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**More Than Value\$
in the Food System**

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Photo by Diane Smith, Washington State University Extension, and used with permission.

Special issue on
More Than Value\$ in the Food System
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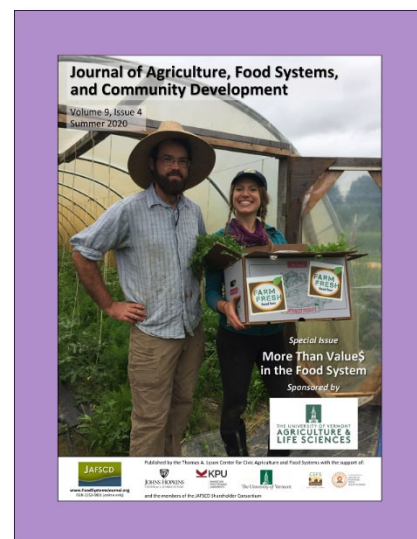
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IN THIS ISSUE DUNCAN HILCHEY

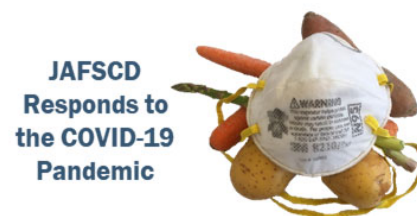
More than value\$ in the food system



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In this jam-packed summer issue of JAFSCD, we offer over 300 pages of commentaries, *Voices from the Grassroots* essays, and peer-reviewed papers, including a special transdisciplinary take on values in the food system by a team of authors from the University of Vermont. On the whole, the scholarly research and voices from practitioners in the field in this issue paint a stark and yet sometimes heartening picture about the future of food and agriculture on our planet. But the warnings are clear and we need to heed them.

However, first I extend our condolences to those who have lost loved ones and colleagues to the pandemic. The United State has just surpassed 200,000 deaths and 7,000,000 cases in its ongoing, vain experiment to prove that freedom and wealth—rather than science and cooperation—are the solutions to our planetary problems. Are the cries of the hungry and scared and the anguish of struggling farmers being heard above the political din? Meanwhile, as many of us face serious challenges, large corporations quietly go about their business playing both sides (food producers and the hungry) against the middle, and quality of life in the world’s richest nation continues to decline.

JAFSCD columnist **John Ikerd** addresses the issue of contradictory American food policy in his Economic Pamphleteer column, *U.S. Farm Policy Alternatives for 2020*. Ikerd examines current farm policies and argues that the Green New Deal is the only policy that is comprehensive enough to make the dramatic changes we need to create a truly resilient food system.

On our cover: Taylor Barker and Arielle Luckmann of Waxwing Farm in Skagit County, Washington, participated in the Farm Fresh Food Box (F3B) community supported agriculture (CSA) pilot program to offer access to their produce to a wider range of individuals and families.

Photo by Diane Smith, Washington State University Extension, and used with permission.

In this same vein, Jane Kolodinsky and a team of students and colleagues from the University of Vermont (a JAFSCD partner) take a transdisciplinary view of food systems' contribution to humanity beyond farm yield and profit. See <https://doi.org/10.5304/jafscd.2020.094.013> to read the introduction to the set of papers on this critical subject.

Over the summer we continued to receive commentaries from around the world about COVID-19 and its extraordinary impacts on food systems. Here is a list of our summer crop of 13 eye-opening commentaries that share the challenges and some responses in a wide range of contexts:

- *Economic Security Assessment of San Jorge, Samar, Philippines, as it Experiences Coronavirus*, by **Marcos E. Bolido**
- *"Informalization" of Food Vending in China: From a Tool for Food Security to Employment Promotion*, by **Taiyang Zhong** and **Steffanie Scott**
- *Food Supply Pressure in France and Germany During COVID-19: Causes from Manufacturing*, by **Suyu Liu**
- *COVID-19 and Food Security in Bangladesh: A Chance to Look Back at What Is Done and What Can Be Done*, by **Debashish Sarker Dev** and **Khondokar H. Kabir**
- *Solidarity Policy in Defense of Life: A Hope in Brazil's Pandemic*, by **Olívio José da Silva Filho** and **Márcia Carolina Silva**
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- *Farmers Markets: Working with Community Partners to Provide Essential Services during COVID-19*, by **Shannon Klisch** and **Katherine E. Soule**
- *Conceptualizing the Nexus of Migration and Food Security during COVID-19*, by **Manoj Sharma**

We also share three Voices From the Grassroots essays focused on COVID-19 issues: *Seeding the World* by **Rafael Alvarez**; *Episcopal Farmworker Ministry and Disaster Response to COVID-19* by **Lariza Garzon** and **Andrew R. Smolski**; and *How Southeastern North Carolina is Building More Resilient Food Systems after COVID-19*, by **Julia F. Waity**, **Samantha Moser**, and **Cara Stretch**.

We also share an additional open call commentary not related to COVID-19: *Pathways to Revitalization of Indigenous Food Systems: Decolonizing Diets through Indigenous-focused Food Guides*, by **Taylor Wilson** and **Shailesh Shukla**.

Of course, this issue has its usual complement of excellent open-call, peer-reviewed papers.

Andrew Berardy, **Thomas Seager**, **Christine Costello**, and **Christopher Wharton** explore the strengths and weaknesses of life cycle analysis in *Considering the Role of Life Cycle Analysis in Holistic Food Systems Research Policy and Practice*.

In *Expanding Food Agency Theory and Measurement with Mixed Methods: A Study from Philadelphia*, **Caitlin Bradley Morgan** shares her experience in the application of a new tool, Cooking and Food Provisioning Scale (CAFPAS), to increase food agency among a sample of low-income residents of color and university students in Philadelphia.

Next, **Mary L. Buchanan** uses a site-suitability analysis to identify additional potential farmland in a community in *Potential for Leasing Institutional Lands in Windham County, Connecticut: Toward A New England Food Vision*.

A simple typology of management styles for community gardens is developed in “Don’t Just Come for Yourself”: *Understanding Leadership Approaches and Volunteer Engagement in Community Gardens* by **Jeffrey Gilbert, Christina Chauvenet, Brett Sheppard, and Molly De Marco**.

In *A Systems Analysis and Conceptual System Dynamics Model of the Livestock-derived Food System in South Africa: A Tool for Policy Guidance*, **Kevin Queenan, Nafiisa Sobratee, Rashieda Davids, Tafadzwanashe Mabhaudhi, Michael Chimonyo, Rob Sloto, Bhavani Shankar, and Barbara Häslar** take a deep dive into the structure of South Africa’s livestock industry and its contribution and challenges in supporting a national food supply.

Brian Raison and John C. Jones reflect on the opportunities and challenges of creating an online farmers market in a rural community in *Virtual Farmers Markets: A Reflective Essay on a Rural Ohio Project*.

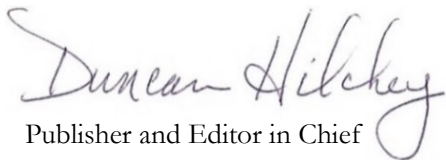
Finally, in *From Online Cart to Plate: What Amazon’s Retail Domination Means for the Future of Food*, **Carly Livingstone and Irena Knezevic** reveal, with some concern, the growth and potential impact of a global one-stop retailer’s impacts on community food systems.

Reviews

We appreciate the reviewers of books on behalf of JAFSCD’s readers.

- **Laxmi Prasad Pant** reviews *Organic Food and Farming in China: Top-Down and Bottom-Up Ecological Initiatives*, Steffanie Scott, Zhenzhong Si, Theresa Schumilas, and Aijuan Chen. While this book was ably reviewed by Anthony M. Fuller in the spring issue of JAFSCD, Pant considers the book in light of the COVID-19 pandemic.
- **Leah Halliday** reviews *Grocery Activism: The Radical History of Food Cooperatives in Minnesota*, by Craig B. Upright.
- **Sarah Morath** reviews *Regulation by Proxy: How the USDA Relies on Public, Nonprofit, and For-Profit Intermediaries to Oversee Organic Food in the U.S.*, by David P. Carter.
- **Claire Hutkins Seda** reviews *The New American Farmer: Immigration, Race, and the Struggle for Sustainability*, by Laura-Anne Minkoff-Zern.
- **Jennifer R. Shutek** reviews *Food Insecurity and Revolution in the Middle East and North Africa: Agrarian Questions in Egypt and Tunisia*, by Habib Ayeb and Ray Bush.

With best wishes for health and resilience,


Publisher and Editor in Chief



THE ECONOMIC PAMPHLETEER JOHN IKERD

U.S. farm policy alternatives for 2020

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The year 2020 seemed destined to be a year dominated by presidential politics. The Republican candidate for president was never in doubt, but the Democrats began with a crowded field of contenders. Climate change seemed destined to be the dominant political issue. However, the political landscape changed abruptly when the coronavirus pandemic exploded into public consciousness. A delayed response led to an economic shutdown, seemingly weakening the Republican case for reelection. The Democrats quickly settled

on a moderate presidential candidate to head their ticket. The police killing of another unarmed African American person then triggered massive street demonstrations. Rather than bring the nation together, these latest crises have further deepened an increasingly critical political divide.

There is no way of knowing the long-run consequences of the climate change debate, the COVID-19 crisis, or the Black Lives Matter movement—for the 2020 elections, the economy, or the future of the nation. Presumably, the 2020 presi-

John Ikerd is professor emeritus of agricultural economics, University of Missouri, Columbia. He was raised on a small farm and received his B.S., M.S., and Ph.D. degrees from the University of Missouri. He worked in the private industry prior to his 30-year academic career at North Carolina State University, Oklahoma State University, the University of Georgia, and the University of Missouri. Since retiring in 2000, he spends most of his time writing and speaking on issues of sustainability. Ikerd is author of six books and numerous professional papers, which are available at <http://johnikerd.com> and <http://faculty.missouri.edu/ikerdi/>

*Why an **Economic Pamphleteer**? In his historic pamphlet *Common Sense*, written in 1775–1776, Thomas Paine wrote of the necessity of people to form governments to moderate their individual self-interest. In our government today, the pursuit of economic self-interest reigns supreme. Rural America has been recolonized, economically, by corporate industrial agriculture. I hope my “pamphlets” will help awaken Americans to a new revolution—to create a sustainable agri-food economy, revitalize rural communities, and reclaim our democracy. The collected *Economic Pamphleteer* columns (2010–2017) are at <https://bit.ly/ikerd-collection>*

dential and congressional elections will take place—by one means or another. The outcome of these elections will shape the policy responses to the multiple crises currently facing the nation. The 2020 elections will also determine the 2023 farm bill and farm policy for at least five years beyond—which is the focus of this column.

Arguably, the outcomes of past general elections, since at least the 1970s, have made relatively little difference in U.S. farm policies. The farm-state Democrats and Republicans who write the farm bills have generally agreed on the broad outlines of farm policy. But this year will be different in one regard. Concerns among farmers, as well as the general public, about increased weather volatility will likely force both parties to address the issue of climate change.

If Republicans retain the presidency and the Senate in 2020, the 2023 farm bill quite likely will address climate concerns by relying on existing commodity-based programs. Increased funding of federally subsidized crop and revenue insurance will be authorized to help farmers cope with the risks associated with increased weather variability. Disaster payments will be authorized in cases where crop insurance is insufficient to mitigate losses. Future climate disasters will be addressed in much the same way as the adverse impact of trade wars and the recent disruptions to the food system wreaked by COVID-19. Taxpayers will continue to bear much of the systemic risks of industrial agriculture. Publicly funded agricultural research and education will continue to support the intensification of commodity production to meet growing global food needs while reducing greenhouse gas emissions per unit of production.

The more “moderate” Democratic candidates, including the nominee, have approached climate-related farm policies much as they would any other resource conservation or environmental issue (Gusten, 2019). They would rely on increased

funding for existing U.S. Department of Agriculture (USDA) programs, specifically the Conservation Stewardship Program (CSP) and the Environmental Quality Assessment Program (EQIP). The USDA provides a list of “Building Blocks for Climate Smart Agriculture and Forestry” (USDA, 2016) that utilize these programs. The list includes farming practices such as cover crops and reduced tillage to increase soil carbon, efficient use of nitrogen fertilizer to reduce fossil energy use and carbon emissions, and better management of manure to reduce methane emissions.

Other practices involve more permanent changes in land use to increase carbon sequestration, include agroforestry, management of intensive livestock grazing, grass buffer strips along waterways and streams, and contoured strips of prairie grasses integrated with row crops.

Even with a moderate candidate, the Democratic Party will be under pressure to embrace a more progressive political agenda to ensure a strong turnout for the 2020 elections. The more “progressive” Democratic candidates have proposed

programs that would bring about more fundamental changes from past farm policies. In addition, all major Democratic candidates have voiced varying degrees of support for the Green New Deal (Recognizing the duty, 2019)—which was outlined in a previous Economic Pamphleteer (Ikerd, 2019). Proposals for a more progressive agenda would shift farm policy from the current commodity-based programs that focus on productivity and economic efficiency to programs that would incentivize and support a transition to regenerative, sustainable whole-farm systems.

In addition to presidential candidates, various nonprofit organizations have developed political agendas around the principles in the Green New Deal. One such organization is Data for Progress, which has developed a “Green New Deal Policy Series” that includes Regenerative Farming and the

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Green New Deal (Feldman, Ikerd, Watkins, Mitchell, & Bowman, 2020). The policies in this document would fundamentally reform the current government-subsidized crop insurance program by (1) limiting crop insurance coverage to crops grown using approved soil conservation practices, (2) placing limits on coverage of insured crops to US\$250,000 market value per farmer, and over time, (3) phasing out subsidized crop insurance programs for single crops, and (4) phasing out all commodity-based programs, unless accompanied by supply management programs.

Current crop insurance programs would be replaced with a Whole-Farm Net Revenue Insurance program that would share the risks of transitioning to regenerative, sustainable farming systems by guaranteeing farm family income on parity with nonfarm family incomes. To qualify, existing or beginning farmers would be required to submit an approved whole-farm plan for establishing a regenerative whole-farm system. Government transition incentives would be in the form of guaranteed tax credits, similar to those in the current earned income tax credit (Internal Revenue Service, n.d.).

