A feasibility assessment for the use of the community health worker model for inclusive
garden-based food systems programming for Virginia Cooperative Extension

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ABSTRACT

Food systems include food production, processing, distribution, marketing, access, preparation, consumption, and disposal and influences of social, economic, and environmental conditions. Virginia Cooperative Extension (VCE) has professionals, paraprofessionals, and volunteers with expertise in food systems dimensions integrated into Virginia communities. Current VCE programming has unequal reach for Black, Indigenous, and people of color (BIPOC) communities. Community health workers (CHWs) are lay outreach workers who are from the communities they serve and can be effective health educators within BIPOC communities who experience health disparities. The CHW model is underexplored in food systems, despite the importance of food systems for health. A scoping review of United States CHW educational food systems interventions found CHW reach to BIPOC communities primarily through education on food preparation and consumption. Garden-based programming educated on the highest number of food system processes, highlighting a potential role of CHWs within food systems. These results guided development of a feasibility evaluation for the CHW model for garden-based food systems programming for VCE, emphasizing reach to BIPOC communities. Semi-structured interviews were conducted with 29 VCE stakeholders representing several disciplines. The CHW model is feasible for VCE within the current focus on food systems, diversity, and inclusion. Participatory approaches for programming should be used to incorporate the cultural knowledge of the CHW and to create a welcoming environment for BIPOC communities. The CHW model can connect disciplines to provide accessible and culturally relevant programming to BIPOC communities, thus extending the reach of VCE and potentially creating more inclusive community food systems.
A feasibility assessment for the use of the community health worker model for inclusive garden-based food systems programming for Virginia Cooperative Extension

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GENERAL AUDIENCE ABSTRACT

Food systems encompass all processes from food production to disposal and are influenced by social, economic, and environmental conditions in which food travels from farm to fork. Virginia Cooperative Extension (VCE) provides outreach to Virginia communities by disseminating research-based information through professionals and volunteers in educational programming for topics that include agriculture, gardening, nutrition, and more. Community health workers (CHWs) are public health educators who serve Black, Indigenous, and people of color (BIPOC) to mitigate health disparities that are exacerbated by unequal distribution of resources within food systems. CHWs are from the communities they serve and thus are uniquely positioned as culturally sensitive educators. This thesis aimed to explore the role of CHWs in food systems education and to evaluate the feasibility of the CHW model for garden-based food systems programming for VCE. A scoping review of U.S.-based food systems interventions found that CHWs have reached BIPOC communities for food systems education that focuses on preparation and consumption of food, but the CHW model has not been widely documented in broad-lens food systems educational programming. Garden-based programs educated on the greatest number of food systems processes. Interviews with 29 VCE stakeholders showed that the CHW model is feasible within the structure and values of VCE. The CHW model can connect traditionally separate disciplines to provide accessible and culturally relevant programming to BIPOC communities, thus extending the reach of VCE and potentially creating more inclusive community food systems.
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<table>
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<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Agriculture and natural resources</td>
<td>ANR</td>
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<tr>
<td>American Public Health Association</td>
<td>APHA</td>
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<tr>
<td>Black, Indigenous, and people of color</td>
<td>BIPOC</td>
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<tr>
<td>Body mass index</td>
<td>BMI</td>
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<td>Centers for Disease Control and Prevention</td>
<td>CDC</td>
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<td>Community health worker</td>
<td>CHW</td>
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<tr>
<td>Expanded Food and Nutrition Education Program</td>
<td>EFNEP</td>
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<tr>
<td>Family and consumer sciences</td>
<td>FCS</td>
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<tr>
<td>Family Nutrition Program</td>
<td>FNP</td>
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<tr>
<td>National Institute of Health</td>
<td>NIH</td>
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<tr>
<td>Population, intervention, comparator, outcome, timeline, setting</td>
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<td>Preferred Reporting Items for Systematic Reviews and Meta-Analysis Scoping Review</td>
<td>PRISMA-ScR</td>
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<tr>
<td>Policy, systems, and environments</td>
<td>PSE</td>
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<tr>
<td>Supplemental Nutrition Assistance Program</td>
<td>SNAP</td>
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<td>Supplemental Nutrition Assistance Program-Education</td>
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<td>Virginia Cooperative Extension</td>
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CHAPTER ONE: INTRODUCTION

1.1 Background and rationale for research

While a definition for food systems lacks a clear consensus, scholars and practitioners generally agree that a food system encompasses all processes from production to disposal of food and the influences of actors on these processes within the social, economic, and environmental context of policies and decision-making (Neff et al., 2009; Nguyen, 2018). Food systems are influential contextual forces in the lives of individuals and communities. Food systems transformation has been a rapidly expanding research area over the past two decades, as scholars recognize the interconnectedness of food systems to urgent problems in global society: food insecurity, climate change, and obesity. In 2019, a Lancet Commission categorized the triple threat of these wicked, global problems as the global syndemic (Swinburn et al., 2019). Each of the United Nations Sustainable Development Goals (United Nations Department of Economic and Social Affairs, 2015) is connected to the food system, thus food system research must consider the economic, social, and environmental implications of change efforts.

Food systems shape public health by their significant effect on the diets of individuals (Neff et al., 2009). Food systems resources are unequally distributed, as populations that experience health disparities are often excluded from food systems programming efforts (Lyson, 2014; Slocum, 2006). Food systems education should be directed to populations that experience health disparities to contextualize dietary choices for underserved populations in the United States (U.S.) (Eng et al., 2020). Cooperative Extension, a public service and community education system implemented by every land-grant institution to serve farmers, ranchers, youth, communities, and families (North Carolina State University, 2005), is well-positioned to be a leader in food systems education (Clark et al., 2017; Colasanti et al., 2009; Dunning et al., 2012; Gwin, 2019; Morgan & Fitzgerald, 2014; Raison, 2010; Ringling & Marquart, 2020), especially with its deep integration into American communities, with an office and one or more agents within nearly all of the 3,000 U.S. counties (Cooperative Extension System, n.d.). The mission of Cooperative Extension is to translate academic research into community action to address public needs. The original outreach mission of Cooperative Extension was to provide scientific advancement to farmers and ranchers, and since then, the topics included in Extension outreach have expanded to include family and consumer sciences, youth outreach, and community viability (North Carolina State University, 2005). Virginia Cooperative Extension (VCE) is a
partnership between Virginia’s two land-grant universities: Virginia Tech and Virginia State University. The mission statement of VCE is:

Building local relationships and collaborative partnerships, we help people put scientific knowledge to work through learning experiences that improve economic, environmental, and social well-being (Mission and Core Values, n.d.).

The VCE model of Community, Local, and Regional food systems (Niewolny et al., n.d.) uses support processes to create values-based impacts within the eight food system processes published by Neff et al., (2009) and several VCE programs are dedicated to or involved in the construction of sustainable community food systems. The VCE model of Community, Local, and Regional food systems can be seen in Figure 1.1
Figure 1.1 The VCE Model of Community, Local, Regional Food Systems
A community health worker (CHW) is a lay health worker who connects underserved communities with healthcare systems through health promotion and education, basic health service provisioning, and health data collection (Olaniran et al., 2017). CHWs go by many titles, including community health advisor, lay health advisor, outreach worker, peer health worker, lay health worker, promotora, and community health representative. All titles describe those who are from the communities they serve or share many of the social and cultural characteristics of community members (Olaniran et al., 2017). There is substantial evidence that CHWs promote positive health outcomes in many diverse populations (Ayala et al., 2010; Perry et al., 2014; Robertson et al., 2021; Sharma et al., 2019; Werfalli et al., 2020).

The CHW model in the United States (U.S.) is often used to provide health education interventions to racial and ethnic minority populations at high risk for diet-related chronic diseases such as type 2 diabetes, obesity, and cardiovascular disease (Adams et al., 2020; Brownstein & Allen, 2015; Perez et al., 2013). Diet-related chronic diseases disproportionately affects Black, Indigenous, and people of color (BIPOC) in the U.S. Non-Hispanic Black adults are 60% more likely to be diagnosed with type 2 diabetes than non-Hispanic white adults. American Indian and Alaska Native adults are 50% more likely to have obesity than non-Hispanic white adults and almost three times as likely to have diabetes as non-Hispanic white adults. Hispanic adults are 70% more likely to be diagnosed with Type 2 diabetes than non-Hispanic white adults (Office of Minority Health, 2021). Obesity rates among Black and Hispanic adults are disproportionately higher than white adults (Warren et al., 2020). Strategies to mitigate health disparities in BIPOC communities are a current focus of public health research (Alvidrez et al., 2019; Brown et al., 2019; Office of Disease Prevention and Health Promotion, 2020).

Garden-based programs offer an opportunity to promote individual and community health (Alaimo et al., 2016; Egli et al., 2016). VCE has extensive gardening knowledge and experience and is well-positioned to deliver garden-based programs within Virginia communities. Garden-based programs conducted with BIPOC communities have been implemented as health promotion tools designed with culturally sensitive elements (Kwon et al., 2015; Mangadu et al., 2017; Wetherill et al., 2021). Garden-based programs are popular and effective food systems interventions (Noy et al., 2019). The CHW model may be a suitable mechanism to integrate food
systems work already happening within the VCE food systems model to extend the reach of VCE programming to previously underserved BIPOC populations, and thus, a potential strategy to mitigate health disparities. The CHW model is not currently used within VCE programming and the feasibility of the CHW model for garden-based food systems programming should be explored.

1.2 Research objectives
The purpose of this master of science thesis is to:
1. Understand how the CHW model serving as an educator has been used in U.S.-based food systems interventions and to describe the type of interventions;
2. Identify populations reached by the CHW model as an educator through food systems interventions and populations within Virginia that VCE professionals believe are suitable to engage with CHW delivered programming;
3. Explore how the CHW model aligns with VCE values and programming goals;
4. Understand integration and programming logistics of the CHW model into VCE for garden-based food systems programming, including how the Virginia Master Gardener and Master Food Volunteer programs align with a CHW model.

1.3 Structure of thesis
This master of science thesis uses the Virginia Tech electronic thesis and dissertation manuscript format and contains a literature review, two studies formatted as manuscripts for publication, a discussion of the thesis research, and appendices. Chapter 2 provides a review of relevant literature to contextualize the need for the research: (2.1) overview of community health workers; (2.2) health disparities in the U.S.; (2.3) food systems; (2.4) food systems for health promotion; (2.5) health and diet outcomes of garden-based programming (2.6) Cooperative Extension Service; (2.7) Cooperative Extension and food systems; (2.8) Cooperative Extension garden and food outreach programs; (2.9) Diversity and inclusion within Cooperative Extension master volunteer programs; (2.10) Paraprofessionals within Cooperative Extension. Chapter 3 contains study 1 of the thesis: a systematic scoping review of the CHW model in U.S. food systems interventions in manuscript format for the American Journal of Health Promotion. Chapter 4 contains study 2 of the thesis: a feasibility evaluation of the CHW model for garden-based food systems programming for in manuscript format prepared for the Journal of Extension. Chapter 5 is a discussion of the results of both studies and implications for Cooperative
Extension programs. The appendices contain supplementary files for both manuscripts and other relevant information. Figures and tables are numbered continuously throughout the thesis as Figure 1.1, 2.1, etc. The numbering of figures and tables in Chapters 3 and 4 has been adjusted from the submitted manuscripts to be consistent with the numbering convention in this thesis. Likewise, heading and subheading formatting in Chapters 3 and 4 has been adjusted from the formats required by the *American Journal of Health Promotion* and the *Journal of Extension* to match the convention in this thesis. Chapter 3 maintains the use of American Medical Association citation style, as is required by the *American Journal of Health Promotion*.

### 1.4 Contribution of research

This thesis advances the public health knowledge of food systems educational programming delivered through the CHW model and provides considerations to VCE for implementation of the CHW model for garden-based food systems programming. The research responds to the current social climate of a focus on food systems and examines a potential strategy to reduce health disparities that are exacerbated in the current food system.

### 1.5 Timeline of research

The research was conceptualized between September and November 2020. Study 1, the systematic scoping review, was conducted from December 2020-March 2021. The research for study 2 was proposed to the committee of advisors in April 2021. Data for study 2 were collected from June-September 2021. Data analysis for study 2, the feasibility evaluation, and preparation of the *Journal of Extension* manuscript was conducted from September 2021-March 2022. This thesis was submitted to my committee in March 2022. The research was defended on April 7, 2022.
CHAPTER ONE REFERENCES


CHAPTER TWO: REVIEW OF LITERATURE

2.1 Overview of Community Health Workers

A well-known formal CHW program emerged in the 1950s in China where trained rural agricultural workers conducted basic health services and education for their communities. The three-month training prepared the “Barefoot Doctors” for a part-time appointment as healthcare providers and educators (Sidel, 1972). The program was popular, successful, and drew global attention, and in 1978 the World Health Organization’s Declaration of Alma-Ata called for CHWs to be a key tool to achieve health for all via primary healthcare by the year 2000 (World Health Organization, 1978). Today, the formal CHW model is widespread globally, with conservative estimates of more than five million CHWs serving across the world (Perry et al., 2014). CHWs have positive impacts on basic healthcare, facilitate connections to primary care, and conduct health education on a broad range of health outcomes: from child undernutrition and breastfeeding to malaria control and HIV/AIDS treatment access (Perry et al., 2014).

Basic health service provisioning is a key role for many CHWs outside of the U.S. Countries in sub-Saharan Africa rely heavily on the CHW model to provide medications to community residents for a variety of neglected tropical diseases, malaria, HIV/AIDS, and other conditions (Amazigo et al., 2021). The CHW model became the primary method of tropical disease medication management in the region in 1997 and coverage has since expanded from 1.5 million people to 153.7 million people in 2014 (Amazigo et al., 2021). Communities select individuals to serve as CHWs and determine their compensation based on community consensus. In addition to medication distribution, the CHWs in sub-Saharan Africa provide some health education and healthcare access information (Amazigo et al., 2021).

CHWs in the global healthcare system are important disseminators of health education information. Recent reviews of the CHW model in Indigenous (Rankin et al., 2022), rural American (Berini et al., 2021), and South Asian (Majid et al., 2021) populations provide examples of CHWs connecting healthcare institutions to communities in a culturally sensitive manner. The ability of CHWs to connect with their clients in a manner that is attuned to the client’s lived experience is a key element to the success of the CHW model (de Alencar et al., 2020).

CHWs often facilitate connections between their clients and government or healthcare services. The CHW has knowledge of resources and by sharing this institutional knowledge with
community members, the CHW can help reduce or eliminate barriers to healthcare access (Rankin et al., 2022). CHWs in South Africa care for children in households affected by HIV/AIDS and connect the children to support services such as healthcare and legal support (Nxumalo et al., 2013; Thomas et al., 2021). CHWs in rural Nepal connect women to postpartum contraception and sexual health education (Wu et al., 2020). Maternal health and birth outcomes are positively impacted when the mother works with a CHW for culturally sensitive education and care (Scharff et al., 2022). CHWs can be members of primary healthcare teams and leverage their relationships to both the institutional healthcare system and the community to facilitate connections (Mhlongo et al., 2020). Scott and colleagues reviewed 83 CHW programs from low-and middle-income countries in 2018 and found that CHWs are key components of strong health systems able to appropriately care for a diversity of individuals (Scott et al., 2018).

CHWs have worked in the U.S. as navigators and educators (Ramos et al., 2001) for underserved populations. CHW was first added as an occupation to the Bureau of Labor Statistics in 2010 and the Bureau of Labor database reported 58,670 U.S.-based CHWs as of May 2019 (U.S. Bureau of Labor Statistics, 2020). CHWs in the U.S. provide some basic health services (Perry et al., 2014), however, their more common role is in health promotion and chronic disease prevention and management (Brownstein & Allen, 2015; Cosgrove et al., 2014). CHWs are proven effective for improving Type 2 diabetes outcomes in BIPOC populations (Campbell et al., 2020; Torres & Schmidt, 2022). CHWs are also effective in improving outcomes for minority populations in the major public health concerns of hypertension (Pasha et al., 2021) and cancer screenings (Liu et al., 2021; Luque et al., 2019), as well as promoting healthy lifestyles through behaviors such as physical activity (Loya, 2018). The American Public Health Association (APHA) recognizes CHWs as an essential part of the frontline of American public health (American Public Health Association, 2009), a recognition reflected in the 2011 call to integrate the skills and local knowledge of CHWs into the U.S. healthcare system (Balcazar et al., 2011). The National Association of Community Health Workers is a 501c(3) nonprofit formed in 2019 to support advancement the CHW workforce’s capacity to promote health in their communities (National Association of Community Health Workers, 2022). A summary of the 2007-2012 Centers for Disease Control and Prevention (CDC) Racial and Ethnic Approaches to Community Health grants re-iterated the crucial role of CHWs in American public health by reporting that the integration of CHWs within local knowledge and community
structures allows for a greater and more appropriate tailored health intervention, thus leading to improved health outcomes (Cosgrove et al., 2014).

The importance of CHWs in the American public health workforce has been especially highlighted during the Covid-19 pandemic, with reports of CHWs assisting individuals and families in marginalized communities with contact tracing, connection to social services, and home care for Covid-19 symptoms (John et al., 2022; Moir et al., 2021; Rosenthal et al., 2020). The U.S. Congress recognized the importance of institutionalizing CHWs to advance health equity by including significant funding for CHW training and service provisioning in the American Rescue Act (American Rescue Plan Act of 2021, 2021; Centers for Disease Control and Prevention, 2021). The CHW model is important to advancing health equity within the U.S. and public health researchers and practitioners must continue to explore novel areas for CHWs to provide connections to marginalized communities.

2.2 Health disparities in the U.S.

Health disparities are differences in health outcomes for a group of people as a result of disproportionately low access to social and economic resources (Office of Disease Prevention and Health Promotion, 2020). In the U.S., health disparities for BIPOC in diet-related chronic diseases are of particular concern (Kris-Etherton et al., 2020; Satia, 2009), and especially in the context of Covid-19 (Belanger et al., 2020). Health inequity has been recognized in policy efforts in the Virginia legislature with joint resolution 537 declaring racism a public health crisis (House Joint Resolution No 537, 2021). As of February 2022, the bill remained in the Virginia senate committee.

The presence of health disparities for BIPOC communities in the U.S. is clear (National Academies of Sciences, Engineering, and Medicine et al., 2017). Data on health disparities is most robust for Black populations, and while information on outcomes for Indigenous and communities of color does exist, the adequacy of the information is limited by small sample sizes and the grouping of heterogeneous communities (National Academies of Sciences, Engineering, and Medicine et al., 2017). For example, data on Indigenous health outcomes is often reported in aggregate for Indigenous populations, but there is great diversity within the Indigenous population in the U.S. (Bauer & Plescia, 2014). There is a clear need for additional research on health disparities and solutions for BIPOC communities (National Academies of Sciences, Engineering, and Medicine et al., 2017). Some data is presented in this section to provide a
framework of understanding of health disparities for BIPOC populations in the U.S., with the recognition that there are many areas of advancement for health disparity research. Black communities experience disproportionately high rates of diet-related chronic diseases such as type 2 diabetes, obesity, and cardiovascular disease (Office of Minority Health, 2021). Indigenous communities in the U.S. experience high rates of diabetes (Wedekind et al., 2021) and other diseases that are significantly influenced by social determinants of health such as heart disease and chronic liver disease (Indian Health Service, 2019). Covid-19 infection rates, hospitalizations, and deaths are disproportionately high for Black and Hispanic individuals (Centers for Disease Control and Prevention, 2020). Racism against BIPOC communities is increasingly a subject of health disparities research (Aaron & Stanford, 2021; Greene et al., 2022).

Virginia has a population of 8.6 million people, 69.4% of whom are white. The two largest racial minority groups in Virginia are Black (19.9%) and Hispanic (9.8%) (U.S. Census Bureau, 2021). A Richmond City health assessment examined the health effects of identifying with multiple marginalized identities and concluded that individuals at the intersection of multiple marginalized groups are among the most vulnerable to poor health outcomes (Zimmerman et al., 2016). These findings are supported by a Virginia Department of Health report in which 24.6% of Black and 17.7% of Hispanic respondents to the Behavior Risk Factor Surveillance System survey perceived racial discrimination in the survey year 2008. Respondents who reported perceived racial discrimination were more than twice as likely to report being in poor or fair health status than respondents who did not report perceived racial discrimination (Virginia Department of Health, 2012, pp 20-21). As of December 2021, Black individuals in Virginia were 1.3 times more likely to contract Covid-19 than white individuals and Hispanic individuals were 1.5 times more likely than white individuals (Virginia Department of Health, 2021).

Health disparities are closely linked to social determinants of health such as income, education, and food security status. Food security, the access to enough food for an active and healthy life (United States Department of Agriculture, 2022) is inversely associated with diet-related chronic disease such as type 2 diabetes and obesity (Warren et al., 2020). BIPOC communities are more likely to experience food insecurity and associated poor health outcomes (Satia, 2009). Food security is shaped in part by the food system (Braveman & Gottlieb, 2014;
Odoms-Young & Bruce, 2018). At the beginning of 2020, 35 million Americans were experiencing food insecurity. By the end of 2020, during the Covid-19 pandemic, more than 50 million Americans were experiencing food insecurity (Hake et al., 2020). Food insecurity disproportionately affects racial and ethnic minorities and those with low income (USDA Economic Research Service, 2021). Food access challenges and associated food insecurity resulting from Covid-19 social and economic effects were disproportionately faced by members of marginalized communities (Clay & Rogus, 2021; Feeding America, 2021; Fitzpatrick et al., 2021). In Virginia, food insecurity increased among SNAP-eligible residents after the onset of the Covid-19 pandemic (Sathe et al., 2021). Disparate rates of food security in Arlington, a high-income area outside of Washington, D.C., were reported between majority white and majority communities of color during the pandemic (Irwin et al., 2021).

2.3 Food Systems

The focus on food systems transformations to combat the global syndemic of obesity, climate change, and undernutrition (Swinburn et al., 2019) has been reflected in global, national, and local levels of governance, research, and community development. The United Nations hosted the first Food Systems Summit in September 2021 to convene stakeholders to craft solutions to global food systems problems (United Nations, 2021). Researchers have published widely urging food systems stakeholders to collaborate and design trans-disciplinary interventions to mitigate detrimental effects of undernutrition, climate change, and obesity (Fanzo, 2014; Garcia et al., 2020; Weber et al., 2020). Within the U.S., leading food systems scholars have called for national policy and action on key food systems issues, especially the interfaces of human and planetary health (Freudenberg & Nestle, 2020; Seligman & Berkowitz, 2019). Within the Commonwealth of Virginia, research activities (Misyak et al., 2018; Zoellner et al., 2012) and food access projects (Yarmosky & Wallace, 2021) are among the efforts to create a more health-promoting food system. The Center for Food Systems and Community Transformation at Virginia Tech works on capacity-building projects to build viable food systems across the rural-urban divide (Virginia Tech, 2021). VCE hosted a workshop for Virginia food system stakeholders to create a joint vision of the preferred Virginia food system in 2027 (Bendfeldt et al., 2019). A complete review of the scope of food systems actions across Virginia is outside the objective of this thesis, however, it is clear that food systems is a focus for some of those who live and work in the Commonwealth.
Food systems should be a focus of public health research because of the high burden of diet-related chronic disease in the U.S. Appropriately trained researchers and community partners are needed to advance solutions to food systems change for public health (Wegener et al., 2018). The nearly ubiquitous presence of food systems centers at land-grant institutions across the U.S. is encouraging evidence that students are training to effect food systems change. Michigan State University Center for Regional Food Systems leads projects in food system infrastructure, farm to institution, and farmer development (Michigan State University, 2021). The University of California at Davis Sustainable Agriculture Research and Education Program works for healthy food access for all Californians, the success of California farmers, viability of community food systems, and equitable treatment of food system workers (University of California Davis, 2021). The University of Vermont Law School researches law and policy methods to build sustainable food systems (CAFS Projects, 2021). The Michigan State University, University of California Davis, and University of Vermont examples are a few selections among the many additional centers that exist across the country.

