SEED LIBRARIES AND FOOD INSECURITY:

AN EMERGING SOLUTION TO AN ENDURING PROBLEM

by

Emily Roberson

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The members of the Honors Thesis Committee appointed

to examine the thesis of Emily Roberson

find it satisfactory and recommend that it be accepted.

Meghann Jarchow, PhD
Assistant Professor, Sustainability Program Coordinator
Director of the Committee

Richard Braunstein, PhD
Professor, Department of Political Science

Dean Spader, JD
Emeritus Professor, Political Science and Criminal Justice

ABSTRACT

Seed Libraries and Food Insecurity: An Emerging Solution to an Enduring Problem

Emily Roberson

Director: Meghann Jarchow, Ph.D.

Food insecurity in the United States is a multidimensional problem that affects over 14% of households. Community seed libraries are one solution that may be able to address food insecurity in terms of access, affordability, and health. Research into seed libraries and low income food security will help determine seed library managers' perceptions of food insecurity in their communities as well as if or how they plan to use the seed library to address food insecurity. Additionally, to address a lack of formal research involving seed libraries, this research provides descriptive statistics about seed library structure and function. The results will help current and future seed library managers and food justice advocates understand low-income food security and the role that seed libraries and home and community gardening can play in addressing community food needs. A 41-question online survey was sent to over 350 seed library managers in the U.S., and 160 responses were received. Roughly half of seed library managers felt that the seed library contributed to helping low-income families gain access to healthy foods. Although seed libraries are a fairly new phenomenon, they have the potential to help many low-income U.S. families enjoy the benefits of growing their own nutritious food.

KEYWORDS: Seed, Seed Library, Food Security, Garden, Public Health

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Chapter 1

Introduction

Across the United States, public libraries are beginning to offer a new service to their patrons reminiscent of Carl Sagan's (2011) observation on books—"They can lie dormant for centuries and then flower in the most unpromising soil." Though Carl Sagan was talking about the spread of knowledge through books over time, seeds themselves act as vessels, carrying with them not only cultural and natural history, but also the fascinating ability to flourish into something edible and nutritious. Seed libraries are making an entrance onto the local food scene at a rapid rate; since their introduction around the turn of the millennium, there are already around 400 seed libraries at various locations around the United States, and they spreading from public libraries into nonprofits, businesses, and schools. Just like with books, seed library users can "check out" seeds and "return" the seeds after growing them. At their best, seed libraries are a renewable system that can ultimately lead to more locally adapted seed varieties; increased interest in home, community, and school gardening; and, as this thesis seeks to explore, less food insecurity within communities.

Food insecurity is an ongoing issue in the United States. In order to understand how seed libraries might be able to help alleviate food insecurity in the U.S., it is important to fully understand what food security means. The World Health Organization (WHO) and the United States Department of Agriculture (USDA) define the problem well. At the 1996 World Food Summit, the WHO determined food security exists "when

all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (WHO, 2016). The WHO also lists what they call the "three pillars" of food security as food availability, access, and use. The USDA defines low food security as "reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake" (2015). They define very low food security as "reports of multiple indications of disrupted eating patterns and reduced food intake" (USDA, 2015).

Each year, the USDA's Economic Research Service (ERS) releases a report of U.S. household food security. The ERS's most recent report puts the number of houses that were food insecure for at least part of the year in the U.S. at 14% (17.4 million households) and 5.6% (6.9 million households) were categorized as having "very low food security" (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2015, p. 1). Additionally, the report states, "For households with incomes near or below the Federal poverty line, households with children headed by single women or single men, women living alone, and Black- and Hispanic-headed households, the rates of food insecurity were substantially higher than the national average" (Coleman-Jensen et al., p. 2). Food insecurity is clearly a problem in the United States, and to address it, communities can take note of their assets and their needs to establish a plan of action—part of which could involve encouraging food gardening by founding a local seed library.

Food gardens are one way to lower food insecurity; they increase access to nutritious foods and can also lower the cost of consuming them. Although low-income food insecurity is a complex issue and no singular program can address every aspect of it, seed libraries could play a role in alleviating food insecurity by providing educational opportunities and material resources for growing a successful food garden. The low cost

and convenient placement of seed libraries in public spaces positions them as an intriguing addition to a list of community-based services to help low-income families access healthy foods. The first objective of my research was to understand the overall structure and functioning of seed libraries in the United States. The second objective was to determine the extent to which seed library managers believe they are addressing or could address food insecurity in their communities.

Chapter 2

Literature Review

Definition. A seed library, for the purposes of this paper, is a location where gardeners can "check out" seeds to grow. Then, at the end of the growing season, seed library participants "return" seeds from the plants they grew so that more gardeners can benefit from the seeds during the next growing season. Seed saving itself is a skill that not every gardener knows. To address this obstacle, many seed libraries host workshops or provide materials on how to save seeds in order to maximize the effectiveness of the seed library's principle of sharing. Seed libraries are overwhelmingly located in public libraries, but some are found in elementary or high schools, nonprofit organization headquarters, businesses, and other public spaces. Seeds are typically distributed in small packets and are sometimes organized by growing difficulty level. Seed libraries almost always contain vegetables but may also include herb, flower, and fruit seeds.

A seed library is not to be confused with a seed bank; though they may be started for many of the same purposes, a seed bank is more of a storage space, or reserve, for preserving genetic diversity. Seed banks typically receive seeds and only distribute them when necessary. For example, the Svalbarg Global Seed Vault in Norway recently experienced its first seed withdrawal since its opening in 2008. The vault was opened in October 2015 by request of the International Center for Agricultural Research in Dry Areas (Doyle, 2015). The action followed the reduced functionality of an important seed bank in Aleppo, Syria due to the country's ongoing civil war (Doyle). Seed libraries, on

the other hand, receive and distribute seeds to and from local growers regularly and on a more casual basis.

Rationale. Each community has its own reasons for starting a seed library. The following are quotes from online articles and blog posts about seed libraries that state some of the reasons for opening one:

> "We think people want to be a part of [the healthy food movement] but don't know how, but we can be a first step for people to get into that movement, because libraries are about discovery." –Mary Coe, Fairfield Woods Seed-to-Seed Library (Landgraf, 2015)

> "We can empower people by giving them the advantage of growing food . . . We can tell people that produce is expensive, but if they have a little plot of land, they can help to feed their family." – Rachel Steiner, Common Soil Seed Library (Landgraf, 2015)

> "[Seed libraries] offer regular folks the opportunity to take matters back into their own hands in their own local communities. No one owns the seeds in a seed library. It is an open source collaboration. Each community can grow the enterprise to fit its own needs." –Bill McDorman, Native Seeds SEARCH and Seed School (Greene, 2013)

> "Our goal is to preserve genetic diversity, empowering our local farmers and gardeners to take back the power of the seed stewardship." –Rowen White, Sierra Seed Co-op (Greene, 2013)

As shown by the above quotations, each seed library has its own unique reasons for opening, and each person using it has a slightly different reason for doing so.

History and Legality. Although seed sovereignty will not be discussed in detail in this paper, seed sovereignty, or seed freedom as it is sometimes called, has been vital to the creation of many seed libraries. Author and activist Vandana Shiva defines seed sovereignty as the reclamation of "seeds and biodiversity as commons and public good" (Shiva). Proponents of seed sovereignty recognize that seed saving and seed sharing have been a part of human history since the beginning of agriculture (Hoidal, 2015). Only in

the last 100 years or so since the development of hybrid seeds and patents on seed genetics has the genetic diversity of agricultural crops been endangered (Hoidal). In fact, the United Nations Food and Agriculture Association estimates that 75% of agricultural crop genetic diversity has been lost since the early nineteenth century due to the advent of modern agricultural practices (Jarvis, Upadhyaya, Gowda, Aggarwal, Fujisaka, & Anderson, 2010, p. 12). According to Kloppenburg (2010), whoever controls seeds has substantial control over the food system, a power that is largely in the hands of corporations that profit from the privatization of a science that used to be public (p. 368). He also points out that the foundations of biotechnology were (and still are) "predicated on access by breeders to the enormous pool of biodiversity that has been produced and reproduced over the millennia by peasant farmers and indigenous peoples" (Kloppenburg, p. 372). Due to these changes in the agrifood system, the sharing of open source seeds is not only a historical act, but has also become a political act, and as such it is important to understand this underlying tension when discussing the potential benefits of a seed library to communities in the U.S.

The state-mandated closure of a seed library in Mechanicsburg, Pennsylvania, spurred a lot of conversations about the legality of seed libraries. According to Pennsylvania law, the seed library would need to test the viability of each seed variety by planting at least 400 seeds of each variety in a test plot (Sustainable Economies Law Center, 2014); this is practically impossible for most small seed libraries that run on donations and volunteer hours. Matthew Dillon, a member of the USDA's National Genetic Resource Advisory Council, says that treating seed libraries like commercial seed distributors is not necessary for people willingly participating in "open and free

exchange" (Holt, 2014). The Seed Savers Exchange (SSE), a nonprofit based out of Decorah, Iowa, is critical of the over-regulation of seed libraries. In response, they created this list of benefits that seed libraries provide that may be affected by overzealous regulations:

- they increase seed access, allowing low-income families to grow their own food;
- they support and encourage regionally adapted varieties by engaging a community in plant selection;
- they protect rare varieties that may not be maintained by the commercial; marketplace; *and*
- they create excitement and interest in seeds. (SSE, 2014)

To ensure legality, the Simpson Seed Library in Mechanicsburg and other seed libraries have instead starting hosting seed exchanges, events where seed savers can meet to exchange and discuss seeds and gardening (Simpson Seed Library, 2014). They also still give out seeds, but they are not able to accept harvested seeds (Simpson Seed Library). Though these exchanges still have many of the benefits of a traditional seed library (and many that a seed library does not), not everyone may be able to attend an exchange event or may feel out of place if they are first-time gardeners. Advocates of seed libraries encourage seed library proponents in each state to challenge state seed laws. In Minnesota and Nebraska, legislation was passed in 2015 that exempted seed libraries from commercial seed operation regulations and testing requirements (Johnson, 2015).

Food Sovereignty and Food Justice. Seed libraries are uniquely positioned to be part of both the food sovereignty and food justice movements. Lafferty (2015) describes both of these movements in her article "Troubling Place in Alternative Food Practices: Food Movements, Neoliberalism, and Place." Food sovereignty activists question whether those who have a voice on national and international stages are those that have the best understanding of a community's needs or assets (Lafferty, p. 230). Food

sovereignty is commonly linked with indigenous rights movements, and it aims to empower local communities and indigenous groups to "make decisions over the amount and quality of food [they] hunt, fish, gather, grow and eat" (as cited in Lafferty, p. 232). A seed library that promotes food sovereignty would, for example, encourage people to take charge of the seed varieties found in the seed library and would encourage the intergenerational sharing of knowledge.

Food justice, on the other hand, is an extension of the environmental justice movement. (Lafferty, p. 234). Food justice activists try to look for the root causes of food issues and access to land and address them directly (Lafferty, p. 233). Lafferty argues that "food-justice activism highlights the relationships between food and lived experiences of human categories of difference" and that food justice activists should find more "self-determined ways of provisioning food for their communities, while rendering visible the racial projects and inequalities inherent in the food system" (p. 234). A seed library that addresses food justice would celebrate the diversity and culture within the growing, eating, and sharing of food. Within both movements, emphasis is put on place in addition to the history and culture of food and seed.

Public Seed Libraries and Low-Income Populations. Public libraries, the most common place to find seed libraries, are an important asset to low-income people because they provide educational materials, are free to access, and serve as a community hub. To understand how seed libraries can be beneficial to a library's patrons, a basic understanding of library services and their usage is essential. According to the most recent statistics, 46% of respondents to a Pew Research Survey age 16 or above claimed to have visited a library in person once in the past 12 months (Horrigan, 2015, Ch. 1).

People tend to value the services that libraries provide for a community, with 65% of survey respondents stating that they believe closing the public library in a community would have a major impact on the community (Horrigan, Ch. 1). This is especially true for Hispanic populations who are the most frequent visitors of public libraries—21% of Hispanic respondents visited the public library "at least once a week," seven percentage points higher than the share of all respondents to the survey (Horrigan, Ch. 1). More traditional library services declined from 2012 such as checking out print books and attending programs, classes, or lectures (Horrigan, Ch. 1). Though 2012-2015 is not a large enough span of time to determine if this is a continuing trend, libraries are starting to research and offer other kinds of services in response to changing needs.

Having a good understanding of library users' needs is important for determining which services a library should offer, including a seed library. When asked to indicate which kinds of information are helpful, respondents favored health information (Horrigan, 2015, Ch. 1). Of the respondents, 36% of Pew Research respondents ages 16 or above said that public libraries help "a lot" for people "seeking health information," and another 37% said they are "somewhat" helpful (Horrigan, Ch. 1). Health information about the benefits of growing one's own food could fall under the topic of "seeking health information" (Horrigan, Ch. 1). Additionally, only 17% of people who visited a public library in the last 12 months attended a "class, program, or lecture," and a similar share (22%) visited a public library website or mobile app (Horrigan, Ch. 1). Therefore, by knowing what services people value, librarians can be key actors to educate more people about seed libraries, health, and the benefits of growing one's own food.