Existing farm programs would be used to facilitate the transition. Funding of the CSP and EQIP programs would be increased to incentivize the conversion of current croplands into pastures, agroforestry, buffer strips, and other components of regenerative whole-farm systems. The USDA Conservation Reserve Program (USDA Farm Service Agency, n.d.) would be modified to include the permanent retirement of marginal cropland to forests and native prairies. These cropland diversion programs would reduce the supplies and increase the costs of feed grains, further incentivizing the transition of livestock from concentrated feeding operations to regenerative, pasture-based systems. Publicly funded agricultural research and education programs would be shifted from their current focus on productivity and economic

efficiency to regenerative farming and agricultural sustainability.

Such transformative changes in farm policy would not be quick or easy. The corporate agri-food establishment has used its economic and political power to take firm control of farm and food policy-making by both parties in Washington, D.C., and in statehouses across the country. In recognition of this problem, earlier in the campaign cycle several major presidential candidates promised vigorous enforcement of existing antitrust policies to break the stranglehold of corporate agribusiness on American agriculture in general as

well as U.S. farm policy. This would not be easy and it would take time, but it has been done in the past and it could be done in the future.

A crisis is a critical point in time when it becomes necessary to make choices that will fundamentally reshape the future, for better or worse. The multiple crises confronting Americans today have revealed fundamental, systemic flaws in current industrial farm and food systems as well as public policies and political priorities in general. In response, the major Democratic presidential candidates sensed

sufficient public support to base their campaigns on promises for fundamental, systemic change. In fact, the Green New Deal addresses all of the current political crises in its promises to “provide economic security for all” and “to secure for all people for generations to come—clean air and water; climate and community resiliency; healthy food; access to nature; and a sustainable environment; and to promote justice and equity by stopping current, preventing future, and repairing historic oppression” (Ikerd, 2019, p. 4).

A complete transformation of farm policies will not be accomplished in the 2020 elections or the 2023 farm bill. However, for the first time in 50 years, there is an opportunity to begin creating a better future for American agriculture by reshaping U.S. farm policy.

Vigorous enforcement of existing antitrust policies to break the stranglehold of corporate agribusiness on American agriculture in general as well as U.S. farm policy would not be easy and would take time.

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INTRODUCTION TO THE SPECIAL ISSUE

SPECIAL ISSUE: MORE THAN
VALUE\$ IN THE FOOD SYSTEM

More than value\$ in the food system

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This special issue draws attention to the diverse values applied to, embedded in, and emerging from food systems. Although scholarship has long recognized that a range of values is at play in food systems—and the *Journal of Agriculture, Food Systems, and Community Development* has been paramount to showcasing this type of research—the dominant perspective continues to elevate a highly centralized model that prioritizes the values of maximization (of yield and profit) above all else. Yield and profit are no doubt important, but the unparalleled emphasis they receive obscures the other important social and environmental values that inform how and why people engage in food systems. As so many food system scholars have previously articulated, what we need for relevant, inclusive, and

effective policies are accurate representations of food systems and the actors who construct and maintain them. The position of this special issue is that transdisciplinary research is critical to ask and answer questions about values in ways that embrace complexity.

Committed to transdisciplinary scholarship, the University of Vermont (UVM) held a faculty/student workshop on values in the food system in July 2019. The workshop was funded by the UVM Graduate College and the Food Systems Graduate Program. UVM has a vibrant food systems program that engages faculty from across the university in collaborative research and was among the first to offer both undergraduate and graduate degrees in the field. The workshop brought together graduate students and faculty from across the College of Agriculture and Life Sciences at UVM representing the departments of Nutrition and Food Science, Community Development and Applied Economics (applied economics, rural

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sociology, communication), and Extension. Also present was a public health faculty member from the Evergreen State College in Washington state. Presenters represented the *Journal of Agriculture, Food Systems, and Community Development* (JAFSCD) and Texas A&M University.

During the workshop, transdisciplinary teams were formed to leverage different ways of understanding and studying food systems, and to eschew dangerous simplifications that can result from studying complex problems with a single disciplinary lens. The base assumption that guided discussions during the workshop was that both economic and non-economic values play an important role in how actors engage in the food system. Despite our disciplinary differences, the extent to which we agreed on the problems with defining value based on short-term production efficiency alone quickly became evident. Broadly, participants provided examples of how activists, scholars, policy-makers, and the general public have become increasingly aware of the major environmental impacts of the global food system, the growing burden of food insecurity and nutrition-related problems, the persistence and perniciousness of food-system related inequities, and the formidable task of ensuring that there will be enough nutritious food to meet the needs of a growing global population.

Of course, the critique was the easy part. And yet, due to our disciplinary diversity, we were able to identify approaches that have emphasized the importance of values aside from maximization: the three pillars of sustainable development, theories of moral economy, the relationships that distinguish direct marketing from the anonymity of long value chains, the efforts of Corporate Social Responsibility, nutrition-sensitive and pro-poor value chains, and food sovereignty, to name a few. Although each of these examples take a different approach—some working within the system while others seeking to transform the system—they all recognize that the goals, processes, and outcomes of food systems must be about more than producing sufficient calories and making profits. Along with yield and profit, there is also value in, for example, environmental stewardship, taking care of others and communities, and enhancing well-being, even if these often lack monetary valuation. These

are insights that have long been articulated by social theorists, dating back to titans such as Max Weber and Karl Polanyi, as well as contemporary scholars in food systems.

It is the transdisciplinary approach underlying each of the papers in this special issue that builds on this impressive foundation, providing examples of how integrating the theoretical and methodological orientations of specific disciplines allows for more nuance and new insight on the myriad values embedded within food systems and motivating food system actors. We contend that only through identifying commonalities and differences in disciplinary perspectives of value in the food system can we comprehensively address complex problems. In this special issue, we compile distinct perspectives on value and shed light on one sliver of the immense diversity of attributes—besides money—that motivates people selling, trading, buying, and receiving food. As a collection, these papers demonstrate the nimbleness of transdisciplinary approaches investigating values and facilitating research across geographic, social, cultural, institutional, and ecological contexts.

At the same time, we do not want to downplay the challenge of transdisciplinary scholarship. Our philosophical, epistemological, theoretical, and methodological orientations differ by discipline, and so it is little wonder that the silos are difficult to transcend. Working across disciplines requires acknowledging assumptions, harmonizing vocabularies, resolving contradictions, practicing patience, engaging in critical self-reflection, and accepting prolonged timelines. And yet, for complex and nuanced issues such as the myriad values embedded in food systems, we are confident that the extra labor, both productive and emotional, is worth it.

The Special Issue Papers

This special issue of JAFSCD is the outcome of the 2019 faculty/student workshop at UVM. The goal of the two-day workshop was to engage in a discussion about transdisciplinary research, learn from others, and have time to develop the papers that are in this special issue. The final paper produced for this issue is an evaluation of the workshop, which was attended by 13 people. We

begin with the end of the workshop—a paper that resulted from poetic analysis of the workshop evaluations that were collected using a rather standard set of questions with both close-ended and open-ended responses.

Poetic Expressions of Transdisciplinary Food Systems Collaborations by Heiss, Daigle, and Kolodinsky (2020) uses poetic analysis to create understanding of the results of an evaluation of the workshop described above. Poetic transcription transforms participants' responses to interview questions into poetic form. The authors note that this type of analysis is appropriate for and has been used in food systems research previously, but was new to all but one of the workshop participants (Heiss). Six poems emerged from the data, representing the *process of, roles and practices* of participants in, the *expression of value(s)*, and a note about what *was/is missing* in transdisciplinary research. Reading this evaluative paper first provides context for the other papers in this issue.

Balancing Social Values with Economic Realities: Farmer Experience with a Cost-offset CSA by Sitaker et al. (2020) focuses on farmer experiences with a cost-offset community supported agriculture model. One of a series of articles from a USDA-funded project that examined nutrition and farmer economic outcomes related to community supported agriculture (CSA) membership using a qualitative, in-depth interview approach, the paper indicates that farmer participation wasn't all "about the money." Indeed, farmers adapted to clientele needs. They "selected pick-up locations that met CO-CSA members' needs, were responsive to members' food preferences in selecting CSA contents, and allowed for late payments and pickups, though sometimes this placed an additional burden on farmers' time and resources" (p. 30). While a cost-offset CSA can challenge a farm's bottom-line profit, farmers thought that it could also increase their reach and visibility, allow more people access to fresh food, and even lead to policy changes that could benefit direct-to-consumer food systems in the future. Short-term monetary profit was supplanted by long term alternative food system success. The value to participating farmers is in contributing to sustained and expanded markets and a healthy, well-nourished population, in addition to

simply making a living.

Supporting Agricultural Resilience: The Value of Women Farmers' Communication Practices by Daigle and Heiss (2020) uses a qualitative interview methodology to examine the resilience of women farmers in what has been a gendered occupational category. As the authors note, women's farming practices within sustainable agriculture emphasize environmental and social well-being, as well as food quality, over agricultural intensification to increase monetary income. Communication networks, including by gender (or not), crop, experience, and more helped to maintain and increase the resilience of women farmers. Networks not only helped personal resiliency, they also contributed to traditional farm profitability.

Differences in Crop Selection, Resource Constraints, and Crop Use Values Among Female- and Male-headed Smallholder Households in Kenya, Tanzania, and Uganda by Reynolds et al. (2020) also focuses on gender in agriculture, but in an international context. Using survey data from more than 1,000 households, the authors "provide novel cross-country evidence on how female- and male-headed households, and women and men farmers within households, may prefer different crops and also face different levels of access to resources needed for market-oriented agriculture" (p. 66). Using very detailed quantitative methods, the authors conclude that men have more access to land and grow more market crops compared to women. While a typical economic interpretation would be that women need more access to land and technical support to choose income-producing crops, the authors point to a more nuanced, valued possibility. On less land, women planted a wider variety of crops. Aligned with previous research, these women, who also are nurturers, care about food security for their family members, perhaps valuing the ability to provide directly rather than grow, sell, and use that cash to purchase food. Understanding differences in values by gender, as well as resource differences, cultural norms and agroecology, are important as policy-makers develop programs for rural development.

Helping Farmers with Continuation Planning for Cost-offset Community Supported Agriculture to Low-Income Families by Sitaker et al. (2020) is another in the series of articles from the USDA-funded pro-

ject that examined nutrition and farmer economic outcomes related to CSA membership. This paper describes findings from an evaluation of a structured planning and implementation process conducted during the last intervention year of the study that aimed to help participating farmers sustain the cost-offset portion of their CSA after study funding ended. The evaluation components of continuation plans, farmers' experiences during implementation, their opinions about the planning process, and their future plans revealed a multitude of approaches. Farmers participating in the Farm Fresh Foods for Healthy Kids (F3HK) program used diverse methods to plan, recruit, and raise funds, and adapted strategies to fit their local conditions and farm businesses. Lack of farm resources—time, money, and expertise—was a continual barrier to moving forward. As with full-price CSAs, reciprocity between CO-CSA members and their farmer was a key factor. Farmers were committed to the success of the CO-CSA continuation planning process and most intended to continue the CO-CSA the following year.

Farm Fresh Food Boxes: Relationships in Value-Chain Partnerships by Greco et al. (2020) focuses on the importance of relationships in the development of a farm fresh food box (FFFB) model to provide access to fresh food to consumers unwilling or unable to access other direct-to-consumer value chains. This model uses components representing a CSA share and a short supply chain. The resulting values-based supply chain “refer[s] to both the quality of products sold and the values reflected in the operational decisions about the way product moves through the supply chain” (p. 116). The paper uses data from qualitative interviews of farmer-retailer pairs involved in the pilot for the FFFB project to discuss relationships: shared

values and mutual regard; shared governance (fair, stable pricing of value-differentiated products); and trust, transparency and communication. In the FFFB model, it is not enough to provide a box of produce at a price that consumers will pay. The paper does not provide simple answers that address the challenges of melding the shortest value chain (direct-to-consumer) with a traditionally long value chain (retail markets), nor a magic-bullet approach to a successful short values-based supply chain. Instead, it raises important questions that farmers and retailers must consider when deciding whether to create such a venture. One size does not fit all.

This special issue was the result of the coming together of faculty, graduate students, and experts in the field. We are especially appreciative of the presentations by Duncan Hilchey and Amy Christian, editors of the *Journal of Agriculture, Food Systems, and Community Development*. Their expert presentation and patience in answering student questions was impressive and helpful to everyone - student and faculty alike. Rebecca Seguin-Fowler of Texas A&M University was also generous with her time, offering a professional and personal view of how to lead and participate in successful transdisciplinary research. The initial two-day transdisciplinary workshop laid a strong foundation. It took over a year for student/faculty groups to move their papers to the publication stage. This special issue is evidence that transdisciplinary approaches to food systems research that celebrate both commonalities and differences in disciplinary perspectives of value in the food system can result in comprehensive approaches to address complex food system problems and offer viable solutions.



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Poetic expressions of transdisciplinary food systems collaborations

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SPECIAL ISSUE: MORE THAN
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Abstract

Transdisciplinary research, involving scholars and practitioners from a variety of fields, disciplines, and experiences, helps identify and explore the dynamic, multidimensional intersections among food systems challenges. While a valuable practice for exploring the food system in a meaningful way, transdisciplinary research in and of itself is a complex collaborative process. To support efforts for transdisciplinary approaches to food systems challenges, the Food Systems department at the University of Vermont sponsored a two-day workshop. This article uses poetic transcription

drawn from participants' written evaluation of the workshop to analyze and share themes in experiences with transdisciplinary research and collaborations. The results, presented in a set of poems, promote conversation and understanding around the importance of transdisciplinary collaborations, as well as their challenges and opportunities for food systems.

Keywords

Food Systems, Workshop Evaluation, Poetic Transcription, Transdisciplinary Research

Introduction

Conceptualizing value as more than just economic returns requires practitioners and scholars to view food systems as interconnected material, built, and social systems (Francis et al., 2008; Restrepo, Lelea, Christinck, Hülsebusch, & Kaufmann, 2014;

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Valley, Wittman, Jordan, Ahmed, & Galt, 2018). Transdisciplinary research, involving scholars and practitioners from a variety of fields, disciplines, and experiences, helps identify and explore the dynamic, multidimensional intersections among these systems. In particular, when multiple scholars and practitioners work collaboratively, they can use multiple lenses and a variety of datasets that transcend any one discipline. In collaboration on a project, their knowledge, skills, and experiences become synergistic. They are better able to identify complex problems facing a food system and generate complex interpretations of a particular phenomenon (Ellingson, 2009).

