduction

Throughout North America and Europe two prominent social movements exist that call for immediate action: environmental justice and community food security (Gottlieb & Fisher, 1996). The development of community food ecosystems has married the goals of both movements by improving food security in ways that effectively preserve the environment. However, despite growth in the implementation of community food ecosystems and large scale social marketing campaigns that promote nutrition guidelines for health, the consumption of fruit and vegetables in Canada, Germany, and the United States is inadequate and this deficiency is most pronounced in disadvantaged populations in urban centres (World Health Organization, Regional Office for Europe [WHO-E], 2001a; British Columbia Ministry of Agriculture and Lands [BCMAL], 2006).

This paper follows a presentation on Urban Community Food Security Ecosystems delivered at the 10th Annual Health Education and Injury Prevention Conference in Cologne, Germany in May 2008. It identifies challenging factors that influence diet and nutritional health trends faced in these developed countries and it highlights a variety of effective community food ecosystems in place in urban areas of Canada, Germany, and the United States. Further, recommendations for health education initiatives and future research, as well as community actions to develop environmentally sustaining systems that will enable adequate intake of fruits and vegetables by all community members, including disadvantaged populations, are outlined.

Urban Community Food Security Ecosystems

Access to fruit and vegetables. Urban community food security ecosystems promote community health and sustainable environments by increasing the amount and distribution of locally grown food, enhancing access to fresh fruit and vegetables, especially for vulnerable groups, and promoting consumption of locally grown foods through education campaigns, community engagement and collaboration with organizations, institutions and public health professionals (Rideout, Seed, & Ostry, 2006). Hamm & Bellows (2003) defined community food security as "a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice" (p. 37). By engaging in community food system initiatives, residents become aware of where food comes from, how to access nutritious food as well as being educated on the benefits of consuming locally grown fruit and vegetables (Gottlieb & Fisher, 1996).

Building community capacity. Food security initiatives also address the capacity of the community with regard to access, availability, supply and utilization of healthy food (Public Health Services Authority PHSA, 2008; Rideout et al., 2006). In Canada, public health policy encompasses the components of community food security by considering the economic ability of individuals and

households to purchase food, the production and supply of food, and the ability of Canadians to make healthy food selections in their local environments - homes, schools, workplaces (Power, 2008). Communities build capacity when they develop relationships with public health professionals, community leaders, and policy makers to help find long-term solutions for urban hunger, advocate for increases in minimum wage and social assistance, influence changes in policy, promote the consumption of fresh fruits and vegetables, and encourage regional sustainable agriculture practices (Baker, 2004).

Dietary Guidelines Not Met

In 2004 the World Health Organization released its Global Strategy on Diet, Physical Activity and Health recommending more than five servings of fruits and vegetables be consumed daily to maintain health and avoid disease (WHO, 2004). Diets low in fruits and vegetables are associated with increased risk of obesity, heart disease, diabetes and cancer (WHO-E, 2001a). However, these guidelines are not being met in Canada, Germany, or the United States (Srinivasan, Irz, & Shankar, 2006; WHO-E, 2001a). A large increase in the consumption of fruits and vegetables is necessary to improve population health.

Factors impacting diet choices. Inadequate diets result from a multitude of factors such as pricing policies that do not facilitate the sale of affordable fruits and vegetables, local markets that stock primarily non-perishable foods, absence of street markets, food cooperatives, and community food security schemes and the lack of financial resources, transport, time, or ethno-culturally appropriate foods (WHO-E, 2001). It is well understood that families with lower household incomes spend fewer of their food dollars on vegetables (Metcalf Foundation, 2008; Nathoo & Shoveller, 2003). This situation is pronounced in communities with high poverty rates, where vegetables tend to cost more and are not readily available (Metcalf Foundation, 2008; Stewart & Blisard, 2008; WHO-E, 2001a). Furthermore, Srinivasan, Irz, and Shankar (2006) reported that the least educated families need to make the greatest adjustment to their diets to satisfy the five servings or more a day guideline.

Rising obesity rates. Whereas it is certain that socio-demographics have a strong influence on food purchasing (Metcalf Foundation, 2008; Nathoo & Shoveller, 2003), a diet lacking in fruit and vegetables is common through all demographics in North America and Europe (WHO, 2004). Over-consumption of calorie dense, less nutritious, and highly processed foods is widespread and as a result obesity is a growing health issue (WHO, 2004). Half or more of the population over age 15 in Canada, Germany, and the United States are obese or overweight (Organization for Economic Co-operation and Development [OECD], 2007). Current nutrition campaigns such as the 'five a day' servings of fruits and vegetables, which continue to be promoted in Canada, Germany, and the United States, have not succeeded in achieving widespread diet change (BCMAL, 2006). There is an urgent need to implement new strategies.