Public libraries provide valuable services for low-income populations. As such, they need to provide an inclusive environment. The American Library Association created Policy 61, titled "Library Services for the Poor," in 1990, and it provides directives for libraries to ensure they are providing an inclusive environment for the socially disadvantaged (Gehner, 2010, p. 40). To further these directives, Gehner provides a list of five actions that public libraries should take to "engage low-income people" (p. 41). Action 2 pairs well with the goals of a seed library because it encourages libraries to "focus on the causes of social exclusion, not just symptoms" (Gehner, p. 41). Providing education and materials to grow and cook one's own food addresses a way that food insecure people may be able to alleviate the financial burden of buying food. A seed library also has the potential to increase consumption of nutritionally whole foods via the dispersion of knowledge and materials. In addition, increased consumption of healthy foods (or decreased consumption of unhealthy foods) may lead to decreased medical costs, another financial burden overwhelming low-income communities (Gehner, p. 42). Thus, seed libraries may be a valuable addition to a public library's services designed to lessen social exclusion, poverty, and medical issues.

Social Exclusion within Alternative Food Movements. While public libraries have historically catered to disadvantaged populations, the alternative food movement has done quite the opposite. Unfortunately, "alternative foods" such as "fresh, local, sustainable, '5 (fruits and vegetables)-a-day', non-processed, whole grain, small-scale or organic" foods are not as spatially available to minorities as they are to whites (Slocum, 2007, p. 526). Advocates of alternative foods are overwhelmingly white, and, as Slocum writes:

> Community food thrives on a culture of food that has been made white. How this food is produced, packaged, promoted and sold—engages with a white middle class consumer base that tends to be interested in personal health and perhaps in environmental integrity. White, wealthier bodies tend to be the ones in Whole Foods, at co-ops . . . , the peoples attending CFSC [Community Food Security Conference] conferences, those making certain purchases at the St. Paul Farmers' Market and the leaders of community food nonprofits. Here, whites come together, stick together and then become impenetrable to others despite their desire to be otherwise. (p. 526)

Additionally, Schupp, Som Castellano, Sharp, and Bean (2015) argue conventional agrifood system are increasingly setting the parameters in which local food systems can operate," a scenario that, historically, has not encouraged diversity within the food system (p. 3). Lastly, revitalizing urban spaces such as Brooklyn attract what authors LeBesco and Naccarato (2015) describe as hipsters and foodies (pp. 121-122), groups that generally cannot be classified as low-income. The gentrification of historically diverse immigrant neighborhoods has created a space in Brooklyn that celebrates food "otherness" while simultaneously pushing out the very cultures that made Brooklyn what it is today. This creates both an imagined and geographic area that caters to urban hipsters and foodies by altering price and accessibility and emphasizing identity through consumption patterns (LeBesco & Naccarato). Seed libraries, especially at public libraries, are a great place to break down this perceived barrier and involve more people of different backgrounds to participate in local, alternative food movements, especially by growing their own food.

Planning for Healthier Communities. Food systems within cities, especially concerning the lack of affordability and access, are often overlooked by urban planners. According to Pothukuchi and Kaufman (1999), people often take for granted the availability of food within cities (pp. 213-214). Food issues often lose out compared to

issues involved with "the loss of manufacturing jobs, rising crime rates, downtown revitalization, maintaining the viability of aging neighborhoods, and coping with rising city government expenditures in the face of declining revenues" (Pothukuchi & Kaufman, p. 216). Although these are important urban issues, the authors argue that food issues should not be taken lightly. Planning without food in mind can lead to wider gaps in accessibility, affordability, and nutrition between higher and lower income communities (Pothukuchi & Kaufman, p. 217). Additionally, community gardens are one aspect of the urban food environment that are often not prioritized when city planners are considering land use (Pothukuchi & Kaufman, p. 216). Although these disparities are widespread, one way city planners can help with urban food issues is to provide spaces in neighborhoods, schools, and libraries for people to grow food to feed their families and the community.

Unfortunately, according to some zoning laws, growing too many vegetables—or having a garden at all—is illegal. In DeKalb County, Georgia, one man faced a fine of up to $5,000 for growing too much broccoli on his property and needed to seek rezoning to grow his desired amount of vegetables ("Where Growing," 2010). Julie Bass, another food gardener in Oak Park, Michigan, could have spent up to 93 days in jail if she was convicted after she grew vegetables on her front lawn (Kirpalani, 2011). The ordinance she supposedly broke states, "All unpaved portions of the [screening and landscaping] site shall be planted with grass ground cover, shrubbery, or other suitable live plant material" (Kirpalani). The debate became what was meant by "suitable" (Kirpalani). To many, a vegetable garden is just as suitable as a grass lawn. If the goal of a piece of land (in this case, a front lawn) is to feed people a healthier and more sustainable diet rather

than just serve an aesthetic purpose, a vegetable garden becomes the more suitable option.

Issues of Weight and Health. One rationale for using seed libraries to counter food insecurity is the issue of inadequate diet; food grown in a garden is likely to be more nutritious and healthy than other food options in a neighborhood or community. Campbell and Campbell, authors of *The China Study,* show that a plant-based diet is associated with improved health and lower rates of obesity, heart disease, and diabetes. Likewise, consuming food from the garden could help prevent overweight or obesity—and their coinciding health issues.

Obesity and overweight are epidemics that affect low-income people in the United States at an increased rate than higher-income people. According to the Centers for Disease Control and Prevention (CDC), a body mass index between 25.0 and 29.9 constitutes overweight, whereas a body mass index above 30.0 defines a person as obese (CDC, 2012). Approximately two in three adults in the United States are overweight or obese, and over one in three are obese ("Overweight and Obesity Statistics," 2012). Unfortunately, obesity is a health condition that can lead to a variety of other health problems, a few of which include high blood pressure, type 2 diabetes, heart disease, sleep apnea, and a limited number of cancers (CDC, 2015). Obesity has many causes, but two of the most common behavioral causes are poor diet and lack of exercise ("Obesity causes," 2015).

However, not all scholars accept the definition of obesity defined by the WHO, the CDC, and other health organizations. Guthman (2011), author of *Weighing In,* is critical of the medicalization of fatness that is inherent in the definition of "obesity" and

the conflicts between measurement and definition (p. 25). Keeping this in mind, obesity and overweight in this thesis are used only to stand for the various risk factors typically present when one is considered obese or overweight.

Environmental factors play a role in behavioral choices that lead to obesity, and these are often more prevalent among low-income communities. Lack of access to healthy food has been linked to the increase in obesity among the U.S.'s poor. Higher rates of crime in low-income areas also cause people to be less active outside (Levine, 2011, p. 2667). Additionally, low-income persons are less likely to be able to afford "gym memberships, sports clothing, and/or exercise equipment" (Levine, p. 2667). Ultimately, addressing obesity and overweight in the United States requires more than just nutrition education; environmental and economic factors play a large role in the behaviors that lead to an unhealthy weight.

One environmental factor that does not get discussed very often is the role of environmental toxins in the rise in obesity rates seen since the 1980s. Some environmental toxins that get into people's bodies may be endocrine disruptors which, in turn, can cause people to store extra fat (Guthman, 2011, p. 100). Studies of estrogen and weight are gaining momentum in the scientific community (Guthman, p. 101). Other possible endocrine-disrupting chemicals that can be find in our environment and even in our food include bisphenol A (BPA), perfluorooctanoic acid (PFOA), 4-nonylphenol (NP), propyl gallate, 4-hyxyl resorcinol and organochlorine insecticides; though the majority of studies were performed on animals, they show a potential link between endocrine disruptors and weight gain in humans that could partially account for the rising rate of obesity in the United States (Guthman, pp. 104-109).

Obesity is more prevalent among socially-disadvantaged minority populations (excluding Asian Americans) than among whites (Kumanyika, 2006, p. S10). The National Institute of Diabetes and Digestive and Kidney Diseases claims that 49.5% of blacks and 39.1% of Hispanics are obese compared to 34.3% or whites ("Overweight and Obesity Statistics"). Additionally, 13.1% of black people are defined as "extremely obese" compared to 5% of Hispanics and 5.7% of whites ("Overweight and Obesity Statistics"). Kumanyika lists multiple constraints that may prevent minority populations from making dietary changes that could reduce obesity rates:

> Limited availability of recommended foods, exposure to targeted marketing of foods with high energy content and low nutritional value, the relatively higher costs of some recommended foods, and the complexity of products in the food supply that makes it very difficult to ascertain food content and identify the most nutritionally sound choice per unit cost. (p. S12)

Clearly, overweight and obesity are problems that disproportionately affect minority populations, and they need to be addressed through economic, social, and environmental solutions beyond just nutrition education.

Issues of Access and Cost. Lack of access to healthy food is a two-part problem—the ubiquity of fast food restaurants in low-income areas on the one hand, and a decrease in grocery stores and supermarkets that sell healthier food at affordable prices on the other. However, researchers have not reached a consensus on the effects of healthy food access and the food actually bought and consumed by low-income persons. A geographic analysis of fast food restaurants done by Block, Scribner, and DeSalvo (2004) found that "fast-food restaurants are geographically associated with predominately black and low-income neighborhoods after controlling for commercial activity, presence of highways, and median home values" (p. 214). Also, lower-income areas are less likely to

contain supermarkets with heart-healthy foods than higher-income areas, instead showing higher rates of convenience stores or neighborhood grocery stores with more less nutritious foods (Morland et al., 2002; Sallis, Nader, Rupp, Atkins, & Wilson, 1986). Though the study did not focus on whether the availability of fast food versus fresh food led to an increase in consumption of unhealthy food, Morland et al. (2002) show a link between what types of food are geographically more available and food choices.

Food availability and type may differ based on neighborhood demographics. A study done by Morland and colleagues (2002) found slightly different results than Block, Scribner, and DeSalvo. Morland et al. show that predominantly white and racially-mixed neighborhoods had higher numbers of fast-food restaurants than predominantly black neighborhoods (p. 27). However, when measured by income, Lewis et al. (2005) found that fast food restaurants in South Los Angeles were least prevalent in affluent neighborhoods, and also that affluent areas had a significantly higher availability of healthy options in terms of menu choice and preparation method compared to lower income areas (p. 672). Although there was no significant correlation between income, race and ethnicity and the availability of fast food restaurants versus full-service restaurants in the study (Powell, Chaloupka, & Bao, p. S244), "higher proportions of available fast-food restaurants out of total restaurants in predominantly black versus predominantly white neighborhoods may contribute to racial differences in obesity rates" (p. S240).

The availability of healthy foods does not necessarily mean that more healthy foods will be consumed; however, the USDA found some correlation between access to healthy food and consumption of healthy food. One source they cite suggests that food

stamp recipients who did not shop at supermarkets (known for having more healthy food options) purchased fewer healthy foods, including fruits, vegetables, and milk, than those who frequented supermarkets (USDA, 2009, p. 68). As mentioned above, supermarkets are typically less frequent in low-income areas (Block, Scribner, and DeSalvo, p. 215). The 2009 USDA study also shows that household purchases of non-canned vegetables, canned vegetables, potatoes and beans, non-canned fruits, canned fruits, and milk and dairy products (the six designated categories for the study) varied by race and ethnicity, but not by education level or per capita income within those who qualify for and receive food stamps (USDA, 2009, p. 68). For example, Asian and Hispanic households were less likely to canned vegetables and potatoes and beans but more non-canned vegetables and non-canned fruits compared to White households (USDA, 2009, p. 68).

The location of a supermarket or grocery store relative to low-income families can influence where a family chooses to shop. Most often, low-income families will choose to shop "at outlets offering lower prices," even if the outlet may not be in their neighborhood (USDA, 2009, p. 77). Low- and middle-income families spend 22-23% of their food dollars at supercenters, places where prices are typically lower, than families with annual incomes over $70,000 (USDA, 2009, p. 77). Higher-income families only spend 13-17% of their food dollars at supercenters (USDA, 2009, p. 77), suggesting that they are less likely to seek out a shopping center just because the prices are lower. The data also show that low-income families use a higher percentage of their budget (2-3%) at convenience stores versus the highest income consumers who spend only 0.7% (USDA, 2009, p. 77). Overall, the study cited here shows that "the poor do not pay higher prices for food," but does not address costs associated with travel to outlets with less expensive

food (USDA, 2009, p. 78). The burden on families who may not have a car or who may live farther away from outlets with healthy or less expensive food has an effect on the healthiness of food consumed by low-income families. Better access to supermarkets and large grocery stores will, according to the majority of the literature, have a positive effect on the consumption of healthier food by low-income Americans (USDA, 2009, p. 52).

Home, Community, and School Gardens. There are a lot of factors involved in food choice and accessibility, but gardening is one way to reduce the effect of price, location, and accessibility on healthy food consumption. Getting seeds into the hands of people is the main focus of every seed library; however, the seeds are only useful if they are planted and tended. Information about the benefits of, incentives for, and barriers to home, community, and school gardening is included here because it is assumed that a seed library cannot exist without a means of growing plants from seed, such as in a garden. Likewise, a garden necessitates seeds.

Home, community, and school food gardening is just one possible solution to the issue of low-income food insecurity. Booth et al. (2001) conclude in their study that "population-wide improvements in eating and physical activity behaviors are most likely to result from interventions that change as many levels of the framework [of healthy eating determinants] as possible, including intrapersonal, social, cultural, environmental, and policy levels" (p. S35). For food gardening to become more popular among low-income Americans, it must be approached from more than one angle. The following paragraphs provide a variety of angles by which food gardening can be promoted or that need to be understood for the practice to become more widespread.

Food gardening is a pastime that spans across generations, and though it would be easy to assume that food gardening is declining, there has been a significant increase in the number of people food gardening in the last five years (NGA, 2014, pp. 1, 4). A National Gardening Association (NGA) special report, "Garden to Table," shows millennials are getting outside, cultivating food, and sharing these experiences with their children (NGA, p. 8), with the majority gardening in spaces of 100 ft^2 or less (NGA, p. 18). In 2013, 35% of U.S. households participated in some form of food gardening, a 17% increase from five years before (NGA, p. 4). The number of first-time gardeners also increased to 20% in 2009 in the same timespan (NGA, p. 4). Considering homeownership (and, presumably, the amount of outdoor space for gardens) went down 7.6% from 1995 to 2015 (Egan, 2015), the fact that more people are gardening is especially interesting. The physical, mental, nutritional, and financial benefits of gardening are beginning to be understood by more people, and many are now recognized through empirical research.