Just as food systems problems are complex, so are the solutions. Transdisciplinary research is valuable to food systems because it is well-positioned to develop, implement, and share meaningful solutions that address multidimensional needs, rather than just one dimension of a single need. These collaborations should generate more creative, responsible, and sustainable solutions to complex issues in the food system.

While a valuable practice for exploring the food system in a meaningful way, transdisciplinary research in and of itself is a complex process (Wickson, Carew, & Russell, 2006). To support efforts for transdisciplinary approaches to researching value in the food systems, the Food Systems department at the University of Vermont sponsored a two-day workshop on May 31 and June 1, 2019. The purpose of the workshop was to produce articles that highlight transdisciplinary perspectives of value in the food system. In addition to providing dedicated time to work on team articles related to the special issue of this journal, the workshop included several sessions related to defining value in the food system and transdisciplinary research processes and experiences. For example, each faculty member gave a short talk regarding their involvement in previous transdisciplinary projects. Other sessions included publication strategies for transdisciplinary work with editors of the *Journal of Agriculture, Food Systems and Community Development* (JAFSCD), transdisciplinary teamwork with experienced researchers, and transdisciplinary grant management with principal investigators.

With the goal of supporting food systems through research, the workshop aimed to increase and learn more about transdisciplinary collaboration. Following the workshop, the host collected program evaluations of the workshop focused on the topics, skills, and experiences that resonated with participants. As intended, the workshop provided space and time for teams to write articles for JAFSCD. An initial reading of the evaluations suggested, however, that the workshop produced more than publishable articles. The workshop created a space for participants to reflect on how their experiences of transdisciplinary research as a process and an outcome resonated or departed from those of others.

While the synergy produced in research collaboration is fairly well cited, the literature is limited in its ability to explain “the specific skills and approaches needed to spearhead or participate on a successful, highly collaborative and integrated research team” (Bennett & Gadlin, 2012, p. 3). Beyond highlighting processes and frameworks needed to participate in collaborative research teams, the workshop evaluation responses also addressed how food systems and transdisciplinary research both represent and function as interconnected, complex material, built, and social systems.

With this study, our goal is to highlight the experiences and opinions of the participants based on the workshop and past collaborative experiences. The current article uses poetic transcription to represent how participants’ experiences of the workshop and transdisciplinary research collaboration reflect, reinforce, and challenge each other. Under the assumption that transdisciplinary research is important to understand the complexities of the food system, our goal is to facilitate reflection that helps readers better understand their current collaborative experiences, identify what they need to know in order to advance their collaborative potential or output, and guide choices for further collaborations. Future workshop planners may also find these poems helpful as they plan activities to foster successful collaborative and integrated research teams.

Workshop Participants

The workshop participants were a transdisciplinary

group, ranging in professional roles within food system research, levels of academic training and standing, disciplinary backgrounds, and institutional affiliations. All were currently engaged in food systems research. Originally, 11 faculty members working in the area of transdisciplinary food systems were invited to participate in a transdisciplinary workshop. These faculty members shared the invitation with fellow faculty and graduate students who might be interested in joining the workshop (the total number of faculty and students reached is not known). To accept, participants had to submit (1) a short abstract of a transdisciplinary project they were working on or planned to write about for a JAFSCD special issue, related to the topic of value in the food systems, and (2) the name of at least one graduate student who would work on the paper and attend the workshop with them. A total of 21 faculty members and graduate students responded and were included in the workshop cohort.

Attendees were predominantly female (69%). Those in attendance included graduate students, professors, research professionals, and a public health professional. Participants were employed by three different universities, one extension agency, and a public health department in three different states (Vermont, New York, and Washington). Graduate students were all a part of the masters' program in Community Development and Applied Economics at the University of Vermont. Those included on the original list of participants, but not in attendance, included an assistant professor from a physical science discipline and his graduate student, a female agricultural extension agent, and a female research professional with a master's degree in a social science discipline. The absent individuals all resided in the same state as the workshop session. Each reported time conflicts as their reason for not attending.

Workshop Feedback Tool

After the two-day workshop on transdisciplinary approaches to exploring value in the food system, the participants completed a workshop feedback survey. The purpose of this survey was to better understand participants' experiences and attitudes around transdisciplinary work and workshop

activities. The survey included open and close-ended questions. Close-ended questions asked participants to identify as either a faculty or student and to rank on a Likert scale whether or not they feel they learned more about transdisciplinary research, found the material useful, and are more likely to engage in transdisciplinary research in the future. Open-ended prompts were then given for participants to record three things that came to mind when asked about each of the workshop sessions, as well as any additional information they wanted to include.

The Emergence of a Transdisciplinary Project

The current study emerged from an interesting place of vulnerability for all three authors. Jane Kolodinsky (#3 author), a professor in applied economics at the professor rank, was the principal investigator on the grant that funded the workshop. Sarah Heiss and Kerry Daigle (the #1 and #2 authors, respectively) were participants. Sarah is an associate professor in communication studies, and Kerry is a graduate student in community development. During the workshop, Sarah talked to Kerry and Jane about a transdisciplinary food systems manuscript using poetic transcription she was completing for a different publication. This was Sarah's first time using the method and Kerry and Jane's first exposure to the method.

Following the workshop, Jane reviewed the survey responses and found the open-ended feedback to include compelling and forceful reflections on the workshop, as well as on the transdisciplinary process itself. She reached out to Sarah and Kerry about using the evaluation contents as a dataset. Before reviewing the evaluations, the researchers obtained IRB Human Subjects Approval. The study was categorized as secondary research on a dataset, as the original purpose of the surveys was for evaluation of the workshop for future improvement within the department. Evaluations were anonymous, and participants were notified via email that their responses would be included in this analysis. Once IRB approval was obtained, the three authors reviewed the responses and decided together to use thematic analysis and poetic transcription for the analysis and write-up. Sarah Heiss

provided methodological readings and basic training sessions for the team before and during the analysis and writing processes.

Relevance and Rationale

Poetic transcription, “the creation of poem like compositions from the words of interviewees” (Glesne, 1997, p. 3), is a relevant method for analyzing and representing qualitative datasets related to complex systems and experiences. Cahnmann (2003) argued that poetic transcription provides new ways of seeing previously hidden complexity and contradictions that improve understanding of social phenomena.

Because it is a useful and relevant method for analyzing complex social processes and systems, a variety of social science disciplines have used this research method over the last 20 years, including but not limited to sociology, education, social work, communication studies, and anthropology (Becker, 1999; Calafell, 2004; Carr, 2003; Hartnett, 2003; Nichols, Biederman, & Gringle, 2014; Patrick, 2016; Poindexter, 2002; Teman, 2010; Richardson, 1994).

Poetic transcription has also been used as a tool to explore and teach about food systems. For example, poetic transcription has been used to research food systems topics ranging from socio-ecological transformations linked to changes in grazing practices and the livestock industry (Fernández-Giménez, 2015) to the experience of loss of appetite among cancer patients (Souter, 2005). Poetry has also been used as a tool to teach food system issues, including agricultural awareness (Bjorsen & Emery, 2002), biological and agricultural engineering (Christy & Lima, 2007), conservation science (Januchowski-Hartley et al., 2018), hunger and food insecurity (Huye, 2015), and environmental sustainability (Anabaraonye, Nji, & Hope, 2018).

The current study seeks to foster transdisciplinary collaboration and training within food systems, as well as to contribute to the growing body of food systems scholarship and practice using poetic transcription. This section begins with a brief rationale for using poetic transcription to analyze and share the complex themes that enable and constrain transdisciplinary collaboration in

food systems. We next describe the poetic transcription procedures used in this study. Finally, we invite audiences to read a set of poems based on participant responses to the workshop.

Background in Poetic Transcription

While research is traditionally written in prose, Richardson (2001) believed that researchers, participants, and research audiences could benefit from diversifying the ways in which data is analyzed and represented. Poetic transcription provides a departure from traditional prose. Cahnmann-Taylor (2008) explained the complementary nature of poetry and prose well: “just as the microscope and camera have allowed different ways for us to see what would otherwise be invisible, so too poetry and prose are different mediums that give rise to ways of saying what might not otherwise be expressed” (p. 16). While poetic transcription serves the same goals as systematically analyzing and highlighting patterns in participants’ voices and experiences (Curtin & Fossey, 2007), its ability to complement or shift the focus of prose research makes it a valuable addition to food systems and transdisciplinary research. Many scholars highlight the ability of poetic transcription to shift the power dynamics among the participant, researcher, and reader.

Poetic transcription, like other forms of qualitative analysis, empowers participants by placing their voices in the “center of inquiry, analysis, and discussion rather than on the margins” (Tillman, 2006, p. 282). Poems resulting from poetic transcription are composed of words taken directly from a qualitative dataset (Glesne, 1997; Richardson, 1994; Simpson & Quigley, 2016). A poem or set of poems can include direct quotes from a single participant interview or survey (for examples, see Glesne, 1997; Poindexter, 2002). Rather than committing a poem per participant, a poem or set of poems can also be multivocal compositions, consisting of direct quotes from multiple participants to capture the recurrent nature of themes within and across participants’ comments (for examples, see Hartnett, 2003; Teman, 2010). A poem or set of poems can focus on the multidimensional nature of a theme or multiple themes simultaneously. By doing so, poetic transcription

serves to simplify complex themes and/or complicate themes once thought to be simple concepts (Ellingson, 2009).

Although poetic transcription empowers participants, researchers still have a role in shaping the research project's design, data collection, analysis methods, and representation (Ellingson, 2009). This method does not uphold certain standards of validity and reliability expected by quantitative researchers, nor does it try to do so. Furman (2006) asserts, "not all research must have as its ultimate goal the generation of knowledge that is generalizable" (p. 3). Rather than seeking objectivity in their actions, researchers using poetic transcriptions privilege subjectivity and reflexivity, which includes thoughtful, conscious self-awareness. Researchers must constantly think about how those intersections shape or are shaped by the research process. For example, with poetic transcription, researchers much consider why they are using the method, whose voices to include, and what methods to use when arranging the phrases and stanzas to create the poems (Ho, 2012). Researchers also exercise reflexivity by recognizing that they themselves can be transformed through the research process. Through thoughtful reflection research that centers participant voice and audience experience, researchers using qualitative methods, including poetic transcription, support the transferability of results. Rather than seeking generalizable results that are representative of a larger population, the transferability of results means that readers are given the opportunity to decide the degree to which results can be used in their unique situations (Maxwell & Chmiel, 2014).

Unlike conventional research write-ups, which require the author to explicitly interpret the themes or data, poetic transcription invites readers to have an active role in experiencing and making sense of the data and results. The researcher is not positioned as "the sole legitimate carrier of knowledge" (Richardson, 2001, p. 877). Rather, authors create spaces that share and evoke emotion, engaging readers in a creative relationship that moves them beyond passivity to co-creation (Furman, 2006). By "highlighting larger segments of participants' words than usually occurs in conventional reports" (Ellingson, 2009, p. 65), poetic transcription allows

readers to have an increased opportunity to experience participant(s), contexts and the nuanced connection among themes.

Current Methodology

The goal of this study was to write poems that would highlight the experience and opinions of the participants as they experienced the workshop and reflected on past collaborative experiences. Guidance on poetic transcription is being included increasingly in qualitative research handbooks, though no single method has been identified (Faulkner, 2009; Harter, Peterson, McKenna, & Torrens, 2012; Madison, 2012; Richardson, 2001). Across sources, the common methodological recommendations include crafting poems that use exclusively words and phrases from participants, in order to represent the most powerful and relevant themes. Participants' words are condensed and arranged in ways that communicate the themes and allow room for interpretation.

The authors used thematic analysis methods to inductively identify patterns in the dataset. Thematic analysis is a commonly used cyclical and continuous method of making sense of, reducing, and explaining patterns within and across qualitative datasets (Braun & Clarke, 2006; Lindlof & Taylor, 2011). In the initial stages of analysis, each author worked independently to read and open-code the open-ended survey responses for concepts related to transdisciplinary collaboration in the food system. Upon a second review, authors collapsed related codes into each other to create categories or patterns. After two weeks, the authors met and discussed the categories we identified independently. Drawing on independently derived categories, the authors identified five central themes that are reoccurring, repetitive, and forceful (Owen, 1984) within and across participants' comments: transdisciplinary research is (1) an ongoing process; (2) a complicated and dynamic process; (3) valuable to the food system; (4) requires effective communication; and (5) valued more by some than others.

Guided by these themes, the authors individually began the process of poetic transcription. Standards of rigor associated with poetic transcription reflect the ability of a poem or set of poems to express and share meaning. The authors individu-

ally worked to select phrases that represented the emergent themes. Each author juxtaposed these phrases to create thematically driven poems (Ho, 2012). After two weeks, the three authors met and read their poems aloud. The authors discussed commonalities and departures in style, form, and representation of the themes. Some poems, written by different authors, were then combined to add increased dimension to a given theme. While faithfully representing the words and meanings of the original dataset, the authors also worked together to adjust issues related to form, pattern, and line spacing for aesthetics and impact, and editing things such as word spacing. Poindexter (2002) described this step as “diamond cutting ... the chipping away of all but the phrases and stanzas that seemed most evocative in emotion and clarity” (p.709). Some poems were eliminated in favor of what the team considered stronger poems on the same theme. To capture the recurrent nature of themes within and across participants’ comments, the resulting set of poems represents a composite of direct quotes from multiple participants. Each poem was reviewed several times to confirm that any given poem read alone resonated with one or more themes and that, when read as a set, the poems served to both complicate and simplify the original themes (Mears, 2009).

The poems were originally written with the intention of inviting readers to interpret the themes without the authors’ guidance. Introductions were added to the poems after the fact and upon editorial request. The goal of the introductions is to provide a basic framing for the poems, while simultaneously maintaining readers’ autonomy to have independent interpretations and responses. While not a consistent practice in poetic transcription, introductory content is comparable to the writing styles seen in other published poetics research (for example, see Harter et al., 2012)

The poems that follow represent forceful and recurring themes within and across workshop feedback. The authors invite the reader to consider the themes that emerge within individual poems, as well as across the set of poems. The hope is that readers from a variety of disciplines, professions, and ranks will suspend themselves in these poems—reflecting on how the themes expressed through these poems resonate with their personal transdisciplinary collaborative experiences. In addition, readers should consider how this reading experience may reinforce or challenge how other articles in this special issue of the *Journal of Agriculture, Food Systems, and Community Development* use transdisciplinary collaboration to examine or define value in the food system.