Preserving the Environment

World-wide concern about global warming and green house gas emissions drives the need for environmentally sustainable food production and distribution systems that are less reliant on globalized food transport (FoodShare Toronto, 2005). Sustainable local food systems are economically viable for farmers and consumers, use ecologically sound production and distribution practices, and enhance social equity and democracy for all members of the community" (Feenstra, 1997; Peters, 1997). With the impact of trade agreements, increasing populations and urbanization, sustaining locally and regionally grown food production is an emergent challenge.

Locally grown food. Localization movements such as the *100 Mile Diet*, *Slow Food*, and *Food Miles* have received mainstream media attention n Europe and North America (Weber & Mathews, 2008). Advocates promote many benefits to buying local food including fresher, tastier, more nutritious, safe food supply that is better value for the dollar, supports the local economy, supports small growers and is based in the values of caring for place, the community and the environment (Feagan, 2007; Hurley, 2008; Seyfang, 2006). By alerting consumers to the benefits of purchasing locally grown food these movements help to sustain local food production, encourage more environmentally sustainable modes of production and influence healthy food choices (Maxey, 2006).

Food lifecycle. These localization movements are not without their critics who emphasize that emissions are released throughout the food lifecycle, not only during transport (Weber & Matthews, 2008). Since the distance food travels is not the only factor, all aspects, from 'field to fork,' must be considered for the true carbon footprint to be assessed. For instance, trucking food to a neighbourhood store that can be accessed by walking or biking may have less impact than many trips in personal cars to supermarkets or farmers markets (Editors of *Natural Life Magazine*, 2007). Switching to a diet richer in vegetable based foods, even one day a week, can be an effective means of lowering the average

household's food-related climate footprint because more greenhouse gas emissions are associated with meat and dairy products (Weber & Mathews, 2008). Consumers impact the environment in how they access food and what they choose to purchase; however, the economy of families has a greater influence on buying decisions than where food originates (Francis, et al., 2005).

Urban Lifestyles

"Urbanization increases the physical and mental distance between urban and rural residents and separates city people from knowledge about where and how their food is grown" (Francis, et al., 2005, p. 60). In both Europe and North America, 80% of the population lives in urban environments (Hancock, 2002; WHO-E, 2001b). With continued urbanization, who will grow food in rural agricultural areas? Urban consumers may be unaware of how foods are produced, consumed, exported, and imported and only participate in the existing food system through purchase of market food (Feenstra, 1997). They may not consider the impact of their food choices on sustaining local food suppliers.

Defining a community and engaging residents can be challenging in dense urban areas with a blend of diverse cultures, often with clusters of immigrant and aboriginal populations. As residents adjust to urban living, they may be required to adapt their traditional diets as culturally preferred fruits and vegetables may not be available or affordable (Power, 2008; Toledo & Burlingame, 2006). Without access to land, gardening and farming skills are not used; generations' worth of agricultural knowledge is not passed on. In these situations urban residents become dependent on available market foods, which for some may not include access to affordable fruits and vegetables.

Food Policy Councils

Integrating policy fields within government institutions including food, social welfare, agricultural, education, and economic development is a critical element that links production and distribution aspects of the local food economy and helps to coordinate the ways that community residents can access quality food (Baker, 2004; McCullum, Desjardins, Kraak, Ladipo, & Costelllo, 2005). To ensure a coordinated approach to community food security, nutrition, health, and agricultural sustainability, some cities have established a food policy council. Typically these involve a group of stakeholders who advise a city or state government on policies relating to agriculture, food distribution, hunger and nutrition (Feenstra, 1997). Food policy councils work together to create positive changes in the food system and address the needs of low income and marginalized communities by researching access issues, food production, and design and implementing projects and policies to address food security issues.

Community Food Initiatives

Local, direct market systems such as farmers markets, good food box programs with locally grown produce and community-supported agriculture farms educate consumers about food production and encourage increased consumption of fresh produce by building relationships between consumers and producers (Feagan, 2007; Hinrichs, 2000). Local food system advocates see the globalizing corporate food system contributing to a great psychological and physical distance between food production and consumer, creating a disconnect between the general public and the social and environmental consequences of how food is being grown and eaten (Feagan, 2007).