The traditional nutrition education profession of dietetics is also embracing engagement with food systems. In 2020, the Academy of Nutrition and Dietetics asked its membership to engage in community food systems efforts (Spiker et al., 2020), following the suggestion of Wilkins et al., (2010) for dietetics professionals to work for public health by advocating for structural changes in the food system. It is important for food and nutrition professionals to be properly trained in food systems awareness and engagement because cross-functional teams are necessary to create changes within the complexity of the food system (Garcia et al., 2020). In addition to the need for food systems expertise by food and nutrition professionals, local knowledge from community partners must be integrated within community food system change efforts to ensure that changes serve the interests of those the change is intended to benefit (Conner et al., 2008). Authentic inclusion of community partners is critical to understand and address opportunities for innovations within the food system (Clark et al., 2017).

The unequal distribution of food system resources contributed to health disparities in underserved populations prior to the Covid-19 pandemic (Neff et al., 2009), however, the pandemic’s effects on the food system exacerbated these disparities among marginalized populations (Alkon et al., 2020). Individuals who were deemed essential workers during pandemic lockdowns, e.g., meatpacking workers, food manufacturing employees, and farm
laborers, were overrepresented by racially and economically marginalized groups (Williams et al., 2020). The disproportionate exposure to the virus by populations already at risk for health disparities contributed to the reverberation of existing food system challenges for marginalized groups (O’Connell et al., 2021). The outsized effect of Covid-19 on populations underserved in the current food system, the same populations that experience health disparities, presents an opportunity for food systems researchers and practitioners to engage in transformative efforts focusing on increasing equity and inclusion (The Rockefeller Foundation, 2020).

2.4 Food systems for health promotion

In 1974, the U.S. government released a guidebook to healthy living for its citizens: Healthy People: The Surgeon General’s Report on Health Promotion and Disease Prevention (United States Public Health Service, 1979). The guidebook provided suggestions on how Americans could live a healthy lifestyle and framed health as an individual responsibility. This neoliberal approach did not consider the policies, systems, and environments in which people conduct their lives and how many social-ecological contexts do not allow or make it exceedingly difficult for individuals to follow the healthy lifestyle suggestions from their government. Recently, health promotion researchers and practitioners have increasingly recognized the need to incorporate social-ecological structures into interventions to improve the effectiveness of health education on individual behaviors (Golden et al., 2015; Golden & Earp, 2012). Social-ecological structures frequently targeted in health promotion interventions include policy, systems, and environmental changes to encourage healthy lifestyles. Policy change includes changing rules, procedures, laws, ordinances, resolutions, and mandates at the legislative or organizational level. Systems change involves changing rules and/or infrastructure, often to support the policy change. Environmental change is altering the built environment, including physical, social, and economic factors, to encourage behavior change (The Food Trust, 2012).

Health promotion interventions address a wide range of health behaviors, from diet and physical activity to smoking, substance use, and sexual behavior. Health promotion interventions are distinct from health education in that health promotion considers the context in which individuals make health behavior decisions (McKenzie et al., 2013, p 4). Interventions that intend to change diet-related health behaviors must consider the food environment and food system context of the target population (Neff et al., 2009; Story et al., 2008). Research with
populations at high risk for diet-related chronic disease has demonstrated that despite individuals’ knowledge of healthy lifestyle behaviors, such behaviors are difficult to attain due to policies, systems, and environments of the food system (Adler & Stewart, 2009; Carnahan et al., 2016; Neff et al., 2009). PSE changes to community food systems are successful and popular among health promotion practitioners and community members (Noy et al., 2019) so that individual behavior change is supported by the context of the decision.

Food system experts have called to leverage the unique circumstances of Covid-19 and the national reckoning with exclusion, inequity, and health disparities to transform the food system to include and equitably serve the needs of all communities of people (Freudenberg & Nestle, 2020; The Rockefeller Foundation, 2020). Scholarly calls to action are mostly directed at policy-level changes, and while these changes must be considered, food system transformation can be supported by local and individual-level changes. Academic literature published during the pandemic contains many examples of local and individual-level changes to food system interactions (Carolan, 2021; Clay & Rogus, 2021; Jablonski et al., 2021). While a full review of these behavior and local systems changes is outside the scope of this thesis, a particular examination of gardening practices is warranted so that the thesis research can be understood within the current social context. Community gardens and their associated programs are popular platforms for health promotion because of the potential to strengthen many aspects of individual and community well-being (Egli et al., 2016).

Gardens can be a platform to promote health within a community food system. Institutional sourcing agreements that use garden produce are garden-focused policies to improve health and strengthen community food systems (Bolshakova et al., 2018). In addition, public planning policies that allow for gardens create a policy framework that promotes community health (Butterfield, 2020). Community and home gardens create a local source of food, a systems change that builds resiliency (Corrigan, 2011; Lal, 2020). The implementation of a community garden is a change to the built environment that promotes fruit and vegetable consumption, physical activity, and social interaction—all behaviors that contribute to good health (Alaimo et al., 2016; Ornelas et al., 2017).

Home gardening and urban agriculture as a partial solution to increasing food system resiliency appear in the academic discourse as suggestions to alleviating some of the Covid-19 related hardships (Lal, 2020). Lockdowns, with widespread closures of businesses, schools, and
other public places, were quickly implemented globally in March 2020 as Covid-19 caseloads increased exponentially (Katella, 2021). Reuters reported that seed sales were the highest ever in March and April of 2020 (Polansek & Walljasper, 2020). Although seed sales are not a direct measure of home garden participation, they suggest interest in gardening, and anecdotal evidence suggests that people began to garden during lockdown or expanded their home food production systems (Polansek & Walljasper, 2020; Timmins, 2020). The Indigenous Seed Keepers Network, an organization serving U.S. tribal communities, was inundated with requests for seed starter packages during the lockdowns in the spring of 2020, thus demonstrating an interest in gardening and more resilient local food systems within a BIPOC population (Hoover, 2020).

Robust academic evidence of increased gardening activity during Covid-19 has yet to be published, however, nascent literature does confirm the anecdotal evidence mentioned above. Niles et al. (2021) reported that individuals who identify as BIPOC increased their gardening activities to bolster food access during the pandemic. San Fratello et al., (2021) surveyed adults across the U.S. and found that respondents did increase their gardening activities, not limited to food production, in 2020, however, many respondents indicated that they may not repeat their 2020 gardening behaviors in 2021. A community garden network with a majority BIPOC membership in Rochester, Minnesota saw its membership substantially increase for the 2020 growing season (Mejia et al., 2020). These examples align with the recommendations of (Fitzpatrick et al., 2021), who proposed gardening as a method to partially alleviate food insecurity during shocks to the food system such as Covid-19.

2.5 Health and diet outcomes of garden-based programming

Gardening is a mechanism to improve mental health (Koay & Dillon, 2020), diet quality (Alaimo et al., 2008), and physical activity (Sadeghzadeh et al., 2021). Community gardens offer a space for whole-person health promotion in that they can increase access to fresh produce, provide a venue for physical activity, allow a connection to nature, and serve as a space to form social relationships (Alaimo et al., 2016). Research on the effects of community gardens within vulnerable populations shows positive associations between community gardens and physical activity, physical health, diet quality, food knowledge, and community connectedness (Malberg Dyg et al., 2020). In 2010, the PubMed database held less than 250 articles on community gardens as public health interventions, while in 2020, more than 750 articles were in the
database, demonstrating the growing evidence base of gardening for public health (Gregis et al., 2021).

Alaimo et al., (2008) was one of the first studies to assess the association between community garden participation and fruit and vegetable consumption, finding that there were significant differences in mean daily fruit and vegetable consumption in at least one household member participating in community gardens. Many studies have found positive associations between community gardening and diet-related health behaviors within U.S. populations (Barnidge et al., 2013; Booth et al., 2018; Landry et al., 2015; McCormack et al., 2010; Zick et al., 2013).

Although the research conducted to date demonstrates improvement in diet quality and physical activity for community garden participants, it remains unknown if community gardens are a mechanism to health outcomes such as decreases in diet-related chronic disease incidence. Many studies which assess associations between community gardens and healthy lifestyle behaviors are cross sectional (Alaimo et al., 2008; Barnidge et al., 2013; Zick et al., 2013). There is a need for longitudinal studies to assess the sustained impact of gardens on health outcomes. Porter et al., (2019) will conduct a five-year randomized controlled trial to assess the health impacts of home gardening within the Wind River Indian Reservation community. Similar studies on community gardens are needed.

Prior to the pandemic, community gardens established with marginalized communities were effective in health outcomes such as diet quality, physical activity, and social connectedness (Eggert et al., 2015; Teig et al., 2009). Qualitative findings from studies with BIPOC community gardeners report that community gardens are a resilience mechanism for underserved communities (Corrigan, 2011). Community garden projects which included community members at all decision-making stages reported high levels of program satisfaction among participants (Baker et al., 2006).

The extensive evidence on the health benefits of gardening, as well as the emerging evidence of gardening as both a health promotion and food access tool in the context of the Covid-19 pandemic (Schoen et al., 2021), support the need for an exploration of how garden-based programming can serve vulnerable populations in Virginia. There is a need to explore methods of outreach to communities who have disproportionately suffered from the pandemic and historical exclusionary structures of the food system.
2.6 Cooperative Extension Service

The 1914 Smith-Lever Act formally established Cooperative Extension at land grant universities and funding continues today via the National Agricultural Research, Education, and Teaching Policy Act of 1977, and Agricultural Research, Extension, and Education Reform Act of 1998 (Croft, 2019). The Cooperative Extension Service employs more than 32,000 people in communities across the U.S. and at each land-grant university (Extension Committee on Organization and Policy, n.d.). While Extension was initially formed to support farmers and ranchers through dissemination of research-based information, the informational outreach channels have expanded and now include family and consumer sciences (FCS), youth development (4H), and community viability as nationally widespread education areas (Extension Committee on Organization and Policy, n.d.). Most recently, some state systems have created outreach systems for climate and opioid management education (Pathak et al., 2014; Steen et al., 2021), reflecting the flexibility of Extension to adapt to the changing educational and outreach needs of communities. Extension professionals are experts in translating scientific evidence into community education, and the reach of Extension professionals is extended via a volunteer educator network.

Many state Extension systems administer master volunteer programs where community members attend a specified number of training hours to gain a robust lay knowledge of a particular subject. Master volunteer programs have strict training and service hours requirements, although the requirements vary by state and by program area. Community members also help extend the reach of Extension programs by volunteering in capacities less stringent than the master volunteer programs. The success of VCE programs includes the reliance on trained volunteers. VCE and residents of Virginia benefited from over 859,000 volunteer hours from more than 29,550 people in 2013 (Virginia Cooperative Extension, n.d.). Volunteers extend the reach of county and city agents and are instrumental in delivering direct education. Virginia master volunteer programs include food, gardener, financial education, well owners, and naturalist (Virginia Cooperative Extension, 2021b). Community volunteers support many additional VCE programs.

There is a movement within the national Extension system to leverage the community-based network of educators and science dissemination skills of Extension to address critical national issues in health. A workgroup published a national framework for health and wellness
programming for the Extension system in 2014 designed to address six priorities: health policy issues education, health insurance literacy, positive youth development for health, chronic disease prevention and management, health literacy, and integrated nutrition, health, environment, and agriculture systems. Extension has over 100 years of expertise in disseminating agricultural knowledge to communities, and the leaders of the Extension health programming movement believe that Extension has potential to impact the health of the nation at a scale similar to its impacts on the agriculture and farming systems in the U.S. (Braun et al., 2014; Rodgers & Braun, 2015).

Extension does provide health education programming to effect behavior change (Li et al., 2021; Mullins et al., 2014; Stotz et al., 2019) and can partner in community public health initiatives (Linnell et al., 2021; Sulzer et al., 2020). The national Extension framework for health and wellness includes six health programming priorities: integrate nutrition, health, environment, and agricultural systems; health literacy; health insurance literacy; chronic disease prevention and management; youth development for health; and health policy education. The framework can be found in Figure 2.1. Food systems and public health are closely intertwined, and Extension has developed programs that address health in the context of food systems (Cuite et al., 2021; Ketterman et al., 2021). Food systems programming could address several of the health programming priorities such as (1) integrated nutrition, health, environment, agriculture systems; (2) chronic disease prevention and management; (3) positive youth development for health.
Figure 2.1 The Cooperative Extension National Framework for Health and Wellness, found in Braun et al. (2014) “Cooperative Extension’s National Framework for Health and Wellness.”

2.7 Cooperative Extension and food systems

Extension is well-positioned to deliver food systems programming (Morgan & Fitzgerald, 2014) and has done so using a variety of platforms and methods. McCoy, (2019) offered suggestions for intervention points throughout the food system for Extension professionals to assist with food waste reduction, thus building on the conclusions of Snyder et al., (2018) that Extension can help ensure a safe food supply system as the food system adjusts to reduce high-waste operations. North Carolina offers an online course to train Extension professionals in local food systems topics (Bloom et al., 2017) and Oregon State Cooperative Extension recently shared lessons on how Extension can conduct community food assessments to better design programming to meet community food system needs (Maille, 2022). Discussions of engagement with food policy councils are also present in the Extension literature (Feenstra et al., 2021; Fitzgerald & Morgan, 2014). Distribution and procurement within local food systems can also be supported with Extension expertise and programs (Munden-Dixon et al., 2015; Wise et al., 2013).
VCE administers several programs that outreach to Virginia residents to strengthen food systems and provide education on food systems topics. The VA Beginning Farmer and Rancher Coalition Program is a statewide system to support beginning farmers and ranchers through training, social networking, mentorship, and other resources (Virginia Beginning Farmer & Rancher Coalition Program, n.d.). Two master volunteer programs, the Extension Master Gardeners and Master Food Volunteers, provide outreach work towards food self-efficacy. The Virginia Family Nutrition Program (FNP) works to educate limited-resource families and youth on healthy food resource management, nutrition, physical activity, and food safety to achieve a healthy lifestyle (Virginia Cooperative Extension, 2021a).

2.8 Cooperative Extension garden and food outreach programs

Extension disseminates agriculture and horticulture knowledge to the community through support and education services for home gardeners. The Extension Master Gardeners program was established in 1972 and continues in popularity today, with more than 86,000 Extension Master Gardeners in 49 states (Extension Master Gardeners National Committee, 2019; Meyer, 2007). Extension Master Gardeners training varies by state, however, topics generally span food plants, ornamentals, plant disease, weeds, and lawn care (Knauss, 2020). Extension Master Gardeners often train for 40 or more hours and are required to reciprocate the training with a predefined number of volunteer hours, making membership in Extension Master Gardeners organizations an investment of resources for potential volunteers. While a traditional role of the Extension Master Gardeners is to assist community members in troubleshooting gardening problems (Leyte-Vidal, 2017), Extension Master Gardeners leaders nationwide recognize that Extension Master Gardeners volunteers can be key stakeholders in advancing the Extension National Framework for Health and Wellness (Braun et al., 2014) by utilizing their gardening knowledge to advance community health (S. Dorn et al., 2021).

One component of community health is community food security (Hamm & Bellows, 2003). Extension Master Gardeners can be important stakeholders in community food security (Kowalski & Barrett, 2020) and success in increasing community food security is more likely if the Extension Master Gardeners volunteer can understand and respond to the needs of the community they serve. Extension Master Gardeners have significant gardening knowledge as lay people, and in recognition of the benefits that Extension Master Gardeners knowledge can have for community members, Extension programs have adapted the Extension Master Gardeners
curriculum to a condensed version to so that home gardeners can learn start-up gardening knowledge (Miller & Arnold, 2012). Achieving Extension Master Gardeners volunteer status, however, is time-consuming and expensive, and so alternative methods to leverage the Extension Master Gardeners’s knowledge in working towards community food security should be explored. An adapted version of the Extension Master Gardeners curriculum designed to train volunteers to work on food access projects in underserved communities in Alabama was successful in a pilot study (Randle, 2015). Extension Master Gardeners have shown some success in connecting with vulnerable populations such as those experiencing homelessness (Seals & Pierce, 2007) and food insecurity (Murphy, 2013). Research is needed to determine if a CHW can strengthen the connections between Extension Master Gardeners and vulnerable populations to improve health outcomes. The well-engrained expertise with garden-based programming and garden topic training make Extension well-suited to explore the potential of Extension Master Gardeners volunteers to reach currently underserved audiences.

The Virginia Master Food Volunteer program trains community volunteers on home food processing, preservation, and nutrition information to equip volunteers with the knowledge to assist in food demonstrations at farmer’s markets, support FCS programs, and perform other food-related outreach to help Virginians increase their food knowledge and confidence (Virginia Cooperative Extension, 2017). Recently, the Virginia Master Food Volunteer program implemented an option for existing Master Food Volunteers to participate in a continuing education program to better prepare the volunteers to assist with delivery of Balanced Living with Diabetes (Jiles et al., 2019). The North Carolina Master Food Volunteer program, established in 2018, has trained more than 100 Master Food Volunteers to assist with program delivery to increase food knowledge and health of North Carolina residents (Bloom et al., 2021). Partnerships between master volunteer programs within food systems, such as the Master Food Volunteers and Extension Master Gardeners, should be explored as a potential method to increase community food security. Master Food Volunteer curriculum can include basic nutrition information (Bloom et al., 2021; Virginia Cooperative Extension, 2017), and Master Food Volunteers may be able to extend information shared by Extension Master Gardeners through the dissemination of nutrition and food preparation information.
2.9 Diversity and inclusion within Cooperative Extension master volunteer programs

The Extension master volunteer model has many variations, all modeled from the first Extension Master Gardeners program (Meyer, 2007): Food (Bloom et al., 2021), Climate (Pathak et al., 2014), Compost (Tedrow, 2018), Wellness (Washburn et al., 2017), Financial Coach (Ehmke, 2021), Naturalist (Hildreth & Mengak, 2016), and Beekeeper (Breece & Sagili, 2019) are several examples. Master volunteer programs are effective in creating positive life changes for both volunteers and the communities they serve (Strong & Harder, 2010; Takle et al., 2016; Washburn et al., 2017; Wilson & Newman, 2011).

Master volunteer program evaluations also reveal a lack of diversity among volunteers as categorized by race, age, and socio-economic status. Extension master volunteers, regardless of program area, are overwhelmingly white, identify as female, hold a bachelor’s degree or higher, and earn an income of at least middle-class earners (Cunningham et al., 2021; S. T. Dorn et al., 2018; Hildreth & Mengak, 2016; Newberry & Israel, 2018; Strong & Harder, 2010; Takle et al., 2016; Wilson & Newman, 2011). The lack of socio-economic diversity within master volunteer programs is not a new phenomenon (Schrock et al., 1999).

The Extension system recognizes that the current demographics of the master volunteer programs do not match the demographics of many of the communities in which master volunteers serve (Freidig, 2018; Washburn et al., 2017), and that the structure of master volunteer programs: extensive training requirements that conflict with full-time employment, costly applications, and rigorous certification requirements, exclude many underrepresented communities. Extension master volunteers can be an effective method for outreach and community education, however, an action plan to increase the diversity of the volunteers must be created so that the educational capacity of Extension is realized in an equitable manner, thus serving the mandate of Extension (National Institute of Food and Agriculture, n.d.) to deliver evidence-based education to all communities in the U.S.
2.10 Paraprofessionals within Cooperative Extension

Although the mission of Extension is to provide educational outreach to communities, the CHW model is not widely employed within the system. Extension does rely on a network of community volunteers to aid in delivering programs, but health promotion programs are often delivered by Extension agents or paraprofessionals.

The Expanded Food and Nutrition Education Program (EFNEP) is a nutrition education program conducted through the Cooperative Extension service in all fifty U.S. states, six territories, and the District of Columbia. The EFNEP curriculum is designed to increase the self-sufficiency of individuals with low income via an educational series taught by peer educators (National Institute of Food and Agriculture, 2021). The peer educators are members of the communities they serve, and similarly to CHWs, are respected for their connection and understanding of the lived experiences of their participants. EFNEP is proven effective for improving diet-related health behaviors (Auld et al., 2015; Perkins et al., 2020). In 2020, the USDA reported that 71% of EFNEP adult participants identified as a racial or ethnic minority (National Institute of Food and Agriculture, 2021). EFNEP peer educators are not CHWs by the traditional definition of the CHW model, however, they share many of the key characteristics of the CHW model. Nutrition education is an important component of food systems programming. Due to the ubiquitous and well-engrained presence of EFNEP in state Cooperative Extension systems, the EFNEP program may be an important partner in an Extension CHW program. EFNEP has expertise in lay education and established reach into underserved BIPOC communities and food systems education may be complimentary to the EFNEP nutrition education curriculum.
CHAPTER TWO REFERENCES


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CHAPTER 3: A SYSTEMATIC SCOPING REVIEW OF THE COMMUNITY HEALTH WORKER MODEL USED FOR FOOD SYSTEMS INTERVENTIONS WITHIN THE UNITED STATES

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Keywords: Community health workers, food systems, nutrition, health disparities, education, health policy, health communications

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3.1 Abstract

Objective: To document and analyze the food systems interventions delivered by community health workers (CHW) serving as educators within the United States (U.S.)

Data source: Ten databases (i.e., Agricola, CAB Abstracts, CINAHL, ERIC, Proquest Social Science and Education, Proquest Theses and Dissertations, PubMed, Scopus, SocIndex, Web of Science) and gray-literature repositories were searched for publications between 2005-2020.

Study inclusion and exclusion criteria: English-language and U.S. studies included with CHW as educators or facilitators for food systems interventions. Food systems defined as processes of production, processing, distribution, marketing, access, preparation, consumption, and disposal of food products. Studies excluded for clinical settings; non-adult CHWs; CHWs with medical or public health credentials; and programming guides, reviews, and commentaries.

Data extraction: Variables included CHW and intervention description, priority population, food system processes, and targeted and unexpected outcomes.

Data synthesis: Data were analyzed by the lead investigator and described narratively

Results: Of 43 records, CHWs educated for consumption (n=38), preparation (n=33), and food access (n=22) to improve health of priority populations. Gardening spanned more food system processes than other programming categories. Programs reached many underserved racial and socioeconomic populations.

Conclusions: The CHW model has been used to educate in interventions for all food systems processes and reached many diverse underserved audiences. Future work must explore garden-based food systems education and CHWs as community change agents.

