

Review Article

Community Supported Agriculture: A Conceptual Model of Health Implications

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Abstract

Community supported agriculture (CSA) is an alternative food marketing and distribution model in which consumers pay a membership fee before the season in return for a weekly share of a farm's harvest. Since the first two were initiated in the 1980s, the number of farms operating as CSAs in the US has grown to more than 6,000. This paper offers a conceptual model of the health implications and challenges of CSA for individuals, families, communities, and local food systems. CSAs benefit individual health by improving diet; contribute to family health by advancing food skills and encouraging family meals; foster the development of healthy relationships between growers and eaters in communities; and promote sustainability in local food systems by conserving natural resources, improving economic viability of small-scale agriculture, minimizing the need for food processing and long-distance distribution, and improving access to high quality food. Challenges for CSA members include more time to prepare whole foods compared to processed foods, inconvenience compared to one-stop shopping at a supermarket, and prohibitive pricing for limited-resource families. Fully utilizing CSA as a health promotion strategy will require the support of health professionals, policy makers, and private sector industries such as health insurance.

Keywords: Health Implications; Community Supported; Agriculture.

Introduction And Background

What is CSA?

Community supported agriculture (CSA) is an alternative food marketing and distribution model in which consumers pay a membership fee in advance of the season in return for a weekly share of a farm's harvest [1,2]. While CSAs typically provide fresh produce, some also include eggs and flowers. Others distribute bread, grains and legumes, meat and poultry, and more recently fish [1-4]. CSAs that distribute fresh produce are the most common, and will be the focus of this paper. CSAs often provide members with weekly newsletters containing recipes, and sometimes cookbooks as well [1]. Educational tours and opportunities for social gatherings where food is shared are a common feature of CSAs [1,5]. In some cases, CSAs offer members a place to return food waste for composting [1].

Purpose of this Paper

This paper offers a conceptual model of the health implications of CSA for individual members, families, communities, and local food systems. This work adds to the current body of CSA literature by providing a systems view of health implications. Previous studies mostly focus on one aspect of CSA such as members, growers, CSA structure, economics, environmental issues, or the evolving philosophy of CSA. The proposed model of health implications is meant to provide a broader view of the benefits and challenges associated with CSA, and intends to illustrate why this alternative food network deserves consideration and support from the range of local food system stakeholders including consumers and potential members, the agricultural community, health professionals, community development specialists, planners, federal and local

policy makers, and private enterprise. By generalizing and simplifying, conceptual models provide a vehicle for understanding the interconnections among parts of a system, in ways that more specific analyses cannot [6-8].

History and Philosophy of CSA

While early CSA projects were initiated in Japan and Chile in the 1970s, CSAs in the US were mainly inspired by the biodynamic farming tradition that evolved in Europe after World War II [9]. Austrian Rudolf Steiner developed this spiritual-ethical-ecological approach to agriculture, food production and nutrition, subsequently brought to the US from Switzerland by Jan Vander Tuin [9-10]. The first two CSAs in the United States were started in Massachusetts and New Hampshire in the mid-1980s, and they are still in operation today [1,9]. CSAs embody Steiner's vision of a diversified, balanced farm ecosystem that generates health and fertility from within, seeking to satisfy a triple bottom line—ecological, social, and economic sustainability [10].

The enduring philosophy of CSA includes creating mutually beneficial relations among producers and consumers, and developing an economy where food consumed locally is produced locally [9]. CSA remains a way to reestablish a sense of connection to the land, particularly for urban dwellers. It also fosters a sense of community around food, contributes to farmland protection, and provides farmers growing on a small-scale and marketing directly, a way to earn returns that exceed wholesale prices [1].

More broadly, the initiation of CSA asserts local control over a food system that is increasingly consolidated and distanced from consumers [1-2, 11]. CSA represents an effort to internalize

the societal costs of agricultural production by minimizing the degradation of natural resources, improving animal welfare, and helping to create fair wages and improved working conditions for farm labor [12].

Growth of CSA

The participation of both farmers and consumers in alternative food networks has grown tremendously. Ten years after the first CSAs began operating in Massachusetts, there were an estimated 450 CSAs operating in the United States [13]. In the next decade, the number nearly quadrupled to 1,700 [14], and in the decade since, the number of CSAs has nearly quadrupled again. "Local Harvest", an on-line CSA locator, currently lists more than 6,000 operations in the US, with several in each state [15]. The popularity of CSAs mirrors the growth in farmers' markets, which have increased in number from 1,755 in 1994 to 8,144 in 2013 [16]. Expansion of farmers' markets and CSAs are strong indicators of public interest in locally grown, organic, and healthful food [17].

When they began, CSAs were a major source of organic produce, and concern about the use of pesticides in food production motivated participation [11,18]. The vast majority (94%) of CSAs use organic methods [19-20]. Since the 1980s, the National Organic Program and Organic Certification have ensured access to organically produced food in mainstream supermarkets, amidst growing awareness and subsequent demand. The organic food production industry has become large scale, monocultural, and even corporate-owned [11,21]. CSA, however, still offers a true alternative to consolidated industrial-scale food production and distribution systems by creating connections among eaters, and between eaters and producers. It also sustains economically viable small-scale production within the context of a local food system [11,22].

CSA has the potential to provide food security for disadvantaged groups through improving access to locally grown foods [1,23]. Strategies for reaching low-income audiences include creating affordable CSA memberships, providing opportunities to pay membership fees with food assistance, and developing connections with emergency food providers [1,23]. Still CSA primarily attracts well-educated and higher income participants [24-26].

CSA Structure and Operation

Prepayment for a produce share is a common trait of CSAs, but they differ in how they are initiated and structured, and in how food distribution is handled. Currently, there are three common ways CSAs are initiated and structured. Shareholder CSAs are formed by a core group of members who make administrative decisions, and collectively hire a farmer. Subscription CSAs, in contrast, are initiated by the farmer who maintains ownership of the operation, makes decisions, and hires other staff as needed [1,11,27]. Shareholders are more likely to provide labor on the farm in addition to payment, where subscription owners typically only pay a membership fee [1]. In most CSAs members may have the opportunity to participate in harvesting labor-intensive crops [1]. CSAs that operate as non-profit organizations represent the third type of structure, where decisions are made by a board of directors in collaboration with paid or volunteer staff [1]. Of these three types, the subscription farm has become predominant [1,27,25,28].