Home Gardens. Before delving into the benefits of home gardening, it is important to define what it means for a household to participate in home gardening. In general, home gardens refer to small plots of land located around or within walking distance of a household that are used for the cultivation of edible or medicinal plants (Dilrukshi, Freed, & Maredia, 2013). Typically, a garden will be a mix of "vegetables, fruits, plantation crops, spices, herbs, ornamental and medicinal plants" (Dilrukshi, Freed, & Maredia). In some cases, home gardens may also include livestock that serve to provide supplementary income or food (Dilrukshi, Freed, & Maredia). This definition of home gardening is very broad, but it provides a comparison to agriculture. Agriculture,

as defined by the Oxford Dictionaries, is "the science or practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool, and other products" ("Agriculture," 2015). This thesis does not address agriculture, whether sustainable or industrial, as part of a seed library's sphere of influence. Increasing the number of households home gardening as well as the efficiency and sustainability of each of these home gardens over time is presented as a potential alternative to the current food system.

Home gardens are beneficial to food insecure people in many parts of the world. One author for the Food and Agriculture Organization of the United Nations (FAO), Marsh (1998), says that "the most important [potential benefit of home gardening] is increased direct access to nutritious foods by the food insecure," and that direct evidence has been found that home gardening fulfills this goal for many people around the globe (pp. 4-5). Additionally, food production controlled by households is more successful at providing nutritional benefits than "government goodwill or financial support" (Marsh, p. 5). Globally, home gardens provide on average more than 50% of a households' annual fruit and vegetable consumption (Marsh, p. 6). Lastly, even very small "mixed vegetable gardens" can provide 10-20% of a household's daily protein needs, 20% of its iron, 20% of its calcium, 80% of its vitamin A, and 100% of a household's vitamin C (Marsh, p. 6).

Home gardens are not always successful; a variety of conditions are suggested in order to ensure the garden's sustainability and benefit to the gardener. To ensure a successful home gardening project, Marsh states that home gardeners should:

- Work in areas where households have some experience with home gardening; building traditional methods to enhance household food security.
- Use a group approach and village leaders for technical training.
- Integrate nutrition awareness and education into garden planning.

- Involve whole families in garden planning and management, and especially involve women in the distribution of garden harvests and income generated.
- Be flexible with respect to choice of species and cropping patterns, encouraging diversity and use of locally adapted varieties.
- Encourage reliance on local materials for soil, water and pest management and on household or community seed production; minimize "giveaways".
- Monitor the project for regular feedback and fine-tuning of training and other needs. (Marsh, 1998, p. 8)

This list was created for home gardening projects globally, but a successful one in the United States would follow these guidelines as well, perhaps exchanging the word "village" for "community." A community seed library helps to address many parts of this list, especially when discussing locally adapted varieties, encouraging community involvement, and involving people with more expertise to help those with less expertise.

There are concerns about the transfer of knowledge within communities and between generations. Authors like Wendell Berry huge proponents of relying on traditional forms of knowledge and are critical of the reductionism inherent in institutionalized knowledge (Filipiak, 2011). Though some have argued that Berry's ideas of knowledge transfer rely on an outdated or naïve idea of agrarianism, Filipiak argues that they are relevant to contemporary agricultural issues. Filipiak argues that Berry's determination that agricultural communities are "the sturdiest basis for wisdom relevant to the use of nature" should be taken as a serious solution to the disappearance of knowledge. Though the transfer of knowledge about gardening appears at risk, the very act of teaching others to garden or farm is what will, ultimately, lead to a more sustainable knowledge base about how to use the natural environment. The only way to reverse the problem is to participate in its revival, even when other forces such as technology are competing with traditional knowledge passed between people within communities.

Community Gardens. Gardening, specifically in community gardens, may have positive effects for a community as a whole. Okvat and Zautra's (2011) findings state, "Community gardens can contribute to the creation of resilient urban neighborhoods and facilitate a city's recovery when faced with a sudden crisis such as a natural disaster or human-made conflict, or a more gradual disturbance such as an economic downturn" (p. 376). In fact, Stocker and Barnett (1998) show that gardens can act as agents of change for a community's ecological, social, and economic sustainability. Specifically, gardens can be used for research, training, and development of skills that help promote a community's economic resilience (Stocker and Barnett). Public green spaces are known to correlate with positive social contact between neighbors as well as an increased sense of community (Okvat & Zautra, p. 378). Increased contact may also lead to an increase in inclusivity, especially of older adults or people who have disabilities that want to garden but might have limitations (Okvat & Zautra, p. 379). Lastly, neighborhoods with greenspaces may have reduced crime rates: "Regression analyses predicting reported crime levels from vegetation in the inner city found that the greener a building's surrounding, the fewer crimes that are reported, including both property crimes and violent crimes" (Okvat & Zautra, p. 379). Although the direct purpose of starting a community garden is, presumably, to grow food, these findings show that a community garden can be beneficial to a community or neighborhood in a variety of other ways.

It is important to note, however, that the term "community" is difficult to define (Holland, p. 288), and, likewise, the term "community garden" is rather inchoate itself (Pudup, 2008, p. 1228). A community garden can be anything from a school garden that gives its food to a lunch program, a rehabilitation garden at a prison that uses the food to

"give back" to the community, or a plot of land in an urban neighborhood where people are competing for space with each other and with the city (Pudup). Although there are some aspects of community gardens that may be applied to all types of food gardens, community gardens may have different goals and different outcomes for the people who use them.

School Gardens. School gardens that provide children with experience gardening and cooking the food that they grow may be one way to encourage better nutrition and a healthier lifestyle as the children grow up. Writing for the World Food Programme, Emberland (2015) says that, as of June 2015, school gardens are becoming more popular in the developed world; in fact, 49% of schools in Washington, DC, have gardens that are active. She also writes that school gardens "lay the groundwork for long-term resilience," and that students who learn how to grow food will grow up with a better understanding of nutrition as well as the economic and environmental benefits of gardening (Emberland). Lautenschlager and Smith's (2007) study shows that, for urban children in the Minneapolis/St. Paul region who participated in a gardening program, children were more likely to try new foods, be aware of junk food marketing techniques, be "more knowledgeable about gardening and food systems," enjoy gardening and express a wish to continue gardening, and were more likely to eat vegetables than children of the same age who had not participated in a gardening program (pp. 253-255). School gardens are also great for science lessons, which in turn help children to develop a sense of curiosity about the world as well as the skills necessary to understand complex problems and find solutions (Krajcik & Czerniak, 2007, p. 17)—skills that may be important for navigating the complex global food system. Additionally, some qualitative

research has shown that the memories of the gardens people cultivate as children carry over into adulthood ideals of gardens and outdoor spaces (Francis, 1995, p. 187). Francis suggests that "as adults we are always trying to recreate some of the qualities and images from our early experiences of gardens" (p. 187), an important implication when we again consider the impression a youth gardening experience may have on a child's adult life.

Psychological and Physical Benefits of Gardening. It has been a long held Western belief that encounters with nature are good for one's psychological well-being, but only recently has there been empirical evidence that shows the psychological benefit of so-called "natural" experiences (Burls, 2007; Okvat & Zautra, 2011, p. 375; Waliczek, Mattson, & Zajicek, 1996; Wang & Glicksman, 2013). Survey results in Waliczek, Mattson, and Zajicek's study "Benefits of Community Gardening on Quality-of-Life Issues" shows that people value the self-esteem and self-actualization they get from gardening which involves feeling "a sense of self-sufficiency," "creating something of beauty," and "feeling good about [their] own abilities" (p. 207). Community gardening may increase community or individual empowerment (Okvat & Zautra, p. 379), increase social relationships including multi-cultural relationships (Okvat & Zautra, pp. 378-379), and increase cognitive function, especially for children with ADHD (Okvat & Zautra, p. 377). Additionally, Hispanic and African-American gardeners put more value in "teaching children" and gardening as a space where they can "nurture both plants and children" more than Asian or Caucasian gardeners (Waliczek, Mattson, & Zajicek, p. 207). Lastly, gardening as a "relaxing" or "cleansing" hobby was a main theme that emerged from a study of low-income, older adults living in senior housing (Wang &

Glicksman, 2013, p. 95). Psychological benefits of garden are numerous, but they are not the only important benefits.

The physical benefits of gardening are also important to note. Gardening is a physical activity and can be beneficial to the body in different ways. Activities such as cutting stems can help to increase fine motor skills, while other activities like turning a compost pile can be classified as an "aerobic gross motor [task]" (Brown & Jameton, 2000, p. 28). The CDC considers gardening a "moderate-intensity level activity," and when done for at least 2.5 hours a week, gardening and other moderate-intensity activities "can reduce the risk for obesity, high blood pressure, type 2 diabetes, osteoporosis, heart disease, stroke, depression, colon cancer and premature death" (Darnton & McGuire, 2014). Likewise, activities like gardening that involve both the arms and legs can help reduce the risk of coronary diseases (Darnton & McGuire). Stress-relieving qualities of gardening can help prevent a whole host of stress related conditions such as "irritability, headaches, stomach aches, [and] heart attacks" as well as prevent the worsening of some pre-existing health conditions (Darnton & McGuire). Overall, the process of gardening can be just as good for the body as its end product so long as a person does not ignore any physical limitations.

Economic Incentives for Food Gardening. Food gardens may have the benefit of saving a person or a family money on food. Fifty-seven percent of respondents to a 2014 National Gardening Association report said that one of their motivations for food gardening was to save money (p. 15). Brown & Jameton (2000) state that "the average gardener can produce $240 worth of food for no more than an outlay of $9" (p. 23).

However, start-up costs, a learning curve, and weather can all effect the potential financial gains of growing one's own food.

Beyond saving money, sometimes home gardens can provide a little extra income for a family. Whether this is actually done, though, depends on the views of the gardeners and the area in which they are located. In Taylor and Lovell's (2014) study of African-American, Mexican-origin, and Chinese-origin gardeners in Chicago, they found that few of the families actually tried to sell extra produce; most preferred to save it by freezing it for the winter or giving it away (pp. 26-27). One Mexican-origin gardener sold an herb popular in Puebla, Mexico, and a few Chinese-origin women were seen selling produce in a makeshift market (Taylor & Lovell, p. 27). However, when they were approached about it, they denied it. The gardeners, especially migrant workers, were wary of city zoning ordinances on selling produce from a garden (Taylor & Lovell, p. 27). The study also found that African-American gardeners "seemed to find the idea of selling garden produce to be almost morally repugnant" (Taylor & Lovell, p. 27). Like many gardeners, they were much more comfortable giving food away to other family, friends, and sometimes even strangers than trying to sell it (Taylor & Lovell, p. 27). Vacant lot gardeners were much more likely to give food away and thereby contribute to the local food system than on-lot gardens (Taylor & Lovell, p. 27)—perhaps one reason they are called "community" gardens.

Economic hardship does not necessarily mean that families are more likely to garden. In their article "Exploring the Social Bases of Home Gardening," Schupp and Sharp (2012) report mixed findings in their literature review on whether economically disadvantaged people are more likely to garden. They found that some communities

return to self-provisioning actions such as gardening during economic hardship, but others do not (Schupp & Sharp, p. 96). In some cases, economically stable people are more likely to garden than economically disadvantaged people (Shupp & Sharp, p. 96). Based on these and other findings, Schupp and Sharp speculate that "gardening as a self-provisioning activity in the face of economic hardship is more likely to be an adaptive strategy for lower income people where a community or culture of self-provisioning remains" (p. 97). However, they did find that "households making behavioral changes due to economic hardship" were more likely to have a garden at home (Schupp & Sharp, p. 103).

Barriers to Food Gardening. Even for people who may wish to garden, there are some barriers, perceived or real, that they must surpass in order to grow their own food. However, apart from a few studies on marketing and farmer's market participation, Schupp et al. (2015) contend that there has not been much research done on the barriers to participating in a local agrifood (agriculture and food) economy (p. 4). Gardening requires many inputs including "interest, time, knowledge, space, and financial resources," all of which have the potential to unevenly impact persons with different race, ethnicity, geographic location, and/or socioeconomic status (Schupp et al., p. 5). For women of lower socioeconomic status, food choice does not always prioritize health and nutrition. They may possess limited knowledge about the science of nutrition; combined with limited financial resources, lack of nutritional knowledge can create a barrier to participating in a local agrifood economy, especially home gardening. (Schupp et al., p. 5). Additionally, people of lower socioeconomic status are less likely to be able to invest in gardening equipment, even if they are only one-time purchases (Schupp et al., p. 5).

Schupp et al.'s analysis concluded that cost is one of the main barriers for people of lower socioeconomic factors to get started home gardening (p. 10). Additionally, time restraints due to work responsibilities effect people of lower socioeconomic status, though the study results showed that people of higher household income saw time as more of a restraint than those of lower household income (Schupp et al., pp. 6, 10). Lastly, knowledge about growing, preserving, and cooking food from a garden is often exchanged through social networks that are often less available to people of lower socioeconomic status (Schupp et al., p. 6).

Some barriers are more mental, but often they lie in physical resources. The article "Beliefs, knowledge, and values held by inner-city youth about gardening, nutrition, and cooking" reports that children ages 9 to 15 in the Minneapolis/St. Paul region listed these barriers to gardening: "housing situation, dislike of gardening, and lack of a social network" (Lautenschlager & Smith, 2007, p. 249) In particular, students living in apartment buildings were not certain about their options (Lautenschlager & Smith, p. 249). Other perceived barriers included soil quality in the area, dislike of getting dirty, theft of produce, and dealing with pests such as squirrels and rabbits (Lautenschlager & Smith, p. 249). Despite that some of these barriers to gardening may disproportionately affect persons of lower socioeconomic status, the benefits could far outweigh any burdens over time.