Urban agricultural activity such as farmers markets and community gardens, strengthen communities especially when located in areas where access to fresh affordable produce is limited (Gottlieb & Fisher, 1996; McCullum et al., 2005). The benefits are being recognized globally by health professionals, urban planners, environmental activists, community organizers and policy makers, who see these community based activities as important contributors to economic development, food security, and environmental management (Baker, 2004).

Community Food Security Ecosystems in Canada

In Canada the number of organizations and local coalitions formed to address food security is on the rise. The common goals are to ensure all people are food secure, establish and maintain a sustainable food system and to ensure food is healthy and safe. The recently developed *Food Secure Canada* is a national non-profit organization working to unify those working for food security in Canada and globally.

Media attention on 'green choices' to preserve the environment and rising food costs both raise awareness about the impact of food purchases. Surveys indicate that the local food movement is supported by Canadians; 56% regularly check country of origin labels and 42% regularly buy local food (Metcalf Foundation, 2008).

Programs

Food policy council, Toronto, Canada. Toronto's food security social movement has been called one of the most advanced in North America (Wekerle, 2004). A reputation that was built on the success of its food policy council in keeping food

security on the municipal agenda for over a decade and influencing City Council's adoption of Toronto's Food Charter in 2001 (McCullum et al., 2005; Wekerle, 2004). The food policy council is a sub-committee of the Toronto Board of Health that includes representatives from a diverse network of community agencies, advocacy groups, city councilors, and city staff who collaborate on policy innovations, education, and specific projects (McCullum et al., 2005; Werkel, 2004).

Agricultural Land Reserve. In the province of British Columbia (BC), five percent of the land base, where the best growing soils are, has been reserved for agricultural use since 1973. The production capacity of the agricultural land reserve can supply an estimated 48% of the province's food consumption (BCMAL, 2006). However, if daily intake guidelines for fruit and vegetables were being met, only 34% could be supplied. There is a need for more irrigated land for the production of fruit and vegetables as this is the largest self-reliant shortfall in BC. By adopting supply management systems, farmers are better able to respond to changes in consumer demand and sustain their livelihood. Agriculture in the province of British Columbia faces many challenges that are common throughout Canada including farmers are aging (currently 38% of BC's farmers are over age 55) and most rely on second jobs that are off-farm incomes (Metcalf Foundation, 2008). Protecting agricultural land and increasing consumer demand for locally grown fruits and vegetables will contribute significantly to sustaining agriculture in Canada.

Urban Agriculture: Vancouver, Canada. Urban agriculture is growing in Canadian metropolitan areas. In 2006, Vancouver City Council unanimously passed a motion to increase the number of community garden plots by 2,010 by the year 2010. New farmers' markets are emerging every year, with a focus on introducing markets in low income areas where access to affordable fresh produce is limited. Developers are incorporating edible landscaping, roof top gardens and garden plots in urban housing complexes (Provincial Health Services Authority [PHSA], 2008).

100-Mile Diet. In April 2007, Vancouver journalists MacKinnon and Smith released their book entitled, *The 100-Mile Diet: A Year of Local Eating* in Canada. The United States version, *Plenty: One Man, One Woman, and a Raucous Year of Eating Locally* was released one month later. The books detail the authors' one year journey of eating only foods grown within 100 miles of their Vancouver home. With over 50 million copies sold and published in 20 languages, the book has impacted food choices in communities around the world. Their 'local eating for global change' message has inspired many to start their own journey toward eating a diet rich in seasonal fruits and vegetables, reducing green house gas emissions and reconnecting with local growers and their environment.

Sustainable living – Local Food Plus. Toronto's Local Food Plus is a not for profit organization that was launched in 2005. It links local farmers committed to sustainable-farming principles and practices with a guaranteed market for the food they produce through a supply-chain link with food service companies (Friedman, 2007; Metcalf Foundation, 2008). Local Food Plus won the 2008 Gold Canadian Environment Award in the Sustainable Living category.

Community Food Security Ecosystems in Germany

In Germany, the tendency of buying fruits and vegetables is increasing, especially of organic and also local products. That is supported by the many different programs that deliver fresh local food.

Programs

Good food bags. In Cologne, for example, there is the "Rheinländische ökologische Gemüsetüte", which you can order in different places, especially whole food stores where it is then delivered to and where you can pick it up once a week. There are different types of bags, consisting of vegetables only, but also combinations with fruit in different sizes. The main part of the content is seasonal and organic food from farms in the area of Cologne. For example, a big vegetable bag with 3-4 portions costs 10, 95 €.