Process Theme Poems

It doesn't just happen

(What did you like best) Time to share research perspectives to move the field

Transdisciplinary research doesn't just happen

Need trust

Reflection

Time

Getting the time

More time

We carved out time for the transdisciplinary workshop

It takes time to LEARN ABOUT this transdisciplinary work.

Time

- To learn a new vocabulary; it's hard enough to know the words of my own discipline
- To change my perspective; it's hard enough to understand my discipline's perspective
- To appreciate my colleagues who have different training
- To practice respect beyond the giants in my own field

It takes time to DO this transdisciplinary work.

Time

- To interpret the theme across disciplines
- To harmonize our writing
- To synthesize our drafts

But still there isn't enough time

No time

- To think
- To discuss
- To write
- To reflect

How do we make time for this transdisciplinary work in a world deep in disciplinary thought?

Yet, we carved out time for a transdisciplinary workshop.

The poems entitled "It doesn't just happen" and "We carved out time for a transdisciplinary workshop" frame transdisciplinary research as an ongoing, complicated, and dynamic process. In addition to completing the tasks associated with any research project, such as research writing, transdisciplinary research requires more time to

develop relationships, mutual respect, and shared understanding across disciplines. The poems highlight the extra demands this need for time puts on individuals already struggling to find time to do research and grow within their own disciplinary boundaries.

Roles and Practices Theme Poems

Parts

Baby steps forward; giant steps backward.
Falter, embrace, hesitate, jump in.
We are in this together because we choose to be.

Building respect, trust and rapport,
Fostering appreciation,
Learning from one another,
Leveling the playing field.

But wait!

It's not a level playing field.

There needs to be a leader.

We have to be accountable.

There are rules.

A hierarchy exists.

Is this transdisciplinary work an oxymoron?

Build trust.

Do your part.

Speak up.

The Key

Transdisciplinary research is hard to achieve,

Communication is key.

Teamwork is important,

Communication is key.

Leadership can determine dynamics,

Communication is key.

Trust,

Respect,

Boundaries.

Politics and personalities take time and effort,

. . . but are worth it.

. . . so keep trying.

Reinforcing and building on the prior two poems, which situated transdisciplinary research as dynamic and complicated processes, the poems entitled “Parts” and “The Key” highlight important practices or roles within transdisciplinary processes. “Parts” suggests that transdisciplinary team members should “do your part.” Specifically, the poems recognize effective leadership, engagement, and communication as important elements. Leadership is recognized as an important role within transdisciplinary teams. In “Parts,” one participant suggests that “leadership can determine the dynamics”; leaders do not just manage the project tasks and timelines. Leaders’ role also included managing the team climate. Specifically, leaders attend to issues of power by “leveling the playing field.” Participants wanted leaders who could facilitate

appreciation and learning across disciplines. While leaders would have some level of power over the team, it is important to note that strong leaders were not defined by their discipline or formal role on a grant application; rather, they were competent communicators able to facilitate task completion and respect among team members. The other poem, “The Key,” demonstrates how communication skills transcend the leader role. Transdisciplinary team members need to exercise communication competence as they engage in teamwork and build trust and respect, as well as manage boundaries, personalities, and politics. It is interesting to note that while these poems highlight “do your part,” participants did not focus on research-specific tasks, such as grant administration, data collection, analysis, or write-up.

Expression of Value Theme Poems

Value Varies

Appreciate colleagues,

Values are constructed and context dependent.

Collaborate with a new colleague in a discipline you haven’t heard before,

There are multiple perspectives.

Make sure the lesser discipline gets their voices heard,

Values vary by culture.

[There are] pitfalls of transdisciplinary as a social scientist,

“tokenism” is still rife in academic circles.

Transdisciplinary relationships can last,

Common language and common vision are needed to make it happen.

What is one thing you would have like to have seen covered?

The hard scientists’ perspective.

Where is the Natural Scientist?

Cross-fertilization of ideas.

Everyone's research -

One size does not fit all.

Where is the natural Scientist?

Don't be afraid to ask.

Effective teams are hard, but worth it.

Communication is key.

Sometimes people stray.

Where is the natural scientist?

Don't be afraid to ask.

Values vary by culture.

Values are constructed and context dependent.

Value expression vs constraints revealed.

Where is the natural Scientist?

Don't be afraid to ask.

Be ever mindful of including others from the beginning of the project.

Don't be afraid to ask.

Building on the prior poems, "Value Varies" and "Where is the Natural Scientist?" highlight how issues related to disciplinary values shape the dynamic and complicated processes of transdisciplinary research teams. While many participants expressed a desire to work in transdisciplinary teams because they thought it was valuable to the food system, they also said that they did not think members of every discipline felt this way. Specifically, a tension between social scientists and natural scientists emerged. One participant felt that they were seen as "token" social scientists when invited onto grants for which the primary investigator was a natural scientist. Other participants asked, "where is the natural scientist?" This was likely a reflection of the workshop, with only social scientists in attendance. However, the comments during the workshop and in the feedback also highlighted

that, although natural scientists did not accept the invitation to participate in this transdisciplinary event nor submitted an abstract and did not attend, it was still worth asking them to collaborate. The concern over including these voices or strengthening collaboration with researchers from natural sciences is important to food systems research. It is interesting to note that the social scientists who participated did not comment on the lack of participation from the humanities in transdisciplinary projects. While this study cannot determine why the absence of the humanities did not appear in evaluations, it is worthwhile to note that the absence of this group may indicate a disconnect between the social sciences and humanities and point toward yet another opportunity for collaboration across disciplines.

Discussion

When addressing researcher-stakeholder relationships in food systems, Lamine (2018) argued that “acknowledging the variety of values and interests involved and constructing a collective ‘intelligence’ of the situation and processes” (p. 9) is essential. The Food Systems department at the University of Vermont hosted a workshop to learn about and support transdisciplinary food system research. An outcome of this workshop was a collection of articles for a special issue of JAFSCD on the topic of “more than value\$ in the food system.” In addition to articles, responses to a workshop evaluation provided scholar and practitioner accounts of what it is like to engage in transdisciplinary work and insight for future workshops. Additionally, the workshop evaluation form captured participants’ experiences regarding the value of such collaborative efforts in the food system. These evaluation forms became a dataset for the current study. The results of a poetic analysis of this dataset have important implications for current and future conversations in food systems research and practice.

Theoretical Implications

The themes in these poems speak directly to current conversations in food systems research. While most of the poems explicitly reference the tensions related to resources, relationships, or power dynamics, the poems simultaneously convey a positive or optimistic tone. Participants reframe collaborative challenges as necessary team dynamics that can be managed through communication, time allocation, reflection, relationship-building, and good leadership.

In addition to the belief that team dynamics can be managed, participants pushed further, suggesting that they should be managed. This finding is consistent with Lamine (2018), who argued that collaborative dynamics should be managed to develop cohesive narratives of food system problems and research agendas. Pointing to the value of transdisciplinary work, the participants were driven to seek out and manage team dynamics by their desire to understand the complexity of food systems. In one participant’s words, “Effective teams are hard, but worth it.” Research teams and

researcher-stakeholder relationships should prioritize team management in setting research agendas. This finding is valuable because it demonstrates the value of collaboration to researchers, as well as some of the processes that enable and constrain collaboration.

While the process of research collaboration and teaming has been examined in other disciplines, such as the medical fields (see Bennett, & Gadlin, 2012), it is not well examined within food systems research. Future research should examine the interpersonal processes that shape and are shaped by food systems research team processes. For example, future research may quantitatively investigate instances of collaboration across disciplines involved in food systems research or analyze relevant disciplines’ perspectives directly as they relate to collaborating across natural sciences, social sciences, and the humanities. These findings would foster increased collaborative potential within food systems research.

The use of poetic transcription makes novel contributions to methodical approaches to understanding how food systems research shapes and is shaped by social processes and complex systems. Cahnmann (2003) argued that poetic transcription provides new ways of seeing previously hidden complexity and contradictions that improve understanding of social phenomena. Poetry’s ability to synthesize complex data into concise, yet evocative, text mirrors the need for food systems collaborations that can establish common goals among sometimes competing perspectives. In addition to bringing participant voices together, the poetic form provided an opportunity for the reader to uniquely experience the words of participants, in both complex and accessible ways, that traditional forms of qualitative research papers would not allow (Canniford, 2012; Ward, 2011). We believe that analyzing and delivering themes through poetic transcription acknowledges, as Lamine (2018) described, the variety of values involved in constructing a collective intelligence.

Practical Implications

The themes in these poems speak directly to current conversations in food systems practice. This workshop is one example of ways scholars and

practitioners can come together to gain skills toward more effective transdisciplinary collaborations. The theme of “process” in the analysis suggests that these events are necessary and that, without doing the work to learn effective skills for transdisciplinary work, it would be difficult for teams to come together productively to address food systems topics.

The results are valuable because they could help future workshop planners develop formal training experiences to foster increased collaborative potential in their food systems. Specifically, these results suggest three techniques for hosting effective workshops on transdisciplinary food systems research:

- 1. Purposefully recruit researchers who operate from diverse paradigms.**

A common frustration among participants was the lack of attendance by natural scientists. In the future, inviting scholars from many different disciplines may be useful to anticipate a low attendance rate by scholars from the hard sciences and invite a greater number of participants from these disciplines. While the participants did not recognize humanities and arts researchers as missing, we would like to suggest that these scholars also be actively recruited.

- 2. Address effective communication strategies.**

The analysis suggests that successful communication is a common concern among scholars and practitioners interested in transdisciplinary work. Future workshops might prioritize strategies for communicating across actors in a way that honors the strengths of each unique disciplinary practice.

- 3. Validate the factors that constrain collaborative research.**

Results convey the feeling that time is a barrier to reaching transdisciplinary food systems research goals. Similar to the workshop evaluated in this paper, future events should include large windows of time dedicated to writing in

research teams in addition to hands-on, team-building activities.

In addition to providing themes for workshop leaders and educators, the poetic results of this study are uniquely valuable because they also yielded content for future workshops. The results in poetic form are valuable to future transdisciplinary food systems collaboration because their themes and form are accessible to audiences of varying disciplines, professions, reading levels, and quantitative reasoning skills (Cahnmann, 2003). Additionally, unlike more traditional representations of results, the poetic form of our results allows planners to create participatory learning opportunities. Poetry can provide “an avenue for communication” among students (Gunn, 2012, p. 25.1132.3). Participants can quickly read the multi-vocal accounts represented in the poems and then talk about how complex topics, such as power or teaming processes, are represented in the poems and in their own teaming experiences. These findings contribute to ongoing examples of poetry as a tool for teaching about food systems (Anabaraonye et al., 2018; Bjorsen & Emery, 2002; Christy & Lima, 2007; Huye, 2015).

Conclusion

This study highlights the experiences of researchers and practitioners conducting transdisciplinary research to address challenges in the food system. The key findings demonstrate that transdisciplinary research requires time for developing relationships and shared understanding across disciplines, open communication and engagement from all participants, and a conscious effort to value all disciplines’ perspectives equally. These insights contribute to ongoing efforts to encourage transdisciplinary research in the food system, as well as offer practical suggestions for planning workshops for researchers and practitioners to both experience and develop strategies for transdisciplinary collaboration.

To maintain the readers’ active participation in research using poetic transcription, this article concludes in an invitational tone. Readers are invited to reflect on their own values, practices, and experiences regarding transdisciplinary research. Of

what value is transdisciplinary research to food systems? How do your values, practices, and experiences reinforce, challenge, or complicate

transdisciplinary research collaboration? Are you included or including others in your pursuits within the food system?



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Balancing social values with economic realities: Farmer experience with cost-offset community supported agriculture

SPECIAL ISSUE: MORE THAN
VALUES IN THE FOOD SYSTEM



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Abstract

Some farmers are offering subsidized or “cost-off-set” community supported agriculture (CO-CSA)

shares as a strategy to counter market saturation and improve low-income families’ access to fresh local foods. However, little is known about farm-

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ers' experiences with this model, particularly in regard to the balance between additional resources required for adoption and subsequent contributions to farm revenue. As part of the *Farm Fresh Foods for Healthy Kids Study* of the impact of a CO-CSA on dietary behaviors in low-income families, we conducted qualitative interviews with 12 farmers across four states after the first and the third years of CO-CSA implementation. We explored these data to understand what accommodations farmers provided to low-income families, the benefits and challenges of implementing the CO-CSA model, and farmers' perceptions of its impact on cash flow and profitability. We found that farmers selected pick-up locations that met CO-CSA members' needs, were responsive to members' food preferences in selecting CSA contents, and allowed for late payments and pickups, though sometimes this placed an additional burden on farmers' time and resources. Additionally, weekly payment transactions led to increased recordkeeping. Despite its challenges, most farmers said CO-CSA adoption was a worthwhile addition to their business model. Expanding food access through this mechanism may become more sustainable with the additional support of innovative policies like eased land-use restrictions, operational models, and community strategies to fund and operate CO-CSA programs. This is an area ripe for future research, as there is little documentation on both single farm and multi-farm CO-CSA operations.

Keywords

Cost-Offset CSA, Community Supported Agriculture, Entrepreneurship, Farmer Profitability, Nutrition Incentives, Subsidized Direct-to-Consumer

Introduction

Developments in the U.S. food system since the early 20th century have created efficiencies that have reduced both direct costs to the industry and prices for consumers (Institute of Medicine & National Research Council, 2015). Despite many notable accomplishments, one critique of this system is that food prices do not reflect the full social, economic, and environmental costs of production (Buttel, 2003). Trends that include globalization, technological innovation, and industry consolida-

tion have created competitive advantages for large firms that benefit from economies of scale. Smaller and mid-sized producers may be marginalized in this system, with implications for local economies and the choices available to consumers (Hendrickson, James, & Heffernan, 2018; Institute of Medicine & National Research Council, 2015).