Of particular interest when discussing barriers to gardening is soil quality, especially since urban soil is often contaminated with lead, arsenic, cadmium, and polyaromatic hydrocarbons; precautions should be taken before contaminated soil is used to grow food ("Urban gardens," 2010). Taylor and Lovell found that the soil in Chicago-

area gardens they studied often contained lead (p. 30). Though the uptake of lead by vegetables may be weak, gardeners may still be exposed to the lead through accidental inhalation or consumption (Taylor & Lovell, p. 30). About a quarter of the soil samples they took in Chicago had lead concentration that exceeded the Environmental Protection Agency's 400 ppm hazard threshold for children's play areas (Taylor & Lovell, p. 30). Additionally, not a single one of the gardeners they studied had tested for lead in their soil before growing food, and only one gardeners used raised beds to mitigate some risk from soil contamination (Taylor & Lovell, p. 30).

Food Choice Factors. What a person chooses to eat and why are important factors when considering how to market fruits, vegetables and the whole idea of home gardening to low-income people. According to a study entitled "Why Americans Eat What They Do," there are five main factors concerning food choices among Americans: taste, cost, nutrition, convenience, and weight control (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). This study found that demographics greatly influence which factors are more important to a particular person. For example, income level correlated strongly with the importance that cost and convenience account for in food choice. The study shows that low-income people tend to prioritize cost and convenience more than people with higher incomes (Glanz et al., p. 1124). Additionally, nonwhite peoples, especially blacks, rated convenience as having more influence over their food choices than whites (Glanz et al., p. 1124). Another finding shows that "concerns about reduction in the taste quality of the diet are the most often mentioned obstacles to adopting reduced-fat and healthful diets" (Glanz et al., p. 1126). All these points show that the idea of growing one's own food could be marketed in a way that better targets low-income persons'

concerns—namely, taste reduction, cost, and convenience—while still educating about the nutritional and health benefits.

A study by Lucan, Barg, and Long (2010) entitled "Promoters and Barriers to Fruit, Vegetable, and Fast-Food Consumption among Urban, Low-Income African Americans-A Qualitative Approach" found similar results to the aforementioned study. Again, taste played a large role in the decision for African-Americans in Philadelphia to choose fast-food over fruits and vegetables (Lucan, Barg, & Long, p. 631). One promoter of vegetable consumption among African-American women was the concept that a full meal contained some sort of vegetable; a coinciding barrier, though, was when the vegetables were not fresh—a problem that could be remedied by a home or community garden (Lucan et al., p. 631). As with the prior study, convenience was a barrier to vegetable consumption (Lucan et al., p. 632). The convenient, ubiquitous nature of fast food restaurants in urban areas was a promoter of fast food consumption (Lucan et al., p. 631). Ideally, if one could make fruits and vegetables more convenient and decrease the ubiquity of fast food chains, the consumption of fruits and vegetables could increase among urban, low-income African-Americans.

The cost prohibitive nature of fruit and vegetable consumption is another problem worth mentioning. In Cassady, Jetter, and Culp's (2007) study, they reveal that food is often more expensive in lower-income neighborhoods than in higher-income neighborhoods due to the size of stores and relative lack of supermarkets in low-income urban areas (p. 1910). Additionally, they report that "the cost to eat more healthful alternatives to standard food items (ie, whole-wheat breads instead of white breads, lean meats, and nonfat dairy products) is greater by 17% to 19%" (Cassady et al., p. 1910).

The results of their survey found that budgeting specifically for fruit and vegetable consumption overall was more of a barrier than the individual price points of fruits and vegetables. Also, educating low-income persons about budgeting for fruit and vegetable consumption as well as the importance of eating fruits and vegetables are both important steps for increasing low-income fruit and vegetable consumption (Cassady et al., p. 1914).

Another barrier that may prevent people from purchasing and/or growing healthier foods is a lack of knowledge of how to cook and prepare them. Americans are increasingly purchasing and consuming food outside of the home at restaurants, fast food chains, and cafeterias according to research done by Smith, Ng, and Popkin (2013) about home food preparation and time use. Though low-income Americans are more likely to consume food at home than higher-income Americans, they had the most dramatic decrease over time in amount of people who cook each day from 67% in 1965-1966 to 56% in 2007-2008 (Smith et al.). The decline in the amount of time spent cooking as well as the amount of at-home food consumption, however, plateaued in the mid-1990s and has stayed relatively stable since then. Most important to mention, though, is that on any given day, "only slightly more than half of US adults cook foods" (Smith et al.). Though there are many factors that could be attributed to this percentage, the authors of the study speculate that the major reason is that "more people are relying upon ready-to-eat foods that require no preparation" (Smith et al.). Additionally, the relative decrease in time spent cooking foods overall could mean an increase in the amount of "packaged and convenience foods" such as frozen pizzas and pasta sauces (Smith et al.). Knowing how to grow food is a great start to a healthier lifestyle, but ultimately some people might

need help learning how to prepare the food they grow. Teaching cooking skills could decrease food waste and help people feel more confident about their gardens in general.

Environmental Concerns. Although there are many reasons growing one's own food can increase personal food security, environmental issues with the agrifood system also effect local, national, and global food security. Addressing these may impact an individual's decisions about food. Adolescence is a time when "developing a personal system of beliefs, morals, and values" occurs (Bissonnette & Contento, 2001, p. 72). Developing an environmental ethic, especially having to do with the food system, is another reason to encourage gardening at a young age. Bissonnette and Contento's study found that although adolescents "subscribed to the idea in the abstract of the importance of organic and locally grown foods," they were not very knowledgeable about local foods and did not feel that purchasing locally grown foods was their responsibility or concern (p. 78). An additional study demonstrated that young people tend to be confident in their ability to purchase sustainably-grown foods and believe in the ideals of sustainably-grown food, but their purchasing choices tend not to reflect these beliefs; instead, they prefer foods that require less preparation (Robinson & Smith, p. 322). In order to provide adolescents and with a better understanding of the food system, Bissonnette and Contento suggest providing "greater opportunity to examine psychosocial or affective factors such as their attitude, self-identity, and sense of responsibility in terms of [food and nutrition] issues" (p. 81). Youth gardening would be an excellent teaching mechanism to encourage this examination.

Robinson and Smith (2002) did a similar study of adults and their intentions of purchasing "sustainably-grown" food. The study found that among a variety of

demographic factors, the only factor that seemed to affect a consumer's intentions of buying sustainably-grown food was marital status (Robinson & Smith, p. 322). Income did not seem to substantially affect a consumer's intention to buy sustainably-grown food (Robinson & Smith, p. 322). The marital status factor may be due to the age of people who are married or their desire to feed healthy food to their children. Overall, people who participated in the study "held supportive beliefs and attitudes with regard to purchases of sustainably produced foods. However, many consumers were not confident in their ability to purchase these foods and were not likely to have highly supportive past purchasing behaviors" (Robinson & Smith, p. 321). To address this issue, Robinson and Smith suggest that nutrition educators and sustainable food marketers help raise awareness of food system issues and the attributes of sustainably produced foods (p. 324). Seed libraries could play a part in disseminating knowledge not only about how to grow food, but about how our food choices affect the sustainability of the global food system and other interconnected systems.

Conclusion. Seed libraries are becoming increasingly common. Seed libraries can work to help alleviate food insecurity in the U.S., but first, a variety of interacting pieces of the socioeconomic and agrifood systems must be understood. Seed libraries can play a role in both the food sovereignty and food justice movements that are happening globally, and they can also take also part in efforts to make spaces more inclusive for disadvantaged persons at the individual and community level. Understanding issues of overweight and obesity, nutrition, and healthy food access and cost can help seed library managers better cater to food insecure peoples. Seed libraries necessitate the creation of home, community, and school garden spaces—spaces which provide a variety of benefits

to those who use them including increased physical and psychological health and access to nutritious foods. Food choice and economic incentives influence people's views on growing food and eating healthy, and many of them are statistically significant when analyzed demographically. Lastly, there are many barriers to beginning a home, community, or school garden project, especially among low-income populations, but the benefits can outweigh any negatives as long as people feel welcomed and have a strong support system behind them. Although seed libraries are currently generally informal, they make up a growing section of the local, healthy food movement. Including food insecure persons in this movement may help alleviate an enduring problem among America's lower income populations.

Chapter 3

Research Methods, Results, and Discussion

Introduction

Low-income food insecurity is a pressing issue in the United States. At the 1996 World Food Summit, the World Health Organization (WHO) determined food security exists "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (WHO, 2016). The WHO also lists what they call the "three pillars" of food security as food availability, access, and use. According to the USDA, 14% of households were, at least part of the time, not able to access food of good quality, variety, or desirability, and a smaller percentage (5.6%) faced disrupted eating patterns and times of decreased food consumption (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2015). Clearly, food insecurity is a problem in the U.S. that should be look at from a variety of viewpoints.

Increasing the ability for people to grow their own food is one factor that could help address low-income food security in the U.S. Writing for the United Nations Food and Agriculture Organization, Marsh (1998) says that "the most important [potential benefit of home gardening] is increased direct access to nutritious foods by the food insecure," and that direct evidence has been found that home gardening fulfills this goal for many people around the globe (pp. 4-5). For those who find that cost is a barrier to eating healthier, gardening may also have an economic incentive. Brown & Jameton (2000) report that "the average gardener" is able to produce $240 worth of nutritious food with only $9 in start-up costs (p. 23). The National Gardening Association found that

57% of respondents to a survey on food gardening reported that one of their motivations for food good gardening was to save money (2014, p. 15). Food gardening is one way to reduce costs and increase access of healthy foods among low-income U.S. populations.

Despite the aforementioned benefits of gardening, there are still many barriers to food gardening among low-income populations. Schupp, Som Castellano, Sharp, and Bean (2015) argue that gardening requires many inputs including "interest, time, knowledge, space, and financial resources," all of which have the potential to unevenly impact persons with different race, ethnicity, geographic location, and/or socioeconomic status (p. 5). Also, knowledge in growing, preserving, and cooking food from a garden is often exchanged through social networks that are often less available to people of lower socioeconomic status (Schupp et al., p. 6). Other possible barriers include poor soil quality, dislike of getting dirty, produce theft, pests, and housing situation as well as a general dislike of gardening (Lautenschlager & Smith, 2007, p. 249). However, food gardening in the United States is on the rise; the National Gardening Association reports that 35% of families in the U.S. are participating in food gardening, up 17% from five years earlier (NGA, 2014, p. 4)

Although low-income food insecurity is a complex issue and no singular program can address every aspect of it, seed libraries could play a role in alleviating food insecurity by providing educational opportunities and material resources for growing a successful food garden. Seed libraries are an emerging service in the United States. A seed library is a location, usually at a public library, where a participant can "check out" seeds and "return" the seeds they have grown at the end of the growing season. Seed libraries exist for a variety of reasons, including to preserve heirloom vegetable varieties,

increase interest in gardening, and maintain seed sovereignty, among other goals. The low cost and convenient placement of seed libraries in public spaces, especially public libraries, positions them as an intriguing addition to a list of community-based services to help low-income families access healthy foods.

The premise of my research was to find out if increasing food security within low-income populations in the U.S. could be an achievable goal for a seed library. In order to learn more about the intersection between seed libraries and low-income food insecurity, two research objectives were established. The first objective was to understand the overall structure and function of seed libraries in the United States. Since seed libraries are an emerging service, I thought it important to establish a basic understanding of what they are. The second objective was to determine the extent to which seed library managers believe they are addressing or could address food insecurity in their communities.

Methods

Survey and Research Design. The current research asks how home, community, and school food gardens can increase low income food security in the United States. It also asks what role seed libraries might play in popularizing the self-provisioning of food for economic and health reasons within families and communities. To pursue these questions, and to gain more insight on the current and potential contributions of seed libraries, I developed a survey distributed to all known seed libraries in the U.S.

The effort to develop a comprehensive list of existing seed libraries was facilitated by online resources dedicated to this area. In particular, seedlibrarian.com, seedlibraries.net, and the Ester Library webpage were of noted value. After a seed library

was found, contact information was collected from the webpage. It was not always clear who the best contact was for a seed library or if the contact information was up-to-date, so oftentimes more than one email address was collected per seed library. The ideal contact was the person most directly in charge of managing the seed library. Roughly 360 seed libraries were discovered via online search, though I expect that more exist that were not located.

The survey was completed in three rounds, and all three were sent by email. The first round was sent to the email address identified as most qualified to complete the survey. The second round was sent to the same contact for a specific seed library that had not responded or to a secondary email address if the first had been blocked or was no longer viable. The third round was sent to a secondary email (if one had been identified) if the first had not responded. The survey consisted of 45 questions that were a combination of dichotomous, multiple choice, checkbox, interval scale, and open-ended question types. The survey was completed through Google Forms, and responses were received over a span of 11 weeks from July to October 2015. From the three rounds, 160 qualified responses were received from seed libraries in 40 different states in the U.S.

Objective 1 – Seed Library Structure and Function. To determine the empirical status of seed libraries in the United States and better understand their overall structure and function, survey participants were asked a variety of questions on their observations or knowledge about the seed library. Survey questions approached topics such as affiliation of person who founded the seed library, founding date, location, community size, participation, advertisement/promotion, materials offered, cost to users,

funding, seed return rates, community partners, and educational opportunities offered at the seed library location. For a complete list of survey questions, refer to the appendix.