Similar to that program, there is the "green box" or vegetable box" in many different German cities that you can order as well and which are delivered right to your home. You can order different sized boxes, which have vegetable and fruit combined also. The food is organic and most of it is local as well. Besides these boxes you can also order meat, milk products, cheese, and different bakery products in this program.

As mentioned, most of the products in these programs are local, but sometimes, depending on the seasons and the small variety of fruit that exists in Germany at the time, organic fruit from France, Italy, or Spain is added.

Farmers' markets. In Germany, there are also plenty of farmers' markets. Since they are organized locally there is no number of how many there are in Germany. If you look at Cologne as an example, there are 38 farmers' markets spread over the entire city and they all take place at least weekly with many of them occurring twice up to five days a week. On top of these farmers' markets, there is "Ökomärkte"

in Cologne where only local, organic food is sold, so you can not buy any fish there for example. In the area of the Rhineland there is an association called "Rheinländische Bauernmärkte e.V." where farmers and professional schools from that region can sell there own produce. This way the goal is achieved; there is no food sold that comes from a distance further than 80 kilometres. Other goals, besides selling local food, include: feeding the population in the cities with fresh food for adequate prices; supporting a trustful relationship between farmers and consumer; giving transparency of the food-production; and protecting the environment by reducing emissions also through reducing transportation distances.

Slow food. Another important program that aims to support the consumption of local food is "Slow Food", which was founded in Italy in 1986 under the name "Agricola". In the autumn of 1992 "Slow Food" was also founded in Germany and has been growing a lot since 2004, welcomed their 7000th member in April 2007, and is organized in about 63 "Convivien." Goals of this program are to protect the biodiversity of food, to support farmers markets and within this to support the consumption of local food as well. One more important goal is to elate children for healthy food which they try to achieve by doing projects with students, for example laying out school gardens and cooking with their own produce.

Supermarkets. The increasing interest on local food also becomes visible when looking at supermarkets. For example "Rewe" is starting an initiative on selling food from the region. This program has only started in the independent supermarkets yet, with produce like onions and potatoes which are easy to get in huge quantities. Also, in discounter supermarkets you can find seasonal local food.

5 a Day. Another program that looks at healthy alimentation, well-known in other countries as well, is the program "5 a day" that recommends to eat 5 portions of fruits and vegetables a day, which is equivalent to 650 grams, for adults. In Germany people only eat half of the recommended amount of fruit and vegetable though it has been shown that they have an important influence on health and this is the reason why the campaign started in Germany in May 2000. As is reported in the *5 am Tag* (5 a day) Web site, the 5 a day program is supported by many organizations that deal with health issues, like the Federal Ministry for Nutrition, Agriculture and Consumer Protection, the Federal Ministry for Health and also The German Cancer Association, The German Association for Alimentation, insurance companies and so on (5 am Tag, 2008). "5 a day" gives a lot of information about the campaign, its backgrounds and activities e.g. on the internet, for adults and also for children and they offer material for school. "5 a day" also goes into schools and conducts projects.

Community supported agriculture. A new and still quite unknown initiative is community supported agriculture (CSA) farms, which is a community of customers and farmers. In Germany there are nine of these communities (Table 1).

Members in these communities are mainly young families with children. Important arguments for people to join the communities are regionalism, sustainability, securing diversity, enrichment of quality of life in the region, being an active part, controllable security regarding the quality of food and its cultivation methods referring to health of people, animals and plants and also the experience of personal contacts and community. For the farmer positive aspects are liquidity and financial safety, no commercialization, sharing the risks and responsibilities, optimal use if produce and also personal contacts and the experience of community.

Community Food Security Ecosystems in the United States

In the United States, we have some interesting facts about how food is used:

- Americans buy 90 percent of their food in supermarkets.
- In the US, produce travels an average of 1,500 miles before it reaches supermarkets.
- Processed foods now account for three-fourths of all food sales globally.
- The 30 largest supermarket chains sell one-third of all food.
- Demographers estimate that in 2006, for the first time, over half of humanity will be urbanized, living in towns or cities.
- The food security of most humans is tied to overextended energy grids because of globalization of food industries, the rapid boom of metropolises, and the expansion of supermarkets.
- 35 million Americans and 2 billion people worldwide suffer chronic hunger or malnutrition.
- After crops leave the farm, two times more energy is expended to transport, process, package, and sell food as was used to cultivate and harvest it.
- Without massive inputs from fast depleting reserves of oil and natural gas, most crops, especially grains, could not be grown at their present hyper-industrial scale.