Alternative models have arisen to sustain small and midsized operations. One such model is the values-based supply chain (VBSC), in which all network actors (e.g., farmers, processors, third-party certifiers, distributors, and retailers) collaborate to maximize the social and financial return on investment for all participants in the supply chain (Bloom & Hinrichs, 2011a; Bloom & Hinrichs, 2011b; Cohen & Derryck, 2011; Stevenson, 2013; Stevenson & Pirog, 2008). This model is values-based because of its deliberate effort to create trust, transparency, and cooperation among supply chain actors, and its commitment to the welfare of the people, land, and livestock involved (Cohen & Derryck, 2011). VBSCs seek to maximize the intrinsic value of products for intermediate and final customers by highlighting such distinctive characteristics as local provenance, sustainable production techniques, high ethical standards, and other elements that consumers increasingly associate with quality (Cohen & Derryck 2011). Producers engaged in VBSC may sell through a number of intermediated marketing channels, including grocers, restaurants, and regional aggregators (e.g., food hubs). They may also make buying arrangements with the foodservice operations of schools, universities, hospitals, and other institutions (Low & Vogel, 2011).

Civic agriculture is another alternative model, in which farmers aim to decrease the physical and social distances between producer and consumer, as well as eliminate intermediaries. This is a strategy to increase farmer profits while decreasing consumer costs (Renting, Marsden, & Banks, 2003). According to Feenstra (1997), civic agriculture emphasizes the place-based characteristics of regional food systems, the economic viability of farmers and rural communities, ecologically sound production and distribution practices, reliance on local knowledge, and social equity for all members of the community (see also Chiffolleau, Millet-Amrani, &

Canard, 2016; DeLind & Bingen, 2008).

These principles are embodied in direct-to-consumer (DTC) sales strategies such as farm stands, farmers markets, and community supported agriculture (CSA). In these markets, consumers are seen as co-creators of the new food system, motivated by shared values of environmental sustainability, the economic viability of producers, support for local communities and economies, and reciprocal relationships (Andreatta, 2000; Chiffoleau et al., 2016; Goland, 2002; Hayden & Buck, 2012; Henderson & Van En, 1999; Martinez et al., 2010; Ostrom 2007). Consumers are willing to pay higher prices and accept certain inconveniences when they choose to purchase through DTC venues (McGuirt et al., 2020) because they like the quality and taste of the food and consider it worthwhile to support the development of an alternative food system.

DTC marketing of local foods has demonstrated dramatic growth in popularity over the past few decades. Beginning in 1992, the inflation-adjusted value of DTC sales increased by 77 percent, reaching \$1.2 billion¹ in 2007 (Low & Vogel, 2011). But by 2012, DTC sales began to flatten, possibly due to DTC market saturation, increased competition from intermediated market sales of local foods, and new technologies like online ordering and meal kits (Galt, Bradley, Christensen, Van Soelen Kim, & Lobo, 2016; Low et al., 2015). In 2017, DTC sales of raw and value-added products involved just 6.4 percent of farms and contributed to only 0.7 percent to total agricultural sales (U.S. Department of Agriculture, National Agriculture Statistics Service [USDA NASS], 2019). Further, while 130,056 farms sold via DTC approaches and 28,958 farms sold via intermediated channels that year, intermediated sales greatly outpaced DTC sales, such that the average sale per intermediated farm was \$312,042 while the average per DTC farm was \$21,570. (USDA NASS, 2019).

The traditional CSA model, in which consumers pay the farmer ahead of the growing season in return for a “share” of the harvest, is arguably most emblematic of civic agriculture, requiring members’ commitment and high allegiance to its core values (Galt et al., 2016; Martinez et al., 2010; Pole & Ku-

mar, 2015). Well-documented barriers to participation include up-front payments, pick-up logistics, farmer-directed selection, seasonality, and unfamiliar vegetables (Kolodinsky et al., 2017). Therefore, it is not surprising that 2015 CSA sales made up only seven percent of DTC sales overall, while the proportions of sales through farm stands and farmers markets were 44 and 23 percent, respectively (USDA NASS, 2016a; 2016b). Thus, to retain customers and expand markets, CSA farmers are exploring various business expansion strategies. Some of these strategies include adding value-added products, offering flexible shares (frequency, payments, item selection, etc.), utilizing flexible electronic purchasing and other e-commerce marketing tools, partnering with institutional health and wellness programs, collaborating with food hubs and multifarm systems to increase scale and scope, and employing season extension technologies (Woods, Ernst, & Tropp, 2017).

Other strategies to expand markets include CSA outreach to those with lower access to fresh produce, such as low-income families (AbuSabha, Namjoshi, & Klein, 2011; Cohen & Derryck, 2011; Hinrichs & Kremer, 2002; Lang, 2010), rural populations (Local Food Research Center, 2013; Wells, Gradwell, & Yoder, 1999), and those living in urban food deserts (Ammerman, 2012; Duvall, 2014; Friedman, R. R. (2008), Jablonski, Perez-Burgos, & Gómez, 2011). Two USDA grant programs, the Farmers Market Promotion Program and the Local Food Promotion Program, incentivize low-income consumers to shop at farmers markets or purchase CSA subscriptions using SNAP benefits (USDA AMS, 2016). Additionally, many farmers seek to reduce barriers to participation through discounts, sliding-scale membership fees, work-shares, and donated shares.

Another strategy some CSA farmers use is altering the payment structure and offering cost-offset (subsidy) shares at a 25 to 50 percent discount. While its prevalence is unknown, one study estimated that half of all CSA farms interviewed in Central California offered some type of cost-offset CSA (CO-CSA) (Guthman, Morris, & Allen, 2006). CO-CSAs rely on diverse funding strategies to

¹ All values are in U.S. dollars.

cover the CSA subsidy. Some of these methods include accepting donations from full-pay CSA members, seeking grants, conducting community fundraising, accepting work-shares and bartering, partnering with organizations that raise or supply funds, and using low input, minimal-labor practices to reduce share price (Forbes & Harmon, 2008; Galt et al., 2016; Guthman et al., 2006; Hinrichs & Kremer, 2002; Lang, 2010; Rossi, Woods, & Allen, 2017). Some farmers further reduce barriers by offering flexible payment plans, accepting SNAP EBT, arranging alternative pick up sites and/or times, and taking food preferences into account when packing the CSA (Kantor, 2001).

A few studies examining the dietary habits and nutrition impacts of subsidized CSAs have provided insights from farmers on implementing the CO-CSA model. One CO-CSA intervention study found that farmers generally liked that the subsidy provided by the study gave them guaranteed sales and allowed them to use imperfect produce in the boxes (Abbott, 2014). Novice CSA farmers adopting CO-CSA said they struggled with packing and distribution logistics while trying to be sensitive to the food preferences of low-income customers (Abbott, 2014; Andreatta, Rhyne, & Dery, 2008). Farmers mentioned problems with CO-CSA members dropping out, picking up, and paying for food on time (Andreatta et al., 2008; Hoffman et al., 2012). Suggested explanations included CO-CSA members not fully understanding the CSA concept (Abbott, 2014) and CO-CSA share costs that were too high to be sustainable. Farmers' suggestions included reducing the share size, asking for partial payment from participants, and accepting SNAP and WIC to pay for weekly shares (Quandt, Dupuis, Fish, & D'Agostino, 2013). Yet, there remains a need for a systematic study of the benefits, burdens, and financial impacts of operating a CO-CSA program from the farmer's perspective, particularly across diverse geographic regions where these programs might have differing impacts.

In this article, we describe findings from qualitative, in-depth interviews with 12 farmers in four U.S. states who added a cost-offset to their CSA operation. This is part of a larger, multistate, multidisciplinary study on the impact of CO-CSAs on dietary behaviors in low-income families (Seguin et

al., 2017). The research questions to be explored in this paper include:

- What strategies did farmers use to accommodate low-income families?
- How did the CO-CSA adoption affect cash flow and profitability?
- What were the benefits and challenges of implementing the CO-CSA model?

Design and Setting

The Farm Fresh Foods for Healthy Kids (F3HK) study was a multistate, USDA-funded randomized trial that investigated how CO-CSA membership, combined with tailored nutrition education, affected diet and other health behaviors in low-income families and local agricultural economies (Seguin et al., 2017). Twelve farms across New York, Vermont, North Carolina, and Washington were selected based on the farm's interest in adding a cost-offset program to their existing CSA business to include more low-income families in their customer base. As previously reported, farms varied in population size and in proximity to either metropolitan or rural areas (McGuirt, Sitaker, Jilcott Pitts, Ammerman, Kolodinsky, & Seguin-Fowler, 2019; Sitaker, McGuirt, Wang, Kolodinsky, & Seguin, 2019). Research staff recruited eligible families to participate in the CO-CSA, provided pre-season funds to cover 50% of the CSA share cost for each participant, and covered equipment and transaction costs for participating farmers to accept EBT payments (Seguin et al. 2017). In turn, participating farmers agreed to abide by the study's operational parameters and participate in data collection activities and continuation planning during the final intervention year. Farmers were at liberty to select the F3HK CSA pickup sites, which included on-farm sites, offsite locations, or both (McGuirt et al., 2019; Sitaker et al., 2019).

The three-year CO-CSA intervention began implementation in 2016. CSA seasons varied in duration from 15 to 24 weeks (mean=19 weeks), with market share prices ranging from \$365 to \$900. Cost-offset participants paid 50 percent of the market price, in weekly installments of between \$9 and \$21 per week. Many farmers offered only one share size, while four offered various sizes at graduated

prices. In the first season (2016), there were between two and 17 F3HK participants per farm.

Research Methods

We analyzed data from two sets of interviews with 12 participating F3HK farms. In the 2016 postseason interviews, we asked farmers to reflect on their motives for F3HK participation, along with the successes and challenges of CO-CSA implementation during the first year. Farmers also provided information on how adding the CO-CSA affected inputs (e.g., staffing, training, workload, equipment, etc.), CSA operations, and finances (i.e., sales, cash flow, and profitability), along with plans for the CO-CSA in the next year. The 2018 debriefings occurred after the final F3HK intervention year, during which farmers received training and support for developing and implementing a CO-CSA continuation plan with support from F3HK coaches. Debriefing interviews focused on farmer experience with continuation planning and implementation; challenges, successes, and lessons learned; and plans for their CO-CSA operation after the F3HK study ended.

Interviews and debriefings were audio-recorded, transcribed verbatim, imported into the NVivo qualitative data analysis software (QSR International Pty Ltd., Version 11), and coded by question. Researchers met to discuss the coding process and emergent ideas. These discussions informed the development of preliminary descriptive codebooks reflecting farmers' experience with CO-CSA implementation, including alignment with values, interactions with participants, associated costs,

and impact on revenue. We then iteratively and collaboratively revised and refined the codebooks, and final codebooks were applied to the full set of transcripts. Qualitative data were analyzed by reviewing and summarizing codes.

Results

The findings are divided into seven major categories: farm characteristics, motives for participation, labor costs and expenses related to CO-CSA, financial impacts, strategies for cementing new customer relationships, challenges of accommodation, and benefits of CO-CSA implementation. The themes that emerged from the data within each of these categories are described in the text below, accompanied by illustrative quotes.

Farm Characteristics

F3HK farms generated an average of \$289,641 in gross sales in 2015, but this ranged from \$42,000 to \$1,021,110 (Table 1). Sales varied widely between and within states, with North Carolina displaying the lowest average sales and smallest intra-state variation (\$77,468, \$38,733 s.d.) and Washington farms, the highest (\$546,037, \$490,197 s.d.). Similarly, CSA membership for individual F3HK farms varied, from 45 to 1145 members (mean 243; median 101).

Ten F3HK farms sold between 75 and 100 percent of their product through CSA; only one farm sold through CSA exclusively. Seven F3HK farms (58 percent) also sold to restaurants or retailers, similar to the national estimate of CSA operations selling to restaurants (55 percent), but higher

Table 1. Characteristics of Farm Fresh Foods for Healthy Kids (F3HK) Farm Operations, 2016, Averaged by State

State (Region)	2015 Gross Farm Sales in USD (s.d.) ^a	DTC as % of all sales ^a	CSA members per farm		CO-CSA members (% of CSAs) ^c
			F3HK Ave. (s.d.) ^a	Region ^b	
NY (NE)	\$195,871 (\$237,552)	80%–98%	170.3 (113.2)	203.8	31 (6.1%)
VT (NE)	\$273,758 (\$194,316)	75%–93%	248.3 (249.4)		19 (1.9%)
NC (SE)	\$77,468 (\$38,733)	50%–84%	75.5 (14.8)	105.9	31 (20.5%)
WA (W)	\$546,037 (\$490,197)	26%–100%	422 (652.1)	125.7	16 (1.3%)
Overall (Avg. or Range)	\$289,641 (\$305,205)	26%–100%	243 (336)	144.8	97 (3.3%)

^a F3HK self-reported data from 2016 farmer interviews

^b As reported in Woods, Ernst, & Tropp, 2017

^c F3HK administrative data, 2016

than the estimated 38 percent selling to grocery stores (Woods et al., 2017). Additionally, 33 percent of F3HK farms sold to food hubs or wholesalers, and eight percent sold to institutional buyers or processors.

F3HK farms located in New York and Vermont had smaller CSA memberships compared to the Northeast regional estimate of 203.8 (Woods et al., 2017), while farms in North Carolina and Washington had larger CSA memberships than the Southeast and West regional estimates of 105.9 and 125.7, respectively. An average of eight study participants was recruited by the study for each F3HK farm (range, 2 to 17 members), with Vermont F3HK farms having the fewest and North Carolina F3HK farms having the most CO-CSA members. This means that, on average, about 3 percent of F3HK farms' CSA membership received a CO-CSA, with a broad range across states (0.8 to 21 percent). Thus, with the exception of North Carolina farms, the potential for F3HK to make significant contributions to farm revenue during the three-year study was small, given the modest number of participants.

Motives for Participation

When asked, after their first year of implementation, why they agreed to participate in the F3HK study, farmers were unanimous in stating that the CO-CSA model aligned with their goal "... to get food into places or to people that had a harder time providing fresh produce to their families":

We've always wanted to be able to provide CSA shares ... to people who couldn't afford it otherwise. (41-2016)

It drives me crazy that the idea of good food is only for the wealthy and that it has some sort of elitist connotations to it. (31-2016)

This reflects farmers' internalization of the social values of civic agriculture. Farmers empathized with the plight of low-income families; in one case, this was based on first-hand experience of having "lived in a more like 'budget-tight' household, so I can really relate to... not having a chunk of money at once [for upfront CSA payment]" (43-2018). Yet

for many farmers, funding the subsidy constituted a barrier to setting up a CO-CSA program:

I think what's difficult for the farm is to actually offer a price-subsidized share because people are pretty much buying things at cost anyway by joining a CSA. It's really hard for a farmer to make that cost even lower. (22-2016)

In addition to wanting to improve local food access for low-income families, farmers voiced a desire to expand their business in new locations and market segments. Farmers appreciated the support provided by the study, including funding the cost-offset, recruiting new customers, and facilitating their ability to accept SNAP EBT payments:

It was a great opportunity to start getting into that [low-income consumer market] without too much legwork on our part, trying to figure out logistics. (13-2016)

... the idea that we could create a business model that in part was funded and supported, and reaching a wider audience was definitely a positive. And also, being able to make money at the same time. (32-2016)

Thus, participation in F3HK provided a low-risk opportunity for farmers to adopt a new practice that brought their business into better alignment with their values. For most farmers, getting only 50% of the seasonal share cost upfront was not a barrier to participation. As one farmer said, their farm was "big enough that we don't have to just rely on pre-season payments."