Data were retrieved by use of dichotomous, multiple choice, open-ended, and checkbox question types and analyzed using univariate and bivariate descriptive statistics, especially frequency and cross-tabulation. Correlation analysis was also completed for some questions.

Objective 2 – Seed Libraries and Low-Income Food Insecurity. To analyze seed library managers' perspectives on the capability or potential of a seed library to help alleviate low-income food security in their communities, survey participants were asked a series of questions. The first was if they perceived the majority of seed library participants as being low-income, middle-income, or high-income; for those that were not confident in their answer, "Unsure" was a fourth option. Then, at the end of the survey, participants were asked whether they felt that there are low-income families in their communities who have trouble accessing healthy foods due to any barriers such as income, time, transportation, distance to nearest grocery store, etc. Next, participants were asked if they felt that the seed library contributed to helping low-income families gain access to healthy foods. If they answered "No" or "Unsure," a follow-up question was asked to determine whether they thought the seed library had the potential or capability of helping low-income families gain access to healthy foods. Participants were also asked whether they had taken any specific steps to reach more low-income families and what they had found had worked or not worked. Lastly, participants were given the opportunity to state what they thought their seed library would need in order to help more

low-income families grow their own healthy foods if low income food security was a concern at their seed library.

The questions used to research the second objective were a combination of multiple choice or open-ended. The questions were analyzed using univariate and bivariate statistics, specifically frequency and cross-tabulation analysis.

Results

Objective 1 – Seed Library Structure and Function. Out of the 160 survey respondents, 83.75% (134 total) reported that their seed library had been established between 2013 and 2015. Only one seed library was established before 2000, and only eight were established before 2010. In terms of location, the majority of seed library managers (SL managers) that responded to the survey were located in the Midwest region of the United States (33.8%) (n=160). The next highest share was located in the West (22.6%), followed by the Northeast (18.8%), Southeast (15.6%), and Southwest (8.8%), with one remaining seed library found outside the coterminous United States.

The majority of seed libraries (84.9%) were found at public libraries (Table 1). Over half of respondents (68.1%) reported that the seed library they are associated with was at least partially founded by a public library staff member. In addition, 80% of seed libraries located at public libraries reported that the seed library was at least partially founded by a staff member at the public library.

Table 1. Count of seed libraries located at each facility type. (n=159)

FACILITY TYPE	SEED LIBRARY COUNT
PUBLIC LIBRARY	135
NONPROFIT ORGANIZATION	9
COLLEGE OR UNIVERSITY	4
GOVERNMENT AGENCY	3
BUSINESS	2
LOCAL RESIDENCE	2
MUSEUM	2
TRIBAL HEALTH CENTER	1
ELEMENTARY, MIDDLE, OR HIGH SCHOOL	1

When asked about the number of families that checked out seeds during the last growing season, the responses ranged from 5 seeds to 3500 seeds (n=144). However, there was no correlation between seed library participation and the size of the community the seed library served, suggesting that the size of a community does not play a role in the amount of people served. Additionally, there was no correlation between the total number of places/ways they advertised their services and the number of families served. Advertisement types and places included "At the Seed Library Location," "Local Advertisement (Newspaper, Flyers, etc.)," "Page on an Associated Website," "Seed Library Website," "Social Media," and "Community Events," among other less popular places and types.

When asked how participation in the seed library had changed since its founding, more than half of the respondents said that participation had increased. However, it is important to keep in mind that most of these seed libraries were only 1-2 years old when the survey was taken, so there was not much participation history to go off of. Reports that participation had decreased were relatively few (6.3%). Table 2 shows the responses for participation change over time. Lastly, 15.2% of seed library managers were unsure of how participation had changed since the seed library had been founded.

Table 2. Reported seed library participation change since founding date. (n=158)

	FREQUENCY	PERCENT
INCREASED	82	51.9%
FLUCTUATED	20	12.7%
DECREASED	10	6.3%
STAYED THE SAME	22	13.9%
NOT SURE	24	15.2%

Seed libraries offered many different services and material support to their patrons, the most obvious being the availability of seeds to check out. All respondents to this question (n=157) reported having vegetable seeds in the seed library, and almost all (95.7%) also included some herb, flower, or fruit seeds as well. Only 30.6% of SL managers stated that their seed library categorized the seeds by ease or difficulty to grow (n=160). The number of different varieties of seed given out at each seed library varied widely (Figure 1). The largest share (31%) went to seed libraries that offered 25 or fewer varieties, but, on the other end, a surprising share reported that they offered over 100 different varieties. Ten seed libraries also provided material support for gardening not only in seeds, but also in the availability of gardening tools to check out or use.

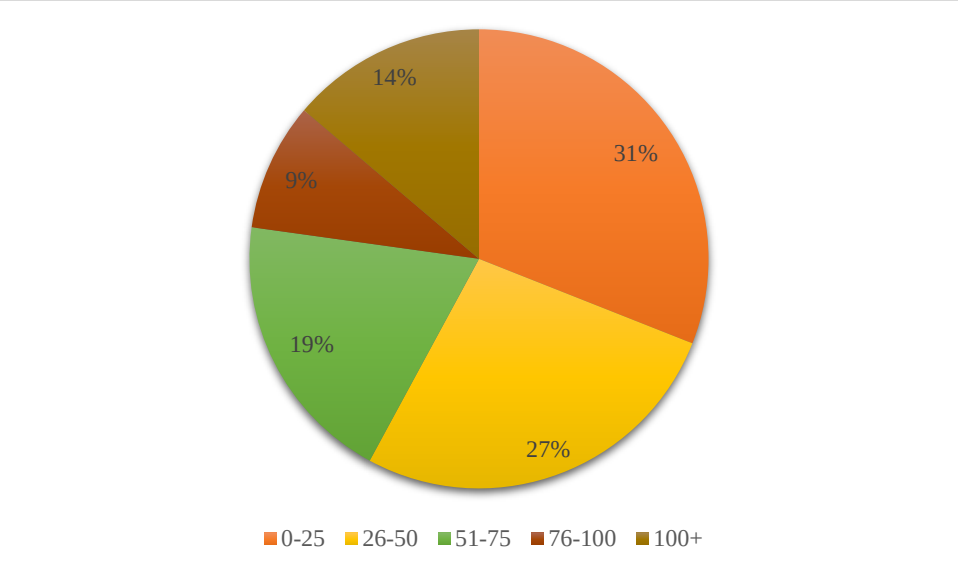

Figure 1. Number of plant varieties offered at each seed library during the 2015 growing season. (n=145)

Seed libraries were overwhelmingly free with 98.1% of SL managers reporting that the seed library was available at no cost to the user (n=159). The cost paid in taxes to maintain a public library was not accounted for. Only three total SL managers reported requiring any payment at all from their users, and even so, two of these seed libraries required payments under $5.00. A little more than half of seed libraries (53.5%) did not set a limit on how many seeds a participant can check out (n=159); 64 seed libraries had an overall check-out limit in place, and another 10 only set limits by variety, not overall total.

The relative lack of cost to a user means that the costs to run the seed library are coming from somewhere else. Though the majority of seed libraries encourage the return of seeds after the end of the growing season (84.4%), none reported enacting a penalty if users do not return seeds (n=160). Additionally, 64.8% of SL managers reported that only 0-25% of participants returned seeds they "checked out" at the end of the growing season

(n=159). Another 6.9% reported a return rate of 26-50%, but an additional 28.3% of respondents were "unsure" of the amount of seeds being returned to the seed library.

Where the funding came from for the seed library varied widely. Different funding types included donations, fundraisers, grant, and library funds, with 8.1% reporting multiple sources of funding (n=135). Additionally, some seed libraries (14.1%) were able to start at no cost, depending only on supply donations and volunteer hours.

Some seed libraries partnered with organizations in their communities. Eighty-three of the seed libraries surveyed, or a little more than half, reported that they have partnered with a community garden or community garden organization (n=159). Whether this was an ongoing partnership or just a one-time partnership was not differentiated. In addition, 78 seed libraries reported partnering with another organization, business, school, or other group (n=160). Of the seed libraries that did not report a partnership with a community garden organization (n=76), 18 of them claimed to partner with a different organization whereas the remaining 58 did not report any partnership at all. In total, 58 seed libraries did not partner with another organization, community garden or otherwise, to expand the seed library service.

The vast majority of seed library locations have space to host workshops or classes. Only nine seed libraries reported that the seed library location could not host workshops or classes (n=159). The most common workshop types were "Seed Saving" and "Gardening Basics." The total number of seed libraries (or the facilities they are hosted in) performing workshops on the following topics are shown in Figure 2.

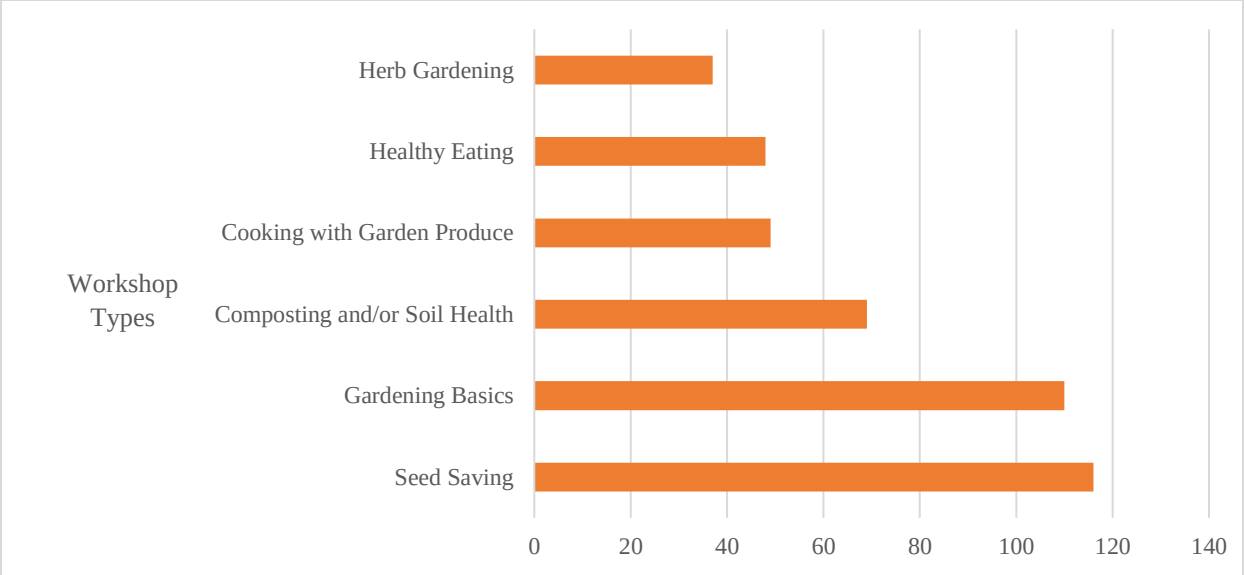

Figure 2. Count of workshop types offered. (n=160)

Fifty-six other workshops were written in as responses on topics such as “Beekeeping,” “Seed Starting,” “Pollinators,” “Vermiculture,” and other specialty gardening classes such as “Square Foot Gardening” and “Permaculture.” Almost half of seed libraries (45.6%) had hosted 3-5 different types of workshops of the kind listed above since the seed library had been founded (n=160). The next most common was 1-2 workshops at 30.6% and >5 workshops at 12.5%. Eighteen seed libraries (11.3%) had never hosted a workshop. In addition, almost half (48.6%) of seed libraries whose managers believed that participants were mostly inexperienced (n=35) had hosted 3-5 different types of workshops.

Most seed libraries perceived participants as being intermediately skilled gardeners (73.7%) (n=156). In addition, 22.4% of managers believed the participants to be inexperienced gardeners. Only six managers reported that the majority of their participants were experienced gardeners. There was no relationship between perceived skill level and number of workshops hosted.

Objective 2 – Seed Libraries and Low-Income Food Insecurity. The second research objective was to determine the extent to which SL managers believe they are addressing or could address food insecurity in their communities. Survey respondents were asked a series of questions pertaining to income level.

Respondents were first asked what they perceived as the income level for the majority of seed library participants. As shown in Table 3, the majority perceived seed library participants as being middle-income at 50.6%. Another 17.5% felt that most participants were low-income, and only 3.1% felt that they were high-income. Many respondents were not sure of the income level of the majority of participants, totaling 28.7%.

Table 3. Seed library managers' perceptions on participant income level. (n=160)

	FREQUENCY	PERCENT
LOW-INCOME	28	17.5%
MIDDLE-INCOME	81	50.6%
HIGH-INCOME	5	3.1%
UNSURE	46	28.7%

Survey takers were also asked if they felt that there were low-income families in their communities that had trouble accessing healthy foods due to any barriers such as income, time, transportation, distance to nearest grocery store, etc. As Table 4 shows, a large share, 79.7%, felt that there were people in their communities that were food insecure. Another 8.9% did not feel that there was food insecurity in their communities, and 11.4% of respondents were unsure.

Table 4. Seed library managers' perceptions on food insecurity in their communities. (n=158)

	FREQUENCY	PERCENT
NO	14	8.9%
YES	126	79.7%
UNSURE	18	11.4%

Survey participants were also asked if they felt like the seed library contributed to helping low-income families gain access to healthy foods. Results to this question are shown in Table 5. Almost half (46.5%) felt like they were contributing to food security in their communities. Fewer, 36.5%, were unsure if they were contributing. An even smaller share, 17%, did not feel that they were contributing to low-income food security.

Table 5. Seed library managers' perceptions on seed library contributions to low-income food security. (n=159)

	FREQUENCY	VALID PERCENT
NO	27	17%
YES	74	46.5%
UNSURE	58	36.5%

Respondents that answered "no" or "unsure" to the previous question, as shown in Table 5, were asked a follow up question: Do you feel that the seed library has the potential or capability of helping low-income families gain access to healthy foods? Responses to these questions are shown in Table 6. Out of those respondents, 78.8% felt that they did have the potential or capability of contributing to food security. Another 7.1% did not think they could contribute to food security, and 14.1% were unsure about their potential to contribute to food security.