Key words: Community health workers, food systems, nutrition, health disparities, education, health policy, health communications
Indexing key words: community health workers, food systems
3.2 Objective

In 2010, a coalition of four professional organizations in the United States (U.S.), including the Academy of Nutrition and Dietetics (formerly the American Dietetic Association), American Nurses Association, American Planning Association, and the American Public Health Association published a statement defining their shared principles of a community food system. These organizations jointly supported the principles that U.S. food systems should be health-promoting, resilient, economically balanced, transparent, fair, and sustainable. 1 Food systems are defined as: all of the processes involved in getting food from farm to table to disposal, including production, processing, distributing, preparing, marketing, accessing, consuming, and disposing. Food systems also involve people, farms, businesses, communities, interventions, policies, and politics. 2

Sustainable community food systems integrate the processes described above to improve the environmental, economic, and social health of a place and promote equity amongst all stakeholders. 3 Food systems influence public health through food environments and food supply chains to determine how and what types of foods are available to individuals. Diet-related chronic diseases such as obesity, type 2 diabetes, and cardiovascular disease are experienced in disproportionately high rates by marginalized populations such as racial and ethnic minorities and those with low-income. Health disparities in marginalized populations are amplified by food systems that do not equitably serve all communities. 2 Food systems are a critical component of health promotion and public health researchers and practitioners must explore strategies to mitigate health disparities.

Community health workers (CHWs) are public health practitioners who are trusted community members with a thorough understanding of local cultures. 4 CHWs serve as knowledge brokers between subject matter experts and community members in populations at high risk of diet-related chronic disease 5–8 by disseminating culturally sensitive education on health behaviors to prevent poor health outcomes. 6,7,9–11 The CHW model has been proven to improve individual health behaviors in communities vulnerable to health disparities. 7,9,11 While the use of the CHW model is established in public health education, 11 this model has not been widely explored in community food systems education. No published review has yet examined the role of CHWs to deliver food systems education to improve public health outcomes. An
examination of the CHW model within food systems education is needed given the influence of food systems on public health. The CHW model is a potential strategy to provide education to vulnerable communities in an influential area of health promotion: food systems. The results of this review can be used to plan educational interventions to reach communities marginalized in the current food system who are at high risk for diet-related chronic disease. The purpose of this review was to identify the use of the CHW model as educators in U.S. food systems interventions to inform future inclusive public health food system research and initiatives. The objectives of this scoping review were:

1. To determine the food system processes addressed and populations reached by CHWs serving as educators or facilitators in U.S.-based interventions;
2. To identify and describe the type of food system interventions delivered by the CHW model as an educator, including targeted outcomes and priority populations

3.3 Methods

A systematic scoping review, which allows for the inclusion of multiple types of studies, was selected due to the broad nature of the research objectives. Future systematic reviews may use the results of this study to examine more focused research questions. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis Scoping Review extension (PRISMA-ScR) checklist was used to guide the study design, search strategy, and reporting of the results.

Food systems are a series of key processes that form a framework of the cyclical food system from farm to fork and include: production, processing, distribution, marketing, access, preparation, consumption, and disposal. Food systems education includes educational efforts that target one or more of the eight key processes. Agriculture education may target food production and nutrition education commonly targets food preparation, consumption, and access. Food systems education, however, encompasses both subsets of agriculture and nutrition education and may promote connectivity among farm-to-fork processes or may equip participants with knowledge to critically assess the implications of engagement within all eight food system processes. This study is not a comprehensive review of nutrition education or agriculture education delivered by the CHW model, however, nutrition education and agriculture education are components of some food systems education interventions.

3.3.1 Data sources
Two content blocks (food systems and CHW synonyms) of search terms were applied to ten electronic databases (i.e., Agricola, CAB Abstracts, CINAHL, ERIC, Proquest Social Science and Education, Proquest Theses and Dissertations, PubMed, Scopus, SocIndex, and Web of Sciences) and gray-literature repositories to identify records published between January 2005 and December 2020.

Additional Google searches were performed for several gray literature repositories: the American Planning Association Community Health blog, the American Planning Association Community Health reports, reports and issue briefs of the American Public Health Association, Centers for Disease Control and Prevention (CDC) Stacks, the Johns Hopkins Center for a Livable Future resource collection, National Institute of Health (NIH) clinical trial registry, and University of California Davis Sustainable Agriculture Research and Education Program resource collection.

The primary investigator (MD) conducted a supplemental search using methods modified from Pham et al. (2009) in which 20 articles were randomly selected and the reference lists hand-searched to identify additional evidence sources. In addition, the reference lists of all returned reviews were hand searched and additional relevant records were added to the master record file. A secondary search was conducted by (MD) one week after the initial search in the Scopus and Web of Science databases using CHW synonyms uncovered in the supplemental search. All searches were executed in December 2020. The full search methodology can be found in Appendix A.

3.3.2 Inclusion and exclusion criteria

Table 3.1 displays the inclusion and exclusion criteria using a population, intervention, comparator, outcome, timeline, and setting (PICOTS) framework. The full text of the criteria can be found in Appendix B.
3.3.3 Data extraction

The evidence selection process used methods adapted from the recommendations of Levac et al. (2010). Titles and abstracts of all returned records were independently screened by two co-investigators (MD and MM) and included or excluded by consensus. The full text review and extraction was completed by the first two authors using a grouping method in which MM reviewed 100 records and MD reviewed the remaining records. MD and MM independently completed data extraction on records that were included from their grouping of full-text screens. A random sample of twenty records were independently reviewed and extracted, if applicable, by both MD and MM and results were compared to ensure reliability between the groupings.

| Table 3.1. PICOTS framework for inclusion and exclusion criteria of records for the systematic scoping review |
|-------------------------------------------------|-------------------------------------------------|
| Included | Excluded |
| Population | • U.S. residents, including those of the fifty states, U.S. territories, and sovereign Native American nations | • International populations located outside of the U.S. |
| | • CHW is a peer lay educator in the adult subset of the priority population | • CHW has credentials such as registered dietician, registered nurse, master of public health, certified health education specialist, or schoolteacher |
| | • CHW is a youth, adolescent, or college student | • CHW is a youth, adolescent, or college student |
| Intervention | • CHW role is an educator or facilitator | • CHW role is one of peer support |
| | • Strategies that target one or more food system processes of food production, processing, distribution, marketing, access, preparation, consumption, and disposal | • Intervention serves to educate on breastfeeding |
| Comparator | • Any comparator | • Not applicable |
| Outcome | • Any health behavior | • Primary outcome is mental or spiritual health |
| Timeline | • Published between 2005-2020 | • Published before 2005 or after December 2020 |
| Setting | • Unique intervention or study | • Editorials, opinion papers, formative research, literature reviews, programming guides, programming suggestions, abstracts |
| | • Written and published in English | • Full text not available |
| | | • Intervention delivered in clinical setting |
Disagreements at each stage were resolved through discussion between MD and MM and mediated by a third member of the research team when necessary.

The authors completed data extraction using the Covidence Extraction Tool 2.0 on the variables of intervention priority population, targeted food system processes, description of the intervention, and targeted outcomes. A description of the CHW was extracted using any demographic information provided by the record authors. A full definition of each variable can be found in Appendix B. Table 3.2 contains the data extracted from the records included in the review.

3.3.4 Data synthesis

The extracted data was downloaded from Covidence to a Microsoft Excel file and the lead investigator (MD) analyzed the data for each variable. The descriptions of interventions were reviewed and activities collected in a separate Excel column. Education topics such as dietary recommendations and information about food groups were summarized as an activity labeled “nutrition education.” The dose of the intervention was listed in a column and the intervention setting was classified as home, community, school, work, or faith community. Targeted, secondary, and unexpected outcomes were analyzed by categorizing by general healthy lifestyle behaviors such as diet quality, and by diet-related chronic disease management outcomes such as body mass index (BMI) or blood glucose. The priority population for each intervention was analyzed and categorized using the data by key demographic characteristics such as race, ethnicity, socioeconomic status, and faith community membership. CHW descriptions were categorized by neighbor and then any additional defining traits, such as faith community membership, female, or existing CHW. A chart with each of the eight food system processes (i.e., production, processing, distribution, access, marketing, preparation, consumption and disposal)\(^2\) was created and the targeted processes of each study were tracked so a total count of studies targeting each food system process could be presented.

3.4 Results

The search yielded 2594 records and 898 duplicates were removed by the Covidence algorithms. The 1335 records excluded in the title and abstract screening include the count of duplicate records removed manually. The full-text review was performed on 361 records and 43 records were ultimately included. Figure 3.1 displays the PRISMA diagram that outlines the evidence selection process.
3.4.1 Description of interventions and targeted food systems processes

Each of the food system processes were targeted in at least one study, with preparation and consumption being the most common targets in 33 and 38 studies, respectively. Table 3.3 displays the number of studies that targeted each food system process. Slightly more than half (n=22) of the studies included a food access component. Food access was targeted via farmers market promotion, food baskets or vouchers, resource education on healthy neighborhood options, Supplemental Nutrition Assistance Program (SNAP) promotion,
or efforts to create a healthy food environment in community settings. Multiple studies used home or community gardens as a platform to increase access to fresh produce and educate participants on healthier food production and consumption choices. Each food system process of production, processing, distribution, marketing, and disposal was targeted in less than five studies per process.

<table>
<thead>
<tr>
<th>Food System Process</th>
<th>Number of Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>4</td>
</tr>
<tr>
<td>Processing</td>
<td>2</td>
</tr>
<tr>
<td>Distribution</td>
<td>3</td>
</tr>
<tr>
<td>Marketing</td>
<td>4</td>
</tr>
<tr>
<td>Access</td>
<td>22</td>
</tr>
<tr>
<td>Preparation</td>
<td>33</td>
</tr>
<tr>
<td>Consumption</td>
<td>38</td>
</tr>
<tr>
<td>Disposal</td>
<td>3</td>
</tr>
</tbody>
</table>

Interventions that included a gardening component spanned more food system processes than any other programming category. Carney et al. (2012) built a home gardening community using CHWs to provide support and materials to families. The nutrition education series developed by Kannan et al. (2010) included lessons on herb and vegetable container gardening to incorporate culturally relevant foods into home-cooked meals so that participants could share nutrition knowledge with their extended families through gardening “show and tell.” Other studies incorporated community gardens. The community gardens established in the intervention published by Stluka et al. (2019) were used as platforms to deliver nutrition education via garden coordinators. Table 3.4 displays the food system processes targeted in each gardening study.
Across all included studies, the most common intervention delivery method was via group sessions. Many classes were participatory and included demonstrations and taste tests. One-on-one mentoring between the CHW and participants was included in seven studies and six studies used this approach exclusively. Multiple studies supplemented group sessions with individualized phone calls or home visits by the CHW to the participant. Studies also used newsletters, print materials, or videos to deliver intervention messages.

### 3.4.2 Description of the CHWs

Several studies recruited individuals to serve as CHWs because of their status as natural helpers, mentors, leaders, or respected neighbors. Others recruited CHWs for the intervention from existing networks of CHWs, promotoras, or Cooperative Extension Master volunteers. Two studies used CHWs from occupations not traditionally associated with health promotion: cosmetologists in a beauty salon and supermarket employees in Baltimore. In four studies, the CHWs were members of faith communities, with Warren et al. (2009) describing the CHWs as “lay health ministers.” Nine studies reported that females served as CHWs.

### 3.4.3 Priority populations

Ten studies reported specific priority populations at risk of or experiencing obesity and/or type 2 diabetes. A common priority population was individuals and families with low income. Racial and ethnic minorities included in study populations were Hispanic, Black, Somali, Native American, Sudanese, Hmong, Korean, Bangladeshi, and Sikh Asian Indian. Refugees, immigrant families, and war veterans were also targeted.

---

**Table 3.4. Targeted food system processes of garden-based studies examined, 2009-2019**

<table>
<thead>
<tr>
<th>Food System Processes</th>
<th>Production</th>
<th>Processing</th>
<th>Distribution</th>
<th>Marketing</th>
<th>Access</th>
<th>Preparation</th>
<th>Consumption</th>
<th>Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnidge et al., 2019</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Carney et al., 2012</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mello et al., 2017</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Stluka et al., 2019</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Warren et al., 2009</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
and migrant farmworkers also participated in studies as the priority audience. Following the inclusion criteria, CHWs shared socio-demographic characteristics with the populations participating in the studies.

3.4.3 Targeted outcomes

All studies targeted healthy lifestyle behaviors or environmental health outcomes. Increasing markers of diet quality, including fruit and vegetable consumption, was the most common primary targeted outcome. Many of the nutrition education efforts also aimed to increase physical activity levels for obesity and diet-related chronic disease prevention. A variety of biomarkers were used to assess healthy lifestyles, including weight, BMI, and waist to hip ratio. Diabetes management interventions included biomarkers such as hemoglobin A1c (HbA1c), fasting serum glucose, and lipid parameters. Additional outcomes measured for interventions included food security, food safety, food self-efficacy, participant experience, SNAP enrollment and participation, screen time, and health behavior knowledge.