Other differences include when food is available seasonally, where and how food is distributed, and how much choice members have in selecting produce. Some CSAs operate year-round while others are limited to specific seasons of the year. Some deliver produce boxes to residences or a mutually convenient location, while others require members to travel to the farm to pick up produce. Others still are operating in conjunction with a particular workplace, university, or church [2,29-31]. Some CSAs allow members to choose the components of their weekly share under a weight limit, or simply to choose which individual produce items will go in the share, while others pre-package the complete share in a bag or box. Some CSAs distribute shares in conjunction with a regular community farmers' market. Others offer differently-sized weekly shares to accommodate small and large families [2,31].

Multi-farm or collaborative CSAs are becoming more common, with a single operation representing a cooperative of farms [32-33]. This arrangement enables individual producers to specialize in growing particular crops or raising animals, while still enjoying a guaranteed market, increased financial security, and the opportunity to build community with other growers. Centralized marketing and distribution for multiple farms reduces labor for any one grower. For members, the multi-farm CSA may offer greater variety in foodstuffs, decrease risk, and perhaps offer more convenience or lower prices [32-33].

CSA Membership, Motivation, and Satisfaction

CSA members are characterized as a homogenous and privileged group that is predominantly Caucasian, female, college educated, and politically liberal, with higher than average household incomes [25-26]. Also important in this characterization is that members tend to be socially and politically aware, and have strong environmental values [25-26, 34]. A significant motivation for joining is the desire to purchase fresh, high-quality produce that is grown organically, improve eating habits, and improve health overall [25,35-36]. Members also want to support local or small-scale farmers, meet like-minded people, and to learn about food issues [25].

CSA Member turnover is common, with approximately 50% of CSA members not re-joining in the subsequent year [1,37]. Member satisfaction is correlated positively with their support of alternative agricultural practices, the number of times they visit the farm, the number of years one has been a member, and the likelihood that the produce share is meeting the needs of the family [37]. Share price can be a source of dissatisfaction, as can unfamiliarity with the produce supplied, or inconvenient quantities [5,38-40]. The time costs of membership appears to be one of the most important reasons members do not re-join [39-40]. As household income increases, the likelihood of continuing membership declines, because individual members begin to place a higher economic value on their time [39-40].

Analysis And Interpretation

Conceptual Model of Health Implications

This paper offers a synthesis of health-related implications based on a review of the existing literature related to CSA and local food distribution. Current literature exists in a variety of disciplines including nutrition and health, geography, sociology and rural

studies, agroecology and sustainable agriculture, agricultural economics, and community development. While this was not a systematic review, the author conducted a thorough search for literature using Agricola and the Web of Knowledge database, a large and interdisciplinary combination of Medline, Biological Abstracts, Science Citation Index, and Social Science Citation Index. Emphasis was placed on literature from the current and previous ten years in addition to older but often cited seminal works. Key search phrases included Community Supported Agriculture, Local Food, Local Food Networks, and Alternative Food Networks.

Individual Health

One of the most obvious and predictable ways that membership in a CSA benefits health is the improvement of diet. Currently, very few Americans are following federal dietary guidance, particularly when it comes to consuming the recommended number of fruit and vegetable servings on a daily basis [41-42]. For individual CSA members, the amount and variety of fruits and vegetables consumed increases as a result of membership [43-48]. This positive outcome has also been observed when CSA or similar food distribution strategies are used as a health intervention in low-income urban areas, suggesting that CSA is a feasible approach to addressing health disparities resulting from low consumption of fruits and vegetables [49-50]. In studies comparing dietary intakes between CSA members and non-members, members consume more dark green and yellow fruits and vegetables; have higher intakes of fiber and vitamin A, as well as a slightly lower intake of saturated fat [51-52]. In general, fruits and vegetables provide many underconsumed nutrients such as folate, magnesium, potassium, dietary fiber, and vitamins A, C, and K [42].

Long term, improved fruit and vegetable intake has been shown to have positive health outcomes, including the reduction in chronic disease risk, and particularly cardiovascular disease. [42]. Speaking generally, vegetables and fruits contain high amounts of antioxidants and phytochemicals—substances that have been shown to protect against cancers and inflammatory diseases. Foods with modest to high levels of anticancer activity include vegetables that are often part of a CSA share such as carrots, parsnips, onions, broccoli, cauliflower, tomatoes, peppers, and cabbage [53-54]. Additionally, when simply prepared, fruits and vegetables are relatively low in calories and can contribute to healthy weight maintenance [42].

Furthermore, unlike produce bought in a supermarket that may have traveled more than 1000 miles and been stored for a significant period of time, produce received in a CSA box is very fresh, often harvested the same day the consumer receives it [55]. Although studies of declining nutritional value in stored produce are lacking, one analysis determined particular nutrient losses of 30 to 50% in fruit and vegetables 5 to 10 days after harvest [56].

Related to the increased consumption of fruits and vegetables, is the opportunity for CSA members to modify their food choices and behaviors over time. The most important personal factors leading to food choices include health and nutrition, quality, convenience, managing relationships, and sensory perceptions [57-58]. Regular access to and consumption of high-quality and fresh-tasting produce has the potential to influence future food choices and behaviors.

The nutritional content of foods and perceived flavor is related to many factors including plant variety and genetics, state of freshness, ripeness, and time of harvest, soil quality, geographic location, climate, season of harvest, postharvest conditions, processing, packaging, and storage [59-60]. Eating foods that have grown nearby and soon after harvest should contribute to improved nutrition and flavor, as would consuming varieties that are selected for their nutrient content and flavor rather than shelf life or durability for long distance transport [56].