Table 6. Seed library managers' perceptions on seed library potential to contribute to low-income food security. (n=85)

	FREQUENCY	VALID PERCENT
NO	6	7.1%
YES	67	78.8%
UNSURE	12	14.1%

Perceived income level of seed library participants was largely not affected by community size, which was divided ordinally into very low (<7,400 people), low (7,500-23,000 people), moderate (24,000-59,000 people), and high population (>60,000 people). Within high population areas, 40% (10 total) of SL managers perceived participants as low-income, and 56% perceived them as middle-income (n=110). Only four SL managers reported that the majority of their participants were high-income—one in each population level. Seventy-eight of the SL managers perceived the majority of their participants as being middle-income.

Another cross-tabulation revealed that SL managers who perceived food insecurity as an issue in their communities were more likely to believe that the seed library was helping low-income families gain access to healthy food (Table 7). Additionally, 81.3% of SL managers (52 total) who thought there were food insecure families in their communities believed that their seed library had the *potential* to help, even though they were unsure or did not feel that they were already contributing (n=85). Another nine SL managers were unsure if their seed library could help, and three SL managers felt that the seed library did not have the potential to reduce food insecurity in their communities.

Table 7. Share of SL managers who believe there is food insecurity that feel they are contributing to healthy food access. (n=126)

PERCEPTION OF SEED LIBRARY CONTRIBUTION TO HEALTHY FOOD ACCESS	SHARE OF SL MANAGERS WHO BELIEVE THERE IS FOOD INSECURITY
NO	14.3%
UNSURE	36.5%
YES	49.2%

In response to an open-ended question on what the respondents would need in order to help more low-income families grow their own food, a variety of answers were given. In order to interpret the results easier, the answers were grouped into categories. Twenty-two seed library managers left the question blank, and another twenty-seven replied that reaching more low-income families was not a concern. Refer to Figure 3 for a detailed count of each item.

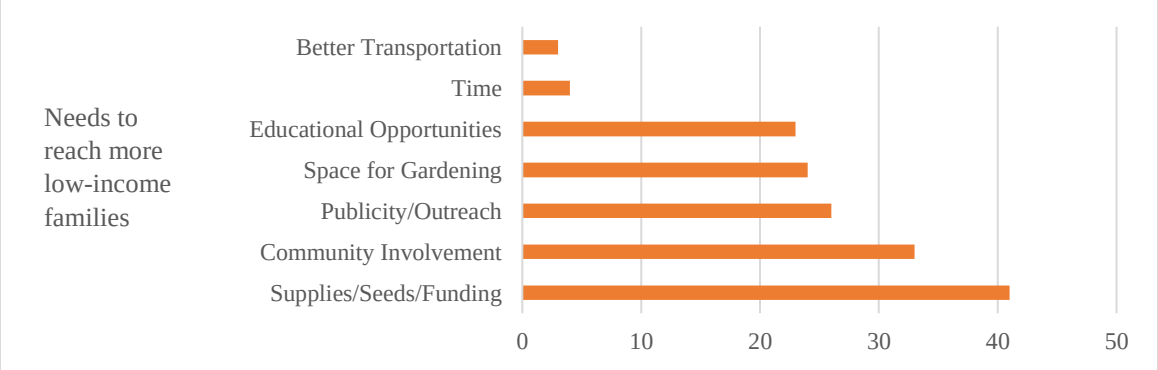

Figure 3. Count of specific needs listed by survey respondents to reach more low-income people. (n=160)

Discussion

Seed libraries are a relatively new phenomenon. According to the survey results, 134 of the 160 seed libraries were established from 2013-2015. However, the turnover rate of seed libraries that open and then close due to lack of interest or other reasons is unknown. There is a possibility that seed libraries that opened earlier than 2013 have closed and therefore did not take the survey. The other more likely possibility is that seed libraries are growing in popularity.

Seed libraries are overwhelmingly located in public libraries, as shown in Table 1. It is speculated that many seed libraries for which contact information was never found may be located outside public libraries and, therefore, may have less of an online presence, but overall, public libraries are the most common location. Public libraries combine a lot of different resources that are helpful for seed libraries. Public libraries contain various educational formats such as books, internet access, and workshops and classes. By providing educational workshops on a variety of topics (see Figure 2) providing materials in the form of seeds for participants to use, and making the service free—as 98.1% of seed libraries surveyed did—seed libraries combine many of the things needed to get started in an accessible way.

In general, the free cost of seed libraries is beneficial to seed library participants, but poses challenges for seed library managers. Of the survey respondents, 64.8% reported that only 0-25% of participants returned seeds they "checked out" at the end of the growing season. Considering seed libraries are not seeing a large return rate on seeds compared to people checking them out, two things are important to keep in mind: 1) Presumably, people who are returning seeds are able to return more than they checked

out or planted because plants produce more than one seed; and 2) Not everyone needs to return seed for the seed library to sustain itself—just enough to replenish the supply for the next season. However, low return rates could be a problem in terms of the sustainability of seed libraries over time. On the other hand, one-hundred and sixteen seed libraries offered seed saving workshops, and there is a possibility that the newness of many of the seed libraries means that people have just not had enough time to develop the skill of seed saving.

Because seed libraries are typically free, they may be able to contribute to a low-income family's ability to grow their own food. By growing their own food, a family can significantly increase the direct access they have to nutritious foods (Marsh, 1998). Survey results showed, however, that seed library manager's perceived the majority of participants as being more middle-income than anything else (Table 3). It is important to keep in mind that these are just the seed library managers' perceptions and are not based on any demographic data from the communities themselves. Though few studies have been done on people's ability to correctly judge others' income level by appearance, one study was able to show that people were very likely to be able to determine the income level of others based on their shoes (Gillath, 2012). However, it is unknown if seed library managers perceive the majority as being middle class because middle class people are more interested in gardening and/or any alternative food movements associated with the seed library, or if the seed library has not reached out successfully to low-income families—or if there is some other factor that is less apparent.

The majority of seed library managers believed that there are low-income families in their communities that have trouble accessing healthy foods due to barriers such as

income, time, transportation, and/or geographic location, among others (Table 4), suggesting that seed library managers understand the needs in their communities. Additionally, 46.5% of seed library managers felt that the seed library contributed to helping low-income families gain access to healthy foods. However, another 36.5% were unsure if the seed library was contributing. For those that did not believe or were not sure if the seed library was contributing to low-income food security, another 78.8% of respondents felt that the seed library had the potential or capability of helping alleviate low-income food insecurity. These results strengthen the idea that seed library managers are aware of food insecurity issues.

Some seed library managers are taking steps to address low-income food insecurity, but many others had not even thought of it. When asked if they had taken any specific steps to reach more low-income families, one respondent commented, "No, but now that you've given me the idea I will!" Others had a much more negative outlook on seed library contributions to low income food security. When asked what the seed library might need in order to help more low-income families grow their own food, one respondent commented that it was "not a workable model" and that low-income families often did not have the space, resources, skills, time, food-efficacy skills, or desire to food garden and that the seed library did not have the staff resources to "inspire enthusiasm." Of course, these are all very real concerns. There are many barriers to gardening, including but not limited to "interest, time, knowledge, space, and financial resources" (Schupp et al. p. 5) as well as poor soil quality, dislike of getting dirty, theft of produce, pests, "housing situation, dislike of gardening, and lack of a social network" (Lautenschlager & Smith, 2007, p. 249). Rather than accepting these barriers as final,

though, seed library managers can work with their communities and the resources at hand to overcome these barriers as they come up.

One thing that twenty-four seed library managers said they would need in order to help more low-income families grow their own nutritious food was space to grow it in. Partnerships with community gardens are one way that seed libraries are finding to overcome this obstacle. Eighty-three respondents reported a partnership with a community garden or community garden organization. Beyond providing space to garden, community gardens can also provide a positive social network for first-time gardeners. Community gardens are known to correlate with positive social contact between neighbors as well as an increased sense of community (Okvat & Zautra, 2011). Neighborhood green spaces also are known to reduce both property crimes and violent crimes in an area (Okvat & Zautra). By providing space to grow the food in, seed libraries can increase their impact within food insecure populations.

Seed libraries may not currently be contributing immensely to alleviating food insecurity among low-income U.S. populations. Although 46.5% of seed library managers felt that their seed library was contributing to helping low-income families gain access to healthy foods, only 17.5% of seed libraries perceived the majority of their participants as being low-income. However, it appears that seed library managers are optimistic that the seed library could contribute to low-income food security, and many were able to list what they would need in order to reach more low-income families. The location of seed libraries at public libraries is beneficial because of their capacity for educational opportunities, continuous government funding, and the ease of access by low-income people. Seeds libraries are a fairly new phenomenon that has been

developing at an increased rate since 2013. Seed libraries are a developing and likely rapidly evolving service, and if the number of people gardening continues to increase (National Gardening Association, 2014), it is likely that seed libraries will continue to be established. Seed libraries are beneficial to communities, and they have the potential to influence low-income food security.

Chapter 4

Recommendations for Seed Libraries

This chapter aims to provide some recommendations for people who are considering opening a seed library or for any seed libraries that are already open and looking to expand their services. Most recommendations are meant for seed libraries that wish to provide a service to the food insecure, but many could be useful for any seed library. Recommendations provided here are not necessarily tied to the research objectives defined in Chapter 3; rather, they are the culmination of research completed for this thesis that may not have practical use within the analysis or literature review but that do provide some relevant knowledge for seed libraries. Despite their reasons for opening a seed library, seed library managers are placing themselves within the ever-changing and frustratingly complex U. S. food system, and each location has something it can offer for those who fall behind in this system. These recommendations can hopefully get someone on the right path to creating an inclusive and successful seed library.

The suggestions in this chapter are meant to be a point of discussion and by no means suggest that seed libraries and food gardening constitute a comprehensive solution to U.S. food security issues. Low-income food security is a multidimensional problem that will require systems-based thinking to solve, and it will be more successful if those most affected play a part in finding the answers. Additionally, communities should consider an assets-based approach to solving key issues. An assets-based approach takes the focus off of the negative aspects of a community or a group and instead builds on the

strengths they already have (J. Treviño, personal communication, February 19, 2016). When discussing strategies for addressing low-income food security, certain assets such as collectivist tendencies, worldviews, and historical relationships to the land should be kept in mind in addition to the specific skills that individuals or groups may have to offer (J. Treviño, personal communication). The suggestions made in this paper are by no means easy and do not provide a comprehensive look at what is causing low income food insecurity in the U.S. The goal of this chapter is to provide seed library managers and community change-makers with the tools and understanding needed to market the idea of home and community gardening to low income families in the U.S. to help alleviate food insecurity.

There are more ways to promote a seed library for people who may not know about it than just touting the health and environmental benefits. Based on research from Glanz et al. (1998), many low-income families prioritize convenience and cost in their food choices (p. 1124). When advertising and promoting a seed library, keep in mind that many people (low-income or otherwise) may dismiss gardening as a time-consuming and expensive activity without looking into it more. Be sure to advertise how one may actually save time or money by growing a garden and the best practices for doing so. Additionally, Hispanic or African-American gardeners (low-income or otherwise) may value gardening more as an activity they can do with their children (Waliczek, Mattson, & Zajicek, p. 207), although there are presumably families from all demographics that would appreciate the time spent with family and the rewards of gardening with children. Seed libraries can keep these things in mind when they are advertising and promoting their service.

One of the survey questions asked respondents to identify what they might need if they were to include more low-income families. Twenty-four people wrote that garden space was needed, especially in urban areas. For seed libraries that do not partner with a community gardening organization, or even for those that do, keep in mind that for a seed library to effectively reach its goals, people need to have space to grow the seeds that they check out. Seed libraries that see this as an obstacle should consider partnering with an organization or expanding library services to include a community gardening component.

Another trend in the responses was that many seed libraries did not really know what they would need; for them, I would suggest talking to people. Ask them what they are looking for or what they would need in order to make their garden a success. Seed libraries should not waste valuable time and resources on creating materials that people do not use. Instead, figure out what people need before-hand if possible. Also, as discussed in Chapter 2, only 17% of people who responded to a Pew Research survey claimed to have gone to the library to attend a "class, program, or lecture" (Horrigan, 2015, Ch. 1). Although workshops are a great way to teach people about seed saving, gardening, and other skills, not everyone is going to be aware of community workshops. Seed libraries should consider providing information online, or at least linking to other websites or videos that would be helpful for seed library participants. As much as is possible though, try to increase community social capital rather than rely solely on technology to spread information. Essentially, encourage community interaction, but do not exclude those who cannot attend in-person events from participating in the seed library.

Public libraries are an important part of many communities, and, as demonstrated by the subject of this paper, offer more services than just checking out books. Public libraries can also serve as a community hub for the spread of culture and local knowledge. I would encourage any seed library to utilize their community as much as possible, especially when it comes to culture and art. Many seeds have a story behind them, and an artist might love to interpret that story and turn it into art for the seed packets. Local schoolchildren might also get involved with decorating the seed cupboard or other things. These are just examples; what I want people to take away from this is that a seed library and its services—and a public library as a whole—can be approached from a variety of angles so as to include as many community assets as possible. This may also increase the exposure of the seed library.

Seed libraries are also an excellent chance to involve people, children and adults alike, in place-based education and environmental literacy. A seed library provides ample opportunities to learn more basic skills such as sorting and counting, but can also involve lessons in biology and history. There was only one seed library at a non-university school that completed the survey, but I believe that more schools could use them as learning tools. They also fit well with schools that already have school garden programs.