3.4.4 Unexpected outcomes

Ten studies reported outcomes not included in the project objectives. In a study with Hmong participants, the CHW assisted in additional lesson design and the CHW-led intervention was a noted source of pride for the Korean American community in New York City. Treiber et al. (2016) discovered additional training needs of the CHW to continue with effective implementation. Political leaders recruited the Food Justice Leaders of the Tenderloin neighborhood of San Francisco to lobby for health promoting local and state policies. Mental health benefits and physical activity increases were reported by participants in a gardening project designed to increase vegetable consumption. Peer educators working in a farmers market SNAP promotion initiative reported that their participation had increased their own healthy behaviors.
<table>
<thead>
<tr>
<th>First Authors, Year</th>
<th>CHW description</th>
<th>Priority Population and Location</th>
<th>Food System Processes</th>
<th>Description of Intervention</th>
<th>Targeted outcomes</th>
<th>Unexpected outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams et al., 2012</td>
<td>Experienced and respected parents, grandparents, or other community members</td>
<td>Family primary caregivers with children ages 2-5. Native American tribes of Menominee, Lac de Flambeau, Bad River, Oneida in Wisconsin.</td>
<td>Preparation, Consumption</td>
<td>Two year obesity prevention intervention. Tool kit lessons delivered by family mentors during home visits. Lessons were: increasing fruit and vegetable intake, decreasing sugary beverages and candy intake, increasing physical activity, decreasing TV time. Year 1: 12 home visits using tool kit lessons, three group sessions with mentors and families. Year 2: mentor-led monthly group meetings with meal, family activities, newsletter</td>
<td>Primary- child BMI z-score, adult BMI</td>
<td>N/A</td>
</tr>
<tr>
<td>Ayala et al., 2015</td>
<td>CHWs with experience with Clinicas de Salud del Pueblo</td>
<td>Mexican-origin mothers in a rural U.S.-Mexico border town in California</td>
<td>Consumption</td>
<td>Health communication via electronic video communication (non-episode family situation comedy), home visits, phone calls, family workbook, other print materials delivered over 4 months.</td>
<td>Primary- fruit and vegetable consumption</td>
<td>N/A</td>
</tr>
<tr>
<td>Bachar et al., 2006</td>
<td>Community mentors matching education and experience criteria, paid</td>
<td>Members of the Eastern Band of Cherokee Indians in rural North Carolina</td>
<td>Preparation, Consumption, Marketing, Access</td>
<td>Mentors conducted school lessons and after-school program. Tribal members participated in physical activity</td>
<td>Primary- diabetes and obesity reduction</td>
<td>N/A</td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Setting</td>
<td>Activities</td>
<td>Outcomes</td>
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<tr>
<td>Baker et al., 2006</td>
<td>Local community members</td>
<td>Low-income and majority African American neighborhood in St. Louis, Missouri.</td>
<td>Access, Preparation, Consumption</td>
<td>Church produce market run by community. Customers transported from other churches, senior centers. CHW provided nutrition info, cooking demos. Nutrition info also shared on bulletin boards, testimonials, sermons. Presentations at local events. Primary- increased fruit and vegetable consumption.</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Balcázar et al., 2012</td>
<td>Promotoras certified as CHW in Texas and at least two years experience</td>
<td>Low-income areas of El Paso, Texas</td>
<td>Preparation, Consumption</td>
<td>Community coalition effort to create a nutrition and exercise-promoting neighborhood environment. Activities included charlas (coffee health talks), heart-healthy cooking demonstrations, heart-healthy grocery tours, promotora-led physical activities. Test the schedule of activities, promotora readiness, preparation for participant enrollment and data collection for HEART 2 study- designed to create a cardiovascular health-promoting neighborhood environment.</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Barnidge et al., 2015</td>
<td>Community advocates</td>
<td>African American adults in rural Missouri.</td>
<td>Production, Preparation, Access, Consumption</td>
<td>Nutrition education, cooking demonstrations at churches and Primary- perceived fruit and vegetable consumption. Secondary-</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Study Authors, Year</td>
<td>Intervention/Target Population</td>
<td>Description</td>
<td>Goals</td>
<td>Outcomes</td>
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<tr>
<td>Buscemi et al., 2019&lt;sup&gt;32&lt;/sup&gt;</td>
<td>SNAP-Ed and EFNEP peer nutrition educators</td>
<td>Low-income preschool children (2-5 years old) that were recipients of SNAP-Ed or EFNEP at participating sites and their parents in Illinois</td>
<td>Preparation, Access, Consumption</td>
<td>Hip-Hop to Health curriculum delivered through EFNEP and SNAP-Ed to parent-child dyads (one parent/one child per household). 8 lessons delivered over 6-8 weeks, curriculum consistent with 2010 Dietary Guidelines for Americans.</td>
<td>Primary changes in diet, physical activity, and screen time among children and parents. N/A</td>
<td></td>
</tr>
<tr>
<td>Bustillos and Sharkey, 2015&lt;sup&gt;42&lt;/sup&gt;</td>
<td>Female, Hispanic/Latino, Texas colonia residents, Spanish-speaking</td>
<td>Established promotoras-researchers in Texas.</td>
<td>Preparation, Consumption</td>
<td>Eight monthly workshops, 4 hours each. Didactic methods and hands-on activities. Nutrition education topics included nutrition science, public health, human behavior, food preparation using limited resources, healthy food resource management, home food safety, and food label reading.</td>
<td>Primary improvement of knowledge of nutrition and nutrition-related topics and empowerment. N/A</td>
<td></td>
</tr>
<tr>
<td>Carney et al., 2012&lt;sup&gt;35&lt;/sup&gt;</td>
<td>Promotores, other characteristics not specified</td>
<td>Migrant seasonal farm worker families in rural Oregon</td>
<td>Production, Preparation, Access, Consumption, Disposal</td>
<td>Home gardening support via resources, materials, volunteer support. Community building via monthly</td>
<td>Primary vegetable intake, food security, and family relationships. Participants reported physical and mental health benefits from working in their gardens.</td>
<td></td>
</tr>
<tr>
<td>Study (Year)</td>
<td>Location</td>
<td>Population</td>
<td>Intervention Description</td>
<td>Outcomes</td>
<td>Notes</td>
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<tr>
<td>Connell et al., 2015&lt;sup&gt;43&lt;/sup&gt;</td>
<td>Lower Mississippi Delta communities</td>
<td>Women in civic, social, and faith-based organizations in Lower Mississippi Delta region</td>
<td>Preparation, Consumption</td>
<td>First treatment arm was 5, 60-minute sessions with multiple message approach on fruit, vegetable, whole grains, lean proteins, and solid fats, alcohol, and added sugars. Second arm was 5, 60-minute sessions with single message approach on solid fats, alcohol, and added sugars. Last session for each arm was summary and potluck. Monthly sessions in a community setting. Interactive sessions with discussion, games, activities, food demos, home challenge, newsletter, phone calls.</td>
<td>Primary - diet quality</td>
<td>N/A</td>
</tr>
<tr>
<td>Crespo et al., 2012&lt;sup&gt;19&lt;/sup&gt;</td>
<td>Females, with Spanish-speaking abilities. Recruited through participating school</td>
<td>K-2 Latino children and their parents at elementary schools in San Diego County, California (CA)</td>
<td>Marketing, Access, Preparation, Consumption</td>
<td>Four conditions: Home/Family environmental change, Community-only environmental change, Family-plus-Community-environmental change, and no-treatment.</td>
<td>Primary - child BMI z-score Secondary - child diet, physical activity, sedentary behavior</td>
<td>N/A</td>
</tr>
<tr>
<td>Study (Year)</td>
<td>Instructor Type</td>
<td>Client Type/Setting</td>
<td>Intervention Details</td>
<td>Primary Outcome</td>
<td>Secondary Outcome</td>
<td></td>
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<tr>
<td>Cullen et al., 2010&lt;sup&gt;31&lt;/sup&gt;</td>
<td>EFNEP educators</td>
<td>EFNEP clients in three cities in Texas</td>
<td>Preparation, Consumption</td>
<td>Six, 60-minute lessons including: nutrition basics and portion size, breakfast and snacks, fruit and vegetables, dairy and meat, breads and grains, and smart shopping. Intervention video included in class sessions. Goal sheets distributed at each class.</td>
<td>Primary- goal attainment for diet</td>
<td>N/A</td>
</tr>
<tr>
<td>Cummings et al., 2013&lt;sup&gt;23&lt;/sup&gt;</td>
<td>African American females, recommended by local public health agencies</td>
<td>Rural, African American women with uncontrolled type 2 diabetes in rural southeastern U.S.</td>
<td>Consumption, Access</td>
<td>Sixteen lifestyle coaching sessions by CHW over 12 months. Behaviorally-centered and culturally-relevant</td>
<td>Primary- change in HbA1c Secondary- psychosocial measures</td>
<td>N/A</td>
</tr>
<tr>
<td>de la Torre et al., 2013&lt;sup&gt;20&lt;/sup&gt;</td>
<td>Local health educator who lives in community</td>
<td>Mexican-origin communities and families with children between 3-8 years in California (CA)</td>
<td>Preparation, Consumption, Access</td>
<td>Nutrition intervention has family nights at school with discussion, activity, food demo, and tasting. Each lesson was 1 hour. Participants must attend a minimum of 15 classes over 3 years. Topics are basic</td>
<td>Primary- reduce childhood obesity Secondary- improve family self-efficacy</td>
<td>N/A</td>
</tr>
<tr>
<td>Study Authors (Year)</td>
<td>Sample Description</td>
<td>Activity</td>
<td>Intervention Description</td>
<td>Primary Outcomes</td>
<td>Other Outcomes</td>
<td></td>
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<tr>
<td>Dollahite et al., 2014&lt;sup&gt;53&lt;/sup&gt;</td>
<td>Paraprofessional educators with 2 or more years of experience delivering EFNEP</td>
<td>Preparation, Consumption</td>
<td>8-week EFNEP curriculum delivered by paraprofessional educators. Hands-on, dialogue-based activities including recipe preparation and food tasting</td>
<td>Primary- improved nutrition behaviors such as diet quality, food safety, food security, food resource management</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Elder et al., 2009&lt;sup&gt;56&lt;/sup&gt;</td>
<td>Latina women, Spanish language dominant, recruited for personality traits</td>
<td>Preparation, Consumption</td>
<td>Three-arm randomized control trial: Promotora plus tailored print, tailored print only, print only</td>
<td>Primary- dietary behavior change and psychosocial outcomes</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Evans and Hudson, 2014&lt;sup&gt;29&lt;/sup&gt;</td>
<td>Lay members of faith communities</td>
<td>Preparation, Consumption, Access</td>
<td>Adapted Body and Soul curriculum&lt;sup&gt;19&lt;/sup&gt;, three phases. Monthly educational sessions, physical activity program development, increase access to local fruits and vegetables</td>
<td>Primary- increased fruit and vegetable consumption and physical activity level</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Flood et al., 2015&lt;sup&gt;30&lt;/sup&gt;</td>
<td>Food Justice Leaders. Tenderloin residents hired for the Coalition</td>
<td>Access</td>
<td>Healthy corner store initiative led by community coalition. Education components taught by food justice leaders (CHW). CHW educated corner store owners on healthy food environment</td>
<td>Primary- healthy food access</td>
<td>State and city leaders sought help from coalition to lobby for healthy store law and soda tax</td>
<td></td>
</tr>
<tr>
<td>Forster-Cox et al., 2010&lt;sup&gt;57&lt;/sup&gt;</td>
<td>Promotoras</td>
<td>Preparation</td>
<td>Promotoras assessed home safety and delivered education on environmental hazards and food safety in 2-3 home visits. Provided</td>
<td>Primary- knowledge and behaviors related to fire and food safety</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Author(s) et al., Year</td>
<td>Peer leader characteristics</td>
<td>Population</td>
<td>Interventions and Components</td>
<td>Outcomes</td>
<td>Additional Information</td>
<td></td>
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<tr>
<td>Goldfinger et al., 2008</td>
<td>Peer leader with background similar to participants</td>
<td>East Harlem adults with overweight or obesity, of minority races, pilot test at Black Harlem church in NYC</td>
<td>Access, Preparation, Consumption</td>
<td>Ten-week nutrition and physical activity course. Eight sessions delivered at church by peer leaders.</td>
<td>Primary- weight loss. Secondary- knowledge, attitudes, behavior.</td>
<td></td>
</tr>
<tr>
<td>Hamilton et al., 2020</td>
<td>Peer educator: member of the target community</td>
<td>SNAP recipients in the state of Washington</td>
<td>Consumption, Access</td>
<td>Peer to peer education and farmer's market promotion to use SNAP benefits</td>
<td>Primary- use of SNAP benefits at farmers markets. Increased fruit and vegetable consumption among peer educators and ownership of local food systems. Formation of social network among participants and peer educators.</td>
<td></td>
</tr>
<tr>
<td>Horowitz et al., 2011</td>
<td>Peer educators</td>
<td>Adults with prediabetes in East Harlem, NYC</td>
<td>Preparation, Consumption, Access</td>
<td>Peer-led group health education (diabetes info, healthy eating, food access in neighborhood, physical activity) workshops delivered in community locations. Pairs of peer leaders. Eight 90-min classes across eight weeks.</td>
<td>Primary- Weight loss.</td>
<td></td>
</tr>
<tr>
<td>Islam et al., 2013a</td>
<td>bilingual Korean American CHW</td>
<td>Korean American adults at risk for diabetes in NYC</td>
<td>Preparation, Consumption</td>
<td>Six CHW-led 2-hour group sessions with topics: diabetes prevention, nutrition, physical activity, complications, stress and family support, access to health care. Ten one-on-one calls across six months.</td>
<td>Primary- weight, BMI, hip to waist ratio reduction, access to and utilization of care, knowledge and practice of physical activity and healthful eating. Secondary- participant experience.</td>
<td></td>
</tr>
<tr>
<td>Islam et al., 2013b</td>
<td>Bilingual Bangladeshi CHWs who are community leaders, One male, one female</td>
<td>Bangladeshi American adults with type 2 diabetes in NYC.</td>
<td>Preparation, Consumption</td>
<td>Six monthly group sessions, each 2.5 hours. Session topics were diabetes</td>
<td>Primary- HbA1c, weight, nutrition and physical activity behaviors, access to. Intervention was a source of pride for community.</td>
<td></td>
</tr>
<tr>
<td>Study (Year)</td>
<td>Setting/Participants</td>
<td>Goals</td>
<td>Interventions</td>
<td>Outcomes</td>
<td>Evaluation Method</td>
<td></td>
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<tr>
<td>Islam et al., 2014</td>
<td>Bilingual Sikh Asian Indian CHW and a supervisor with the same characteristics. Supervisor from a community organization</td>
<td>Preparation, Consumption</td>
<td>Six group interactive sessions, each 2 hours led by CHWs in community setting. Culturally adapted lessons on diabetes prevention, nutrition, physical activity, health complications from diabetes, stress, access to health care. Ten individualized phone calls from the CHW.</td>
<td>Primary- weight, BMI, blood pressure, glucose reduction, healthcare use, knowledge and behaviors of physical activity and healthy eating. Secondary- participant satisfaction</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Johnson et al., 2010</td>
<td>Cosmetologist</td>
<td>Consumption</td>
<td>Three-part motivational sessions delivered by cosmetologist across 6 weeks to meet diet and physical activity goals. Provided info packet and food samples</td>
<td>Primary- fruit and vegetable consumption, physical activity, water consumption</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Kannan et al., 2010</td>
<td>Senior women recognized as experts by community. Assistant CHWs were age 19-25</td>
<td>Preparation, Consumption</td>
<td>Culturally relevant lessons (n=13) on healthy selections and cooking, gardening, food attitudes. Delivered by Black CHW pairs of older lead and younger assistant. Reading and PowerPoint slides. One lesson per week</td>
<td>Primary- Maternal diet quality, diet and health habits, shift to action stage</td>
<td>CHWs assisted in designing additional lessons</td>
<td></td>
</tr>
<tr>
<td>Study Authors</td>
<td>Target Group</td>
<td>Setting</td>
<td>Intervention Details</td>
<td>Outcomes</td>
<td>Notes</td>
<td></td>
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<td>Kattelmann et al., 2009&lt;sup&gt;27&lt;/sup&gt;</td>
<td>Tribal member</td>
<td>Adult Northern Plains Indians from Cheyenne River Sioux Tribe with type 2 diabetes in South Dakota</td>
<td>Preparation, Consumption</td>
<td>Six nutrition ed lessons using Medicine Wheel Nutrition Model (traditional diet of Northern Plains Indians). Two-hour group classes met monthly for 6 months. Co-facilitated by registered dietician and a trained tribal member. Individualized meal plans created</td>
<td>Primary- improved control of type 2 diabetes Secondary- weight, BMI, HbA1c, fasting serum glucose and lipid parameters, circulating insulin, diet, physical activity, dietary satiety</td>
<td>N/A</td>
</tr>
<tr>
<td>Kehm et al., 2017&lt;sup&gt;22&lt;/sup&gt;</td>
<td>Bilingual Somali CHWs</td>
<td>Somali mothers in Minneapolis, Minnesota</td>
<td>Preparation, Access, Consumption</td>
<td>Four sessions, each 1.5 hours over 6 weeks delivered by Somali CHWs. Used culturally modified healthy eating Extension curriculum, group cooking session in community kitchen, grocery store tour with gift card</td>
<td>Primary- Dietary behavior change for increased fruit and vegetable consumption Secondary- fruit and vegetable intake of children of participants</td>
<td>N/A</td>
</tr>
<tr>
<td>Ko et al., 2016&lt;sup&gt;21&lt;/sup&gt;</td>
<td>Bilingual and bicultural community health educator</td>
<td>Hispanic/ Latino adults and the main cook for the family in metro area of Seattle, Washington.</td>
<td>Preparation, Consumption, Access</td>
<td>Eight-week nutrition education with CHW-led group discussion, cooking demos, take-home food basket, newsletters. Four total classes, each 90 minutes</td>
<td>Primary- fruit and vegetable consumption Secondary- Knowledge, perceived barriers, food efficacy, food outcomes</td>
<td>Food baskets helped maintain participation, were useful for health education for family, assisted with food access</td>
</tr>
<tr>
<td>Lee et al., 2015&lt;sup&gt;31&lt;/sup&gt;</td>
<td>Supermarket employees</td>
<td>Supermarket customers in a low-income neighborhood of Baltimore, Maryland.</td>
<td>Access, Marketing</td>
<td>Promotion of healthy items in supermarket using ads, taste tests, labels, increased stocking, community events. Trained store employees on healthy food choices</td>
<td>Primary- healthy purchases by customers</td>
<td>N/A</td>
</tr>
<tr>
<td>Study</td>
<td>Target Population</td>
<td>Interventions</td>
<td>Primary Goals</td>
<td>Additional Notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
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<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
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<td></td>
<td></td>
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<tr>
<td>Mello et al., 2017&lt;sup&gt;36&lt;/sup&gt;</td>
<td>Women conscious about neighborhood problems Low-income residents in Grand Rapids, Michigan</td>
<td>Production, Processing, Preparation, Access, Consumption, Disposal</td>
<td>Peer led gardening workshops, food demonstrations</td>
<td>Primary- food security in local food system, overall health of residents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pescia et al., 2008&lt;sup&gt;18&lt;/sup&gt;</td>
<td>Lay health advisor. Natural helpers recruited via neighborhood organizations and social networks Low-income northwest area neighborhoods in Charlotte, North Carolina</td>
<td>Preparation, Access, Consumption</td>
<td>Door to door visits, walking groups, diabetes support groups, health house parties facilitated by CHWs. Additional interventions co-developed with CHWs and professionals: media campaign for healthy behaviors, local farmer's market, community exercise venues, tobacco tax advocacy, promoting healthy food labeling</td>
<td>Primary- create capacities to reduce incidence of cardiovascular disease and diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quintiliani et al., 2014&lt;sup&gt;32&lt;/sup&gt;</td>
<td>Selected public housing resident health advocates trained as healthy living advocates for the study Families living in public housing. Evaluation conducted among mother-daughter (8-15 years) pairs in Boston, Massachusetts</td>
<td>Access, Preparation, Consumption, Marketing</td>
<td>Multicomponent healthy living in public housing: CHWs promote mobile fruit and vegetable van, attend health screenings to link participants to clinicians, walking group leaders, promote cooking demos, promote intervention social media, provide neighborhood resource maps at all events</td>
<td>Primary- diet and physical activity behaviors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Siegrist and Chandler, 2014&lt;sup&gt;39&lt;/sup&gt;</td>
<td>Volunteers for a four-day festival, many were Master Composters Festival attendees in New York</td>
<td>Disposal</td>
<td>Compost Crew at a music festival sort waste bins, education at booth, collect food scraps from vendors</td>
<td>Primary- divert organic waste from landfill to compost facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staten et al., 2005&lt;sup&gt;18&lt;/sup&gt;</td>
<td>Existing promotoras recruited from community health U.S. Hispanic adults in living in border communities of</td>
<td>Preparation, Consumption</td>
<td>Pasos Adelante topics: risk for cardiovascular disease, physical</td>
<td>Primary- reduce risk factors for cardiovascular disease. Promotoras initially uneasy providing feedback to research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study (year)</td>
<td>Type of Intervention</td>
<td>Description</td>
<td>Setting</td>
<td>Outcomes</td>
<td>Notes</td>
<td></td>
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<td>-------------</td>
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<tr>
<td>Sltuka et al., 2019</td>
<td>Worked in junior/senior pairs.</td>
<td>Worked in 10 women, 1 male.</td>
<td>Arizona.</td>
<td>Worked in junior/senior pairs.</td>
<td>Staff used notes from lesson plans to probe for promotora opinions. Early morning walking groups beginning at 5:00 AM were acceptable to beat heat.</td>
<td></td>
</tr>
<tr>
<td>Treiber et al., 2016</td>
<td>Garden coordinators hired from within communities. Many, but not all, were Master Gardeners</td>
<td>Adults with high prevalence or risk of obesity and SNAP participation in counties of South Dakota.</td>
<td>Production, Processing, Distribution, Preparation, Access, Consumption</td>
<td>Three 2-hour sessions, weekly. Lessons: SNAP, SNAP for healthy lifestyle, physical activity, healthy eating, food resource management, sugar sweetened beverages. Interactive lessons.</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Warren et al., 2009</td>
<td>Lay health ministers from church population</td>
<td>Church communities, primarily African American and nearby families in Raleigh, North Carolina.</td>
<td>Establishment of community garden on church grounds, youth nutrition education provided by North Carolina Extension, health promotion to adults via Body and Soul curricula, walking groups.</td>
<td>Primary-reduce proportion of youth and adults who engage in no leisure-time physical activity and increase number of youth and adults who eat at least 5 servings of fruit and vegetables per day.</td>
<td>Garden participants sold surplus produce, including at church produce market. Many churches signed a health policy agreement.</td>
<td></td>
</tr>
<tr>
<td>White et al., 2019</td>
<td>Community educators</td>
<td>Adult and child (aged)</td>
<td>Preparation, Eight 2-hr, biweekly.</td>
<td>Primary-childhood</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Author(s) and Year</td>
<td>Intervention Details</td>
<td>Outcome Measures</td>
<td>Goals</td>
<td>Notes</td>
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<tr>
<td>Wieland et al., 2016&lt;sup&gt;59&lt;/sup&gt;</td>
<td>Bilingual family health promoters from the community</td>
<td>Hispanic, Somali, Sudanese immigrant families in Rochester, Minnesota.</td>
<td>Consumption</td>
<td>Twelve modules, each 30-90 min delivered in-home to families by CHWs over 6 months. Biweekly phone calls. Tailored goal-setting. Topics: physical activity and nutrition</td>
<td>Primary - weekly physical activity, dietary intake. Secondary - BMI, blood pressure, waist circumference, waist to hip ratio.</td>
<td></td>
</tr>
<tr>
<td>Wilson and Rodriguez, 2019&lt;sup&gt;25&lt;/sup&gt;</td>
<td>Caseworker employed by refugee resettlement organization, usually former refugee</td>
<td>Recently resettled refugees in a large Midwest city</td>
<td>Access</td>
<td>Exploring caseworker role in introducing refugees to U.S. food systems: initial meal; grocery store tour; connect to SNAP; Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); food pantries and banks</td>
<td>Understand how caseworker introduces U.S. food system to refugee families.</td>
<td></td>
</tr>
<tr>
<td>Woodson et al., 2005&lt;sup&gt;50&lt;/sup&gt;</td>
<td>Peer educators from faith communities</td>
<td>African Americans in faith communities in Nevada.</td>
<td>Preparation, Consumption</td>
<td>Six 60-minute classes using Food for Health and Soul curriculum taught by faith community peer educators</td>
<td>Primary - diet quality. Peer educators train new peer educators in train-the-trainer.</td>
<td></td>
</tr>
</tbody>
</table>

9-10) dyads, and adults who were the main food preparers in households across five states (Maine, Nebraska, South Dakota, Tennessee, and West Virginia).

Youth also recorded these activities at home.

Consumption sessions on cooking, eating, and playing together. Youth also recorded these activities at home.

obesity incidence

Secondary - cooking competence, family mealtimes, physical activity.
3.5 Conclusions

The use of the CHW model to provide education on public health issues is well-established. The food system processes most associated with nutrition education, preparation and consumption, were the most common processes included in the 43 educational interventions. Given that most studies educated only on food preparation and consumption practices, future work should explore how the CHW model can expand educational efforts across a greater number of food system processes. The garden-based studies included in this review had education on the greatest number of food system processes. Gardens allow an opportunity to learn about each food system process and the connectivity of individual processes to the larger food system, often in a culturally relevant manner, as plants and foods important in cultures marginalized in the U.S. can be grown and used in garden-based education for populations commonly reached by the CHW model.

The nutrition education activities included in this review were culturally tailored to priority populations. The results demonstrate that the CHW model can connect individuals to culturally relevant foods through education on food preparation and consumption, and these CHW-facilitated connections are emerging into food access efforts, evidenced by the 22 included studies with a food access component. However, the limited number of studies that provided education on multiple food system processes beyond preparation and consumption indicates that the CHW model has not been widely used in broad lens food systems educational interventions. Future research could build on included studies with garden-based educational programs that spanned the greatest number of food systems processes, to facilitate connections to culturally relevant foods for underserved populations.

Garden-based programming is a platform from which nearly all of the food system processes can be connected in an educational intervention and is an effective health promotion tool. The garden-based interventions incorporated six of eight food system processes. The choices that are accessible within preparation and consumption processes are shaped by the contextual processes of production, processing, distribution, access, marketing, and disposal. Food systems education that spans multiple processes, such as garden-based programming, more fully integrates health promotion into the community and may allow for sustained success in making healthy changes.
The diverse characteristics of the priority populations of the studies included in this review confirms that the CHW model can reach underserved communities who often experience diet related disparities\textsuperscript{70,71} to provide education on health-related topics.\textsuperscript{72} Culturally sensitive modes of educational outreach to populations that experience health disparities must be integrated into efforts to advance equity by reducing health disparities.\textsuperscript{73} As health promotion efforts which address food systems issues for underserved communities continue to grow,\textsuperscript{74–76} the CHW model can be considered a key programming component in these interventions. This review is the first step in understanding how the CHW model has been used to deliver education in food systems to reach underserved communities. The unequal structures and reach of food systems programming for underserved communities was exposed by the Covid-19 pandemic,\textsuperscript{77,78} and researchers and practitioners must explore strategies that can mitigate health disparities exacerbated by the current food system.

Food systems education to influence individual behavior change can be a tool for health promotion in underserved communities, however, root causes of health disparities must be addressed through interventions that address policies, systems, and environments of food systems and the broader social determinants of health.\textsuperscript{79,80} This review confirms that the CHW model can connect with underserved communities and identifies how the CHW model has been used as an educator in food systems interventions for public health. Food systems and health promotion researchers and practitioners should prioritize future exploration of the CHW model as community change agents within food system structures. Exploration of CHW as community change agents would support the recommendations of Kumanyika (2019)\textsuperscript{73} and Golden & Earp (2012)\textsuperscript{81} to incorporate equity into multi-level health promotion interventions. The emergent nature of CHWs educating on three or more food systems processes provides researchers and practitioners a blueprint from which to explore the CHW model as an agent in community food system change and a support to social ecological health promotion. Food system researchers and practitioners should continue to explore the CHW model as a tool to deliver garden- based programming to create health-promoting community food systems through educational interventions. Research should extend into an exploration of the CHW model as an advocacy tool for underserved communities and a method of advancement for health and food equity.

Although this review documented the processes of the food system in which CHW have engaged as educators, future work must document how the CHW model can advance equity in
food systems. Food systems frameworks that expand beyond the key processes used in this review and include considerations for community development and social equity should guide future examinations of the CHW model in promoting community social, economic, and environmental health and sustainability through food systems initiatives. A comprehensive collection of nutrition education and agriculture education records were not included in this review due to the search strategy focus on common food systems terms. Future reviews should utilize a more targeted search strategy to understand the role of the CHW model in these subsets of food systems education. The scope of the review was limited to U.S. food systems programs. The definition of CHWs employed by the review limited the known scope of practice of CHWs as many CHWs are engaged in activities outside of education and facilitation. Future reviews should explore expanded roles, such as community change agents and advocates, of the CHW model in food systems. The CHW population included in this study was exclusively adults. We did not assess the study quality or risk of bias in studies given the exploratory nature of the research objectives to understand the scope of educational reach of CHWs within food systems efforts.

3.6 So What?

3.6.1 What is already known on this topic?
CHWs are proven effective for health promotion education with communities who experience health disparities. Food systems are a key determinant of public health. Strategies for food system interventions are needed to mitigate health disparities.

3.6.2 What does this article add?
This article documents the use of the CHW model as food systems educators within the U.S. and confirms that the CHW model can reach underserved populations for food systems-related education. The CHW model has not been widely implemented for food systems education beyond preparation and consumption practices.

3.6.3 What are the implications for health promotion practice or research?
Health promotion researchers and practitioners can use this review as a tool for future research on food systems educational interventions and program planning. The CHW model is a strategy for education to combat health disparities in underserved communities and additional educational interventions should be planned for food system understanding. Food systems educational interventions that include gardening span many food systems processes that, coupled with a
CHW model, can promote health in underserved communities. The role of CHWs as community change agents to advocate for health-promoting food systems should be explored.
CHAPTER 3 REFERENCES


CHAPTER 4: EVALUATION OF A COMMUNITY HEALTH WORKER MODEL FOR GARDEN-BASED FOOD SYSTEMS PROGRAMMING FOR VIRGINIA COOPERATIVE EXTENSION

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Keywords (n=5): Community health workers, food systems programming, feasibility, garden-based programs, inclusive

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2. Virginia Family Nutrition Program (EFNEP and SNAP-Ed), Virginia Cooperative Extension
3. Department of Food Science and Technology, Virginia Tech, Blacksburg, VA
4.1 Abstract

The objective of this study was to assess the feasibility for Virginia Cooperative Extension (VCE) to adapt a community health worker (CHW) model for garden-based food systems programming, with an emphasis on underserved communities experiencing inequities and health disparities. CHWs are lay public health workers from underserved communities who provide basic health services and culturally sensitive education while bridging between social services and community needs. Interviews with 29 VCE stakeholders showed that the CHW model is feasible for garden-based food systems programming for VCE. This article discusses major themes and considerations for implementation of the CHW model in VCE.

4.2 Introduction

Food systems encompass the networks and interactions of processes that span food production to food disposal (Neff et al., 2009). Over the past decade, there has been a call to action for Cooperative Extension (hereafter called Extension) to leverage its resources, technical expertise of staff, and social network integration to strengthen local, community-based food systems beyond its historical focus on more traditional methods of large-scale food production (Clark, Bean, et al., 2017; Dunning et al., 2012; Morgan & Fitzgerald, 2014). By supporting food systems education and programming at a community level, Extension can mutually increase access and availability of food, increase community food security, and address health and wellness goals (B. Braun et al., 2014; Gwin, 2019).

Research shows many health benefits for garden-based programming, in addition to being an effective platform from which to launch food systems programming (Alaimo et al., 2016; Gregis et al., 2021). Garden-based programming also builds upon a strong internal infrastructure and expertise on gardening within Extension that can translate into community members learning about each food system process from production to disposal from Extension employees and/or trained volunteers.

Food systems programming can also reach new and more diverse audiences that report lower access and more barriers to affordable and nutritious foods. There is strong evidence that the current food system structurally perpetuates inequities that contribute to food insecurity and health disparities for U.S. populations with diverse ethnic, racial, and cultural identities (Neff et al., 2009; Odoms-Young & Bruce, 2018). Black, Indigenous, and communities of color (BIPOC)
often experience unequal engagement with food systems programming that may prevent the advancement of health equity goals and overall prosperity (Clark, Freedgood, et al., 2017; Kumanyika, 2019; Lyson, 2014).

The community health worker (CHW) model is a lay health outreach position. CHWs provide basic health services, health education, and health promotion to reach underserved populations and communities (Olaniran et al., 2017; Scott et al., 2018). CHWs are unique within public health because many CHWs are members of the communities they serve, giving them a deep understanding of the sociocultural characteristics of their priority populations (American Public Health Association, 2009). This shared cultural knowledge positions CHWs to advance health equity for vulnerable populations by connecting their communities to health systems and services (Olaniran et al., 2017; Perry et al., 2014). The CHW model in the United States is most commonly used to deliver culturally sensitive health prevention and education programs to prevent or manage diet-related chronic diseases such as type 2 diabetes, obesity and cardiovascular disease in BIPOC communities (Brownstein & Allen, 2015).