Labor Costs and Expenses Related to CO-CSA

Many farmers said that the additional labor and staff costs associated with adopting the CO-CSA were "very minimal." One farmer estimated spending 30 hours in planning for the CO-CSA, at a seasonal cost of \$450. This farmer also estimated \$150 in staff time was spent packing two [CO-CSA] shares that were assembled in a slightly different manner than full-pay CSA shares, while staff training costs amounted to \$150. Other farmers reported training costs to be negligible or

non-existent. Three farmers said they paid staff to spend extra time waiting for CO-CSA customers to pick up and pay for their weekly share. Administrative staff time spent recording weekly payments was mentioned by three Vermont farmers. Regarding other expenses, a Washington farmer reported spending \$450 on transportation to deliver to a new location, and others reported minor expenses for flyers, replacement bags, boxes, and cold packs.

Financial Impacts

In postseason interviews, farmers reported the size of their 2016 CSA membership, along with the proportion of sales made through direct channels (Table 2). We compared this with administrative data on the number of enrolled F3HK participants in 2016 to arrive at the estimated proportion of

overall sales that could reasonably be attributed to the CO-CSA. These estimates are shown below, along with the farmers' opinions of how adding a CO-CSA program impacted revenue. Eight farmers indicated there was a positive effect, while four said the impact was negligible. We then ordered farmer responses according to the proportion of overall farm sales attributable to the CO-CSA (Table 2).

In general, farms for which the CO-CSA was a larger portion of overall sales tended to report that the program positively impacted their revenue. However, two farms in which the CO-CSA represented the smallest proportion of overall sales said adding the CO-CSA had indeed made a positive, incremental financial contribution because it "encouraged more people to join than otherwise"

Table 2. Cost-offset Community Support Agriculture (CO-CSA) Sales and Perceived Impact on Revenue

Farm ID#	CO-CSA members 2016 ^a	CSA members 2016 ^b	% sales attributed to DTC ^b	CO-CSA Sales, as % of all ^c	Farmers' opinions of CO-CSA impact on farm revenue ^b
31	14	71	84.0%	16.6%	"[It increased] . . . we've picked up some more CSA shares."
32	17	80	50.0%	10.6%	". . . Increased the revenue, based on not even 15 people because if you took the average of how many weeks they did . . . you're more like 10 full members."
13	14	120	90.0%	10.5%	"It increased our shares by about 6 percent. And a couple of people would still buy extras at the market."
23	3	45	100.0%	6.7%	"It increased it a little bit."
12	6	91	98.0%	6.5%	"[No]—we would have been able to fill those shares anyway."
43	9	110	78.0%	6.4%	"There's 9 x \$360. So there's definitely a volume increase."
11	11	300	80.0%	2.9%	"I don't know what percent we increased but it was definitely noticeable to have the extra people, revenue-wise."
41	2	63	76.0%	2.4%	"It hasn't. Just with the two people, there wasn't that big of a difference."
45	3	209	75.0%	1.1%	"It didn't really, much. We're a bigger farm."
44	5	611	93.0%	0.8%	"Definitely . . . it helps us to sell shares. That's our—it's 93 % of our revenue."
21	3	46	26.0%	1.7%	"Insignificant."
22	10	1,175	80.0%	0.7%	"A plus for our farm . . . it encouraged more people to join than otherwise."

^a F3HK Administrative data, 2016

^b F3HK self-reported data from 2016 farmer interviews (Note: sales attributed to DTC included CSAs, farmers markets, farm stands, etc.)

^c Calculated: [(CO-CSA enrolled/Total CSA members) X (% attributed to DTC)] = CO-CSA sales as a % of overall sales

and “it helps us to sell shares.” It should be noted all but one other F3HK farmer (13-2016) said that CO-CSA members were additions to their member base as opposed to merely replacing drop-outs.

When asked how the CO-CSA policy of accepting weekly installment payments affected cash flow, four farmers said they saw little effect because they already allow members to pay in installments. Five other farmers thought it was “nice to have,” while two felt that installment income throughout the season “didn’t really help, but it didn’t hurt.”

Strategies for Cementing New Customer Relationships

As with full-pay CSA members, building customer relationships was an essential part of business development when adapting the CSA model for a new market demographic. Some farmers felt that staffing the pickup was “absolutely crucial” to allow for face-to-face interaction with CO-CSA members:

In the past, [for] the folks who pay in full upfront, I would just leave their bags and I would leave . . . [but] these last three years, some of the folks actually started coming during the window they knew I was going to be there . . . I had them actually say that: “Oh, you know, I wanted to get here while you’re here and see you and ask you about-- whatever.” So, . . . I do think that being on site with the bags is important. (31-2018).

Some farmers made an effort to convey that there was no difference in status between the CO-CSA and full-pay members. As one farmer explained,

There isn’t really any difference between a supported share and a regular share otherwise, because everyone is coming and getting the same vegetables, same amount of vegetable, they come on the same schedule, they get statements every month . . . once I know how they’re going to pay, they’re reminded about paying just like everyone else is (44-2018).

Yet farmers were mindful of the need to respect the privacy of potential CO-CSA members during outreach: “We’re certainly never asking anybody what their income is.” They also recognized that CO-CSA members might require additional accommodations to overcome barriers to participation and therefore were more lenient about accepting late payments and allowing next-day pickup for those who missed the regular day. They also chose pickup sites at culturally sensitive locations along known daily travel routes. For example, one farmer switched pick-up locations from an isolated spot to the church parking lot where the F3HK nutrition education classes were held:

The church had more going on, people coming and going, and it was just a better place

. . . [co-location was] another reason for them (CO-CSA members) to actually go to class and come get their produce. (23-2018)

Additionally, to ease the adoption of this new way to shop, two farmers made an effort to set aside the “first and best” of the more familiar varieties to include in the F3HK participants’ box. As one farmer explained:

I set a priority that, for instance, they [CO-CSA members] would always get carrots and then maybe the [full pay] people might not get them every week . . . It’s just kind of thinking these people have kids and they have limited money, so let’s give them something really popular. (22-2016).

What I always did with all of the CO-CSA people—both the people still in the study and the people who are not— . . . I always gave them the first and the best . . . the more wealthy people in my CSA-- they don’t really need me . . . they could go to the farmers markets and they could buy organic and whatnot. But these folks who are in the program, they really might not be able to. . . if there was only a limited amount, I gave it to those subsidized people. (NC31-2018)

Challenges of Accommodation

Yet farmers said some CO-CSA accommodations often came at their own expense. For example, farmers sometimes made personal deliveries of missed shares for people who lived or worked close by because it was “easier than trying to coordinate a time,” yet lamented “it cost me a lot of time and gas.”

Farmers frequently mentioned that the extra recordkeeping associated with weekly payments drained their resources, particularly for farmers selling through multiple channels:

Part of CSA is getting the money up front and not dealing with a lot of paperwork with your sales . . . you get a chunk of money up front and you don’t have to deal with money any more for a while. So, it would be a lot easier if it was payments all at once. (45-2016).

Further, there was a relational aspect to collecting late payments, because farmers felt uncomfortable telling families, “you can’t get any until you pay something.” When asking for late payments, farmers sometimes felt “guilty, terrible about doing that, but at the same time we need to fund our business.”

Farmers who had to track down late payments for product that had already been picked up, frequently felt their business suffered:

[What they’re] doing is making it so hard for me to run a business where I can . . . pay my employees fairly and like do raises . . . when I like don’t know when we’re going to be paid for something that we’ve already put out, it makes it really difficult across the board. (43-2018).

Farmers mentioned that extra burdens associated with CO-CSA accommodations occurred on top of the usual agricultural challenges of weather, rising labor costs, flattened market trends, and managing multiple market channels. Some farmers felt that customers were only vaguely aware of the precarious nature of agricultural businesses, and sought to educate consumers by sharing photos in their newsletters and social media accounts:

Our newsletter has pictures in it each week. And the picture of the week is not just some pretty scene from the farm, it’s something specific to what I’m trying to show them. You know, it might be a picture of a particular pest that we’re experiencing. “This is the yellow margin leaf beetle and this is what it does to a leaf.” Or “This is what our fields look like after we got those 12 inches of rain.” You know, that sort of thing. And I think that helps. (31-2018).

Further, farmers felt a need to remind customers that though they have a personal connection with the farm, there is still a strong economic aspect to the relationship:

I’m always concerned with people who may not value the program as much as we do, and think of it just as a hand out . . . it’s hard to impress upon people that, you know, they have the obligation to fill their part of the contract . . . they’re getting a great benefit for their obligation . . . I’ve been trying to be better about, if people are sliding too much, you know, telling them they are not keeping up their monthly payments, or whatever, that we’ll stop [their share]. (44-2018).

Benefits of CO-CSA Implementation

The relationships built over the course of the intervention helped cultivate a sense of community, which was rewarding for the farmer as well as the customer. As one farmer noted:

...we’ve been seeing each other for almost four years now. And it’s just so great— they like stay and hang out and it’s not just about picking up the vegetables, it’s like a community event every [pickup day]. It’s really, really neat. I think that people are really, really happy to be getting the food, and that feels like a huge success (22-2018).

Farmers acknowledged that relationship building takes time, and therefore they try to “figure out a way that kind of maintains that sort of face-to-face contact without being so expensive.” Yet rela-

tionships also confer tangible benefits to the farmer. For example, the relational ties built between one farmer and CO-CSA customer eased the farmer's worries over late payments. The farmer explained that if a member was unable to pick up their share when the site was staffed, the farmer left it for them at the drop site to be retrieved at the customer's convenience. In most cases, the customer would pay for their share by the next week; if not, the farmer had their deposit in reserve.

Some folks went through some different tough times but . . . this is my third year with them, I knew that they were going to make it right whenever they could . . . [if] they couldn't [pay], then I could go back to my people [regular CSA] and get more [donations]. (C31-2018).

Discussion

The alternative food systems movement resulted in a rapid rise in DTC sales and farms selling through those venues in the last two decades (Low et al., 2015). CSA has gained traction among some population groups but has been criticized for excluding households with limited incomes. As farmers search for strategies to maintain viability in the face of market saturation and competition from online marketing, information on their experiences with CO-CSA is needed to support policy and extension activities. To our knowledge, this is the first study to systematically examine farmers' motivations for adopting a CO-CSA and reflections on their experiences.

In this multistate study incorporating diverse operations, F3HK farmers consistently reported two primary motivations to develop and implement a subsidized program: a desire to align their business operations with their personal values around healthy food access, and the pursuit of new markets. Prior research with CSA farmers identified equitable access to healthy food as an important part of the farm's mission (Galt, O'Sullivan, Beckett, & Hiner, 2012; Morgan et al., 2018; Ostrom, 2007). That said, most farmers are engaged in a business enterprise, and as such cannot sacrifice their own livelihood; the alternative food systems movement is not intended to be a

charity model. In at least one other study of farmers engaged in farm to institution sales, the most successful were those able to balance both economic and altruistic goals (Conner, King, Kolodinsky, Roche, Koliba, & Trubek, 2012).

While F3HK farmers aimed to confer an equal status on all CSA members, some gave special treatment to new CO-CSA members to address their needs, including selecting convenient and culturally appropriate pick-up locations, arranging for late payments and pickups, and being sensitive to the food preferences of CO-CSA members (as described in Andreatta et al., 2008). However, when asked about implementation challenges, farmers admitted that some accommodations, such as following up on skipped payments and arranging to make up missed pick-ups, placed an added burden on their time and resources. As previously reported, many F3HK farmers found that increased frequency of CO-CSA payment transactions led to increased recordkeeping burden, particularly when there was no clear system in place for tracking payments (Sitaker et al., 2019).

According to F3HK farmers, only a few of their new CO-CSA members seemed motivated to participate by the ideals of civic agriculture, not unlike the "quintessential" CSA members described by Pole and Kumar (2015). Farmers said noncompliance with CO-CSA requirements (i.e., on-time payments and pickups) reflected a lack of understanding on the part of F3HK participants of how the model works. Abbott (2014) similarly reported farmers attributing CSA drop-outs to a lack of familiarity with the CSA model. Like many U.S. consumers, F3HK participants may have been conditioned by the mainstream food system to expect an inexpensive selection of familiar fresh fruits and vegetables that were of uniform appearance and conveniently available year-round (White et al., 2018). Further, although F3HK provided support in the form of skill-building classes, this alone could not remove the time constraint barriers and other stressors faced by low-income participants, which may have inhibited full enjoyment of the CO-CSA, as described by Morgan et al. (2018).

Further, farmers sometimes felt F3HK participants did not understand or appreciate the effort required to grow nutritious produce using sustaina-

ble methods under the typically precarious farming conditions. As reported in Samoggia, Perazzolo, Kocsis, and Del Prete (2019), engaging CSA shareholders is critical to success. A few farmers actively countered this by educating new CO-CSA members about the specific challenges of their work in newsletters, online media, and conversation. Additionally, farmers sought to build long-term, reciprocal relationships with CO-CSA members through face-to-face interactions, just as they do with other new CSA members.

Farmers were unable to say definitively whether adding a CO-CSA made a noticeable financial impact after the first year because most had not fully calculated annual farm profits at the time of the 2016 interview (this question was not addressed during the 2018 continuation planning debriefs). However, for half the participating F3HK farms, the CO-CSA represented a sizable added contribution to sales: between 6.4 and 16.6 percent. These farmers had positive things to say about the model's potential to add to farm revenue. Even for two farmers for whom F3HK participation added less than 1 percent to their revenue, CO-CSA adoption was perceived to have been worthwhile. Both were larger farms with a social justice orientation, as evidenced by their practices of accepting EBT, providing free food to local food banks, and offering supported shares to low-income families. Thus, these farmers may have been more willing to accept the risks associated with CO-CSA adoption because of their values. In this sense, they operated like social entrepreneurs, seeking to maximize their profits while also providing social and environmental benefits. This may be true of most of the F3HK farmers, whose participation was concurrently motivated by social and financial goals.