To get a seed library started, I was once told to ask seed companies in the fall for donations of seeds. Many will be happy to support a project like a seed library. Also, try to support local seed companies when you can. Seeds that are already locally adapted provide a great starting point for a beginning seed library.

Another thing to consider when helping participants to first get started gardening or using the seed library is soil testing. Seed libraries should encourage participants to get their soil tested for contaminants before planting, and provide them with instructions on how they can get this done in their communities. Urban soil may be contaminated with lead, arsenic, cadmium, and polyaromatic hydrocarbons ("Urban gardens," 2010), and people may not be aware of this before planting.

All of these recommendations, like I mentioned, are things to consider when setting up or expanding the services of a seed library. They do not provide a comprehensive, step-by-step guide to creating a seed library—there are plenty of other sources that do this—but I did provide some observations from my last year of research for both beginning and established seed libraries that I have not seen mentioned many other places. Seed libraries can be a valuable asset to a community, just like public libraries, and are one step we can take as a country and as communities to better understand where our food comes and how it affects us. Seed libraries are emerging as one part of a community-focused and assets-based solution to the enduring problem of low-income food insecurity.

APPENDIX A

Seed Library Research Survey

You are invited to participate in a research study as part of my undergraduate thesis project! My name is Emily Roberson, and I am a Sustainability and Anthropology student at the University of South Dakota. My project consists of qualitative and quantitative non-experimental empirical research that seeks to answer these questions: Are seed libraries helping to solve the problem of low-income access to healthy food? If so, how? The two major components of the research include locating where U.S. seed libraries are compared to USDA-designated low-income food desert regions and surveying existing seed libraries to find out if and how they are contributing to providing low-income community members access to the things they need to grow their own nutritious food--knowledge and seeds.

We are inviting you to be in this study because an organization, business, or public library you are associated with has (or once had) a seed library. We are searching for individuals best able to answer questions about the seed library you are associated with, so **if you believe there is someone more responsible for or more involved with the seed library, please send this email along to them.** Additionally, for all public library staff receiving this email, I am hoping to receive a survey per seed library, not per library branch, so if it is possible, please have the most qualified person for each seed library at each participating branch fill out this survey.

I obtained your email address by searching through lists of seed libraries on seedlibraries.net and seedlibrarian.com (as well as a couple others), visiting your website, and attempting to find the email contact most associated with the seed library.

The survey consists of 41 questions (or less depending on certain answers given) and, on average, should take no more than 20 minutes. Your participation is completely voluntary. If you change your mind at any time before or during the survey, you do not have to complete the survey and I do not need to be notified. Additionally, you may leave any questions blank that you do not wish to answer.

Every seed library that completes a survey will be entered to win a $50 gift card from seedsavers.org. The gift card will be sent to the address of the seed library given in the survey and is meant to be used to help build the seed library program, not for personal use.

We will keep the information you provide confidential; however federal regulatory agencies and the University of South Dakota Institutional Review Board (a committee that reviews and approves research studies) may inspect and copy records pertaining to this research.

Your name will not be associated with the survey. We will, however, keep the survey responses connected with the address and name of the seed library you are associated with. If we write a report about this study we will do so in such a way that you and the individual seed libraries cannot be identified.

All online survey responses that we receive will be treated confidentially with a username and password combination. Additionally, all related offline files will be kept on an encrypted flash drive. However, given that the surveys can be completed from any computer (e.g., personal, work, school), we are unable to guarantee the security of the computer on which you choose to enter your responses. As a participant in our study, we want you to be aware that certain "key logging" software programs exist that can be used to track or capture data that you enter and/or websites that you visit.

The only known risks associated with this study involve states that prohibit seed libraries in their state seed laws. However, all the contact information I received was from online sources that already openly admit to running seed libraries, so it is my belief that our confidential records will not put you personally at any risks that are not already present. There is no known personal benefit from the study. However, we hope that others may benefit in the future from what we learn as a result of this study.

If you have any questions, concerns or complaints now or later, you may contact us at the email address by which this email was sent. If you have any questions about your rights as a human subject, complaints, concerns or wish to talk to someone who is independent of the research, contact the Office for Human Subjects Protections at (605) 677-6184. Thank you for your time!

Emily Roberson

1. What seed library are you associated with? _____
2. In what year was the seed library founded? _____
3. What is the address of the seed library? (Street Address, City, State, Zip Code) _____
4. In what kind of facility is the seed library located?
    A. Business
    B. College or University
    C. Community Garden
    D. Elementary, Middle, or High School
    E. Local Residence
    F. Museum
    G. Nonprofit Organization
    H. Public Library
    I. Other _____
5. (If answer to #4 was H, this question came next using skip logic) Is the seed library part of an on-line cataloging system?
    A. Yes
    B. No

6. (If answer to #5 was B) Is there a separate system for keeping track of which seeds are checked out and checked in?
    A. Yes
    B. No
7. (If answer to #4 was G) What is the name of the nonprofit organization?
    _____
8. (If answer is anything but B for #4) Is there a system for keeping track of which seeds are checked out and checked in?
    A. Yes
    B. No
9. Is the seed library easily accessible by public transportation?
    A. Yes
    B. No
    C. My community does not have public transportation
10. Regardless of the seed library's location, who founded the seed library? (Check all that apply)
    - Business
    - Club
    - Community Member(s)
    - Educator(s)
    - Extension Office
    - Nonprofit Organization
    - Public Library Staff
    - Other:_____
11. If so, since the founding of the seed library, have any free workshops or classes been held on the following topics? (Check all that apply)
    - Seed Saving
    - Gardening Basics
    - Cooking with Garden Produce
    - Herb Gardening
    - Composting and/or Soil Health
    - Healthy Eating
    - Other Related Topic _____
12. Who is in charge of running the seed library? (check all that apply)
    - Business
    - Club
    - Community Member/Volunteer
    - Educator(s)
    - Elected Board
    - Extension Office
    - Public Library Staff
    - Volunteer Board
    - Other:_____

13. Please put in order of importance the goals of your seed library with 1 being the highest and 7 being the lowest. (If any are not applicable, please click "N/A") [This question was in grid form and allowed each person to click anywhere from 1-7 on each goal provided]
    - To support eating local
    - To increase biodiversity
    - To promote gardening as a hobby
    - To increase local access to healthy food
    - To preserve local heirloom varieties
    - To use as an educational tool
    - To expand library services
14. Does the seed library have any goals not listed in the grid above? Please list any that have been missed. _____
15. Does the location of the seed library have space to hold workshops or classes?
    A. Yes
    B. No
16. (If answer to #15 was A) Since the founding of the seed library, have any free workshops or classes been held (at the location of the seed library) on the following topics? (Check all that apply)
    - Seed Saving
    - Gardening Basics
    - Cooking with Garden Produce
    - Herb Gardening
    - Composting and/or Soil Health
    - Healthy Eating
    - Other:_____
17. (If answer to #15 was B) Do you know of any other community organizations that may offer free or low-cost workshops or classes related to seed saving, gardening, cooking with fresh produce, herb gardening, composting/soil health, healthy eating, etc.? (If yes, please specify the organization) _____
18. How did the seed library receive initial funding? (Only answer if applicable to your seed library). _____
19. What kinds of seeds did the library offer this growing season? (Check all that apply).
    - Fruit
    - Vegetable
    - Herb
    - Flower

20. Approximately how many different species were “checked out” during this growing season?
    A. 0-25
    B. 26-50
    C. 51-75
    D. 76-100
    E. 100+
    F. Not sure
21. Are seed library participants asked to return seeds at the end of the growing season?
    A. Yes, but there IS NO penalty if they do not.
    B. Yes, but there IS a penalty if they do not.
    C. No
22. Do you catalog your seeds by ease or difficulty to grow?
    A. Yes
    B. No
    C. Some, but not all
23. Is there a limit to how many seeds a participant can check out each season?
    A. Yes
    B. No
    C. Limited by species, not overall total
24. Does this seed library partner with any community gardens or community garden organizations?
    A. Yes
    B. No
25. Does the seed library partner with any other organizations, businesses, schools, or other groups?
    A. Yes
    B. No
26. (If answer to #25 was A) What is the name of the organization, business, school or other groups that the seed library partners with? _____
27. What is the approximate population of the community the seed library is located in? _____
28. What is the approximate number of people participating in “checking out” seeds from the seed library for this growing season? _____

29. At what cost (if any) is the seed library available to participants per growing season? This would include any costs associated with access to a public library if applicable.
    A. Free
    B. $.01-$5
    C. $5.01-$10
    D. $10.01-$15
    E. Over $15
    F. Depends on number of seeds checked out
30. Do you perceive the majority of seed library participants as being:
    A. Experienced Gardeners
    B. Intermediately Skilled Gardeners
    C. Inexperienced Gardeners
31. Do you perceive the majority of seed library participants as being:
    A. Low-income
    B. Middle-income
    C. High-income
    D. Unsure
32. Please use this box to further explain your answer to the previous question if you feel it is necessary. If not, please leave it blank. _____
33. Does the seed library also include gardening supplies to "check out?"
    A. Yes
    B. No
34. (If answer to #33 was B) Are there any separate organizations that you know of in your community that would offer gardening supplies to check out such as a tool library? (Just write "no" if you do not know of any). _____
35. Does the seed library (or hosting organization) partner with any organizations that focus on health and wellness education?
    A. Yes
    B. No
36. (If answer to #35 was A) What is the name of the organizations that focuses on health and wellness education? Is it local? _____
37. Since the founding of the seed library, has participation:
    A. Increased
    B. Decreased
    C. Stayed the same
    D. Fluctuated
    E. Not sure

38. What percentage of participants return seeds they "checked out" after the growing season?
    A. 0%-25%
    B. 26%-50%
    C. 51%-75%
    D. 75%-100%
    E. Unsure
39. Where can people find information about the seed library? (Check all that apply)
    - Social Media
    - Page on an Associated Website
    - Seed Library Website
    - At the Seed Library Location
    - Local Advertisement (Newspaper, Flyers, etc.)
    - Community Events
    - Other:_____
40. Do you feel that there are low-income families in your community that have trouble accessing healthy foods due to any barriers such as income, time, transportation, distance to nearest grocery store, etc.?
    A. Yes
    B. No
    C. Unsure
41. Do you feel that the seed library contributes to helping low-income families gain access to healthy foods?
    A. Yes
    B. No
    C. Unsure
42. (If answer to #41 was B or C) Do you feel that the seed library has the potential or capability of helping low-income families gain access to healthy foods?
    A. Yes
    B. No
    C. Unsure
43. Have you taken any specific steps to reach more low-income families? If so, what has worked and/or what has not worked? _____
44. What would the seed library need in order to help more low-income families grow their own healthy food? (If this is not a concern at your seed library, please state so). _____
45. Thank you for completing the survey. If you feel any answer deserves further explanation, please state the question number and your comment here.
    _____

References

Agriculture. (2015). In *Oxford Dictionaries.* Retrieved December 27, 2015, from http://www.oxforddictionaries.com/us/definition/american_english/agriculture

Bissonnette, M. M., & Contento, I. R. (2001). Adolescents' perspectives and food choice behaviors in terms of the environmental impacts of food production practices: Application of a psychosocial model. *Journal of Nutrition Education, 33*(2), 72-82. doi: 10.1016/S1499-4046(06)60170-X

Block, J. P., Scribner, R. A. & DeSalvo, K. B. (2004). Fast food, race/ethnicity, and income: A geographic analysis. *American Journal of Preventative Medicine, 27*(3), 211-217. doi: 10.1016/j.amepre.2004.06.007

Booth, S. L., Sallis, J. F., Ritenbaugh, C., Hill, J. O., Birch, L. L., Frank, L. D. . . . Hays, N. P. (2001). Environmental and societal factors affect food choice and physical activity: Rationale, influences, and leverage points. *Nutrition Reviews, 59*(3), S21-S39. Retrieved 19 December, 2015, from http://search.proquest.com/docview/212309402?accountid=14750

Brown, K. H., Jameton, A. L. Public health implications of urban agriculture. *Journal of Public Health Policy, 21*(1), 20-39. doi: 10.2307/3343472

Burls, A. (2007). People and green spaces: Promoting public health and mental well-being through ecotherapy. *Journal of Public Mental Health, 6*(3), 24-39. Retrieved from http://www.proquest.com/libraries/academic/databases/ProQuest_Central.html

Campbell, T. C. & Campell, T. M. (2006). *The china study: Startling implications for diet, weight loss and long-term health.* Dallas, TX: BenBella Books, Inc.