The plasticity of the human palette ensures that regular consumption of recently harvested fruits and vegetables will help the individual develop a preference for the flavors of fresh produce and an appreciation for its quality [61]. What has been observed in CSA members is that once the consumption of fresh produce has become a habit, expectations related to flavor perception are raised. It becomes difficult to enjoy counter-seasonal produce that has been handled by multiple people in the supply chain, traveled long distances, or spent time sitting in a retail store [62].

Psychological factors are also an important individual health benefit of CSA membership. For some members, CSA participation enhances autonomy, competence, and relatedness [63]. According to Self-Determination Theory, fulfilling these unconscious psychological needs leads to internalizing motivation, and a higher likelihood of adopting a given behavior long-term [64]. Indeed, members who experience psychological benefit are more likely to continue their CSA membership, and the opposite is true when psychological benefits are not realized [63].

CSA membership is an opportunity for individuals to express their social values and engage in consciousness-raising. For members who join a CSA in part because of their commitment to the environment, the experience fosters resonance. Through CSA membership, individuals can take concrete actions to support their idealism. They can practice living in harmony with the local agricultural seasons [40].

Other than the membership fee, the primary challenge for individual CSA members is that of time costs and inconvenience [65]. Belonging to a CSA can require that an individual travel to the farm or distribution location to pick up the produce share. Some members also provide farm labor, which can be physically demanding, include encounters with stinging insects and prickly weeds, and expose one to inclement weather [40]. When a share is brought into the home kitchen, members must then spend time handling, washing, trimming, peeling, and storing or cooking food [26,39]. As previously stated, the additional time needed for the inconvenience and labor of CSA membership becomes relatively more expensive as household income increases [26,39,40]. For members unaccustomed to eating fresh produce, the large quantity of seasonal vegetables, some of which are unfamiliar, is overwhelming. Food is wasted, which creates negative feelings [65-66].

Family Health

Family members experience the same health benefits and opportunity cost described for individuals above, but family units as a whole also enjoy additional benefits. Households subscribing to CSAs report increased frequency of cooking at home, cooking

together with family members, and family meals [26,31,39-40,46-47]. Children's exposure to preparation of fresh produce in the family kitchen and the opportunity to learn cooking skills could have a long-term positive impact on health behaviors. Family meals have been shown to enhance the health and well-being of adolescents. For example, frequency of family meals is inversely associated with substance abuse, poor grades, depressive symptoms, and suicidal thoughts and attempts [67]. Family meals are associated with eating healthier foods and promoting family communication [68-74]. Additionally, families have the opportunity to visit the farm, participate in tours, workshops, and farm festivals which encourage physical activity [1-2,5].

While research has not confirmed that food skills improve as a result of CSA membership, families certainly have the opportunity to develop increased competence with preparation of fresh produce and increased knowledge of local agriculture, produce varieties, and their culinary uses. In entering a CSA contract, members become acquainted with what the local agricultural landscape can provide throughout the growing season. The contents of the share changes on a weekly basis and sometimes depends on the weather [75].

CSA operators often provide a weekly newsletter with recipes to assist members in maximizing the utility of their share [1]. CSAs often provide members with educational farm tours and work days in addition to social events like seasonal festivals and children's activities [1,5,75]. For families with children this is an opportunity to connect young people with the sources of their food and provide gardening experiences. Children who have grown their own vegetables are more willing to taste those foods [76].

CSA share prices range from \$300-\$600 or more depending on the number of weeks included in the season. This may seem expensive, but in studies comparing the weekly cost of a CSA share with the price of an equivalent amount of produce purchased at a retail store, a CSA share is a better economic value, even when compared with the price of conventionally grown food. In one study, the retail value of the CSA share was between 120-250% of its cost [66,77-79].

CSA shares spare the household food budget in other ways as well. A fully-utilized share can take the place of other more expensive and less nutritious foods. More meals cooked at home, means fewer relatively more expensive and less nutritious restaurant meals purchased [80-82]. The weekly CSA share requires a significant amount of space in the refrigerator, which may be part of the reason members report fewer food shopping trips as a result of CSA membership [45]. Fewer shopping trips equates to fewer opportunities to buy unneeded or non-nutritious items on impulse [83]. A study of supermarket circulars shows that supermarkets promote fruits and vegetables much less often than protein foods and grains. Significant space in newspaper advertisements is devoted to sweets and sugar-sweetened beverages [84].

Community Health

When CSA originated in Japan, it was referred to as "teikei" which means partnership or cooperation, and is often translated as "food with a farmer's face" [2,85]. For communities, CSA represents a way to build relationships, and specifically, direct ties between eaters and the farmers and landscapes that sustain them with food [11,22].

While an eater's desire for high quality produce may be the strongest motivation for joining a CSA, desires to develop a stronger sense of community and support local growers are also significant [86]. By paying ahead of the season, members are agreeing to share the risks of farming with the farmer. CSAs therefore, are more than a way for people to buy local food. The CSA arrangement allows us to reconsider the importance of relationships among food, economics, and community. In joining, members can participate in re-establishing a strong local agricultural economy, a moral economy, and an associative economy [2, 87-89]. Members and farmers are both sacrificing something to build a relationship they consider valuable [88, 90].

When compared to all US farmers, CSA farmers are younger and more likely to be women [20, 91]. Few have a background in agriculture, but most have a college degree and nearly all farm using organic methods [19, 79, 89, 91]. While for growers, a CSA is a means to marketing food locally, their motivation is not limited to a profitable return [17]. CSA farmers have a strong sense of obligation to their members, even exploiting themselves to ensure fulfillment [5, 87]. Surveys show that CSA farmers enjoy their work and their lifestyles, educating consumers, and being part of expanding the kind of agriculture they see as a true alternative to the industrial food system [87, 89]. Women CSA farmers describe their motivations within categories of lifestyle choice, feeding people, economic independence, commitment to sustainable food system, and as a way to educate people about food and farming [88].

Several social science researchers have questioned the ability of CSA to build community beyond the farmer-member relationship [18,35,45,92-93]. Indeed CSA has evolved from its initial "back to the land" ideals, and Subscription CSA farms are more common than farms supported by a core community of members who share the work, decision making, and planning of events [1,25,28].