- Fertilizers, pesticides, irrigation, and gas-guzzling farm machinery are the essential ingredients that drive modern factory farming – and the affordability, or availability, of these inputs depends entirely upon that of the fossil fuels used to manufacture and operate them (Heinberg, 2005; Murray, 2005; Church, 2005; Manning, 2004; Pfeifer, 2003).

It is no surprise that for conventional farmers, typically among the first to feel the effects of shifting energy winds, an increasingly crippling "energy crisis" is no remote possibility but already an everyday reality. In the United States, where dwindling production of natural gas (a phenomenon similar to peak oil but geologically unique) has led to soaring fertilizer costs, industrial farmers are struggling to raise profitable crops despite the enormous aid they receive – $22.7 billion out of $71.5 billion of net farm income in 2005 – through government subsidies (Cox, 2005; Pfeifer, 2003).

Corn, the most fertilizer-hungry crop, highlights the problem: In late 2005, some farmers forecasted that their 2006 corn plantings could decrease by up to 25 percent as they switch to less fertilizer-intensive crops like wheat and soybeans. But when oil scarcity sends fuel prices skyrocketing, could not those crops too quickly become unprofitable, forcing many farmers to plant no crops? How fast might processed foods become a luxury or supermarket shelves grow empty? Will grain stocks be fed to livestock, or converted into biofuels, to make meat and gas for wealthy consumers, while poorer humans starve? And, more to the point, what can communities do in order to insulate their food supply from such unnerving, yet not unrealistic, future impacts of oil depletion?

During the decades following peak oil, community supported agriculture could evolve to serve additional functions. Community members might save seeds from their yield to plant at home and form seed-sharing networks, organize food security skill trainings, develop collective systems to pool their compost and protect local water security, and unite to confront broader challenges that impact local food security like climate change, invasion of non-native species, political upheaval or over-exploitation of natural resources. The Community Supported Agriculture (CSA) model could even extend beyond food to other areas of local economies. For example, the Post-Carbon Institute – a peak oil think tank – envisions Community Supported Manufacturing and Community Supported Energy, or "Local Energy Farms," that would provide modest amounts of reliable, renewable energy for local use. As well as satisfying wider community needs, these could contribute the tools and energy base that local agriculture requires.

Programs

Community supported agriculture. Another form of economic interdependency between farmers and community members that further intensifies their relationship of mutual support and commitment is community supported agriculture (CSA). As a non-capitalist kind of cooperative trade, community supported agriculture is a prototype of what some community organizers have defined as "solidarity economics" (Miller, 2008). Through community supported agriculture, members pay the farmer an annual fee to cover the farm's production costs. In exchange, they receive a weekly share of the harvest during the growing season. This arrangement guarantees the farmer financial support and enables many small- to moderate-scale organic family farms to remain in business.

In addition to sustaining the enterprise and reducing the personal risk of farmers by distributing the cost of any failed harvest throughout the community, community supported agriculture creates "agriculture-supported communities" where members receive a wide variety of foods harvested at their height of ripeness, flavor, and vitamin and mineral content. Some CSA farms deliver bundles of food to the homes of members; others drop them off at a median location or require members to pick them up at the farm. Many aim to enhance community participation in the farm by hosting special seasonal events, letting members harvest or select their produce at the farm, and encouraging them to volunteer time to assist farm work. Some also return community solidarity by donating surplus food to low-income families, food banks, or soup kitchens. An international directory of CSA farms is available at www.csacenter.org.

Community gardens. Community gardens promote healthy communities and provide food security for many low income persons. In an urban setting, community gardens are part of the open space network. The gardens and those who participate in community gardening contribute to the preservation of open space, provide access to it, and create sustainable uses of the space. Community gardens strengthen community bonds, provide food, and create recreational and therapeutic opportunities for a community. They can also promote environmental awareness and provide community education.