Cassady, D., Jetter, K. M., & Culp, J. (2007). Is price a barrier to eating more fruits and vegetables for low-income families?. *Journal of the American Dietetic Association, 107*(11), 1909-1915. doi: http://dx.doi.org/10.1016/j.jada.2007.08.015

Centers for Disease Control & Prevention. (2015, June 5). The health effects of overweight and obesity. Retrieved December 19, 2015, from http://www.cdc.gov/healthyweight/effects/

Centers for Disease Control & Prevention. (2012, April 27). Defining adult overweight and obese. Retrieved February 21, 2016, from http://www.cdc.gov/obesity/adult/defining.html

Coleman-Jensen, A., Rabbitt, M., Gregory, C., & Singh, A. (2015, September). Household food security in the United States in 2014 [Report Summary]. *United States Department of Agriculture Economic Research Service.* Retrieved February 21, 2016, from http://www.ers.usda.gov/media/1896836/err194_summary.pdf

Darnton, J., & McGuire, L. What are the physical and mental benefits of gardening?. (2014, May 19). Michigan State University Extension. Retrieved December 2, 2015, from http://msue.anr.msu.edu/news/what_are_the_physical_and_mental_benefits_of_gardening

Dilrukshi, H. G., Freed, R., & Maredia, K. M. (2013, May). Home gardens: A promising approach to enhance household food security and wellbeing. *Agriculture & Food Security, 2*(8), n.p. doi: 10.1186/2048-7010-2-8

Doyle, A. (2015, September 21). Update 1-Syrian war spurs first withdrawal from doomsday Arctic seed vault. *Reuters.* Retrieved February 28, 2016, from http://www.reuters.com/article/mideast-crisis-seeds-idUSL5N11R3SE20150921

Egan, J. (2015, November 4). The changing face of the American homeowner [Infographic]. *LawnStarter.* Retrieved March 15, 2016, from https://www.lawnstarter.com/blog/home-garden/homeownership-rates-in-america-infographic/

Emberland, A. (2015, June 5). Global gardens: Teaching students to grow their own food. *World Food Programme.* Retrieved December 27, 2015, from https://www.wfp.org/students-and-teachers/teachers/blog/global-gardens

Ester Library. (n.d.). Sister seed libraries. Retrieved March 16, 2016, from http://www.esterlibrary.org/?page_id=92

Filipiak, J. (2011). The work of local culture: Wendell Berry and communities as the source of farming knowledge. *Agricultural History, 85*(2), 174-194. Retrieved March 28, 2016, from http://search.proquest.com.ezproxy.usd.edu/docview/863351453?accountid=14750

Francis, M. (1995). Childhood's garden: Memory and meaning of gardens. *Children's Environments*, *12*(2), 183–191. Retrieved December 23, 2015, from http://www.jstor.org/stable/41503426

Gehner, J. (2010). Libraries, low-income people, and social exclusion. *Public Library Quarterly, 29*, 39-47. doi: 10.1080/01616840903562976

Gillath, O., Bahns, A. J., Ge, F. & Crandall, C. S. (2012). Shoes as a source of first impressions. *Journal of Research in Personality, 46*(4), 423-430. doi: 10.1016/j.jrp.2012.04.003

Glanz, K, Basil, M, Maibach, E., Goldberg, J., & Snyder, D. (1998). Why Americans eat whay they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association, 98*(10), 1118-1126. doi: 10.1016/S0002-8223(98)00260-0

Greene, K. (2013, March 29). The seed library movement from roots to bloom. *Hudson Valley Seed Library.* Retrieved February 17, 2016, from http://www.seedlibrary.org/blog/the-seed-library-movement-from-roots-to-bloom/

Guthman, J. (2011). *Weighing in: Obesity, food justice, and the limits of capitalism.* Berkeley & Los Angeles: U of California Press.

Hoidal, N. (2015, October 2). What's in a seed? The critical role of seed politics in the food sovereignty movement. *Sustainable Food Trust.* Retrieved February 20, 2015, from http://sustainablefoodtrust.org/articles/food-sovereignty-seed/

Holland, L. (2004). Diversity and connections in community gardens: A contribution to local sustainability. *Local Environment, 9*(3), 285-305. Retrieved December 15, 2015, from http://web.b.ebscohost.com.ezproxy.usd.edu/

Holt, S. (2014, August 14). What is the state ag department's beef with a tiny seed library?. *TakePart.* Retrieved February 21, 2016, from http://www.takepart.com/article/2014/08/14/pennsylvania-targets-seed-library

Horrigan, J. B. (2015, September 15). Pew Research Center. *Chapter 1: Who uses libraries and what they do at their libraries.* Retrieved November 21, 2015, from http://www.pewinternet.org/2015/09/15/who-uses-libraries-and-what-they-do-at-their-libraries/

Jarvis. A., Upadhyaya, H., Gowda, C.L.L., Aggarwal, P.K., Fujisaka, S., & Anderson, B. (2010). Climate change and its effect on conservation and use of plant genetic resources for food and agriculture and associated biodiversity for food security. *United Nations Food and Agriculture Association.* Retrieved February 20, 2015, from http://www.fao.org/docrep/013/i1500e/i1500e00.htm

Johnson, C. (2015, June 15). Seed sharing movement wins big with new legislation. *Shareable.* Retrieved February 21, 2015, from http://www.shareable.net/blog/seed-sharing-movement-wins-big-with-new-legislation

Kirpalani, R. (2011, July 12). Woman faces jail time for growing vegetable garden in her own front lawn. *ABC News.* Retrieved December 24, 2015, from http://abcnews.go.com/US/vegetable-garden-brings-criminal-charges-oak-park-michigan/story?id=14047214

Kloppenburg, J. (2010). Impeding dispossession, enabling repossession: Biological open source and the recovery of seed sovereignty. *Journal of Agrarian Change, 10*(3), 367-388. doi: 10.1111/j.1471-0366.2010.00275.x

Krajcik, J., & Czerniak, C. (2007). *Teaching science in elementary and middle school: A project-based approach* (3rd ed.). New York: Routledge.

Kumanyika, S. (2006). Nutrition and chronic disease prevention: Priorities for US minority groups. *Nutrition Reviews, 64*(2), S9-S14. Retrieved December 23, 2015, from http://search.proquest.com/docview/212321529?accountid=14750

Lafferty, J. (2015). Troubling place in alternative food practices: Food movements, neoliberalism, and place. In K. M. Fitzpatrick & D. Willis (Eds.), *A place-based perspective of food in society* (pp. 221-240). New York, NY: Palgrave Macmillan

Landgraf, Greg. (2015, January 5). Not your garden-variety library. *American Libraries Magazine.* Retrieved February 27, 2016, from http://americanlibrariesmagazine.org/2015/01/05/not-your-garden-variety-library/

Lautenschlager, L., and Smith, C. (2007). Beliefs, knowledge, and values held by inner-city youth about gardening, nutrition, and cooking. *Agriculture and Human Values, 24*(2), 245-258. doi: 10.1007/s10460-006-9051-z

LeBesco, K., & Naccarato, P. (2015). Distinction, disdain, and gentrification: Hipsters, food people, and the ethnic other in Brooklyn, New York. In K. M. Fitzpatrick & D. Willis (Eds.), *A place-based perspective of food in society* (pp. 121-139). New York, NY: Palgrave Macmillan.

Levine, J. A. (2011). Poverty and obesity in the U.S. *Diabetes, 60*(11), 2667-2668. doi: 10.2337/db11-1118

Lewis, L. B., Sloane, D. C., Nascimento, L. M., & Diamant, A. L. (2005). African Americans' access to healthy food options in South Los Angeles restaurants. *American Journal of Public Health, 95*(4), 668-73. Retrieved March 17, 2016, from

http://search.proquest.com.ezproxy.usd.edu/docview/215093721?accountid=14750

Lucan, S. C., Barg, F. K., & Long, J. A. (2010). Promoters and barriers to fruit, vegetable, and fast-food consumption among urban, low-income African Americans-A qualitative approach. *American Journal of Public Health, 100*(4), 631-635. doi: 10.2105/AJPH.2009.172692

Marsh, R. Food and Agriculture Association of the United Nations. (1998). *Building on traditional gardening to improve household food security* [Report]. Retrieved December 26, 2015, from http://www.fao.org/3/contents/5d721875-489a-5e9f-af2c-de1e96fd9094/X0051t02.pdf

Morland, K., Wing, S., Diez Roux, A., & Poole, C. (2002). Neighborhood characteristics associated with the location of food stores and food service places. *American Journal of Preventive Medicine, 22*(1), 23-29. doi: 10.1016/S0749-3797(01)00403-2

National Gardening Association. (2014). *Garden to table: A 5-year look at food gardening in America.* Retrieved November 30, 2015 from http://www.hagstromreport.com/assets/2014/2014_0402_NGA-Garden-to-Table.pdf

Obesity causes. (2015). Harvard T. H. Chan School of Public Health. Retrieved December 19, 2015, from http://www.hsph.harvard.edu/obesity-prevention-source/obesity-causes/

Okvat, H. A., & Zautra, A. J. (2011). Community gardening: A parsimonious path to individual, community, and environmental resilience. *American Journal of Community Psychology*, *47*(3/4), 374-387. doi:10.1007/s10464-010-9404-z

Overweight and obesity statistics. (2012, October). National Institute of Diabetes and Digestive and Kidney Diseases. Retrieved December 23, 2015, from http://www.niddk.nih.gov/health-information/health-statistics/Pages/overweight-obesity-statistics.aspx

Pothukuchi, K., & Kaufman, J. L. (1999). Placing the food system on the urban agenda: The role of municipal institutions in food systems planning. *Agriculture and Human Values, 16*(2), 213-224. Retrieved December 24, 2015, from http://search.proquest.com.ezproxy.usd.edu

Powell, L. M., Chaloupka, F. J., & Bao, Y. (2007). The availability of fast-food and full-service restaurants in the United States: Associations with neighborhood characteristics. *American Journal of Preventive Medicine, 33*(4), S240-S245. doi: 10.1016/j.amepre.2007.07.005

Pudup, M. B. (2008). It takes a garden: Cultivating citizen-subjects in organized garden projects. *Geoforum, 39,* 1228-1240. doi: 10.1016/j.geoforum.2007.06.012

Robinson, R., & Smith, C. (2002). Psychosocial and demographic variables associated with consumer intention to purchase sustainably produced foods as defined by the Midwest Food Alliance. *Journal of Nutrition Education and Behavior, 34*(6), 316-325. doi: 10.1016/S1499-4046(06)60114-0

Sagan, C. (2011, July 6). *Cosmos.* [Google eBook]. Retrieved from https://books.google.com/books?id=EIqoiww1r9sC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Sallis, J. F., Nader, P. R., Rupp, J. W., Atkins, C. J., & Wilson, W. C. (1986). San Diego surveyed for heart healthy food and exercise facilities. *Public Health Reports, 101*(2), 216-218. Retrieved March 28, 2016, from http://www.jstor.org/stable/4627841

Schupp, J. L., & Sharp, J. S. (2012). Exploring the social bases of home gardening. *Agriculture and Human Values, 29*(1), 93-105. doi: 10.1007/s10460-011-9321-2

Schupp, J. L., Som Castellano, R. L., Sharp, J. S., & Bean, M. (2015). Exploring barriers to home gardening in Ohio households. *Local Environment: The International Journal of Justice and Sustainability,* 1-16. doi: 10.1080/13549839.2015.1017807

Seed Savers Exchange. (2014, August 25). In defense of seed libraries. [Web log post]. Retrieved March 26, 2016, from http://blog.seedsavers.org/blog/in-defense-of-seed-libraries

Seedlibrarian.com. (2016). Seed library locator map. Retrieved March 16, 2016, from http://www.seedlibrarymap.com/

Seedlibraries.net. (n.d.). Sister libraries. Retrieved March 16, 2016, from http://seedlibraries.net/

Shiva, V. (n.d.). Definition of seed sovereignty. *Lexicon of Food.* Retrieved February 20, 2016, from https://www.lexiconoffood.com/definition/definition-seed-sovereignty

Simpson Seed Library. (2014, August 7). Cumberland County Library System. Retrieved February 21, 2014, from http://www.cumberlandcountylibraries.org/SIM_SeedLibrary

Slocum, R. (2007). Whiteness, space and alternative food practice. *Geoforum, 38*, 520-533. doi: 10.1016/j.geoforum.2006.10.006

Smith, L. P., Ng, S. W., & Popkin, B. M. (2013). Trends in US home food preparation and consumption: Analysis of national nutrition surveys and time use studies from 1965-1966 to 2007-2008. *Nutrition Journal, 12*, 45. doi: 10.1186/1475-2891-12-45

Stocker, L. & Barnett, K. (1998). The significance and praxis of community-based sustainability projects: Community gardens in Western Australia. *Local Environment, 3*(2), 179–188. doi: 10.1080/13549839808725556

Sustainable Economies Law Center. (2014, August 11). Setting the record straight on the legality of seed libraries. *Shareable.* Retrieved February 21, 2016, from http://www.shareable.net/blog/setting-the-record-straight-on-the-legality-of-seed-libraries

Taylor, J. R., & Lovell, S. T. (2014). Urban home gardens in the Global North: A mixed methods study of ethnic and migrant home gardens in Chicago, IL. *Renewable Agriculture and Food Systems, 30*(1), 22-32. doi: 10.1017/S1742170514000180

United States Department of Agriculture. (2009). *Access to affordable and nutritious food: Measuring and understanding food deserts and their consequences.* Retrieved December 21, 2015, from http://www.ers.usda.gov/media/242675/ap036_1_.pdf

United States Department of Agriculture. (2015). Ranges of food security and food insecurity. Retrieved March 15, 2016, from http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx

Urban gardens and soil contaminants: A gardener's guide to healthy soil. (2010). Minnesota Institute for Sustainable Agriculture. Retrieved December 28, 2015, from http://www.misa.umn.edu/prod/groups/cfans/@pub/@cfans/@misa/documents/asset/cfans_asset_287228.pdf

Waliczek, T. M, Mattson, R. H., & Zajicek, J. M. Benefits of community gardening on quality-of-life issues. *Journal of Environmental Horticulture, 14,* 204-209. Retrieved November 30, 2015, from http://www.hriresearch.org/Docs/Publications/JEH/JEH_1996/JEH_1996_14_4/JEH%2014-4-204-209.pdf

Wang, D., & Glicksman, A. (2013). "'Being grounded': Benefits of gardening for older adults in low-income housing." *Journal of Housing for the Elderly, 27*(1-2), 80-104. doi: 10.1080/02763893.2012.754816

Where growing too many vegetables is illegal. (2010, October 3). *The Economist.* Retrieved December 24, 2015, from http://www.economist.com/blogs/democracyinamerica/2010/10/weird_zoning_laws

World Health Organization. (2016). Food security. Retrieved February 21, 2016, from http://www.who.int/trade/glossary/story028/en/