The sheer growth of CSA numbers suggests that they are inclusive of a more mainstream audience than they were three decades ago. For members, CSAs have to compete with the convenience, variety, and quality provided by the dominant food system. Even idealists have busy harried lives and simply need to "pick up their vegetables" sometimes [28]. The success of CSA as an alternative food distribution model must in part be due to its dynamic nature, resilience, and ability to adapt [28,95-96]. The farmer-member relationship created by CSA allows the business to be particularly sensitive to customer needs. The tension between the social embeddedness of CSA and the instrumental approach of either growers or members, fuels its evolution while still keeping it intact [5,93]. CSA remains a source of organically-produced food that is connected to place. Even in its most pragmatic form CSA has the potential to contribute to food system change and the incremental development of "food citizenship," which connects eating with political and social engagement [25,94,97].

Food System Health

The food system includes all entities and processes involved in creating the food supply in both sociocultural and biophysical contexts [6]. Food system sectors include production (farming and ranching, fisheries, gardening, wild foods); transformation (processing, packaging, labeling), distribution (wholesaling, storage, transportation), access (retailing, institutional foodservice, emergency

food programs), and consumption (purchasing, preparation, and waste management). As shown in Figure 1, Human resources and natural resources serve as inputs and as the foundation of the food system, while technology, policy, economics, sociocultural trends, and education are sources of influence [98]. Sustainable food systems conserve and renew their natural resource base, advance social justice and promote animal welfare, build wealth in communities rather than concentrating it among corporate entities; and fulfill the needs of all eaters now and in the future [99].

CSA can improve the health and sustainability of local food systems by conserving and protecting the natural resource base, ensuring the economic viability of small-scale production, reducing the distance of food distribution, and serving as a means to create access to high quality locally produced food for all income groups.

Regarding food system inputs, CSA typically involves less chemical use, causes less soil erosion, employs water conservation practices, allows for more crop and ecosystem diversity, and protects farmland at the rural-urban interface [1,75,87,100]. CSA members are interested in environmental issues and are willing to support conservation with their food dollars. CSA farmers share these values tend to use environmentally regenerative practices. They often provide soil and water conservation education and demonstrate land stewardship for members [19-20,75].

In the production sector, CSA creates agricultural livelihoods. In surveys, slightly more than half of CSA farmers report being profitable, believe that their CSA improves their ability to cover operating costs, and believe that CSA improves farmer compensation [20,91]. CSA returns for farmers exceed the profits that would be realized selling produce into the wholesale market [78,87]. Farmers use CSA as a way

to diversify production-related income channels [17,91].

CSA operators face the same problems faced by all small business entrepreneurs [101]. CSA profitability depends on farmer experience and CSA structure. About half of CSA farmers depend on off-farm income to supplement CSA income [17]. Health care and retirement savings are lacking for CSA farmers [45]. For these and other reasons, some CSAs are short-lived, only operating for one or two years [45]. More experienced CSA farmers have higher net incomes and larger operations [17]. CSAs that involve a dedicated group of core members realize higher incomes [90].

On the whole, CSA financing seems to be a viable alternative to traditional debt financing in agriculture. CSA members supply the grower with risk reduction and non-farm equity capital that is free of financing costs. Advance payments for produce shares cover the costs of inputs. The grower has a guaranteed market, and assuming successful production, a fair market price for produce [78]. CSA financing makes starting a food enterprise more accessible to new farmers. A farmer can start CSA operation by leasing land and selling memberships to raise capital for seeds and supplies, an avenue not available to a conventional farm operation.

Regarding the transformation and distribution sectors, CSA minimizes the need for food processing and packaging. At the same time, CSA provides opportunities for members to practice home-preservation of the seasonal harvest. CSA reduces food miles, and while food miles may be too simplistic an assessment of environmental impact, the establishment of local food systems helps minimize the energy expenditures linked to food distribution [55,100,102].