Table 1. Community Supported Agriculture Farms in Germany

CSA- Farms	Next city	Distance	Size of the farm	Members	CSA since	CSA	Full supply
Buschberghof	Hamburg	40 km	101 ha	92 households	1988	100 %	Yes
Kattendorfer-hof	Hamburg	40 km	154 ha	70 households	1988	50 %	Yes
Gärtnerhof Entrup	Münster	12 km	26 ha	36 members	1999	3 %	Sheep products
Schmitthof	Kaisers-lautern	30 km	35 ha	65 households	2003	100 %	Yes
LandGut Lübnitz	Branden-burg	50 km	16 ha	35 members	2004	75 %	No milk
Junge GbR Löwengarten	Berlin	90 km	5 ha	85 members	2006	100 %	vegetable
Hof Hollergraben	Lübeck	45 km	12 ha	7 members	2007	20 %	vegan
Gastwerke in Gründung	Kassel	15 km	20 ha	Up to 200 households	2008	100 %	yes
Karlshof	Berlin	90 km	6 (50)ha	80 people	2006	100 %	potatoes, grains

Source: http://forschungsring.de/fileadmin/lebendigeerde/pdf/2008/Forschung_2008-2.pdf

One of the goals to create healthy communities is to improve nutrition in the community as a whole. For example, the Washington State Department of Health has developed strategies and has described how to develop healthy communities by community gardening as stated in the Washington State Nutrition and Physical Activity Plan (NPASP).Washington's strategic plan has among its objectives increasing access to health promoting foods. An example is increasing the availability of and access to local community gardens. Healthy Communities Pilot Projects are testing the effectiveness of the plan strategies in local communities.

One great source for learning more about community gardens is the American Community Gardening Association. Their Web site can be viewed at http://communitygarden.org/. Steps for starting a community garden can be found at the University of California Cooperative Extension (http://celosangeles.ucdavis.edu/garden/articles/startup_guide.html).

Farmers' markets. One of the simplest ways for communities to liberate their food supply from oil dependence is to create and support local farmers markets. By minimizing transport distances of produce and eliminating intermediaries between grower and consumer, farmers markets drastically reduce levels of fossil fuel use. Through the face-to-face communication they enable, farmers markets not only foster community interaction but also allow buyers to learn what energy-efficient methods of crop cultivation various farmers employ – and to direct their support to those using the best practices.

Purchasing food at farmers markets, whether in small amounts or in bulk, also keeps cash within the local economy, protects the livelihood of farmers and therefore preserves open spaces and combats sprawl, and gives communities a reliable source of fresh, nutritious, frequently organic and hand-picked food. Many farmers markets sell more than just fruits and vegetables, and include meats, wines, cheeses, flowers, herbs, baked goods, clothing and hand-crafted items. Most are located conveniently at the heart of populated areas and near public transportation.

The number of farmers markets in the US has increased dramatically in recent decades, rising from 300 in the mid-1970s to 1,750 in 1993 and over 3,400 today (Weinraub, 2005). Yet they still represent less than 0.5 percent of total food sales. One reason for this is the irregular hours, days and seasons they are open. Another may be that their produce tends to be higher-priced than that of the mass-produced, federal-subsidized brands sold in stores. As the escalating price of fossil fuels pushes up the cost of conventional foods and makes small-scale, locally harvested produce more financially competitive, this discrepancy should gradually diminish and ultimately reverse.

Nevertheless, most farmers markets do already enjoy great popularity and nurture an excellent atmosphere in which one can meet local food-savvy citizens, share knowledge about peak oil and other issues, and discuss new approaches to improve community food security. And bargains are not uncommon! To find farmers markets and other CFS resources throughout the US, www.localharvest.org provides a free directory. Local independent tabloids are also good sources of information.

Some New Concepts

Urban agriculture (roof top gardens, vertical gardening). Humans have grown plants atop structures since antiquity. Besides the decorative benefit, roof plantings may provide food, temperature control, architectural enhancement, and recreational opportunities. Available gardening areas in cities are often seriously lacking, which is likely the key impetus for many roof gardens. The garden may be on the roof of an autonomous building which takes care of its own water and waste. Hydroponics and other alternative methods can expand the possibilities of roof top gardening by reducing, for example, the need for soil or its tremendous weight. Plantings in containers are used extensively in roof top gardens. One high-profile example of a building with a roof garden is Chicago City Hall. Ideas about roof top gardens can be also found at http://www.skyvegetables.com/.

Buying locally. Locally grown fruits and vegetables are usually picked within the last 24 hours. That freshness affects the taste and nutritional value of the fruits and vegetables.

Farms provide the fields, pastures and meadows that separate residential and business development. They also provide the views of hills, valleys and mountains that give New Hampshire its special character. When you buy local produce, you help preserve your local environment for today and the future.