Greater diversity and inclusion of underserved BIPOC communities in Extension programming will also advance Extension’s efforts to expand its impact in community change and health promotion (Farella et al., 2021; Fields & Nathaniel, 2015; Linnell et al., 2021; Webster, 2021). New methods of inclusion must be studied to ensure that Extension fulfills its mission of serving all community members in an equitable manner. The use of the CHW model within Extension for food systems programming is a previously unexplored concept. This evaluation was designed to examine the feasibility of the CHW model for garden-based food systems programming to previously underserved populations through VCE. The four research objectives addressed in the evaluation are to explore:

1. how the CHW model aligns with VCE values and programming goals;
2. potential integration of CHW training into the current structure of VCE Extension Master Gardener and Master Food Volunteer training;
3. programming logistics of garden-based food systems education through a CHW model;
4. specific populations that VCE professionals believe are suitable to engage with CHW-delivered programming
4.3 Methods

A total of 29 semi-structured interviews with VCE stakeholders were conducted from June to October 2021 via video-conferencing (Zoom). Key stakeholders were defined as any VCE professional with a position or knowledge relevant to the potential fit of a CHW model within VCE for garden-based food systems programming. The research team includes administrators of several VCE programs and initial interview participants were identified by making a list of relevant professional connections. Supplemental Nutrition Assistance Program-Education (SNAP-Ed), the nutrition education arm of SNAP, stakeholders were included because VCE administers SNAP-Ed programming for qualifying Virginia residents. Additional participants were recruited using snowball sampling during each interview by asking “Is there anyone else that you recommend I speak to about this topic?” Interview participants represented each VCE planning district and urban, suburban, and rural areas of Virginia. All participants were recruited via a standardized email and each participant gave verbal permission to tape the Zoom video interview. Transcripts were created from the taped Zoom video recordings with methods adapted from Azevedo et al., (2017): storage of the videos in multiple locations, at least two passes of the transcripts to ensure accuracy, and the application of a denaturalized approach to finishing the transcripts. A denaturalized approach was used because of the practical nature of the research questions. Personally identifiable information was removed during transcription.

The evaluation received a designation as “Not Research” from the Virginia Tech Institutional Review Board in May 2021. All interview participants were informed of the purpose, methods, and use of the evaluation both via email and verbally prior to their voluntary participation in the interviews. Participants had the option to stop the interview or refuse participation at any time. Table 4.1 lists the number of participants in each stakeholder group interviewed.
Table 4.1. Number of participants from eight VCE stakeholder groups who participated in the semi-structured interviews

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia master volunteer program administrators</td>
<td>3</td>
</tr>
<tr>
<td>Virginia SNAP-Ed administrators</td>
<td>3</td>
</tr>
<tr>
<td>VCE specialists with relevant expertise</td>
<td>3</td>
</tr>
<tr>
<td>VCE state leadership</td>
<td>3</td>
</tr>
<tr>
<td>Family and consumer science (FCS) agents</td>
<td>5</td>
</tr>
<tr>
<td>Agriculture and natural resources (ANR) agents</td>
<td>8</td>
</tr>
<tr>
<td>SNAP-Ed agents</td>
<td>3</td>
</tr>
<tr>
<td>SNAP-Ed peer educators</td>
<td>1</td>
</tr>
</tbody>
</table>

The semi-structured interview scripts for the administrators of selected Virginia master volunteer programs and SNAP-Ed programs were designed using a five-phase process (Kallio et al., 2016) with questions to answer the research objectives. Initial phases of semi-structured interview script design were to ensure the evaluation was appropriate for semi-structured interview methods, then to use knowledge of food systems, Extension, and the CHW model to write a preliminary script. Preliminary scripts were piloted tested using expert assessment from research team members and a mock interview between the first author and a VCE administrator. The scripts for the master volunteer program administrators were approved by VCE specialists prior to implementation. Scripts for the remaining stakeholder groups were adapted from the program administrator scripts.

Data analysis was conducted using methods adapted from Creswell & Poth (2018) and Braun & Clarke (2006). A codebook was generated using an iterative process that began with deductive codes to address the research objectives and inductive codes emergent from the data. Table 4.2 displays the final eight codes and their definitions: intention, participatory development, cultural relevancy, logistics, community partners, participants, accessibility and inclusivity, and terminology. The coding was performed in Microsoft Word using memo- ing techniques adapted from Creswell & Poth, (2018). The first author (MD) coded all 29 transcripts. A second author (SM) independently coded eleven transcripts, including at least one from each stakeholder group. Inter-coder agreement was determined via consensus and disagreements were resolved between the two researchers through discussion. The coded Word documents were uploaded to Taguette, an open-source qualitative research tool (Rampin & Rampin, 2021) for
data analysis. The coded extracts were organized in Microsoft Excel into themes and subthemes identified from the data.

**Table 4.2.** Final codebook with codes and definitions applied to the interview transcripts

<table>
<thead>
<tr>
<th>Codes</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention</td>
<td>Purpose of VCE in the community, including goals, objectives, and intention of new and existing programming. VCE organizational messaging. Approach to work and direction of efforts by both organization and individuals.</td>
</tr>
<tr>
<td>Participatory Development</td>
<td>Opportunities to integrate local knowledge from CHW, to co-create programming.</td>
</tr>
<tr>
<td>Cultural Relevancy</td>
<td>How a CHW may influence factors in ensuring a program and environment is comfortable and welcoming to underserved populations.</td>
</tr>
<tr>
<td>Logistics</td>
<td>How a CHW for garden programs fits into VCE structures, including collaborations, support, and supervision for the CHW. CHW work topics, job description, and position expectations. Training and compensation considerations for the CHW and VCE professionals. Needs of VCE professionals to work with CHW, including skills, resources, or capacity building. How a CHW model may influence factors on the establishment, implementation, and sustainability of a garden-based program for food systems.</td>
</tr>
<tr>
<td>Community Partners</td>
<td>Community organizations or individuals not employed by VCE that are relevant to the feasibility of a CHW model. May be mentioned in the recommendations of potential participants in programming.</td>
</tr>
<tr>
<td>Participants</td>
<td>Communities, individuals, groups that may be suitable to engage in programming delivered by CHW, to serve as CHW for VCE or who may be missed by current VCE efforts.</td>
</tr>
<tr>
<td>Accessibility and Inclusivity</td>
<td>How the CHW model may affect or relate to structural inequities in the food system and how the effect of paternalism in food systems work can affect the CHW model. Cultural competency of current VCE programming. Factors, both internal and external to VCE control, that influence accessibility of current VCE programs, including socio-cultural demographics of VCE professionals and volunteers and the public image of VCE.</td>
</tr>
<tr>
<td>Terminology</td>
<td>Thoughts about the title of community health worker and the implications of the term &quot;community health worker.&quot;</td>
</tr>
</tbody>
</table>

**4.4 Results**

Three major themes emerged from the thematic analysis of the transcribed stakeholder interviews: (1) fit of the CHW model within VCE; (2) cultural humility; and (3) logistics. Although eight stakeholder groups participated in interviews, the quotations included in this article are attributed to the broad categories of state faculty, agent, and SNAP-Ed to protect interview participant identities. Additional quotations can be found in the appendix C.

**4.4.1 Theme 1: Fit of the CHW model within VCE**

*Subthemes: Focus on food systems; Serves VCE values and goals; Potential to extend reach to new audiences; Terminology*

Participants recognized disproportionately low access to programming by populations underserved by the current food system and the CHW model as a potential avenue for extending the reach of VCE programming to new audiences. Participants were receptive to a CHW model in part because they viewed VCE as a credible community-health serving organization, especially to improve food access and address food insecurity. Participants shared examples of
their current food systems programming and how a CHW model could extend the impact of current efforts to be more attentive to the needs and inclusive of underserved audiences:

“...Another layer so (that) communities won't be left out...that this community health worker would pull the net tighter where it's kind of loose right now.” -Agent

Participants stated that the CHW model serves the mission and values of VCE and can advance the connection of VCE programming to the needs of underserved communities. The term “community health worker” confused participants about the potential job responsibilities of the CHW within VCE, as participants presumed that the CHW would work in a healthcare-focused position and program to address health promotion and disease prevention or management.

“Coming from a healthcare worker and dealing with how food can act as...medicine...helping the people...see that it's better to eat a butternut squash instead of a pop tart...understanding the importance of what you're eating and your health.” -Agent

4.4.2 Theme 2: Cultural humility

Subthemes: Representation; built trust; reflexivity and bias awareness

VCE professionals were confident in their technical skills to deliver garden-based food systems programming, however, there was widespread recognition that integration of the CHW model into programming must include cultural humility. Cultural humility is a long-term commitment to learning with and from people with identities different than one’s own, working to combat power differentials, and building mutually beneficial partnerships across identity divides (Tervalon & Murray-Garcia, 1998). Cultural humility is distinct from cultural competence in that cultural humility recognizes power structures between identities, acknowledges racism and discrimination, and is focused on learning and collaboration (Foronda, 2020; Gopalkrishnan, 2019). Cultural competence generally refers to a skillset that allows individuals to work within and across cultural identities in a respectful and understanding manner (Betancourt et al., 2003). The concept of cultural humility best represents the emergent theme from the stakeholder interviews in this evaluation.

Participants recognized that the CHW model is an opportunity to expand their own learning about ethnically and racially diverse cultures to better serve all Virginians:

“That community health worker has got the knowledge that we don't have... that cultural knowledge... if we want to be successful, we need to be open to being educated by that individual as these are the things that my community enjoys and these are the things that
they don't enjoy...it doesn't do us any good to provide education on growing X, Y, Z crop if we learn from that community health worker, that culturally, that's not a big part of their diet. What it boils down to is utilizing the wisdom of those community health workers out in their communities…and in turn, they can help us develop programs that are more likely to meet their needs.” -Agent

Participants recognized that lacking representation within VCE and its master volunteer base affects both the inclusion of participants from BIPOC communities and the capacity of current volunteers and professionals to program with all members of their communities.

“It is a challenge to take individuals and volunteers from my program into ethnic communities where they look different from the majority of the people who work, who live there, who participate in those activities...sometimes I have a harder sell that way to promote our programs to what we call underserved audiences.” -Agent

Agents and state-level staff were confident in their abilities to build partnerships and listed several examples of partners that could connect VCE to communities well-suited for CHW-delivered programming such as faith-based organizations representatives, low-income housing managers, and cultural community center directors. Leaders of these organizations were often identified as champions of the communities they serve, and interview participants recognized that authentic relationships with community champions is key to impactful and culturally appropriate programming.

“Having people that are connected within those communities, where they could have those one on ones... a lot of times you have that trusted person who can really speak the language... not even like a language dialect, like they live there, so they know who they are and you know that they are trusted.” -Agent

VCE professionals were reflective in their responses on how they work with diverse audiences. Participants acknowledged their own biases and privilege and expressed desire to improve cultural competency, accessibility of programming, and connections with diverse audiences.

“Why, if you're a member of a minoritized segment of the local community, why is it that they do not feel like they can see themselves as an Extension Master Gardener volunteer, because, from our perspective, we do want it to be available to anybody that has an interest. But there are obviously some barriers either unseen... that are impeding people's willingness to participate or join in, and if there are things that we can do to remove those barriers, that's what we are attempting to do.” -State faculty
Participants suggested the use of participatory methods in program planning and evaluation and the co-creation of curricula with CHWs to ensure cultural relevancy, especially as it relates to food and gardening.

“I would co create with this person, what do we want, what do you feel is misunderstood. And what do I feel is misunderstood by your population...where are the gaps in both of our knowledge, so that we can create a curriculum together around what is not understood...cooking, tasting different things, identifying things that are not accessible or are really strong pillars of that [culture]...like celebrations, when are these foods eaten...there's a whole spectrum of knowledge that could be touched on, to make it more exciting.” -SNAP-Ed

4.4.3 Theme 3: Logistics

Subthemes: CHW integration; Training; Participatory evaluation and planning; Compensation

Agents and state leaders were receptive to working with a CHW to serve as a garden champion and especially welcomed the additional staff time a CHW would provide to extend the programming capabilities of agents. Participants agreed that the CHW model should primarily be in the purview of FCS programming. ANR professionals were amenable to be a technical resource for gardening information and to collaborate in planning, however, state administrators and field faculty recommended that FCS agents should most closely work with CHWs. FCS and ANR agents all supported the CHW model as an interdisciplinary connector between traditionally separate programming areas.

“A lot of us are identified by ANR, FCS, 4H, SNAP-Ed, so those themselves are really siloes. And we have specific programs that we're trying to do so, I could see that health worker really helping bridge the gap and working with all four of those agents...and the volunteers that already exist and agents going with the health workers to reach a specific community.” -Agent

When asked how they envisioned a CHW fitting into the VCE structure, interview participants recommended that the CHW be an equal partner in program design and evaluation and be included in VCE leadership.

“We have something already in place Extension Leadership Councils, boards, committees. These folks certainly need to serve on, so their voice can be heard there, so they bring concerns, as well as recommendations from their community base.” -Agent

Agents and state leaders expressed that Extension Master Gardeners and Master Food Volunteers are well-suited to assist with CHW-led programming and to serve as training aides for the CHW, if the master volunteers have interest. Participants believed the CHW model could
effectively integrate into the Virginia SNAP-Ed structure. Peer educators already deliver SNAP-Ed programming, so a CHW could fit as a gardening-specific peer educator. SNAP-Ed professionals agreed that there must be a delineation between responsibilities of existing program assistants and the CHW. SNAP-Ed agents and administrators expressed support for partnering CHWs and master volunteers in training and program delivery.

“They could be a different type of program assistant, could be like a gardening program assistant... Or we could hire it under the SNAP-Ed agents and agent may supervise them if it's a part time person, and that person works mainly just with gardening programming in the community.”  -SNAP-Ed

Participants stated that training elements for the CHW should include technical aspects of gardening and the expectations of the position within VCE, including the resources available to support the CHW. Training must be delivered in a setting that is accessible to potential CHWs: consider the time of day, the setting, the language of delivery, methods of instruction, and the cultural competency of the training administrators. Participants recognized their own need to increase cultural humility and expressed that they would need diversity and inclusion or cultural competency training to better collaborate with a CHW and apply participatory methods in program planning and evaluation.

“You can get all kinds of information on how to grow tomatoes or peppers or fruits...where our energy is going to be best spent is trying to develop a genuine relationship with those community health workers that's based on trust... from our perspective, we would be well served as an organization to come into these things with a lot of humility versus us coming in, as the so called experts and we're going to train you, community health worker, so that you can go out there and help your community, we would do well to listen more than we speak and take it from there.”  -Agent

Participants either asked about the compensation range for the CHW or stated that it may not be feasible to recruit and retain individuals from underserved communities and train to the level required for a successful garden-based, food systems program without compensation. A part-time paraprofessional with a flexible work schedule was widely recommended.

4.5 Discussion

The results of this evaluation demonstrate that the CHW model is a feasible model for VCE to implement for inclusive garden-based, food systems programming. The robust history of the CHW model working with underserved audiences (Kim et al., 2016) provides additional support to the assertions of VCE stakeholders that the CHW model can be a tool for inclusive
food systems programming. VCE participants immediately recognized the importance of food as culture and the potential of food to connect marginalized communities, as reflected in the work of Cachelin et al., (2019) and Eggert et al., (2015). The best practices shared by Gonzalez et al., (2021) for engaging BIPOC communities in Extension programming were expressed by interview participants in this evaluation, suggesting that the CHW model and integration of local knowledge is a good fit for the values of VCE. The recognition of food as culture and the amenability to participatory programming aligns with calls to shift Extension programming from traditional direct education to a partnership with community members (Strong et al., 2015; Washburn, 2017).

Food systems are complex and span many different VCE programming areas. If the CHW model were to be implemented throughout Virginia, VCE should consider integration of existing training materials across ANR and FCS programs. State leaders should construct a foundational training package but allow for some modifications at the local level, especially as pertaining to specific plants and foods to ensure cultural relevancy. The Extension Master Gardener, Master Food Volunteer, and Urban Agriculture Certificate program are positioned to provide training and curricula support. Many participants reflected on the opportunity garden-based food systems programming provides for interdisciplinary collaboration and recognized the need for teams to work on solutions to complex problems such as those found in the food system.

Extension is an important and relevant stakeholder for designing community solutions to complex societal problems. The frameworks for interdisciplinary programming within the Extension literature (Guion, 2010; Holland et al., 2019) are a testament to the growing demand for integrated programming.

Across the Extension system, professionals are developing methods to formalize diversity and inclusion efforts and build authentic capacity for Extension to equitably partner within diverse constituencies of the community (Bertsch et al., 2020; Chazdon et al., 2020; Walcott et al., 2020). In recognition of the structural barriers that often exclude underserved communities from volunteering (Southby et al., 2019), the prevailing recommendation among VCE stakeholders was that a CHW model should be implemented as a paid paraprofessional position. VCE stakeholders recognized that current master volunteer groups lack racial and socioeconomic diversity, and this internal recognition is supported by a 2016 national survey of Extension Master Gardener volunteers in which 93.7% respondents identified as white and more
than 70% of respondents reported an annual household income of more than U.S. $50,000 (Dorn et al., 2018). The CHW model has potential to connect racial and socioeconomically diverse audiences to VCE; however, participants stated that the CHW model will have more likelihood of success if it is implemented with monetary compensation for the CHW.

The Expanded Food and Nutrition Education Program (EFNEP) is a peer nutrition education program designed for audiences with low income (United States Department of Agriculture, 2017). Extension delivers EFNEP in each state with paraprofessional educators and the program is effective for improving diet-related health behaviors (Auld et al., 2015; Perkins et al., 2020). The CHW model is similar to the EFNEP peer education model in that educators are members of the communities they serve and are respected for their cultural knowledge and communication skills. In addition to the previously discussed potential of the CHW model to extend VCE programming to new audiences, the CHW model could supplement EFNEP education by providing food-systems focused programming. Food systems programming complements nutrition education by expanding the participants’ understanding of the context of dietary choices (Eng et al., 2020). The CHW may be able to work with the EFNEP paraprofessional and a food systems program design team to build a food systems education program that is culturally relevant and easily communicated to BIPOC audiences. Co-created food systems programs can complement the standardized EFNEP curriculum.

The title of “community health worker” was not found to be acceptable among VCE stakeholders for a CHW to work with food systems programming. Interview participants were often confused on the goals of CHW programming, stating how a CHW model could program on healthcare and disease topics. While these perceptions demonstrate a real and/or perceived need for VCE to provide health and disease programming, the perceptions also demonstrate that VCE must use a title other than “community health worker” for the CHW model to be applied to food systems programming to alleviate confusion on work expectations. Further research should explore the coupling of a CHW model to Extension health programming, especially as Extension expands efforts in community health and systems change (Harden et al., 2020; O’Hara-Tompkins et al., 2021).
4.6 Conclusions and Applications

The CHW model for garden-based food systems programming is an appropriate fit for the values and structure of VCE, provided the model is implemented with different terminology. Food systems is an interdisciplinary programming area that can improve the inclusion of underserved BIPOC audiences and advance equity through participatory programming. The values and structures of VCE are unique to Virginia. Other state Extension systems should explore the feasibility of a CHW model within their own values and structures. Programs that contain elements of the CHW model, such as deploying educators who share socio-cultural characteristics with the priority population, already exist in Extension throughout the United States for health promotion topics such as diabetes management, healthy lifestyles, and anger management (Hardison-Moody et al., 2011; Kaiser et al., 2009; Kaufman et al., 2017; Tiret et al., 2018). The implementation of a CHW model for garden-based food systems programming would integrate outreach and programming efforts already occurring across the Extension system to use a best practice for inclusion of underserved populations so that disparities in food systems can be addressed. The current climate is an opportune time to explore the CHW model for garden-based food systems programming as the Covid-19 pandemic and associated disruptions to the food system presents a focus on equity and inclusion and an opportunity to effectively reach underserved populations.
CHAPTER 4 REFERENCES


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CHAPTER 5: DISCUSSION

This chapter discusses the implications of the findings of Study 1: the systematic scoping review and Study 2: the feasibility evaluation by addressing each of the four thesis research objectives. The chapter concludes with limitations of the research and conclusions.

5.1 Research objective #1. Understand how the CHW model serving as an educator has been used in U.S.-based food systems interventions and to describe the type of interventions

The objective of the systematic scoping review was to identify U.S.-based food systems interventions that have been implemented with a CHW serving as an educator so that we could understand in what processes of the food system there is precedence in the literature for CHW-delivered education. While the CHW model has not been widely used as an educator in broad-lens food systems interventions, there is evidence of the use of the CHW model to deliver nutrition education within the preparation and consumption processes of the food system, shown by the 33 and 38 studies, that included food preparation and consumption education, respectively, in the scoping review. Of the studies that had education on food preparation and consumption practices, seven specified that foods were tailored to be culturally sensitive to the priority population (Carney et al., 2012; Cummings et al., 2013; Evans & Hudson, 2014; N. S. Islam et al., 2014; Kannan et al., 2010; Kattelmann et al., 2009; Kehm et al., 2017).

Incorporating cultural sensitivity in food systems education by tailoring foods to match the traditions of the priority population is important in creating inclusive food systems (Conti, 2006; Valenzuela, 2015; Yung & Neathway, 2020). Food is an important component of culture and community traditions. Food systems interventions among BIPOC priority populations are effective and acceptable when implemented within the food traditions of the community. (Bersamin, Izumi, Nu, O’Brien, et al., 2019; Satterfield et al., 2016). CHWs, given their lived experiences within the communities they serve, are well-positioned to share knowledge to design and deliver intervention information about culturally relevant foods and preparation methods (Bustillos & Sharkey, 2015). The preparation methods and a discussion of the foods themselves can be linked to relationships within the larger food system, such as production of the foods, in a garden-based educational setting (Stluka et al., 2019).

Cultural sensitivity in garden-based programming to reach BIPOC communities is gaining recognition in the academic literature (Eggert et al., 2015; Hartwig & Mason, 2016; Mangadu et al., 2017), thus reflecting the results of the scoping review; CHWs can link BIPOC populations to culturally relevant food systems programming. Although the scoping review did not find that
the CHW model has been widely used as an educator in broad-lens food systems education, the results do provide a map for future research and applications. Garden-based programming should be explored as a platform to deliver food systems education that spans most or all food systems processes. Study 2 of this thesis, a feasibility evaluation of the CHW model for garden-based food systems programming for VCE, is a starting point for the expansion of the CHW model into food systems education spanning many food systems processes.

5.2 Research objective #2. Identify populations reached by the CHW model as an educator through food systems interventions and populations within Virginia that VCE professionals believe are suitable to engage with CHW-delivered programming

The CHW model is well-established for reaching BIPOC communities in the U.S. for health education and promotion (Pasha et al., 2021; Ruggiero et al., 2012; Torres & Schmidt, 2022). The results of the scoping review and the feasibility evaluation demonstrate that the CHW model can also engage with BIPOC for food systems education. The populations reached through the studies in the scoping review share demographic characteristics of Virginia locales and organizations that VCE professionals suggested as potential participants in CHW-delivered food systems programming.

VCE professionals suggested faith-based organizations as communities that may be suitable to engage with CHW-delivered programming. Health promotion collaborations with faith-based BIPOC organizations are common and effective, especially within Black communities (Florez et al., 2020; Galiatsatos et al., 2016). Several studies included in the scoping review had components at or partnerships with faith-based organizations (Baker et al., 2006; Evans & Hudson, 2014; Goldfinger et al., 2008; Warren et al., 2009; Woodson et al., 2005). Faith-based organizations serving BIPOC communities may be suitable as physical locations for garden-based programming to connect VCE with underserved BIPOC communities through CHW outreach. Garden-based programs have been implemented at faith-based organizations serving BIPOC communities (De Marco et al., 2016; Derose et al., 2019), and faith-based CHW programs have been effective in improving health behaviors among congregant-participants (Lancaster et al., 2014; Tettey et al., 2017). Faith-based communities are often pillars of local community systems and thus are important in local food systems (Mann et al., 2020; Sharpe et al., 2018; Van Wieren, 2017). VCE should explore the coupling of faith-
based gardening programs and the CHW model to connect with underserved BIPOC communities in food systems programming.