In the food access sector, it is clear that providing adequate access

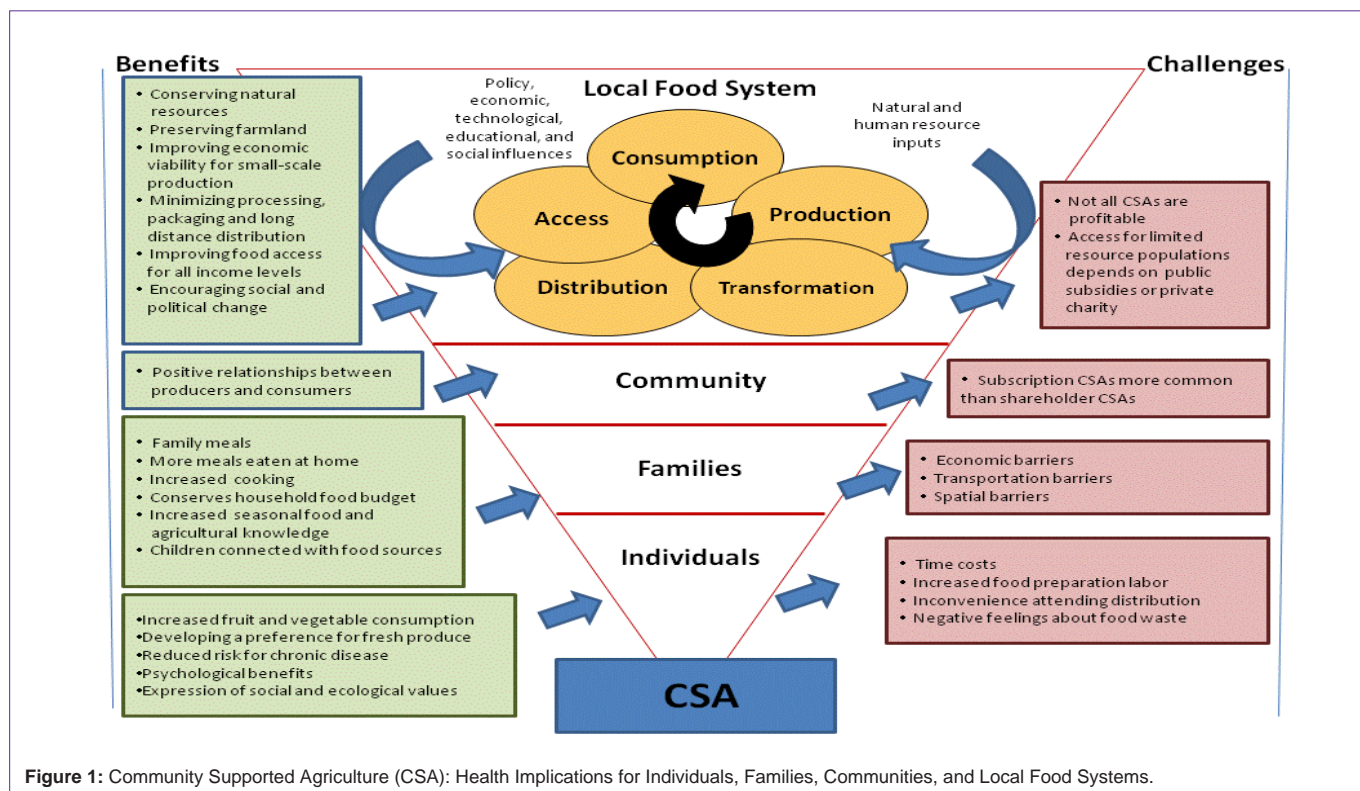


Figure 1: Community Supported Agriculture (CSA): Health Implications for Individuals, Families, Communities, and Local Food Systems.

to food for all members of a community is not accomplished by the market alone. There are areas in rural and urban locales that lack access to affordable fruits and vegetables among other foods, often referred to as food deserts. Limited food access is linked to poor diets and the prevalence of diet-related diseases and exacerbates health disparities for low income populations [103]. The de-commodification of food and community embeddedness embodied by CSA has the potential to do for food access what the market, even when combined with federal food programs, cannot. CSA increases the supply of fresh food that is available and distributed directly from grower to eater in both rural and urban communities [104]. As an alternative food network, CSA can affect social and political change in communities, which would be required for genuine community food security [105].

On the other hand, CSA is described as a white privileged institution [24]. In spite of a share's economic value and potential to create real savings, for limited resource families, the cost of a share can be prohibitive. Payment is most often required weeks or even months ahead of the growing season. A compilation of strategies for overcoming income barriers in CSA membership include use of nutrition assistance such as SNAP, WIC Coupons, or WIC Farmers' Market Nutrition Program vouchers to pay for a CSA share on a weekly basis; payment plans in lieu of paying the whole cost of a share upfront; working shares, in which members pay for all or part of their share with labor; subsidized or low-cost shares for low-income members; sliding scale membership fees based on income; and bartering [23].

Overcoming non-economic barriers requires more effort. Other factors that block access include personal knowledge about nutrition, limited food skills, the time required to pick up and handle the share, physical distance to a CSA distribution point, and lack of familiarity with seasonal vegetables [23-24].

In spite of these challenges, there are ways to connect with limited-resource households. Some CSAs provide transportation assistance to members when this is a limiting factor [23]. Other CSAs operate as non-profit organizations, or partner with non-profit organizations, and have strong ties to emergency food providers such as food banks and food pantries [1,23,31]. Incorporating civic agriculture into urban housing projects enhances the level of civic engagement among residents and contributes to rising levels of socioeconomic well-being [106]. As described above, CSA interventions in low-income communities improve diet quality and health, and also promote access to higher quality foods [49-50].

Conclusion

In summary, this paper offers a conceptual model of the health implications and challenges of CSA for individuals, families, communities, and local food systems. CSAs benefit individual health by improving diet; contribute to family health by advancing food skills and encouraging family meals; foster the development of healthy relationships between growers and eaters in communities; and promote sustainability in local food systems by conserving natural resources, improving economic viability of small-scale agriculture, minimizing the need for food processing and long-distance distribution, and improving access to high quality food. Challenges for CSA members include more time to prepare whole

foods compared to processed foods, inconvenience compared to one-stop shopping at a supermarket, and prohibitive pricing for limited-resource families. Fully utilizing CSA as a health promotion strategy will require the support of health professionals, policy makers, and private sector industries such as health insurance.

The health benefits of CSA seem to far outweigh the challenges they pose. Fully utilizing CSA as a health promotion strategy will require the support of health professionals, community economic development specialists, extension agents, policy makers, and private enterprise with a stake in health improvement.

Health professionals such as physicians and dietitians can encourage patients to participate regardless of income level. Community nutritionists, extension agents, and economic development specialists can encourage the use of CSA as a community development project or health intervention, and support CSA start-ups with market development assistance and referrals. In limited-resource urban neighborhoods and rural areas, CSA can be used as a community intervention to address a multitude of disparities ranging from community engagement, safety, and quality of life to poor food access.

Due to their potential for improving diets and reducing chronic disease risk, CSAs deserve the same federal farm bill policy support that has been given to developing farmers' markets in rural and urban communities. Local policies that set aside a percentage of the land slated for residential development as community agricultural space could also encourage CSA initiation [14]. CSAs can be connected to public and private institutions such as schools, prisons, universities, hospitals and other worksites. Additionally, CSAs can be connected to a variety of federally funded food programs such as the National School Lunch Program, the Child and Adult Care Food Program, WIC, SNAP, and the Elderly Nutrition Program. For independently living seniors a home-delivered CSA share might improve both access to fruits and vegetables and intake of fiber and other essential nutrients.

Finally, private enterprise with a stake in citizen health can support CSA development and membership rates. For example, health insurance providers in Wisconsin offer policyholders rebates for subscribing to local CSAs, reducing the cost of a share by 40% [107]. If CSA involvement demonstrates improved health outcomes, then encouraging participation could have a significant impact on the reduction of healthcare costs.

In conclusion, the expansion of Community Supported Agriculture has tremendous potential to support health in the US and around the globe. Future research can better document the impacts of CSA on specific health indicators for individuals, on improved family health behaviors, and on the potential to improve food access in limited resource communities. Additionally, the question of whether CSA can make a significant contribution to localizing secure food systems should be addressed.