Money spent by consumers at the local level and from local farms will ensure that local farmers stay in business. It's good business for everyone.

Food cooperatives. Food cooperatives are worker or customer owned entities that provide grocery items of the highest quality and best value to their members. Co-ops can take the shape of retail stores or buying clubs. All food coops are committed to consumer education, product quality, and member control, and usually support their local communities by selling produce grown locally by family farms.

Cross-cultural Comparison

Canada, Germany, and the United States are challenged by increases in obesity, illness and chronic disease exacerbated by unhealthy diets. Nutrition education campaigns such as the 'five a day' have been ineffective and the trend to becoming fast food nations continues. As stated by the World Health Organization (WHO-Eb, 2001), "the complex underlying socio-economic factors are often ignored" (p. 6) in the development and delivery of national strategies and policies formed to promote healthier dietary habits through food based dietary guidelines. A comprehensive approach to nutrition education and the implementation of programs and policies that remove barriers to consuming a healthy diet are needed.

Despite growing interest in organic and locally grown food, sustaining the supply of enough healthy food to satisfy the needs of increasingly diverse populations is a challenge as urbanization, immigration, population growth and aging population trends continue. In addition, addressing socio-economic inequities that limit access to fresh fruits and vegetables is a key issue that greatly impacts food security and nutritional health (Kirkpatrick & Tarasuk, 2008; WHO-E, 2001a).

Trade agreements further facilitate the globalization of the food supply and introduce new challenges to the economic sustainabilty of small scale local growers; family farms are being displaced (BCMAL, 2006). Urban agriculture and community food security movements increase awareness and provide a small contribution to the quantity of locally grown food (Gottlieb & Fisher, 1996). However, for Canada, Germany, and the United States to be self-sustaining rural agriculture must be increased. This will become a greater challenge with climate changes which are difficult to forecast as history is not informative in this realm. Climate change will lead to water shortages and variations in growing seasons and temperatures, which will impact food supply (Catford, 2008). Transportation costs increase as fuel costs rise. All of these factors illustrate the vulnerablity and importance of locally grown food.

Recommendations

Future Research

To inform strategies and solutions, regularly reported measures of community food security ecosystems are needed that assess consumer needs and motivations, dietary quality, food safety, food systems and environmental impact (Keenan, Olson, Hersey, & Parmer, 2001; Nathoo & Shoveller, 2003; OPHA, 2002). These could include collecting data on the availabilty and affordabilty of locally grown produce (including fruits and vegetables that satisfy cultural needs), levels of participation in community food initiatives, amount of food produced in urban areas and consumption of fruits and vegetables,

particularly in disadvantaged communities. Developing the local capacity to collect, evaluate and distribute food security information is integral to any sustainable development program (McCullum et al., 2005) so that emerging needs can be responded to quickly and effectively.

Research and analysis of existing community programs is needed to inform future systems, policy, and environmental change by sharing best practices and successes of purposeful local action and the resulting change in community food security and nutritional health (Keenan et al., 2001). The results of community level assessments need to be shared with researchers, community action groups, and policy makers. This will help to inform changes in their approach to policy, systems, program implementation, education initiatives and environmental health (Keenan et al., 2001; Nathoo & Shoveller, 2003).

Future research must take into consideration the unique needs of aboriginal, ethno-cultural and immigrant populations with regard to traditional food systems and market food systems to ensure cultural food security (Power, 2008). A qualitative approach may help to better understand ethno-cultural needs and perspectives. Research and collaboration is also necessary to identify barriers and find new eco-friendly strategies that will benefit residents of disadvantaged communities and lead to increased intake of fruit and vegetables (Feenstra, 1997).

Intervention Design

To improve nutritional health at the community level, new eco-friendly strategies, interventions, programs and policies that are informed by research must move beyond an exclusive focus on individual food security (Keenan et al., 2001). An evidence-based approach would lead to more progressive, comprehensive and population-based policies and programs that promote equitable access to healthy food by all groups of the population (Nathoo & Shoveller, 2003). An effective, comprehensive approach would consider social and cultural norms, changing desires, values embedded in food choices, and motivational factors (Feagan, 2008).

Health Education

Education is an essential component of behaviour change. People need to learn about their regional food system and understand where and how their food is produced, how this impacts the ecosystem, and how urban and rural residents can work together to secure local food production (Francis et al, 2005; Feenstra, 1997). People need the resources and ability to communicate that knowledge and to make well informed decisions.