Yet the question remains: can farmers afford to be social entrepreneurs? Currently, CSA farmers operate on small margins and face increased competition from supermarkets and online retailers selling local foods (McKee, 2018). To make informed decisions about how much value a CO-CSA adds to an existing CSA business, farmers need to have accurate estimates of the associated costs compared to potential financial benefits. They also need advice on how to structure their operation to meet the needs of low-income sub-

scribers in a cost-effective manner. Thus, to inform the development of tools and resources to support CO-CSA farmers, more research is needed on both the economics and best practices of successful CO-CSAs.

Another question is whether these farmers should be expected to carry the burden of democratizing access to fresh local produce alone. While SNAP/EBT rule changes have made it easier for recipients to use their benefits to pay for a CSA, farmers that operate subsidized share programs face challenges associated with fund-raising, conducting market research, and devoting extra effort to educating and maintaining CO-CSA customers. Farmers and low-income consumers alike would benefit from community partners willing to help farmers find funding, develop outreach materials, and provide education to new subscribers on their responsibilities as CSA members. State and federal policies and programs aimed at supporting local food systems should consider adding funding for subsidized share programs. To date, little is known about methods farmers use to democratize the food system on their own (Forbes & Harmon, 2008; Hinrichs & Kremer, 2002); this area is ripe for further research, as are efforts by local nonprofits, food policy collaboratives, and advocates to find ways to support farmers in meeting the twin goals of improving equitable local food access while boosting farm economic viability.

Conclusions


This study qualitatively explores the experiences of CO-CSA farmers implementing a civic agriculture DTC approach for a low-income population across different geographic regions where these programs might have differing impacts. This research builds on previous research to provide new insights on how these types of socially minded operations influence farmer operations and economic viability.

While a CO-CSA model inherently includes components of social entrepreneurship, transactions in DTC markets are economic. F3HK farmers themselves noted both values and economics as being drivers for their participation. These two characteristics can work together, but they also can clash, as farmers noted that accommodating the needs of CO-CSA members resulted in additional

tasks and resource needs. These burdens are quantifiable in terms of lost revenues due to increases in time cost and explicit loss of revenue payments. Ultimately, regardless of the balance of values versus economics, alternative agriculture markets require a match between sellers and consumers. If the match is there, both the farmer and the consumer will find satisfaction in both the value and economic proposition. This project was a test of whether these matches are possible with customers who do not traditionally participate. The answer appears to be ‘sometimes.’ Future research on a larger scale needs to examine whether there are enough customers and farmers who can make such a match work in terms of both values and economics.

The generalizability of the findings may be limited by the fact that farms implemented the CO-CSA within the context of a randomized trial; both grant funding and the low-income customers were provided by the research team. Prior research has documented time constraints, financial strain, and poor member retention to be major challenges for

many CSA farmers (Galt, 2013; Ostrom, 2007; Woods & Tropp, 2015). Thus, funds and assistance provided by the study likely alleviated some pressures and reduced the risk entailed by implementing a subsidized program. Nevertheless, most participating farmers reported that the addition of the cost-offset mechanism positively impacted their revenue, suggesting that it is beneficial to invest in resources to start a subsidized program.

If CO-CSA programs are to be financially viable for farmers, more research is needed on the economics of CO-CSAs and successful operational features in order to develop policies and infrastructure to support them. 

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Supporting agricultural resilience: The value of women farmers' communication practices

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Abstract

While women in the United States (U.S.) are increasingly entering into or being recognized for their role as farm operators, researchers argue that women farmers have been and continue to be under-recognized and researched. In the face of increasing environmental and financial challenges, as well as a variety of challenges related to domestic life, women farmers remain resilient. Buzzanell's (2010) resilience communication theory suggests that forming and maintaining communication networks is essential to resilience processes. Drawing on interviews with 35 U.S. women farmers, we argue that communication networking is valuable to food systems; specifically, these practices contributed to and reified the resilience of the individual farmers, their farm business, and the greater sus-

tainable agriculture sector. Implications for women farmers as a community of practice, as well as organizations serving these populations, are discussed.

Keywords

Women Farmers, Resilience Communication, Sustainable Agriculture, Community of Practice

Introduction

According to the 2017 U.S. Department of Agriculture (USDA) census of agriculture, 56% of farms have at least one woman operator and a third of farms have a woman principal operator (USDA, 2019). Due to both a rise in women entering farming, as well as more accurate identification of existing women farmers, this statistic reflects a 27% increase in women farmers since the previous census in 2012 (USDA, 2014, 2019). Despite these rising numbers, the exclusion of women in land

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property rights and subsequent characterization of women as farm wives have left women overlooked in traditional, conventional farm models (Keller, 2014; Leckie, 1996; Trauger, 2004). On average, women farmers today operate smaller farms for lower wages (Allen & Sachs, 2011), and are three times more likely to operate farms participating in sustainable agriculture (Trauger et al., 2008). Sustainable agriculture refers to farming methods that “equitably balance concerns of environmental soundness, economic viability, and social justice among all sectors in society” (Allen, Van Dusen, Lundy, Gliessman, 1991, p. 37). Prior scholars have argued that farmers in sustainable agriculture operate within a separate paradigm, one that is concerned more about connecting to and protecting the earth than about money (Bell, 2004; Beus & Dunlap, 1990). Research has contributed to an increased understanding of women farmers’ position and experiences in sustainable agriculture in the United States (Barbercheck, Brasier, Kiernan, Sachs, & Trauger, 2014; Hassanein, 1997; Sachs, Barbercheck, Brasier, Kiernan, & Terman, 2016; Trauger, 2004). Yet, more information is needed to observe ways women farmers in sustainable agriculture access resources for support through the challenges of farming (Sachs et al., 2016). This research seeks to fill that need by highlighting the networks women draw on for support amid financial and environmental challenges, as well as challenges related to gender and farming.

Resilience communication theory (Buzzanell, 2010) is a useful lens for examining how women farmers develop or maintain resilience to the challenges of farming. A communication lens frames resilience as a dynamic, on-going process that is co-created among people through discourse, interaction, and material considerations. Adopting a communicative lens for resilience is valuable because it examines the processes by which resilience is developed and maintained in community with others.

A key component of the resilience process is a person or community’s ability to maintain and use communication networks (Buzzanell, 2010). Current research demonstrates that in response to difficulties related to professional development, women farmers have developed networking practices that differ from the practices of men. Women

farmers have been found to rely on both formal and informal support networks to facilitate their success in agriculture (Barbercheck et al., 2014; Hassanein, 1997; Trauger, Sachs, Barbercheck, Brasier, Kiernan, 2010).

While we know that women draw on communication networks for support (Hassanein, 1997, 1999), more research is needed to understand how these networks are maintained through communication, as well as the impact of these communication practices. The current study explores how women farmers maintain and use communication networks in agriculture. In addition to exploring their networking practices, we examine the value of these communication practices to women farmers’ resilience in complex and often overlapping, economic, environmental, and social systems. We aim to develop a set of recommendations related to how individual women farmers, as well as the formal organizations that serve them, can best support the persistence and resilience of women farmers. Our suggested practices will both support women farmers and highlight how adequately supporting their communication practices can contribute to community and environmental resilience more generally.

Gender and Farming

While there is nothing “inherently feminine or masculine” about agricultural tasks, cultural and social formations deeply affect theoretical and realized positions of different genders in farming (Leckie, 1996, p. 310). In the United States, a long history of gender discrimination has shaped the position of women in agricultural contexts today. Traditionally, inheritance laws that pass land ownership from father to son maintained a system where most women entered farming through marriage to a farmer. In this arrangement, men had access to ownership and operation of the farm, while the woman assumed the role of farm wife. The Homestead Act of 1862 lifted prohibitive legal barriers to enable single women head of households to own land; however, the internalization of women as farm wives persists (Horst & Marion, 2019).

Past research has demonstrated how the misunderstanding of women farmers’ contributions has led to their exclusion in agricultural infor-

mation and knowledge exchange (Leckie, 1996; Trauger et al., 2008). For example, a young woman farmer in Ontario was “never trusted to drive” because her town lacked recognition of women as legitimate farmers, which negatively affected the tasks her father perceived her to be capable of learning (Leckie, 1996, p. 320). In this case, socially constructed ideas of women farmers turned into concrete outcomes, as women grow up to lack the full set of skills they need to participate in all agricultural tasks.

On a larger scale, Trauger and colleagues (2008) argued that “long-held social constructions of women as farm wives or ‘bookkeepers’ rather than farmers or decision-makers influence the direction of most educational programming delivered through extension programs in land-grant universities in the United States” (p. 432). Instead of helping women overcome constraints to participation, these institutions continue to reproduce prohibitive barriers; thus, this trend is perpetuated by institutions failing to support women’s educational needs such as machinery training, a hands-on and interactive learning style, and space to ask questions openly and without concern for being perceived negatively by men farmers (Barbercheck et al., 2009; Brasier, Barbercheck, Kiernan, Sachs, Schwartzberg, & Trauger, 2009).

Women in Sustainable Agriculture

According to the U.S. census of agriculture, women are three times as likely to operate farms practicing sustainable farming methods than traditional, conventional agriculture (Trauger, 2004). Sustainable agriculture is not immune to modern financial and environmental challenges; however, participants seek to counter the problematic notions of industrial agriculture through an emphasis on norms such as decentralization, community, harmony with nature, and crop diversity (Beus & Dunlap, 1990). In these contexts, farmers highly value social relations and greater dialogue among farmers to improve one’s farming knowledge and the collective experience of the farming community (Bell, 2004). While men still maintain some gendered identities on the farm, overall, success in sustainable agriculture requires an “altered social arena” that encourages openness and acceptance of

all voices (Peter, Bell, Jarnagin, & Bauer, 2000, p. 216).

The literature on women farmers’ role in sustainable agriculture is well-established (Chiappe & Butler Flora, 1998; Sachs et al., 2016; Trauger, 2004; Trauger et al., 2008). Women’s farming practices within sustainable agriculture emphasize environmental and social well-being, as well as food quality, over agricultural intensification (Barbercheck, Brasier, Biernen, Sachs, & Trauger, 2014; Trauger et al., 2010). Other recent scholars suggest that women perform and reinforce femininity by bringing qualities of care to their farming practices, which highlights how women’s practices take care of the earth, their customers, and other farmers (Jarosz, 2011; Shisler & Sbicca, 2019).

In recent work, *The Rise of Women Farmers and Sustainable Agriculture*, Sachs et al. (2016) introduce the feminist agri-food systems theory (FAST) as a tool to conceptualize women farmers’ role in sustainable farming systems in the Northeast. According to FAST, women in agriculture do not necessarily identify as feminists, but they do assert themselves as farmers, which, in itself, challenges traditional patriarchal conceptions of farm compositions. Similarly, Trauger (2004) argued that women’s identities were central to their social identities within agriculture. Although “work roles of women in sustainable agriculture are similar to the work of women in conventional agriculture,” women identified as farmers within sustainable agriculture and as farmwives within conventional agriculture (p. 303).

While women’s work is more recognized and welcomed in sustainable agriculture, agricultural research, policies, and organizations often overlook other forms of marginalization within sustainable agriculture. As women contend with barriers to land, capital, credit, and information, they have increasingly found their place in alternative agri-food movements that resist the rigid gender norms of conventional agriculture (Sachs et al., 2016; Trauger, 2004). However, the lessening of gender inequality within sustainable agriculture spaces does not dissolve steep economic and social barriers to participation (Pilgeram, 2019). Women are often able to overcome these challenges, but it is overwhelmingly those with the privileged racial,

ethnic, and socioeconomic status to do so (Pilgeram, 2019; Sachs et al., 2016). Therefore, alternative agricultural movements offer narrow opportunities for mobility and exclude farmers whose identity intersects multiple forms of marginalization such as gender and race, sexuality, or socioeconomic status (Leslie, & White, 2018; Leslie, Wypler, & Bell, 2019; Wypler, 2018).

FAST also describes women's roles in agricultural organizations and associated networking structures. Because traditional means of organizing within agriculture, such as extension outreach efforts, do not typically recognize women as farmers, women seek out alternative communities of practice. Communities of practice, unlike communities bound by geographic location or familial relationships, refer to groups of people who genuinely care about the same real-life problems or topics, and who regularly interact to learn together and from each other (Wenger, McDermott, & Snyder, 2002). Sachs and colleagues' (2016) FAST found that U.S. women farmers use communities of practice associated with farming networks such as the Women's Agricultural Network (WagN) or the Women, Food and Agriculture Network (WFAN). Both of these organizations seek to train, engage, and connect women involved in farm work across the United States. This component of the FAST complements past research on unique behaviors in women farmers' networking preferences (Hasanein, 1997; Trauger et al., 2010). However, according to Sachs and colleagues (2016), future research drawing on FAST should build on past research by looking at how women's networking practices evolve alongside their shifting roles in agriculture. This gap in the women farmer research parallels a need within communication literature. While communities of practice is a well-established area of study, more research is needed to understand the development and maintenance of these on-going, organizing practices that allow groups to purposefully and spontaneously "think together" and talk about, cope with, and thrive within complex issues and challenging experiences (Pyrko, Dörfler, & Eden, 2017, p. 390).

Resilience Communication

While sustainable farming operations provide a

space for women to experience less gender exclusion, feel aligned with values of nourishing others, and to better assert their identities as farmers, life on sustainable farms should not be romanticized. All farm work requires endless hours, is physically demanding, and often takes place in socially and geographically isolated areas (Brew, Inder, Allen, Thomas, & Kelly, 2016). Further, in the 21st century, the spread of large scale, industrial agriculture has exacerbated economic and environmental challenges for small farmers (Altieri, 2009). Lastly, women still experience challenges related to their position in a male-dominated work environment (Peter et al., 2000; Shisler & Sbicca, 2019). More research is needed to understand how women farmers access support networks to overcome these economic, environmental, and social challenges on their farms.