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References

1. Adam K. Community Supported Agriculture. ATTRA National Sustainable Agriculture Information Service; 2006.
2. Henderson E, Van En R. *Sharing the Harvest: A Guide to Community Supported Agriculture*. White River Junction, VT: Chelsea Green. 1999.
3. Brinson A, Lee M, Rountree B. Direct marketing strategies: The rise of community supported fishery programs. *Marine Policy*. 2011; 35: 542–548.
4. Campbell LM, Boucquey N, Stoll J, Coppola H, Smith MD. From vegetable box to seafood cooler: Applying the community-supported agriculture model to fisheries. *Society & Natural Resources: An International Journal*. 2014; 27: 88-106.
5. Hinrichs CC. Embeddedness and local food systems: notes on two types of direct agricultural markets. *J Rural Studies*. 2000; 16: 295-303.
6. Sobal J, Khan LK, Bisogni C. A conceptual model of the food and nutrition system. *Soc Sci Med*. 1998; 47: 853-863.
7. Furst T, Connors M, Bisogni CA, Sobal J, Falk LW. Food choice: A conceptual model of the process. *Appetite* 1996; 26: 247-266.
8. Meadows D. *Thinking in systems*. White River Junction, VT: Chelsea Green Publishing; 2008.
9. McFadden S. The history of community supported agriculture, part I. Community farms in the 21st century: poised for another wave of growth? The New Farm, Rodale Institute. 2003.
10. Biodynamic Farming Association. What is Biodynamics?
11. Schnell SM. Food with a Farmer's face: Community-supported agriculture in the United States. *Geographical Review*. 2007; 97: 550-564.
12. Buttel FH. Internalizing the societal costs of agricultural production. *Plant Physiol*. 2003; 133: 1656–1665.
13. Feenstra G. 1994. CSAs: The consumer-farmer connection. *Cal Ag*. 1994; 48: 8.
14. McFadden S. The History of Community Supported Agriculture, Part II. Community farms in the 21st century: Poised for another wave of growth? The New Farm, Rodale Institute. 2004.
15. Local Harvest. Community Supported Agriculture.
16. USDA Agricultural Marketing Service: Farmers Markets and Local Food Marketing.
17. Brown C, Miller S. The impacts of local markets: A review of research on farmers markets and community supported agriculture (CSA). *Amer J Agric Econ*. 2008; 90: 1296-1302.
18. Pole A, Gray M. Farming alone? What's up with the "C" in community supported agriculture. *Agriculture and Human Values*. 2013; 30 : 85-100.
19. Lass D, Stevenson GW, Hendrickson J, Ruhf K. 2003. CSA across the Nation: Findings from the 1999 CSA Survey. Madison, Wis.: Center for Integrated Agricultural Systems.
20. Lass D, Stevenson GW, Hendrickson J, Ruhf K. 2003. Community supported agriculture entering the 21st century: Results from the 2001 national survey. Amherst, MA: University of Massachusetts, Department of Resource Economics.
21. Fromartz S. Organic Inc. Natural foods and how they grew. Orlando FL:Harcourt Inc; 2006.
22. Sumner J, Mair H, Nelson E. Putting the culture back into agriculture: civic engagement, community and the celebration of local food. *Int J Agric Sustainability*. 2010; 8 : 54-61.
23. Forbes CF, Harmon AH. Buying into community supported agriculture: strategies for overcoming income barriers. *J Hun Env Nutr*. 2007; 2 : 65-79.
24. Kato Y. Not just the price of food: Challenges of an urban agriculture organization in engaging local residents. *Sociological Inquiry*. 2013; 83: 369–391.
25. Lang KB. The changing face of community-supported agriculture. *Culture and Agriculture*. 2010; 32 : 17-26.
26. Kolodinsky JM, Pelch LL. Factors influencing the decision to join a community supported agriculture (CSA) farm. *Journal of Sustainable Agriculture*. 1997; 10: 129-141.
27. Stanford L. The role of ideology in New Mexico's CSA (community supported agriculture) organizations: Conflicting visions between growers and members. In *Fast food/slow food: The cultural economy of the global food system*, ed. Wilk R, 181–200. Lanham, MD: AltaMira Press;2006.
28. Feagan R, Henderson A. Devon acres CSA: Local struggles in the global food system. *Agric Human Values*. 2009 ;26 :203-217.
29. Falk CL, Pao P, Cramer CS, Silva E. OASIS: A campus-based, organic, community supported agriculture farm. New Mexico State University; 2010.
30. Wharton C, Harmon A. University engagement through local food enterprise: Community-supported agriculture on campus. *J Hun Env Nutr*. 2009; 4: 112-128.
31. Harmon AH, Robbins S. et al. (2010). Towne's Harvest Garden and Community Supported Agriculture Program, Annual Report 2009. Towne's Harvest Garden. Montana State University, Bozeman MT. 2010.
32. Perry J, Franzblau S. Local harvest: A Multifarm CSA Handbook. Northeast Region Sustainable Agriculture Research and Education Program (SARE); 2010.
33. Flora CB, Bregendahl C. Collaborative community-supported agriculture: balancing community capitals for producers and consumers. *International Journal of Sociology of Agriculture and Food*. 2012; 19 : 329-346.
34. Bougherara D, Grolleau G, Mzoughi N. Buy local, pollute less: What drives households to join a community supported farm? *Ecological Economics*. 2009; 68; 1488-1495.
35. Cone CA, Myhre A. Community-supported agriculture: A sustainable alternative to industrial agriculture? *Human Organization*. 2000; 59: 187-197
36. Farr-Wharton G, Lyle P, Choi H, Foth M. Health matters for subscribers to community-supported agriculture. *Food and Public Health*. 2012; 2: 184-192.
37. Lang KB. Expanding our understanding of community supported agriculture (CSA): An examination of member satisfaction. *J Sustainable Agric*. 2005; 26: 61-79.
38. Groh T, McFadden S. Farms of tomorrow revisited. Kimberton, PA: Biodynamic Farming and Gardening Association; 1997.
39. Kolodinsky J Pelch L. Who leaves the farm? An investigation of community supported agriculture (CSA) farm membership renewals. *Consumer Interests Annual*. 1997; 43: 46-51.
40. Hayden J, Buck D. Doing community supported agriculture: Tactile space, affect and effects of membership. *Geoforum*. 2012; 43: 332-341.
41. Krebs-Smith SM, Guenther PM, Subar AF, Kirkpatrick SI. Americans do not meet federal dietary recommendations. *J Nutr*. 2010; 140: 1832-1838
42. US Department of Agriculture and US Department of Health and Human Services. *Dietary Guidelines for Americans, 2010. 7th Edition*, Washington DC: US Government Printing Office, December 2010.
43. MacMillan U, Alexandra L, Winham DM, Wharton CM. Community supported agriculture membership in Arizona. An exploratory study of food and sustainability behaviours. *Appetite*. 2012; 59: 431-436.
44. Perez, J., P. Allen, and M. Brown. Community supported agriculture on the central coast: The CSA member experience. Research Brief 1. Santa Cruz CA: Center for Agroecology and Sustainable Food Systems; 2003.
45. Ostrom M. Community supported agriculture as an agent of change: is it working? In: *Remaking the North American food system: Strategies for sustainability* (Hinrichs C, Lyson T eds.), pp 99-120. Lincoln NE: University of Nebraska; 2007.
46. Cohen JN, Gearhart S, Garland E. Community supported agriculture: a commitment to a healthier diet. *J Hun Env Nutr*. 2012; 7: 20-37.