Interview participants also recommended low-income housing managers as partners to recruit or serve as CHWs for VCE garden-based programming, with SNAP-Ed field faculty particularly eager to work with housing managers to develop a CHW program. BIPOC communities and low-income status are more likely to intersect than a white racial identity and low-income (American Psychological Association, 2017; Simms et al., 2009). This intersectionality of multiple marginalized demographics is important to understand when examining diversity and inclusion. Plescia et al. (2008) and Quintiliani et al. (2014), studies included in the scoping review, partnered with low-income housing managers to recruit CHWs for food systems interventions. VCE interview participants were confident in their ability to collaborate with low-income housing managers to develop a garden-based CHW program and many shared stories of previous food systems collaborations with housing managers. A pilot test of a garden-based CHW program could be conducted in collaboration with low-income housing communities in Northern Virginia, as this region was often recommended as a location for a pilot test and interview participants based in Northern Virginia were particularly amenable to the CHW model for VCE. The Virginia Department of Health has a CHW program for health outreach to residents of low income housing in Richmond (Obasanjo et al., 2022), and VCE should explore potential partnerships with this established CHW program. The Empower Ocala garden project, a garden-based nutrition education program delivered through Florida Extension agents (Moore et al., 2014), may provide guidance on practices to establish a gardening program with a low-income housing community, including the importance of a community liaison.

Cultural community center directors were the third group of community partners that interview participants recommended engaging with to recruit CHWs and establish a garden-based program. This suggestion reflects the perception of VCE professionals that a connection with a community champion is critical to reach underserved communities. VCE professionals stated that the community center directors were champions for their communities and directors may be able to connect VCE with individuals to serve as CHW and to participate in programming. Many of the educational sessions conducted in the scoping review studies were held at community locations with environments that were welcoming to participants (Barnidge et al., 2015; Connell et al., 2015; Horowitz et al., 2011; N. S. Islam et al., 2014; Staten et al., 2005).
Community centers can be settings well-positioned for food systems programming, as they may have kitchen space for food activities and/or property on which a garden can be established for teaching and learning.

State VCE leaders were united in recommending that the CHW model be explored through a pilot study in both an urban and rural area. Through a needs assessment, VCE should identify locales that are amenable to engage in garden-based food systems programming with a CHW model and then work with the local VCE team to build a CHW program. CHW programs often include some elements of community-based participatory design, evaluation, or other elements of community-driven determination (Cherrington et al., 2010; Hohl et al., 2016) and the results of the feasibility evaluation demonstrate that VCE professionals understand the importance of participatory approaches for CHW programs. VCE should survey FCS and SNAP-Ed agents to determine who may be interested in working with a pilot CHW program. ANR agents in interested locales must also be willing to support a CHW program, as their gardening and horticulture expertise will be important in training the CHW and the establishment of the garden program. The local agent team and CHW should work with state level faculty to tailor the curriculum and other programming logistics to be culturally relevant to the priority population.

The local team should determine how to best recruit a CHW. Interview participants based in communities were confident in their network of community partners and their collaborative ability to recruit a CHW. Agents stated that they would first connect with leaders of community organizations that often serve BIPOC individuals, such as faith-based communities, low-income housing managers, and cultural community center directors to explore how the community organization could assist in advertising or recruiting for a VCE CHW position. Additional examples of community partners that may connect VCE with potential CHWs were: local Department of Social Services offices, hospitals, schools, parent associations, and community colleges. Interview participants recommended that the highest-priority skills for potential CHWs should be the individual’s ability to connect within their community, to communicate, and to have a service mindset. Interview participants stated that VCE has sufficient capacity to train a CHW in the technical aspects of gardening and that an incoming CHW would not need to have existing gardening skills.
5.3 Research objective #3. Explore how the CHW model aligns with VCE values and programming goals

The feasibility evaluation found that the CHW model fits within the structure and values of VCE. Not only are food systems innovations a current global and national focus for research and policy (Rose et al., 2022; Slater et al., 2022; Stefanovic et al., 2020), and especially in the context of the Covid-19 pandemic (Cardarelli et al., 2021; O’Connell et al., 2021), but VCE has several initiatives that align with the goals of a CHW model for garden-based food systems programming. The Community, Local, and Regional Food Systems team operates multi-dimensional programs designed to enhance the viability, resiliency, and inclusion of the Virginia food system (Bendfeldt et al., 2019; Virginia Cooperative Extension, 2022; Virginia Tech, n.d.). VCE conducted a community food equity assessment for Harrisonburg in 2017 and provided several recommendations, some of which are directly applicable to a garden-based CHW program: that small-scale urban farming opportunities be increased and that everyone in the Harrisonburg community have access to education on food equity and opportunities for development within the local food system (Bendfeldt & Schermerhorn, 2017). Similar assessments could be conducted in additional Virginia locations as a component of a needs assessment to develop a pilot CHW program. The results of the Harrisonburg assessment could also be used to develop a pilot CHW program in that area if the local agent team has interest. The Virginia Extension Master Gardener program convened a task force on accessibility and inclusion in 2021, and the results of this thesis may complement initiative of the task force. Many efforts by Extension professionals are not published, however, a 2021 news story about VCE gardening outreach efforts across Virginia offers examples of how VCE works to provide accessible gardening education and opportunities to Virginians (Johnson, 2021).

The national mission of the Cooperative Extension System is to effect positive change in communities by bringing research-based knowledge to people where they live and work (National Institute of Food and Agriculture, n.d.). Formally established in 1914, Extension has integrated into U.S. communities for 100 years to translate university research into local impacts (Croft, 2019), however, research has demonstrated that the current reach of Extension programming is unequal for BIPOC audiences (Farella et al., 2021; Webster, 2021). There is not data publicly available that shows unequal inclusion of BIPOC audiences in VCE programs, however, many interview participants in the feasibility evaluation stated that they struggle to reach BIPOC communities.
VCE has a goal to advance diversity and inclusion in their programming and professional workforce, as evidenced by the June 2020 call to action for racial equity published by the Virginia Tech College of Agriculture and Life Sciences (Thorpe & Grant, 2020). In addition, the need to increase volunteer diversity has been recognized by VCE leadership and is reflected in the November 2021 position posting for a VCE volunteer engagement specialist (Virginia Cooperative Extension, 2021). The CHW model fits within the VCE values of diversity and inclusion, as the CHW model is an effective tool for inclusive programming with diverse BIPOC audiences (Scott et al., 2018).

While this thesis explored the role of the CHW as a food system educator, we did not examine how the CHW could function as a community food system change agent. Research should progress to include studies on the role of CHWs as community food system change agents and how the CHW model could influence policies, systems, and environments to create more health-promoting and equitable food systems. Research that works with CHWs as community food system change agents would support many of the values-based impacts and processes in the VCE model of community, local, and regional food systems (Niewolny et al., n.d.). Future research could also explore how VCE could work in the nexus of food systems and climate adaptation through the lens of diversity and inclusion. BIPOC communities often experience disproportionately poor outcomes of climate change (G. S. Smith et al., 2022) and the CHW model could be explored in potential roles of climate advocacy and education.

5.4 Research objective #4. Understand integration and programming logistics of the CHW model into VCE for garden-based food systems programming, including how the VCE Master Gardener and Master Food Volunteer programs align with a CHW model

The subheadings in this section are logistical considerations for VCE in adopting the CHW model for garden-based food systems programming. These considerations may be a tool for VCE program planners.

5.4.1 CHW model as interdisciplinary connector

The VCE model of Community, Local, and Regional food systems highlights the interdisciplinary nature of food systems programming by depicting food system processes such as “grow food” and “consume” in a circular image (Niewolny et al., n.d.). Food systems are inherently interdisciplinary and VCE interview participants supported the results of the scoping review by stating that the CHW model for garden-based programming can connect traditionally separate programming areas. The studies in the scoping review that spanned the greatest number
of food systems processes were garden-based programs (Barnidge et al., 2015; Carney et al., 2012; Mello et al., 2017; Stluka et al., 2019; Warren et al., 2009).

The initial list of VCE stakeholders to interview for the feasibility evaluation did not include ANR agents or ANR state faculty, except for Extension Master Gardener administrators. The initial list did include VCE specialists with food systems expertise and FCS and SNAP-Ed professionals. Initial interviews were conducted with master volunteer program administrators and food systems specialists. Within the first several interviews conducted, participants recommended ANR agents and state faculty as interview participants, thus demonstrating the interdisciplinary potential for the CHW model in garden-based programming. While the structures of Extension remain segmented across FCS, ANR, and 4H, there is growing literature that inter- and transdisciplinary projects are being implemented to address complex community needs (Bitsch & Thornsbury, 2010).

FCS participants stated that they would have to collaborate with ANR professionals to appropriately train a CHW in gardening topics and to design a garden-based program. Based on the Extension literature, some agents are overwhelmed with programming responsibilities (Forstadt & Fortune, 2016; Russell & Liggans, 2021) and this sentiment was reflected by both VCE agents and state faculty. Garden-based programs require a significant investment of time and resources to design and implement (Drake & Lawson, 2015a, 2015b). State faculty and agents were excited about the potential for a CHW to serve as a champion, ambassador, and advocate for a garden, thus assisting agents by relieving the time commitment of managing garden programs.

The title “community health worker” was not found to be acceptable among interview participants and it was suggested that a different title be used for a food-systems focused CHW. The CHW model has many titles in the health education literature (Olaniran et al., 2017), and VCE should explore the acceptability of titles that specify the gardening and food systems focus of the VCE CHW position. Titles such as “garden outreach educator” or “community food worker” may more accurately reflect the position responsibilities of a VCE CHW. In addition, VCE should ensure that the CHW title is relevant within the cultural traditions of the priority population.

Interview participants stated that due to the complexity of food systems and the interdisciplinary potential of the CHW model, that a VCE program team for CHWs may be
appropriate. The program team could be a standalone CHW program team or could be a sub-
team that works within the existing Community, Local, and Regional Food Systems team. This
recommendation may have been influenced by the title “community health worker” used in the
semi-structured interview scripts and so the recommendation should be verified as VCE explores
new titles that do not include “health.”

5.4.2 Equal partner in program design and evaluation

The CHW model is a bridge to underserved communities and is proven as an outreach
model to include culturally sensitive elements in health education (Ayala et al., 2010; Berini et
al., 2021; Rankin et al., 2022). The documented use of the CHW model as a partner across all
phases of health education program planning and evaluation is nascent (Coulter et al., 2020).
Several of the unexpected outcomes of CHW-delivered food systems education interventions in
the scoping review explained the role of the CHW as program design partners (Flood et al.,
2015; N. Islam et al., 2013; Treiber et al., 2016). These results, coupled with the CHW model
hallmark of local knowledge, helped to inform semi-structured interview questions for VCE
professionals on how to best incorporate the local knowledge of the CHW into garden-based
food systems programming.

Interview participants stated that a key element of the participatory design process should
be the plants and foods included in a garden or gardening curriculum. The plants and foods must
reflect the culture of the priority population and the CHW, as a member of the priority
population, is well-positioned to share that cultural knowledge and work with VCE to design a
culturally appropriate curriculum.

Extension educational programs are often based in a curriculum, however, VCE
interview participants recognized how a CHW program may require a new food-systems based
curriculum and that the curriculum could be developed to be culturally sensitive through
participatory methods. Nationally, there are several examples of participatory food systems
program planning with positive effects among underserved priority populations (Bersamin,
Izumi, Nu, O’Brien, et al., 2019; Budowle & Porter, 2022; DePhelps et al., 2019; Healy &
Dawson, 2019; Weissman & Potteiger, 2020). These examples may provide guidance and
inspiration to VCE for participatory design of a CHW food systems program. Michigan State
University Extension developed a curriculum to prepare Extension field faculty to build
community-based health research projects (Eschbach et al., 2019) and this curriculum, or an
adapted version, may be a useful tool in building the capacity and confidence of VCE field faculty to engage with participatory food systems programming. One of the most important elements of a participatory planning process is commitment to an equitable community-academic partnership at each stage of the planning process, beginning with ideation (Glover & Silka, 2013). The consensus recommendation of VCE stakeholders to use participatory methods indicates that VCE professionals are well-positioned to build an authentic partnership with the CHW that will support successful implementation of participatory program design and evaluation.

5.4.3 Roles of Extension Master Gardener and Master Food Volunteers

The Extension Master Gardener and Master Food Volunteer programs could support the CHW garden-based program through assistance with training for the CHW and program delivery. The VCE Master Gardener program has over 5,000 volunteers and includes training on many aspects of gardening outside of food production: ornamental plants, lawn care, and wildflower management (Virginia Cooperative Extension, n.d.-a). While Stluka et al., (2019) trained existing Extension Master Gardeners in South Dakota to serve as a CHW for a garden-based food systems educational program, VCE professionals felt that Extension Master Gardener volunteers should be included in CHW programming as training and program aides, if they have interest. Extension Master Gardener volunteers have assisted with community food system projects in other state Extension systems (Bennett et al., 2013; Kowalski & Barrett, 2020; Murphy, 2013), thus supporting the assertion of some VCE agents that the Extension Master Gardener volunteers are critical in community food security. A key characteristic of the CHW model is that CHWs share sociocultural characteristics with the communities they serve (American Public Health Association, 2009). VCE interview participants stated that the Extension Master Gardener program often does not represent all subsets of Virginia communities and that this likely impacts perceived accessibility of Extension programming for BIPOC audiences. The lack of diverse racial representation within Extension Master Gardener programs was addressed by Randle, (2015) in the Vegetable Gardener Certification program, a modified Extension Master Gardener program designed to teach food production skills for rural, low-income, and predominantly Black communities. Collaborators at Tuskegee University Extension and Alabama Extension modified the Extension Master Gardener curriculum from 50 hours to 20 hours with a focus on vegetable production in Macon County, Alabama in response to
community interest for Extension Master Gardener training for food access. The Vegetable Gardener Certification program had a fee of $20, more than $100 less than the course fee for the Extension Master Gardener training. Vegetable Gardener participants were often sponsored by community organizations with aspirations to establish a community garden. Program evaluation demonstrated positive effects for the volunteers and advanced Extension knowledge of adaptations that can increase programming accessibility for underserved communities. Elements of the Vegetable Gardener Certification program may be helpful in designing the VCE CHW program.

While data on the demographics of the Virginia Master Food Volunteer program is not publicly available, many interview participants stated that the Master Food Volunteers in their communities were not racially diverse. The Master Food Volunteer program is less expansive than the Extension Master Gardener program, as evidenced by the several field faculty interview participants who stated that they work with Extension Master Gardeners but not Master Food Volunteers in their area. Some agents shared that they work with individuals who are trained as both Extension Master Gardeners and Master Food Volunteers. Program planners for a VCE CHW garden-based food systems program should assess the availability and willingness of Master Food Volunteers to partner with a CHW in each community. One aspect of locality that VCE program planners should consider is the interest of local master volunteers in partnering with the CHW program. The interest caveat further supports the assertion of many interview participants and existing CHW literature that successful programs should be developed with local needs and input at the center (Farquhar et al., 2008; Peretz et al., 2020; Scott et al., 2018).

Agent interview participants stated that a CHW may increase the recruitment of BIPOC individuals into the Virginia master volunteer programs. Agents recognized that the current underrepresentation of BIPOC individuals in the Extension Master Gardener and Master Food Volunteer programs may be a barrier to access for BIPOC individuals to join the programs. Interview participants suggested that a CHW could partner with existing master volunteers to deliver programs with BIPOC communities, thus potentially expanding the connections of existing master volunteers within BIPOC communities and potentially increasing BIPOC participation in the master volunteer programs.

Interview participants believed an individual who represents BIPOC identities is an important element to expanding reach with BIPOC communities. A CHW could assist training
current master volunteers to work within BIPOC communities and could help facilitate connections between VCE and key stakeholders within BIPOC communities. Interview participants stated that the social and cultural connections a CHW could share with VCE are a key element of expanding reach within BIPOC communities and building relationships that could eventually grow into increased diversity in master volunteer programs.

4.4.4 Training elements for a CHW program

The CHW model is recognized as a critical strategy in addressing health disparities in the U.S. (Brownstein & Allen, 2015) and interview participants agreed that the CHW model within Extension may increase equity within local food systems. Advancement of equity and inclusion within local food systems is a potential pathway to a reduction in health disparities (Cachelin et al., 2019). CHWs in the U.S. often lack professional support and opportunities for training and advancement (Dunn et al., 2021). VCE interview participants stated that the training process for a CHW should be explicit in the expectations of the CHW position within VCE, including what resources are available to support the professional and programming goals of the CHW. Although several groups have started to create professional development and training opportunities for CHWs (Bloss et al., 2022; National Center for Chronic Disease Prevention and Health Promotion, 2022; Vadaparampil et al., 2022), these efforts are not expansive enough to support the broad scope of practice of CHWs in the U.S. and to advance the CHW profession to a cornerstone of the U.S. public health force (Rahman et al., 2021). VCE could support the sustainability of the CHW model by including professional development opportunities for the CHW position.

The scoping review did not examine training processes to prepare the CHWs to deliver food systems interventions. While the academic literature lacks information on effective training processes for CHWs (Adams et al., 2020; Scott et al., 2018), it is important to note that there are many nonprofit, community, and state organizations with CHW training and certification programs (National Association of Community Health Workers, 2022). Academic literature that has been published on CHW training has a consensus recommendation for standardized and formal training opportunities for CHWs (Alvillar et al., 2011; Tucker et al., 2018). The gap in the academic literature on training processes for CHWs is a gap that VCE is well-positioned to fill. Extension as an organization has an expert knowledge on community-based educational methods. A CHW program within Extension could advance the knowledge of effective CHW
programming by combining external knowledge of elements of successful CHW programs with the community education expertise of Extension professionals.

VCE agents and state faculty, perhaps due to their employment within the Cooperative Extension system and expertise with developing and delivering curriculum-based programs, shared several elements that VCE must consider when designing the CHW training process including time of day of training sessions, setting, language of delivery, instructional methods, and cultural competency of curriculum and administrators. The recognition of creating a CHW training process through the lens of accessibility and inclusion is an indication that the CHW model is a good fit for VCE.

Training for the VCE CHW could be adapted from existing VCE curriculum, including the urban agriculture certificate program, the Master Food Volunteers, and the Extension Master Gardeners. Interview participants stated that the CHW could attend Extension Master Gardener training courses on modules relevant to food gardening and if the courses are in a setting accessible to the CHW. This attendance would provide gardening information to the CHW and provide an opportunity for the CHW and Extension master gardeners to form relationships. Interview participants suggested similar arrangements for the CHW and Master Food Volunteer and urban agriculture certificate training. Interview participants also suggested that the training for a CHW include attendance at existing VCE events and programs in addition to classroom work.

5.4.5 Cultural competency training for VCE professionals

The need for cultural competency training for VCE professionals emerged from the interview data as an essential programming logistic for a VCE CHW. VCE stakeholders across disciplines stated their desire for training on how best to work with individuals with cultural identities different than their own. If the CHW model is implemented within VCE, program leaders must ensure that established VCE professionals are properly equipped with tools of cultural competency to create a comfortable, welcoming, and generative environment for the CHW position. The Extension literature contains both formal methods of diversity and inclusion outreach (Bertsch et al., 2020; Chazdon et al., 2020; Walcott et al., 2020) and descriptions of training in cultural competence for Extension professionals (Moncloa et al., 2019; Wille et al., 2019). Considerations for training culturally competent healthcare providers (Corsino & Fuller, 2021; C. Smith et al., 2022) and community development practitioners (Gruidl & Hustedde,
2015) are abundant. Although an exploration of 4H programming was outside the scope of this thesis, 4H has substantial literature on diversity and inclusion within its programming (Farella et al., 2021; LaVergne, 2013; Webster & Smith, 2018). VCE could integrate diversity and inclusion best practices from Extension systems, such as 4H, and cultural competence training in external disciplines to construct training to support VCE professional’s work with the CHW model.

Given that the CHW model was recommended as an interdisciplinary connector for traditionally separate programming areas, VCE should consider how the diversity and inclusion efforts within 4H can inform cultural competence needs of professionals engaged with 4H programming.

This connection of adult programming areas with 4H based on cultural competence may provide additional support to the programming outreach of the CHW for garden-based food systems programming. School gardens are a common community food system intervention and are often supported by expertise of Extension agents (Bolshakova et al., 2018; Emm et al., 2019; Greer et al., 2019). School gardens can expand into food systems programming by incorporating nutrition and agriculture education and are a leverage point to include families in food systems education (Charlton et al., 2021). Though school gardens were outside the scope of the feasibility assessment, school gardens were repeatedly mentioned by interview participants as appropriate settings for CHW garden-based food systems programming. Many studies included in the scoping review included families and had school-based components (Bachar et al., 2006; Buscemi et al., 2019; Crespo et al., 2012; de la Torre et al., 2013). The prevalence of school gardens in the results of both studies show that schools are a community institution that cannot be excluded from food systems programming. Prior to the Covid-19 pandemic, farm to school programs existed in 42% of U.S. school districts (Ralston et al., 2017), and this popularity supports the perceptions of interview participants that schools should be included in community food systems efforts. School gardens may be able to provide settings for garden-based food systems programming that is comfortable and welcoming to populations engaging with the CHW.

5.4.6 Compensation

The implementation of the CHW model as a paid paraprofessional was the prevailing recommendation from VCE stakeholders across disciplines. Although renumeration for the CHWs in the scoping review studies was not examined as a variable, some descriptions of the CHWs delivering the food systems interventions included mention of the CHW’s employment
status as promotoras or CHWs with organizations working with the intervention (Ayala et al., 2015; Bachar et al., 2006; Balcázar et al., 2012; Buscemi et al., 2019; Cullen et al., 2010; Dollahite et al., 2014; Flood et al., 2015; Forster-Cox et al., 2010; N. Islam et al., 2013; N. S. Islam et al., 2013, 2014; Staten et al., 2005; K. R. Wilson & Rodriguez, 2019). In a 2014 review of CHW policies, the CDC found emerging evidence on grants and incentives to support the CHW workforce (National Center for Chronic Disease Prevention and Health Promotion, n.d.). In 2020, the National Association of Community Health Workers reported that CHW programs often struggle with sustainability and long-term integration because of uncertain funding and lack of professional development opportunities for the CHW beyond the term of a grant (Rush et al., 2020). Some state healthcare systems are working to institutionalize the CHW model in recognition of the significant impact CHWs can have to reduce health disparities (Allen et al., 2015).

VCE, like other state Extension systems, is a unique entity in that it is both a state and federally funded organization and a community-serving network deeply embedded within Virginia communities (Croft, 2019; Fornash, 2011). Human resources and business structures within VCE already exist to support part-time paraprofessionals and integration of the CHW model into these structures should be explored, especially in the context of collaborations with the master volunteer programs. Interview participants expressed their recommendations for a compensated CHW model because they believed that renumeration will be critical in recruiting and retaining individuals who represent underserved communities.