It is essential to target the 'education-poor' who need to make the greatest change in diet to adhere to nutrition guidelines (Srinivasan, Irz, & Shankar, 2006). Accurate knowledge about the food system must be easily accessible and widely distributed to all community members. Effective education campaigns acknowledge the inequities that exist and address the barriers experienced by disadvantaged families living in environments where access to a variety of affordable healthy foods may be limited.

Organic and country of origin food labeling is one method of alerting consumers to how and where their food is produced, enabling an informed choice. Labeling with only country of origin does not reflect the total lifecycle green house gas emissions and could mislead consumers (FoodShare Toronto, 2005; Weber & Matthews, 2008) and create barriers to trade agreements. Expanded labeling that identifies climate friendly and fair trade food has been recently introduced in some markets.

Educational activities at community gardens, community shared agriculture farms and markets provide information on food preparation, sustainable agricultural practices, nutrition, urban and organic gardening, where food is grown, and opportunities for consumers and farmers to share ideas and concerns. Skill-building experiences include farm work days, composting and gardening, cooking, and canning workshops (Baker, 2004; Ontario Public Health Association [OPHA], 2002).

Educating children and youth about the importance of agriculture, environmental health, and food security through curriculum - based learning and hands-on skill-building activities is essential. Initiatives such as school gardens, green houses and farm to school cafeteria programs provide healthy local food, helps to foster lifelong connections between individuals and the impact of their food choices on their health, their community and their environment (Black, 2008). As farmers are aging, education programs are needed that attract younger individuals and encourage more people to consider farming as a livelihood in order to sustain local food production.

To further the development of community food security ecosystems, a culture of growing and eating local food must be well established through ongoing advocacy at the local, regional, national and international level by community leaders, citizens, health educators, and policy-makers. More food policy councils and advocacy groups are needed to influence determinants of health (Bellows & Hamm, 2003). Individuals can contribute by: joining coalitions and advocacy groups, acquiring knowledge to better understand the links between food security, health and the environment, eating a seasonal diet,

buying locally grown foods, and growing their own foods (Dietitians of Canada, 2007).

Effective education initiatives must address the social and economic determinants of health to improve health literacy (Nutbeam, 2000). Health-literate individuals are able to access, understand, evaluate, and communicate information about issues that impact their health (Nutbeam, 2000). t more advanced levels of health literacy, individuals are empowered by their ability to critically analyze information, advocate for positive changes, and overcome barriers to health. Health literacy is key to capacity building within communities.

Conclusions

Despite ongoing national social marketing campaigns promoting more than five servings a day of fruits and vegetables to maintain health, about half of the adult population in Canada, Germany, and the United States do not achieve this goal. Unhealthy diets high in processed foods are a major contributor to obesity, illness, and chronic disease (PHSA, 2008). A comprehensive, multi-sectoral approach to education campaigns, community programs, organizational practice, and policy development that acknowledges social, cultural, and environmental influences on lifestyle and food consumption choices and engages local community residents is necessary (Nutbeam, 2000) to create conditions where the daily nutritional guidelines for the intake of fruits and vegetables are met by all community members.

Food security is a determinant of health therefore, sustaining the production and supply of healthy food is a global concern. High need communities experience the greatest impact of shortfalls in access, availability and affordability of fresh produce. Urbanization and the increasing disconnect between consumers and the quality and lifecycle of the food they eat, are great threats to food security and nutritional health (Peters, 1997). Much can be learned from the ecological approach of the community food security movement to reconnect consumers with food, increase the consumption of locally grown fruits and vegetables and preserve the environment (Gottlieb & Fisher, 1996; Nathoo & Shoveller, 2003). While many programs have been established at the community level, sustaining and expanding the scale and reach of programs remains a concern (OPHA, 2002). Education and awareness campaigns are lacking in all three countries, Canada, Germany, and the United States. Sharing research and promising practices at all levels, locally, regionally, nationally, and internationally will help communities to broaden the application of successful education campaigns, programs, practice and policy, to create supportive environments and empower individuals to eat, grow, and purchase fruits and vegetables and ultimately to adopt a healthy diet.

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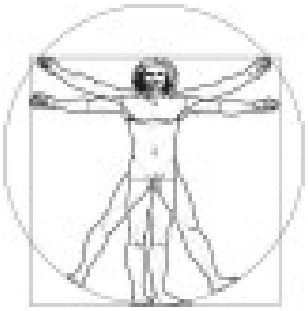

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