47. Curtis K, Ward R, Allen K, Slocum S. Impacts of community supported agriculture program participation on consumer food purchases and dietary choice. *J Food Dist Res.* 2013; 44: 42-51.
48. Landis B, Smith T, Lairson M, McKay K, Nelson H, O'Briant J. Fruit and vegetable intakes and demographic characteristics of community supported agriculture program participants in North Carolina. *J Am Diet Assoc.* 2008; 108: A71.
49. Ohri-Vachaspati P. Improving fruits and vegetable Intake through a community foods approach. *J Am Diet Assoc.* 2007; 107: A85.
50. Quandt SA, Dupuis J, Fish C, D'Agostino RB. Feasibility of using a community-supported agriculture program to improve fruit and vegetable inventories and consumption in an underresourced urban community. *Preventing Chronic Disease.* 2013; 10: E136
51. Cooley J. Community supported agriculture: A study of shareholders' dietary patterns, food practices, and perceptions of farm membership [master's thesis]. Amherst, Mass: University of Massachusetts Amherst; 1996.
52. McCullum C. Using sustainable agriculture to improve human nutrition and health. *J Community Nutr.* 2004; 6: 18–25.
53. Craig W. Phytochemicals: guardians of our health. *J Am Diet Assoc.* 1997; 97 : S199–S204.
54. American Institute for Cancer Research. Phytochemicals: The cancer fighters in the foods we eat.
55. Schnell S. Food miles, local eating, and community supported agriculture: putting local food in its place. *Agriculture and Human Values.* 2013; 30: 615-628.
56. Klein BP. Nutritional consequences of minimal processing of fruits and vegetables. *J Food Qual.* 1987; 10: 179–193.
57. Glanz K, Basil M, Maibach E, Goldberg J, Snyder D. Why Americans eat what they do: Taste, nutrition, costs, convenience, and weight control concerns as influences on food consumption. *J Am Diet Assoc.* 1998; 98: 1118-1126.
58. Furst T, Connors M, Bisogni CA, Sobal J, Falk LW. Food choice: A conceptual model of the process. *Appetite* 1996; 26: 247-266.
59. Bourn D, Prescott J. A comparison of the nutritional value, sensory qualities, and food safety or organically and conventionally produced foods. *Crit Rev Food Sci Nutr.* 2002; 42: 1-34.
60. Wunderlich SM, Felman C, Kane S, Hazhin T. Nutritional quality of organic, conventional, and seasonally grown broccoli using vitamin C as a marker. *Int J Food Sci Nutr.* 2008; 59: 34-45.
61. Shepherd GM. *Neurogastronomy: How the brain creates flavor and why it matters.* New York: Columbia University Press; 2012.
62. Neithercott T, Webb R. Farm fresh: The ins and outs of community supported agriculture. *Diabetes Forecast.* 2011; 64: 31-36.
63. Zepeda L, Reznickova A, Russell W. CSA membership and psychological needs fulfillment: an application of self-determination theory. *Agric Human Values.* 2013; 30: 605-614.
64. Deci, E.L., and R.M. Ryan. 2000. The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry.* 2000; 11: 227–268.
65. Kane D J and L Lohr. 1997. Maximizing shareholder retention in southeastern CSAs: A step toward long term stability. Santa Cruz, CA: Organic Farming Research Foundation; 1997.
66. Cooley JP and DA Lass. Consumer Benefits from Community Supported Agriculture Membership. *Rev Agric Econ.* 1998; 20: 227–237.
67. Eisenberg ME, Olson RD, Neumark-Sztainer D, Story M, Bearinger LH. Correlations between family meals and psychological well-being among adolescents. *Arch Pediatr Adolesc Med.* 2004; 159: 792-796.
68. Neumark-Sztainer D, Story M, Ackard D, Moe J, Perry C. The "family meal": views of adolescents. *J Nutr Educ.* 2000; 32: 329-334.
69. Neumark-Sztainer D, Story M, Ackard D, Moe J, Perry C. Family meals among adolescents: findings from a pilot study. *J Nutr Educ.* 2000; 32: 335-340.
70. Neumark-Sztainer D, Hannan PJ, Story M, Croll J, Perry C. Family meal patterns. *J Am Diet Assoc.* 2003; 103: 317-322.
71. Gillman MW, Rifas-Shiman SL, Frazier AL, et al. Family dinner and diet quality among older children. *Arch Fam Med.* 2000; 9: 235-240.
72. Boutelle KN, Lytle LA, Murray DM, Birnbaum AS, Story M. Perceptions of the family mealtime environment and adolescent mealtime behavior: do adults and adolescents agree? *J Nutr Educ.* 2001; 33: 128-133.
73. Lynam MJ, Tenn L. Communication. *J Adv Nurs.* 1989;14:653-660.
74. Riesch SK. Parent-adolescent communication in nondistressed families. *Annu Rev Nurs Res.* 1997; 15: 123-152.
75. Anderson-Wilk M. Does community supported agriculture support conservation? *J Soil and Water Conservation.* 2007; 62:126A-127A.
76. Morris JL, Neustadter A, Zidenberg-Cherr S. First-grade gardeners more likely to taste vegetables. *California Agriculture* 2001; 55: 43-46.
77. Farnsworth RL, Thompson SR, Drury KA, Warner RE. Community supported agriculture: Filling a niche market. *J Food Dist Res.* 1996; 27: 90–98.
78. Sabih, S.F., and L.B.B. Baker. 2000. Alternative financing in agriculture: A case for the CSA method. *Acta Hort.* 2000; 524: 141–48.
79. Brown C, Miller S. The impacts of local markets: A review of research on farmers markets and community supported agriculture (CSA). *Amer J Agric Econ.* 2008; 90: 1296-1302.
80. Kant AK, Graubard BI. Eating out in America 1987-2000: Trends and nutritional correlates. *Preventive Medicine* 2004; 38: 243-249.
81. Guthrie JF, Lin B-H, Frazao E. Role of food prepared away from home in the American diet, 1977-78 versus 1994-96: Changes and consequences. *J Nutr Educ Behav.* 2002; 34: 140–150.
82. Cullen P. Time, tastes and technology: The economic evolution of eating out. *British Food Journal.* 1994; 96: 4-9.
83. Abratt R, Goodey SD. Unplanned Buying and In-Store Stimuli in Supermarkets. *Managerial and Decision Economics.* 1990; 11: 111-121.
84. Martin-Biggers J, Yorkin M, Alljallad C, Ciecierski C, Akhabue I, McKinley J, Hernandez K, Yablonsky C, Jackson R, Quick V, Byrd-Brenner C. What foods are US supermarkets promoting? A content analysis of supermarket sales circulars. *Appetite.* 2013; 62: 160-165.
85. Imhoff, D. Community Supported Agriculture: Farming with a Face on It. In: *The Case against the Global Economy and for a Turn toward the Local* (Mander J, Goldsmith E eds) pp 425- 433. San Francisco: Sierra Club Books; 1996.
86. Brehm JM, Eisenhauer BW. Motivations for participating in community supported agriculture and their relationship with community attachment and social capital. *Southern Rural Sociology.* 2008; 23: 94-115.
87. Galt E. The Moral Economy Is a Double-edged sword: Explaining farmers' earnings and self-exploitation in community-supported agriculture. *Economic Geography.* 2013; 89: 341–365.
88. Jarosz L. Nourishing women: toward a feminist political ecology of community supported agriculture in the United States, Gender, Place & Culture: A Journal of Feminist Geography. 2011; 18: 307-326.
89. Worden EC. Grower perspectives in community supported agriculture. *HortTechnology.* 2004; 14: 322-325.
90. Sanneh N, Moffit LJ, Lass DA. Stochastic efficiency analysis of community-supported agriculture core management options. *J Agric Res Econ.* 2001; 26: 417-430.
91. Galt RE, O'Sullivan L, Beckett J, Hiner CC. Community supported agriculture is thriving in the central valley. *California Agriculture.* 2012; 66: 8-14.
92. DeLind, L. 1999 Close encounters with a CSA: The reflections of a bruised and somewhat wiser anthropologist. *Agric Human Values.* 1999; 16: 3–9.