CHWs often train for a specific intervention and may also participate in ongoing training with an organization delivering the intervention or ongoing services (Olaniran et al., 2017). Current training requirements for the VCE Extension Master Gardener and Master Food Volunteer programs are 50 and 30 hours, respectively, in addition to required volunteer hours of 50 and 30 hours per year (Virginia Cooperative Extension, n.d.-a, n.d.-b). Serving as a master volunteer is a significant time commitment, and individuals with one or more compensated jobs may find it difficult to have enough free hours to train and serve as a master volunteer. Demographic surveys of master volunteers across many state Extension systems show that the majority of master volunteers are retired (Dorn et al., 2018; J. C. Wilson & Newman, 2011), meaning that the retired individuals may have more free time to volunteer as they are not required to attend a compensated job. Motivations for serving as a CHW and an Extension
master volunteer are similar. A CHW program for VCE garden-based food systems programming would require extensive training for the CHW, similar to the master volunteer training. VCE interview participants stated that the impacts of the CHW program would likely be greater if the CHW were compensated, as compensation may allow members of underserved audiences the justification to master volunteer programs lack racial and socioeconomic diversity (Cunningham et al., 2021; Dorn et al., 2018; Takle et al., 2016). By implementing the CHW model as a paid paraprofessional position, VCE may eliminate a barrier to individuals with diverse racial and socioeconomic identities engaging with VCE programming.

The research in this thesis is the first step in the adaptation of the CHW model for VCE. Additional steps are needed prior to implementation of the position. Following the recommendations of interview participants, VCE must assess how a paid paraprofessional CHW model could integrate with master volunteers. The expectations of the CHW position must be clearly established so they are not competitive with the master volunteers or paraprofessional program assistants. Program planning for a CHW position should assess how implementation of a compensated CHW position may affect recruitment of master volunteers and should take care that the CHW position not compete with master volunteer recruitment. VCE should explore funding models that are appropriate for the local expectations and context of the CHW position. District directors did not participate in this evaluation but must be included in future assessments of the CHW model, especially in those involving compensation structures. SNAP-Ed participants recommended that FNP create a gardening and food systems focused program assistant position and target recruitment for the position from BIPOC communities. Some agent interview participants recommended that VCE partner with community-based organizations, private partners, or other public entities to establish and maintain funding for a CHW position. Grants were recommended as a potential avenue for CHW funding, however, there was a concern that a CHW program requires long-term continuity to be effective and that a grant lifecycle may not allow for this continuity. Interview participants agreed that a part-time position with flexible hours to deliver programming to best serve the needs of a community would allow a CHW to effectively meet the expectations of the position.
5.5 Limitations

Although interview participants were recruited from each VCE planning district and urban, suburban, and rural areas of Virginia, a snowball sampling method was used after the initial list of participants was contacted. It is likely that perceptions of a CHW model were excluded from the feasibility evaluation due to the sampling method. The proposed research had intended to recruit participants until data saturation was reached, however, due to the exploratory nature of the research objectives and the role of individual perceptions in the dataset, it was determined that data saturation was not a realistic goal for the feasibility evaluation. Initial interviews with VCE agents revealed that data saturation was an unrealistic objective due to the diverse nature of VCE agents and the local situation in each Virginia county and Extension office. One month into the data collection period, we began strategically recruiting agents to ensure that each VCE planning district and urban, suburban, and rural areas of Virginia were represented. Interview participants recommended their colleagues and fellow food systems-focused peers. Future evaluations should assess the CHW model within VCE planning districts. No district directors participated in interviews. An evaluation specific to a planning district should include all agents and the district director.

4H and other youth-focused professionals were excluded from this study, however, many interview participants stated that garden-based programming is a good fit for youth and can easily extend to families with children. Likewise, initial interviews excluded school gardens from the scope of questions, however, school gardens were repeatedly mentioned by participants as established community settings that could be a programming area for the CHW.

A more robust definition of food systems is needed to advance the research presented in this thesis. The two studies in the thesis used the definition of food systems presented by Neff et al. (2009): all of the processes of production, distribution, marketing, access, preparation, consumption, and disposal. Future research should study food systems through a systems lens that considers the economic, environmental, and social connections of a food system.

This document may be a tool for VCE program planners in designing and implementing a CHW program for garden-based food systems programming, however, it is limited in that it is an academic work. Academia is rooted in structures that have historically excluded BIPOC populations (Chee et al., 2019; De Welde, 2017; Turner et al., 2008), and thus it is likely that many CHW and food systems interventions were not identified in the scoping review, despite
our efforts to include gray literature sources. Likewise, many efforts of Extension professionals are not published and therefore may not be included in the literature review and discussion sections of this thesis. This thesis may guide VCE in CHW programming, but input from field faculty and community members will be essential to the implementation of the CHW model.

Our finding that the title of “community health worker” was not acceptable for a food-systems focused individual may have influenced the perceptions of VCE interview participants on how to best integrate a CHW. Interview participants suggested that the CHW model fits with FCS programming, however, the inclusion of the word “health” in interview questions may have biased answers, because current health programming is within FCS. Food systems and garden-based programming may fit within ANR structures and VCE should explore how a title other than “community health worker” for a food-systems focused individual may change the integration of the CHW model.

5.6 Conclusions

The CHW model can extend elements of food systems programming to underserved BIPOC audiences, and despite the lack of published evidence of the model’s use in broad-lens food systems programming, the model is promising as an interdisciplinary educational outreach for BIPOC communities. VCE has partnerships that may help with connecting potential CHW and audiences with VCE and the CHW model is a fit for the values and goals of VCE. There is a focus on food systems and increasing diversity and inclusion within current VCE programming, making the current climate a feasible one in which to plan and implement a CHW model for garden-based food systems programming.
CHAPTER 5 REFERENCES


low income women participating in an Expanded Food and Nutrition Education Program intervention study. *Appetite, 55*(2), 305–310. https://doi.org/10.1016/j.appet.2010.06.017


Kehm, R., Hearst, M. O., Sherman, S., & Elwell, K. L. (2017). The FAV-S Pilot Study: Increasing Self-Efficacy and Fruit and Vegetable Intake Among Somali Women and


APPENDIX A: SEARCH METHODOLOGY FOR SYSTEMATIC SCOPING REVIEW

A.1 Search Strategy

The objective of the research is to determine the scope of CHW as educators or facilitators and preliminary searches determined that programs which use CHW in these leadership positions will use their term for CHW in the title and/or abstract of the paper.

A.2 Search Terms

People:
("promotor* de salud" OR "promotor*" OR "health promoter*" OR "community health work*") OR "paraprofessional*" OR "peer educat*" OR "peer support*" OR "peer health educat*" OR "peer health advis*" OR "peer advis*" OR "community health work*" OR "community health advis*" OR "community volunteer*" OR "health volunteer*" OR "lay health work*" OR "health educat*" OR "lay health educat*" OR "community health aide*" OR "village health work*" OR "village health promoter*" OR "village health guide*" OR "village health helper*" OR "health helper*" OR "community health navigat*" OR "community health educat*" OR "community wellness coach*" OR "community health advocate*" OR "community food work*" OR "community agricultur* work*" OR "community health agent*" OR "community health assist*" OR "community nutrition work*" OR "community health aide*" OR "Extension volunteer*" OR "food volunteer*" OR "food educator" OR "master food volunteer*" OR "master wellness volunteer*" OR "community educat*" OR "master compost*" OR "community health extension work*" OR "health coach*" OR "public health aide*" OR "rural health work*" OR "nutrition volunteer*" OR "community-based work*" OR "train the trainer")

Content:
("Sustainable food system*" OR "food system*" OR "local food system*" OR "community food system*" OR "alternative food network*" OR "alternative food system*" OR "local food*" OR "civic agricultur*" OR "regional food system*" OR "community nutrition*" OR "alternative food initiative*" OR "food initiative*" OR "food environ*" OR "food sovereignty" OR "short* food supply chain" OR "community garden*" OR "garden*" OR "civic agricultur*" OR "urban agricultur*" OR "urban garden*" OR "community agricultur*" OR "community kitchen*" OR "food access*" OR "consumer food safety" OR "home food safety" OR "food safety educat*" OR "farm* market*" OR "compost*" OR "food waste" OR "food demo*" OR "community supported agricultur*" OR "community farm*" OR "meal plan*" OR "cooking technique*" OR "recipe* prepar*" OR "teaching garden*" OR "school garden*" OR "food resource manage*" OR "food provision*" OR "food preserv*" OR "home canning" OR "cooking intervention" OR "nutrition intervention*" OR "food educat*" OR "garden* educat*" OR "food cooperative*" OR "food hub*" OR "food bank*" OR "food pantry*" OR "food assist*")

Content limiting:
("developing countr*" OR "cyto*" OR "cyclospor*")
Limit to English results
Limit to United States where applicable

The MeSH “Community Health Workers” was used to search the PubMed database.
A.3 Gray Literature Search

The ProQuest theses and dissertation and social science and education databases were searched on December 17, 2020 using the title and abstract strategy detailed in the search appendix. The social science and education database yielded 227 results, however, only 200 were downloaded to the returned reference folder as the final 27 references were not in English.

The registry of clinical trials administered by the US National Library of Medicine at clinicaltrials.gov was searched using the strategy applied to CDC Stacks. Titles and abstracts were screened for relevancy by the primary investigator (MD) and downloaded to the returned reference collection.

The Centers for Disease Control and Prevention (CDC) reference collection: CDC Stacks was searched by MD on December 16, 2020. The term “community health worker” was used to search all collections because it is a commonly used term to describe the model of interest. A search for “food system” yielded results that were largely irrelevant. Filters were applied to the search by selecting all United States geographic subjects. MD screened all returned titles and abstracts and downloaded relevant references not already included in the returned citations. Relevancy was determined by the inclusion and exclusion criteria.

Additional resources were included in the gray literature search by performing a Google search of “food systems and public health” and identifying relevant resource sets on the first two pages of results. The Center for a Liveable Future at Johns Hopkins University and the UC Davis Sustainable Agriculture Research and Education Program were selected to be hand-searched. The Center for a Liveable Future resource page at https://clf.jhsph.edu/publications was hand-searched on December 17, 2020 by MD. No search terms were used. A search filter provided by the institution excluded letters or public comments and the remaining 204 resources were reviewed for relevancy using the inclusion and exclusion criteria. Seven references were selected by MD and added to the Zotero collection. An Excel spreadsheet record is available upon request.

The 148 available resources on the UC Davis Sustainable Agriculture Research and Education Program were searched using the method described above by MD on December 17, 2020. One reference that was not already included in the returned results was added to the Zotero collection. The 2013 Community Food Systems bibliography was collected as a review resource and was included in the review of reference lists of returned reviews. The record of the search of the 148 references is available in the gray literature search spreadsheet and the record of the review of the community food systems bibliography is available in the returned reviews spreadsheet upon request. The resource page for the Sustainable Agriculture Research and Education Program can be found at https://sarep.ucdavis.edu/resources.

Two professional organizations were selected for inclusion in the gray literature search in consultation with the author team. The American Planning Association and the American Public Health Association were on the author team of the shared principles of a community food system (2010). A record of the search of both organizations can be found in the gray literature search spreadsheet. The Planning and Community Health reports in the completed project sections of Complete Streets, Growing Food Connections, Healthy Communities through Collaboration, Planning for Food Access, Planning for Public Health, and Urban Agriculture were searched on December 17, 2020 by MD using the method described above. The Community Health blog was
also searched. The resources of the American Planning Association can be found at https://www.planning.org/nationalcenters/health/.

The Reports and Issue Briefs section of the American Public Health Association (APHA) was searched by MD using the method described above on December 17, 2020. The newspaper of APHA, the Nation’s Health, was reviewed by searching “community health worker” and then subsequently screening the 59 returned citations. Any relevant citations available through the [REMOVED FOR BLIND REVIEW] library system were added to the reference collection. The search included newspaper issues from November 2008 to November/December 2020. The resources of the APHA can be found at https://apha.org/publications-and-periodicals/reports-and-issue-briefs.

A.4 Secondary Search

A secondary search was conducted on December 22, 2020 in the Scopus and Web of Science databases using CHW terms uncovered in the first search on December 16-17, 2020. The secondary search in Scopus returned twelve references and eleven references were returned from Web of Science. The searches and additional terms are listed below. Scopus and Web of Science were selected because of the breadth of their coverage.

Secondary Search Terms
(“peer facilitat*” OR “peer coach*” OR “peer helper*” OR “peer-led” OR “peer leader*” OR “peer assist*”)

Scopus Secondary Search:
TITLE-ABS-KEY ("peer facilitat*" OR "peer coach*" OR "peer helper*" OR "peer-led" OR "peer leader*" OR "peer assist*") AND TITLE-ABS-KEY ("Sustainable food system*" OR "food system*" OR "local food system*" OR "community food system*" OR "alternative food network*" OR "alternative food system*" OR "local food*" OR "civic agricultur*" OR "regional food system*" OR "community nutrition*" OR "alternative food initiative*" OR "food initiative*" OR "food environ*" OR "food sovereignty" OR "short* food supply chain" OR "community garden*" OR "garden*" OR "civic agricultur*" OR "urban agricultur*" OR "urban garden*" OR "community agricultur*" OR "community kitchen*" OR "food access*" OR "consumer food safety" OR "home food safety" OR "food safety educat*" OR "farm* market*" OR "compost*" OR "food waste" OR "food demo*" OR "community supported agricultur*" OR "community farm*" OR "meal plan*" OR "cooking technique*" OR "recipe* prepar*" OR "teaching garden*" OR "school garden*" OR "food resource manage*" OR "food provision*" OR "food preserv*" OR "home canning" OR "cooking intervention" OR "nutrition intervention*" OR "food educat*" OR "garden* educat*" OR "food cooperative" OR "food hub" OR "food bank" OR "food pantry" OR "food assist*") AND NOT ("developing countr*" OR "cyto*" OR "cyclospor*") AND (LIMIT-TO (AFFILCOUNTRY, "United States")) AND (LIMIT-TO (LANGUAGE, "English"))

Web of Science secondary search:
TOPIC: ("peer facilitat*" OR “peer coach*” OR “peer helper*” OR “peer-led” OR “peer leader*” OR “peer assist*”) AND TOPIC: ("Sustainable food system*" OR "food system*" OR "local food system*" OR "community food system*" OR "alternative food network*" OR "alternative food system*" OR "community food system*" OR "alternative food network*" OR "alternative food system*" OR "local food*" OR "civic agricultur*" OR "regional food system*" OR "community nutrition*" OR "alternative food initiative*" OR "food initiative*" OR "food environ*" OR "food sovereignty" OR "short* food supply chain" OR "community garden*" OR "garden*" OR "civic agricultur*" OR "urban agricultur*" OR "urban garden*" OR "community agricultur*" OR "community kitchen*" OR "food access*" OR "consumer food safety" OR "home food safety" OR "food safety educat*" OR "farm* market*" OR "compost*" OR "food waste" OR "food demo*" OR "community supported agricultur*" OR "community farm*" OR "meal plan*" OR "cooking technique*" OR "recipe* prepar*" OR "teaching garden*" OR "school garden*" OR "food resource manage*" OR "food provision*" OR "food preserv*" OR "home canning" OR "cooking intervention" OR "nutrition intervention*" OR "food educat*" OR "garden* educat*" OR "food cooperative" OR "food hub" OR "food bank" OR "food pantry" OR "food assist*" ) AND NOT ("developing countr*" OR "cyto*" OR "cyclospor*") AND (LIMIT-TO (AFFILCOUNTRY, "United States")) AND (LIMIT-TO (LANGUAGE, "English"))
A.5 Supplemental Search

The supplemental search strategy was used in a scoping review of scoping reviews completed by Pham et al. (2014) and is designed to ensure all relevant information is captured. Twenty randomly selected relevant articles, as determined by MD, had their reference list hand-searched to identify additional evidence sources. All returned reviews had their reference list hand-searched to identify additional papers that may be eligible for inclusion. Returned reviews were identified by searching in Zotero for citations that included “review” in the title. 86 citations were found to include “review” and 31 remained after removing duplicates and irrelevant citations as determined by MD. The reference list of each review was scanned and any relevant references were added to the Zotero collection. Relevant references were found by MD scanning the titles of each reference on the review’s reference list and then reviewing the abstracts of potentially relevant titles. The titles and abstracts were screened against the inclusion/exclusion criteria. A record of the review of reference lists is available in the supplemental search spreadsheet. Additional reviews were discovered during title and abstract screening and selected for inclusion. The first author scanned the reference list of these additional returned reviews using the method described above. A record of the review is available in the supplemental search spreadsheet.

The random sample of articles were selected by using the random integer generator function in R. The population size was 2485 as determined by downloading all returned references into a CSV file. Any reference in the random sample that was deemed irrelevant by the first reviewer was replaced in the random sample by the next relevant reference listed in the CSV file. Relevancy was determined by the first reviewer screening the title against the study inclusion/exclusion criteria. A title qualified for immediate exclusion was replaced by the next relevant title. Any reviews that were included in the random sample were replaced by the next relevant title as the reviews are included in a separate section of the supplemental search. A record of the review of the random sample is available in the supplemental search spreadsheet.

The CDC policy brief on community health workers: Addressing Chronic Disease through Community Health Workers (April 2015) described several relevant programs. A
snowball strategy was used to search the reference list of the relevant programs. The REACH program publications list on the CDC website was searched from 2005-2019.

APPENDIX A REFERENCES

APPENDIX B: DATA CRITERIA AND VARIABLES FOR SYSTEMATIC SCOPING REVIEW

The inclusion and exclusion criteria were pre-tested in an independent screen by MD and MD of twenty randomly selected articles. Details were added to specify a United States population as those in the fifty states, U.S. territories, and sovereign Native American nations and an additional criteria was added to exclude programs that served to educate about breastfeeding.

B.1 Inclusions:
1. Article originally written and published in English
2. Program implemented/tested in a U.S. population. U.S. populations include those in the fifty states, U.S. territories, and sovereign Native American nations.
3. The community health worker must be a peer lay educator in the priority population of the study. The role of the CHW in the program must be either an educator: one who provides an established curriculum using a formalized approach, without a therapeutic relationship, or a facilitator: one who is responsible for leading group interactions towards achieving a common goal. Additional leaders other than the CHW are permitted as long as the role of the CHW remains an educator or facilitator.
4. Database conception until date of search and full-text access is available through the [NAME REMOVED FOR BLIND REVIEW] library system
5. Unique program or study to be included in the review: a study or program that resulted in multiple publications will have only the most relevant publication selected. The most relevant publication from the program or study was selected by consensus of MD and MD involved a third reviewer to solve disagreements if necessary.
6. The program must incorporate one or more food system process (production, processing, distribution, preparation, marketing, access, consumption, and disposal) and a CHW component as defined by the previous inclusion criteria

B.2 Exclusions:
1. The community health worker is an individual or individuals who are specified as holding credentials such as registered dietitian, registered nurse, master of public health, certified health education specialist, or schoolteacher.
2. The CHW acted mainly in a support, rather than, educational role. Support is defined as the peer serving as a partner in the program and providing informal or unstructured assistance such as encouragement and reminders
3. The person serving as the CHW is a youth, adolescent, or college student
4. Program does not target one or more processes in Neff et al. (2009) definition of food systems: production, processing, distributing, preparing, marketing, accessing, consuming, and disposing.
5. The program serves to educate on breastfeeding
6. The primary outcome of the program is mental or spiritual health
7. Editorials and opinion papers
8. The program was delivered in a clinical setting or administered via a healthcare entity
9. Formative research, reviews, programming guides, programming suggestions
10. Citations for which a full manuscript was not available

B.3 Descriptive variables

The CHW description is a description that includes any demographic characteristics provided by the authors.

The study population is the group of people targeted by the intervention or effort and was recorded using details such as stage of life, geographic location, race and ethnicity, and special characteristics. Special characteristics may include pregnancy, low-income, migrant laborers, etc.

The food system processes are the processes of the food system defined by Neff et al. (2009) included in the intervention or effort: production, processing, distributing, preparing, marketing, accessing, consuming, and disposing. Food access is any intervention which alters the food environment.

The description of the intervention was recorded as the what, when, and where of the effort. Information on the platform used, type of activity, the length of the program or dose of intervention, and the setting was extracted. For example, the description of the intervention may be a cooking class delivered biweekly at a community center kitchen.

The primary and secondary targeted outcomes of the intervention are recorded. Unexpected outcomes not included in the objectives of the program are also recorded.
APPENDIX B REFERENCES


### APPENDIX C: Themes, Subthemes, and Illustrative Quotes of results from the semi-structured interviews

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
<th>Illustrative Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fit of CHW model for VCE</td>
<td>Focus on food systems</td>
<td>[The Covid-19 pandemic] helped our volunteers understand how important their involvement Extension master gardener volunteers is to stabilize food security within their local community. They can be involved by growing and contributing produce but also encouraging fellow community members to do the same, on their own property or through community gardens. Our master gardener volunteers can encourage more people to get involved in gardening. That was another positive outcome of the pandemic, we saw a tremendous increase in gardening interest... The question is it sustainable, and are those gardeners going to continue to garden, whether they were successful or not during the pandemic. -State faculty</td>
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<td>Serves VCE values and goals</td>
<td>... one of the big things we are trying to move away from is having a gardening club where people get together and drink coffee and talk about flowers and move that to having people show the importance of gardening and the benefits of gardening...outside of a fun hobby but something that actually can impact lives and health long term - Agent</td>
<td>We have been trying to be known as the Department of Food Systems because it's a great intersect between everything that we do with 4H, food safety, ag and natural resources, commercial horticulture. And SNAP-Ed the intersect is food systems, it's food and food systems and how those things all relate. Part of it is how big the concept of food systems is. And how do we integrate that into what we're doing. That's why it's important to do school gardens and farm to school because our desire is to increase food literacy. That is kids and teachers and parents and families having a better idea of the food system and the choices they make when they eat a meal. - Agent</td>
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<td>Potential to extend reach to new audiences</td>
<td>There's a place for community health workers to adapt and bring and introduce some of these culturally specific crops in communities where there are large segments that are either refugees or immigrants. I think the master gardener program has a role in that, and I hope we can get some folks excited about doing that. -Agent</td>
<td>My vision is to move community food systems beyond a niche thing to being more institutional...But there are there are real challenges to that, based on how our food system is set up...I would like to see food systems work get a little bit more accessible to a broader population. -Agent</td>
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<td>Terminology</td>
<td>I think a lot of what the community health workers would do is help people make connections, almost like navigators, make connections to their care opportunities in their communities and understand what they're being told by their providers. -State faculty</td>
<td>There's a place for community health workers to adapt and bring and introduce some of these culturally specific crops in communities where there are large segments that are either refugees or immigrants. I think the master gardener program has a role in that, and I hope we can get some folks excited about doing that. -Agent</td>
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<tr>
<td>Cultural Humility</td>
<td>Representation</td>
<td>It would be going to where they are, meeting them where they are, making sure that...</td>
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communications are in their language. And that the images are reflected... flyers and things have people that look like them. And if they did a series of highlighting people that are different that are in the food system, that would go a long way. Use that as part of a publication, like "Meet Whoever," they’re a person in the food system too and they look like you. -SNAP-Ed

having a focus on A) having bilingual volunteers... would be a big deal. Also having people with different cultural backgrounds to educate and go hey, this is what growing your own garden looks like... I can't with a straight face, look at the master gardeners we have and say why don’t you go into the [neighborhood] and tell them to grow X, Y... it's like... their... no one is going to turn up. -Agent

The training team has to look and be able to relate to the people wanting to become the type of volunteer. Right? If someone whose first language was Spanish and they spoke English. And they might be intimidated to come to a training that everyone's English speaking, and as well intended as, I might like to be. That might not be something that people are interested in doing, for a variety of different reasons, and so, how do we break down those barriers to make it more appealing for people who maybe English isn't their first language to become a part of the program. -Agent