93. Cone C, Kakaliouras A. Community supported agriculture: building moral community or an alternative consumer choice. *Culture & Agriculture*. 1995; 51: 28–31.
94. Feagan R, Henderson A. Devon acres CSA: Local struggles in the global food system. *Agric Human Values*. 2009; 26: 203-217.
95. King CA. Community resilience and contemporary agri-ecological systems: Reconnecting people with food, and people with people. *Systems Research and Behavioral Science*. 2008; 25: 111-124.
96. Davison J, Louhela A, Lattin R. The Great Basin Basket Company: a community supported agriculture (CSA) success story in Nevada. Reno, NV: University of Nevada; 2011.
97. Hassanein, N. Practicing Food Democracy: A Pragmatic Politics of Transformation. *J Rural Studies*. 2003; 19: 77-86.
98. Harmon AH, Gerald BL. Position of the American Dietetic Association: Food and Nutrition Professionals can implement practices to conserve natural resources and support ecological sustainability. *J Am Diet Assoc*. 2007; 107: 1033-1043.
99. Tagtow AM, Harmon AH. Healthy Land, Healthy Food & Healthy Eaters: Dietitians Cultivating Sustainable Food Systems. White paper for the American Dietetic Association Food and Nutrition Conference and Exhibition. 2009.
100. Tegtmeyer E and M Duffy. Community Supported Agriculture (CSA) in the Midwest United States. Ames, IA: Leopold Center for Sustainable Agriculture, Iowa State University. 2005.
101. Katz J, Green R. *Entrepreneurial Small Business*. 4th edition. New York: McGraw-Hill/Irwin. 2014.
102. Mundler P, Rumpus L. The energy efficiency of local food systems: A comparison between different modes of distribution. *Food Policy*. 2012; 37: 609–615.
103. USDA Economic Research Service. Access to affordable and nutritious food: Measuring and understanding food deserts and their consequences. June 2009.
104. Patel S, MacRae R. Community supported agriculture in the city: the case of Toronto. *Journal of Agriculture, Food Systems and Community Development*. 2012; 2 :85-100.
105. Follet JR. Choosing a food future: Differentiating among alternative food options. *J Agric Environ Ethics*. 2009; 22: 31-35.
106. Chen S. Civic agriculture: Towards a local food web for sustainable urban development. *APCBEE Procedia*. 2012; 1: 169 – 176.
107. Jackson G, Raster A, Shattuck W. An analysis of the impacts of health insurance rebate initiatives on community supported agriculture in Southern Wisconsin. *Journal of Agriculture, Food Systems and Community Development*. 2011; 2: 287-296.