Build trust

It's all about relationships. Building relationships is really important, and building trust is really important, and one way we can do that is have more volunteers that represent these populations and then help us get into those communities... -State faculty

Reflexivity and bias awareness

Growing the food is not the problem. It’s that knowledge of the culture and we as Extension probably don't know, at least in my community we don't have a lot of ethnic diversity. Even in the communities that do, we may not necessarily have a good understanding of what foods they prefer. That would be the first thing we need to learn, for a community health worker to work in those communities... Because that's so important you gotta speak the language, you got to understand the culture, or be willing to learn that culture, well that would be much steeper learning curve, for me, than somebody that's integrated in with them... you got to pick the right folks to make that successful and build those relationships and speak the language and understand the nuances of the society... if you want me to do something like that, I can do it, but I have a lot to learn. -Agent

Working with communities, particularly with vulnerable communities and communities that have suffered, historical or systemic inequalities or racism that, for myself, I haven’t really been exposed, I’ve probably been privileged and benefited from historical inequalities and sometimes systemic racism, so I think being as reflexive as possible is really critical... I think we all need to be better listeners. Both empathetic listeners, as well as generative listeners, and... sometimes we want our opinions heard, or we want our knowledge to be known or our expertise to be validated and... more often than not, we should step back and be more in a listening posture. -State faculty
Logistics

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<th>CHW integration</th>
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| A liaison between our program employees and the community. We need a champion, we need somebody who embraces the idea and concept of a garden, but has the skills to do so... what we have found doesn’t work is when we go in and say we want to put a garden in your school and no one else is stepping up and no one else has the skills...our employees balance a lot of responsibilities, a lot of different programs. And so managing gardens, it’s just not really feasible in the context of their positions. We need somebody who is really excited about a garden who can help keep it going, can help work with a volunteer base to keep it going if they can’t keep it going. And so that’s where I see the fit for the community health worker, is they're trained on, how, if you don't have the skills to keep the garden going, how do you find others with those skills and giving them the tools to be able to do that. -SNAP-Ed

I see it as a collaborative effort within Extension, I think gardens offer a really awesome ability to work through inner agencies, like the ag department, master gardeners, master food volunteers, [State SNAP-Ed], FCS, 4H. There are so many opportunities to collaborate with gardens, so I definitely see it as a collaborative effort and we could really expand if there were community health workers involved. And I do think getting feedback of the needs of the community or the group that you’re working with. And that might be through surveys, or conversations that community health workers could really help with that piece. Just to gauge the needs. -SNAP-Ed

That could show a clear line, especially if a program assistant might feel like that position was competitive. If there was a clear expectation of a community worker working in the garden setting, it would be beneficial. There’s always need and demand for people in community gardens, school gardens. Even the container garden projects there’s a lot of planning and logistics and on the ground work...and education. And I would definitely be supportive in partnering and helping with that piece, as an agent. -SNAP-Ed
<table>
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<th>Training</th>
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<td>You need some technical skills of gardening ... what's equally important is where to find resources when questions come up. And what your role is as a community health worker, because we don't want to set them up to be gardening experts ... we want them to feel confident in their role and what their expectations are, and what their community expectations are. And it's not to be an expert. Who can they look to with questions or issues. What is their place within the [State SNAP-Ed], what's their place within [STATE EXTENSION SYSTEM], within the community. And then compliance, reporting requirements, so those are the different dimensions that I would touch on. -SNAP-Ed</td>
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<th>Participatory evaluation and planning</th>
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<td>The benefit of something like this is that it can create a two-way street of communication between you and this underserved community, who is not participating in a lot of your programming...The information isn't just you going out, it's them coming back in, from them. Working with this person if you've identified them and really built a relationship with them, hopefully you're not just handing them something to go teach in their language...Hopefully you're also asking them for some feedback and what are you missing? What needs to be modified to better serve that population? -SNAP-Ed</td>
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<th>Compensation</th>
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<td>If we have volunteers working with and beside CHWs, it's not impossible, that would be the trickiest, where you have people who are being treated similarly in terms of training and expectations, and one group may need to be compensated differently, but if it were done so that... -State faculty</td>
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<td>CHWs... is actually their job and they are 80% time or something like that, hopefully, that could work, there would have to be some formative work, to be sure it's not going to negatively affect our volunteer program. -State faculty</td>
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<td>To be able to retain a position, offering it as a paid position might be beneficial. If it was maybe offered as an internship to go toward credit to your education, that's a possibility. But offering it as a paid position... the pool would be greater, and you could retain somebody in the position a little bit more. -SNAP-Ed</td>
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<td>I could see it working some as a volunteer model. You're not going to get the continuity, or the continuance as much as you'd like with a volunteer model. We have some very good volunteer models... you can get part of this from a volunteer model, but I don't know that you can get the full-fledged effect that you want. Unless there is some paid model to it. -SNAP-Ed</td>
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APPENDIX D: SEMI-STRUCTURED INTERVIEW SCRIPT FOR MASTER GARDENER ADMINISTRATORS

Thank you for taking the time to speak with me today. We will be discussing your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. CHW in the U.S. commonly work in health promotion and chronic disease prevention for minoritized populations such as racial and ethnic minorities, immigrants and refugees, and low-income families and individuals. CHW are a bridge between traditional knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations.

I have pre-determined questions but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

Do you have any questions? Would you like to continue with the interview? As a reminder, you are free to stop the interview process at any time. I am recording this interview so that I can review the answers later.

Let’s start by discussing the populations that interact with the MGs.

1. What are the mission and goals of the MG program?
2. What populations do you find success in reaching through MG? And why?
3. What populations do you find challenging to reaching through MG? And why?
4. To what degree are MG reaching diverse populations? Diverse populations refers to the populations I mentioned earlier: racial and ethnic minorities, immigrants and refugees, and low-income families and individuals.
   a. How do the MG themselves represent diverse audiences?
   b. In what dimensions could MG better represent a broader audience?
   c. How could the current MG programming be adapted to reach diverse populations?
   d. What is the interest level within the program to adapt programming to expand the diversity of program reach?
   e. Willingness to make adaptations? Are the MG flexible?

Let’s transition to specifically discussing a CHW model.

5. How do you think a CHW model could be integrated into the MG program?
   a. Training
   b. Supervision (MGs? Agents?)
   c. Continuing education adapted to reach diverse audiences
   d. A separate arm that are CHW MGs? These may be MG volunteers trained in nutrition, health, and food system topics
6. What are the benefits and barriers of incorporating food systems education into garden-based programming?

7. Please talk about the feasibility of extending MG training to include health and nutrition topics
   a. How would the MG training curriculum have to be modified?
   b. Would volunteers be interested in guest lectures on these new topics?
   c. Would the agent training have to be modified to be able to successfully supervise the MG?
   d. How could ANR and FCS agents collaborate to successfully supervise?

Closing

1. Who else do you recommend I speak with on this topic?
2. Is there anything else you would like to share
APPENDIX E: SEMI-STRUCTURED INTERVIEW SCRIPT FOR MASTER FOOD VOLUNTEER ADMINISTRATOR

Thank you for taking the time to speak with me today. I am looking forward to this hour to discuss your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. Community health workers in the U.S. commonly work in health promotion and chronic disease prevention for underserved populations such as low-income families and individuals, racial and ethnic minorities, and immigrants and refugees. Community health workers are a bridge between traditional knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations.

I have pre-determined questions but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

Do you have any questions? Would you like to continue with the interview? As a reminder, you are free to stop the interview process at any time. I am recording this interview so that I can review the answers later.

Let’s start by discussing the populations that interact with the MFV.

8. What are the mission and goals of the MFV program?
9. What populations do you find success in reaching through MFV? And why?
10. What populations do you find challenging to reach through MFV? And why?

11. How does the MFV program currently work to connect with underserved audiences? Underserved audiences refer to the populations I mentioned earlier: racial and ethnic minorities, immigrants and refugees, and low-income families and individuals.
   a. In what ways do the MFV themselves represent underserved audiences?
   b. In what ways does the MFV program reach underserved audiences?
   c. Are MFV reaching diverse populations through the programs they are delivering?
   d. How could the current MFV programming be adapted to reach diverse populations and to ensure the programming is accessible to all populations?
e. What is the interest level within the program to adapt programming to expand the diversity of program reach?
f. Willingness to make adaptations? Are the MFV flexible?

*Now let’s talk about garden-based programming and food systems education.*

12. What would be the benefits and barriers of incorporating food systems education into garden-based programming?
   a. How could the work of MFV integrate with food production systems such as the MG?
   b. Can you give examples of garden-based programs the MFV are currently involved in?
      Or have been in the past?
   c. What kind of food systems work does the MFV currently engage in?
   d. What is the interest level and willingness within the MFV to expand into garden-based programming?
13. How could the current work of MFV in food systems programming expand to reach underserved populations?
14. What could a garden-based MFV program look like?

*Let’s talk about how a community health worker model may fit into the MFV. I am trying to assess if the community health worker model is a good fit for VCE.*

15. How do you think a CHW model could be integrated into the MFV program?
   a. Training
   b. Who is best positioned to supervise a CHW? (MFVs? Agents?)
   c. Continuing education adapted to reach diverse audiences
   d. A separate arm that are CHW MFVs? These would be MFV who may be especially adept at reaching certain underserved audiences
   e. Cross-training MFV and MG on content areas

16. Please talk about the feasibility of extending MFV training to include food production topics such as gardening
   a. How would the MFV training curriculum have to be modified?
   b. Would volunteers be interested in guest lectures on new food topics?
   c. Would the agent training have to be modified to be able to successfully supervise the MFV?
   d. How could ANR and FCS agents collaborate to successfully supervise?

*Closing*

3. Who else do you recommend I speak with on this topic?
4. Is there anything else you would like to share?
APPENDIX F: SEMI-STRUCTURED INTERVIEW SCRIPT FOR SNAP ADMINISTRATORS

Thank you for taking the time to speak with me today. We will be discussing your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. CHW in the U.S. commonly work in health promotion and chronic disease prevention for minoritized populations such as racial and ethnic minorities, immigrants and refugees, and low-income families and individuals. CHW are a bridge between formal knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations.

I have pre-determined questions, but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

Do you have any questions? Let’s start by discussing the people and communities you serve.

1. What populations do you find success in reaching in food systems programming? And why?
2. What populations are difficult to reach in food systems programming? And why?
3. How can current programming be adapted to reach more diverse audiences? Diverse audiences refer to the populations I mentioned earlier: racial and ethnic minorities, and immigrants, refugees, and migrant communities.
4. How could a CHW model work within the Family Nutrition Program?
   a. How could a CHW model fit into the food systems work already happening within VCE?
   b. How could a CHW model work with the Master Gardener program?
   c. How could a CHW model work with the Master Food volunteer program?
   d. How could a CHW model work with the existing program assistant structure?
   e. How can the local knowledge carried by a CHW be integrated into Extension programming?
   f. How would the management, supervision, and support for a CHW look?
      i. USDA metrics?
5. What should be included in training for a CHW-delivered garden-based program?
   a. What are the training topics for the CHW?
   b. Do other VCE professionals need training?
   c. Who delivers training to the CHW?
   d. What curricula needs to be developed? What curricula already exists?
   e. How to best incorporate local knowledge?
6. What are the barriers and facilitators of garden-based programming?
   a. What does a CHW-delivered garden-based program look like?
   b. How can current garden-based programming be adapted for diverse audiences?
   c. What areas in VA may be suited to pilot a CHW program?
   d. How can gardening incorporate food systems education?

7. Who else do you recommend I speak to on this topic?

8. Is there anything else you would like to share?
APPENDIX G: SEMI-STRUCTURED INTERVIEW SCRIPT FOR VCE SPECIALISTS

Thank you for taking the time to speak with me today. We will be discussing your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. CHW in the U.S. commonly work in health promotion and chronic disease prevention for minoritized populations such as racial and ethnic minorities, immigrants and refugees, and low-income families and individuals. CHWs are a bridge between formal knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations.

I have predetermined questions, but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

Do you have any questions?

1. What are the organizational goals for VCE in regards to food system programming?
2. How do you see a CHW model integrating into current food systems work?
   a. How could a CHW model work with the Master Gardener program?
   b. How could a CHW model work with the Master Food volunteer program?
3. What populations are difficult to engage in food systems programming? And why?
4. What populations do you have success to engage in food systems programming? And why?
5. How can food systems programming be more accessible and marketable to diverse populations? In this project, diverse populations represent the communities I mentioned earlier: racial and ethnic minorities, immigrants and refugees, and families and individuals with low income.
   a. How can the local knowledge carried by a CHW be leveraged and valued in Extension programming?
6. What are the benefits and barriers to garden-based food systems programming?
   a. How can VCE ensure that the food produced by the gardens is culturally relevant?
      How could a CHW play a role in this?
   b. What does a CHW-delivered garden-based program look like?
   c. What counties in VA may be a good place to pilot a program?

Extra if time allows:

7. In speaking with the Master Gardener program, they mentioned that they see local farmers as community health workers because many farmers are active in engaging with community education. How do you see this grassroots education effort becoming
something more formal? Could the farmers be part of the training team for a community health worker? Could the farmers themselves be a community health worker?

Closing:

8. Who else do you recommend I speak with on this topic?
9. Is there anything else you would like to share?
APPENDIX H: SEMI-STRUCTURED INTERVIEW SCRIPT FOR VCE STATE ADMINISTRATORS

Thank you for taking the time to speak with me today. We will be discussing your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. CHW in the U.S. commonly work in health promotion and chronic disease prevention for minoritized populations such as racial and ethnic minorities, immigrants and refugees, and low-income families and individuals. CHW are a bridge between formal knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations.

I have pre-determined questions, but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

Do you have any questions?

10. What are the organizational goals for VCE in regards to food system programming?
11. How do you see a CHW model integrating into current food systems work?
12. What populations are difficult to engage in food systems programming? And why?
13. What populations do you have success in engaging in food systems programming? And why?
14. How can food systems programming be more accessible and marketable to diverse populations? In this project, diverse populations represents the communities I mentioned earlier: racial and ethnic minorities, immigrants and refugees, and families and individuals with low income.
15. What are the benefits and barriers to garden-based food systems programming?
   a. How can VCE ensure that the food produced by the gardens is culturally relevant?
      How could a CHW play a role in this?

Extra if time allows:

16. In speaking with the Master Gardener program, they mentioned that they see local farmers as community health workers because many farmers are active in engaging with community education. How do you see this grassroots education effort becoming something more formal? Could the farmers be part of the training team for a community health worker? Could the farmers themselves be a community health worker?
APPENDIX I: SEMI-STRUCTURED INTERVIEW SCRIPT FOR FCS AGENT

Thank you for taking the time to speak with me today. We will be discussing your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. CHW in the U.S. commonly work in health promotion and chronic disease prevention for minoritized populations such as racial and ethnic minorities, immigrants and refugees, and low-income families and individuals. CHW are a bridge between formal knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations.

I have pre-determined questions, but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

Do you have any questions? Let’s start by discussing the people and communities you serve.

1. What populations do you find success in reaching through your programming? And why?
2. What populations do you find challenging to reach through your programming? And why?
3. To what degree does your programming reach underserved audiences? Underserved audiences refer to the populations I mentioned earlier: racial and ethnic minorities, immigrants and refugees, and low-income families and individuals.
   a. How could your programming be adapted to reach underserved audiences?

Now let’s talk about garden-based programming and food systems education

1. What goals do you have for food systems programming in the coming years?
2. What are the barriers and facilitators of incorporating food systems education into garden-based programming?
   a. What partnerships and support would you need to manage volunteers trained in food production, health, and nutrition topics?
3. How can VCE ensure that food systems programming is equitable and accessible to all populations?

Let’s discuss the CHW model and how it may fit into your work

4. How do you think a CHW model could be integrated into your programming?
   a. How could a CHW work with MFV?
   b. How could a CHW work with MG?
   c. What support would you need to successfully work with a CHW?
   d. Are there networks within your community from which a CHW could be recruited?
      i. What about relationships to networks that could recruit potential CHW?
5. How could urban and sustainable agriculture be integrated into the work of a CHW?
6. What kind of training would best serve a CHW? Theoretical-based training or hands-on, how-to training?
7. How could a CHW integrate into food systems efforts already happening in your communities?

Closing
8. Who else do you recommend I speak with on this topic?
9. Is there anything else you would like to share?
APPENDIX J: SEMI-STRUCTURED INTERVIEW SCRIPT FOR ANR AGENT

Thank you for taking the time to speak with me today. We will be discussing your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. CHW in the U.S. commonly work in health promotion and chronic disease prevention for minoritized populations such as racial and ethnic minorities, immigrants and refugees, and low-income families and individuals. CHW are a bridge between formal knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations.

I have pre-determined questions, but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

Do you have any questions? Let’s start by discussing the people and communities you serve.

4. What populations do you find success in reaching through your programming? And why?
5. What populations do you find challenging to reach through your programming? And why?
6. To what degree does your programming reach underserved audiences? Underserved audiences refer to the populations I mentioned earlier: racial and ethnic minorities, immigrants and refugees, and low-income families and individuals.
   a. How could your programming be adapted to reach underserved audiences?

Now let’s talk about garden-based programming and food systems education

10. What goals do you have for food systems programming in the coming years?
11. What are the barriers and facilitators of incorporating food systems education into garden-based programming?
   a. What partnerships and support would you need to manage volunteers trained in food production, health, and nutrition topics?
12. I am exploring if the CHW model could be a tool to bring gardening programs to populations currently hard to reach with Extension programs. Is this feasible? What would a CHW-delivered garden-based program look like?
   a. How to incorporate the local knowledge held by the CHW? To ensure the plants and foods are culturally relevant?
   b. Who is best positioned to administer this program?

Let’s discuss the CHW model and how it may fit into your work

13. How do you think a CHW model could be integrated into your programming?
   a. How could a CHW work with MFV?
   b. How could a CHW work with MG?
c. What support would you need to successfully work with a CHW?
d. Are there networks within your community from which a CHW could be recruited?
   i. What about relationships to networks that could recruit potential CHW?
e. How could a CHW integrate into food systems efforts already happening in your communities?

14. What kind of training would best serve a CHW? Theoretical-based training or hands-on, how-to training?
   a. What topics should be included in CHW training for garden-based food systems programming?

15. In speaking with the Master Gardener program, they mentioned that people who parts of these underserved communities have stated that they don’t see themselves as a master gardener volunteer. How, if at all, would the adoption of a CHW model alter this perception? How can VCE ensure that food systems programming is equitable and accessible to all populations?

Extra if time allows:

17. In speaking with the Master Gardener program, they mentioned that they see local farmers as community health workers because many farmers are active in engaging with community education. How do you see this grassroots education effort becoming something more formal? Could the farmers be part of the training team for a community health worker? Could the farmers themselves be a community health worker?

Closing
16. Who else do you recommend I speak with on this topic?
17. Is there anything else you would like to share?
APPENDIX K: SEMI-STRUCTURED INTERVIEW SCRIPT FOR SNAP-ED AGENT

Thank you for taking the time to speak with me today. We will be discussing your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. CHW in the U.S. commonly work in health promotion and chronic disease prevention for minoritized populations such as racial and ethnic minorities, immigrants and refugees, and low-income families and individuals. CHW are a bridge between formal knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations.

I have predetermined questions, but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

Do you have any questions? Let’s begin by discussing the goals you have for food systems programming.

1. What goals do you have for the food systems programs you work with?

Now, let’s talk about the people and communities you serve.

2. What populations are difficult to engage in food systems programming? And why?
3. What populations do you have success engaging in food systems programming? And why?
4. How can food systems programming be more accessible and marketable to diverse populations? In this project, diverse populations represent the communities I mentioned earlier: racial and ethnic minorities, immigrants and refugees, and families and individuals with low income.
   a. How can the local knowledge carried by a CHW be integrated into Extension programming?

Now let’s talk about how a CHW model may fit into your work.

5. How could a CHW model be integrated into your current programming?
   a. How could a CHW model work with the Master Gardener program?
   b. How could a CHW model work with the Master Food volunteer program?
   c. How could a CHW model work with the existing program assistant structure?
   d. How would the management, supervision, and support for a CHW look?
6. How could a CHW integrate into food systems efforts already happening in your community?
7. What does the training process for a CHW garden-based program look like?
   a. What training does the CHW need?
b. What training, support, and partnerships do you need to successfully work with a CHW in garden-based programming?
   i. To work with food production, health, and nutrition topics?
8. What are the barriers and facilitators of garden-based programming?
   a. What does a CHW-delivered garden-based program look like?
   b. How can current garden-based programming be adapted for diverse audiences?
   c. How can gardening incorporate food systems education?
9. Are there networks within your community from which a CHW could be recruited?

Closing

10. Do you have recommendations on other people I should speak to about this topic?
11. Is there anything else you would like to share?
APPENDIX L: SEMI-STRUCTURED INTERVIEW SCRIPT FOR SNAP-ED PROGRAM ASSISTANT

Thank you for taking the time to speak with me today. We will be discussing your thoughts and ideas on the use of a community health worker model to deliver garden-based food systems programming within VCE. A community health worker is a trusted member of a hard to reach or underrepresented community who is trained to provide services to their neighbors or peers. CHW in the U.S. commonly work in health promotion and chronic disease prevention for minoritized populations such as racial and ethnic minorities, immigrants and refugees, and low-income families and individuals. CHW are a bridge between formal knowledge networks and the communities they serve.

I’m excited to hear your thoughts on if a community health worker model may be a good fit to deliver garden-based food systems programming to underserved populations in Extension.

I have pre-determined questions, but this should also be a conversation. Please feel free to speak candidly and share positive and negative opinions. We will try our best to keep your answers confidential.

1. What populations do you find success in reaching through your programming and why?
   a. What populations do you struggle to reach in your programming and why?
2. How do you think the community health worker could fit into Extension?
3. How, if at all, do you see yourself working with a community health worker?
   a. Support and collaboration?
   b. Content sharing
   c. Could you work with the community health worker and the Master gardeners? What about the Master food volunteers?
4. How do you think a community health worker position would work as a volunteer position?
   a. If the community health worker were compensated, could the position be part-time?
5. Are there networks within your community that Extension could recruit community health workers from?
   a. Are there networks in your community that may be suitable to work with community health worker delivered garden-based programming?
6. What kind of garden-based programming do you think could work to serve underrepresented audiences in your area?
7. How can garden-based programming be more accessible and marketable to diverse populations?
   a. How does a community health worker play a role in accessibility and inclusivity of Extension programming?
8. Is there anything else you would like to share?
APPENDIX M: PARTICIPANT RECRUITMENT EMAIL

Dear potential participant,

My name is Maria DeNunzio and I am writing to invite you to participate in a research project on Virginia Cooperative Extension volunteer models. I am a graduate student working in cooperation with SNAP-Ed and the Master Food Volunteers and am completing this research as part of my thesis. I am interested in hearing your thoughts and opinions on a new volunteer model to reach underserved audiences with Cooperative Extension garden-based food systems programming.

As an Extension professional, your knowledge on the structure of Extension programming is critical in assessing the feasibility of using the new volunteer model to reach underserved audiences, especially in garden-based food systems programming. If you are interested in participating in a 30-60 minute interview via Zoom, please respond with times convenient for you and we can schedule a meeting. We will try our best to keep all information shared in the interview confidential. Attached please find a study information sheet for your reference.

Thank you for your time and consideration. I look forward to hearing from you and hearing your insights to this topic.

Best,

Maria DeNunzio