Buzzanell's (2010) theory of resilience communication is a useful framework for understanding how women farmers build and maintain agricultural networks. It is also useful in understanding how their networking practices help them to adapt and bounce forward after disruptions or amidst continued stressors (Buzzanell, 2010; Houston, 2015, 2018; Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008). Resilience can be understood as an individual or groups' ability to bounce back or reintegrate after a disturbance (Buzzanell, 2010; Manyena, O'Brien, O'Keefe, & Rose, 2011). Early literature considered a "disturbance" to require a catastrophic event such as traumatic incidents of natural disaster and loss. However, scholars now include "reoccurring and sometimes anticipated losses that disrupt and challenge everyday life" (Long et al., 2015, p. 67). Conceptions of resilience have since been extended to not only consider how those involved return to baseline, but how they adapt or bounce forward through these challenges (Houston, 2015; Manyena et al., 2011; Richardson, 2002). The idea of "bouncing forward" views disaster as an opportunity for local livelihood enhancement rather than as a simple return to *status quo ante* (Manyena et al., 2011, p. 7).

Resilience as a communication process recognizes that resilience is not something that is achieved. Rather, it is a dynamic process that unfolds over time through the way people collabora-

tively make shared meaning of their experiences through discourse, interaction, and material consideration (Buzzanell, 2010). Buzzanell (2010) developed the foundational theory of resilience communication, which understands resilience as the culmination of five interactive processes (Figure 1): (a) crafting normalcy; (b) affirming identity anchors; (c) maintaining and using communication networks; (d) putting alternative logics to work; and (e) legitimizing negative feelings while foregrounding productive action.

In response to agricultural literature on women farmers' networking practices, this study focuses on the third process of developing and using communication networks. Communication networks refer to individuals and organizations that are connected through relationships and symbolic activity within a specific social context (Monge, Heiss, & Margolin, 2008). Communication networks can be used to obtain information, report, regulate, cooperate, or compete, in addition to a host of other possibilities. They are characterized by co-constructed norms and values that provide a framework for symbolic activities, such as goodwill, trust, reciprocity, or transitivity (Monge & Contractor, 2003). Sligo and Massey (2007) found that un-

der conditions of increasing risk, farmers may feel a sense of shared adversity, which may enable higher levels of trust and social networking behavior.

The process of building and using communication networks is essential to resilience because it is through these processes that social capital is developed. Social capital describes the actions or achievements that are derived from the relationships among different actors in a given social structure (Coleman, 1988). Social capital can be developed in interpersonal relationships, including friends, colleagues, and more general contacts (Burt, 1997), as well as through larger formal or informal networks as norms and social trust that facilitate coordination and cooperation for mutual benefit (Putnam, 1995).

The social capital developed in communication networks can support business resiliency. For instance, communicative networks were essential for small businesses in New Orleans to reintegrate after Hurricane Katrina devastated the city in 2005 (Buzzanell, 2010). Kim, Longest, and Aldrich (2013) found that, for new business owners, relying on the social capital developed among their friends, family, and other business owners was a significant contributor to their success.

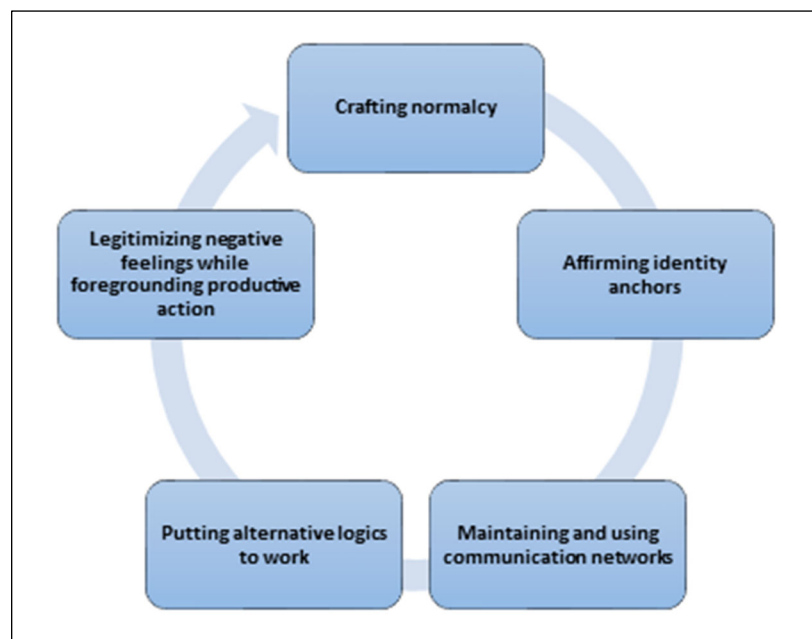
According to Buzzanell (2010), more research is needed to examine how people maintain and use communication networks to be resilient. Recognizing that women farmers face traditional financial and environmental stressors as well as adversity that is unique to their identity, this study aimed to explore how women farmers maintain and use communication networks to be resilient. Specifically, we asked,

R.Q. 1. How do U.S. women farmers maintain and use communication networks in their food systems?

With the goal of supporting resilient women farmers and food systems, we also asked:

R.Q. 2: What economic, envi-

Figure 1. Five Processes of Resilience Communication



Source: Original figure based on information from Buzzanell, 2010.

ronmental, or social value do women farmers' communication practices bring to the resilience of the U.S. food system?

Examining the women farmers' communication networking processes is an important way to contribute to our understanding of how to support women farmers' practices. Further, because women are three times as likely to operate farms that practice sustainable agriculture (Trauger et al., 2008), better supporting women provides benefits to local food and agriculture. We recognize that U.S. women farmers have not had as much agency as they would like when it comes to accessing resources in agriculture. Using interviews with 35 U.S. women farmers, this study seeks to highlight these women's voices.

Methods

Recruitment Strategy

The sample used for this study was obtained from a larger set of interviews of women farmers across the United States. Using a criterion sampling method (Lindlof & Taylor, 2010), interviewees were recruited from the six states with proportionally the most women farmers and proportionally the least women farmers. As determined by preliminary analysis of the 2012 U.S. census of agriculture, states with the highest proportion are Arizona (45%), Alaska (43%), Massachusetts (42%), New Hampshire (42%), Maine (41%), and Vermont (39%). Those states determined to have the lowest proportion of women farmers are Ohio (28%), North Carolina (27%), Minnesota (26%), Iowa (25%), Illinois (23%), and Kentucky (18%). Working with an agricultural outreach specialist whose work focuses on women farmers, we identified key informants from each of these targeted

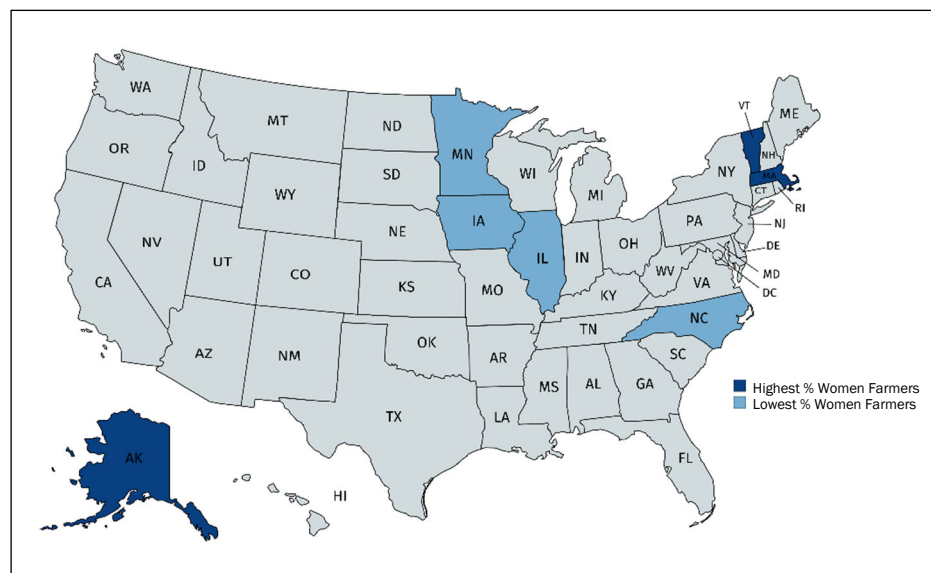
states. These key informants, mostly agricultural extension agents, provided names and contact information for up to 15 women farmers in each of their respective states. Our paper includes analysis of interviews from three states with the highest proportion of women farmers (Alaska, Massachusetts, Vermont) and four with the lowest (Illinois, Iowa, Minnesota, North Carolina). A representation of sample states appears in Figure 2 below.

A team of 11 researchers used email communication to recruit women farmers within their assigned state. To be eligible to participate, a person had to be 18 years or older, identify as a woman, and be the principal farm operator or a farmer when up to three operators were included per farm (per the USDA census of agriculture) for at least six months. Participants were offered a \$50 incentive for their time and participation.

Sampling

To explore research questions related to women farmers in sustainable agriculture, the authors analyzed the interviews conducted with all interviewees who were identified as participating in sustainable agriculture. Participants were asked to fill out a demographic survey that included their farming practices, types of products, and market channels, among other demographic questions. Participation in sustainable agriculture was not specifically

Figure 2. States for Women Farmer Interviews



asked; instead, the authors characterized the farmers as such based on participation in alternative market channels such as CSA and farmers' markets, participation in sustainable or organic farming groups, use of the organic label, or self-identification during the interview.

The data set included interviews with 35 women farmers, ages 25-62 (M=41.7). Of the 35 interviewees included in this study, 85% were first-generation farmers, and 50% had off-farm jobs. All of our interviewees were white. Many different farm types are represented and include diversified fruits and vegetables, dried beans, pasture-raised meat, poultry, dairy, flowers, and medicinal herbs. Farmers typically sold their products through farmer's markets, CSA, restaurants, and direct on-farm sales. Further description of participant farmers is located in Table 1.

There is a lack of diversity in women farmer participants for this study. Specifically, all participants were white, except for one participant who declined to report her race. The demographics of our sample are consistent with the U.S. farm population, given that 95% of all women farm producers are white (USDA, 2019). This is a problematic statistic that this research is not attempting to dismiss; however, this context is important to include to understand why our research sample lacks heterogeneity. While this study intends to highlight the voices of women farmers, because of its focus on sustainable agriculture and farm operators, it does not address the lack of broad diversity of women in the food chain. Future research should be designed to focus more attention on the intersection of gender, race, sexuality, and socioeconomic status within the food chain.

Interview Strategy

Semistructured interviews were pre-scheduled and conducted over the phone and lasted 30-60 minutes. Interviews were conducted by 11 different researchers (including the author), who met weekly for 15 weeks to learn about issues surrounding women farmers, resiliency communication, and interview methods together. These researchers co-constructed the interview protocol.

The interviews contained eight questions, including both moderately-closed and open-ended

questions. As noted by Berg and Lune (2004), semistructured interviews follow a preconceived interview script, but also give the interviewer "freedom to digress" to explore emergent themes (p. 61). The interview questions were divided into two sections. The first two questions asked the farmer to identify the different formal and informal agricultural networks in which they participated. Based on those responses, we asked interviewees to think about the network with which they felt most connected. The next six questions focused on what the network said or did when responding to individual and collective challenges. Farmers were asked to recall instances when they felt others said or did things to help them or others in the community, as well as what the farmers themselves have said or done to help another person(s) in the network.

Researchers were trained to ask all eight questions, in the same order, and to probe around topics related to resilience, communication, and social support. As such, follow-up questions and probes may have differed slightly based on variations in the interviewees' responses. To perform a cohesive interview process across interviewers and probe in similar manners, the interviewers (including the author) reflected together in person twice a week about the content of the interviews throughout the five-week interview collection process. Emergent themes in the interviews and probing options, as well as problematic questions or wording, were discussed and revised as needed during these meetings.

Analysis Strategy

Interviews were transcribed verbatim using speechpad.com, an online transcription service. Transcripts were reviewed for accuracy. All farmers and farm names were changed to protect and maintain confidentiality.

We used constant comparative methods to identify themes in the data inductively. Constant comparative analysis is a cyclical and continuous method of processing, reducing, and explaining (Lindlof & Taylor, 2010). Researchers continually identify codes and themes within and across interviews as well as in comparison to the extant literature (Charmaz, 2005; Lindlof & Taylor, 2010). The analysis calls for the continual refinement of

themes as data is collected and formally analyzed through constant comparisons and recoding of the data set (Boeije, 2002).

In our initial analysis, the author read and coded the transcripts multiple times independently until forceful and recurring themes began to

emerge from the data. The author consulted with others during the analysis processes to discuss similarities between emerging themes. The author then re-read and recoded the data for opportunities to collapse and consolidate codes. This iterative process continued until no new codes or themes

Table 1. Name and Farm Type for all Participant Farmers

Farmer Name	Type of Farm	Age	Race	Years Farming
Alaska				
Cassi	Diversified vegetables	46	White	10
Lilly	Seeds	32	White	6
Lala	Diversified Vegetables	61	White	38
Milly	Diversified vegetables, Poultry	61	White	20
Illinois				
Abby	Diversified vegetables, Poultry	43	White	3
Iowa				
Kelly	Diversified vegetables	32	White	10
Jenna	Diversified vegetables, Meat	32	White	6
Meredith	Bison, Cattle	42	White	14
Maine				
Katy	Organic vegetables	59	White	48
Liz	Organic herbs, greens	45	White	23
Sarah	Vegetables and small fruits	60	White	29
Tasha	Diversified vegetables	44	White	20
Beth	Mixed organic vegetables	59	Declined	>20
Massachusetts				
Kathleen	Nuts, Diversified fruits	30	White	11
Maddy	Herbs	30	White	8
Nicole	Herbs	33	White	10
Lauren	Meat	36	White	25
Mary	Diversified vegetables, Flowers	56	White	15
Martha	Diversified vegetables	Over 50	White	3
Minnesota				
Erin	Flowers	25	White	6
Shelby	Live goats, Goat cheese	31	White	30
Kara	Pork	34	White	14
Jess	Diversified vegetables	45	White	6
Brenda	Diversified fruits and vegetables, Poultry	62	White	11
Sheila	Dry beans, Flint Corn	62	White	13
North Carolina				
Laura	Diversified vegetables, Flowers	27	White	5
Daphne	Diversified vegetables	41	White	15
Olivia	Diversified vegetables, Flowers	45	White	20
Betsy	Diversified fruits and vegetables, Flowers	46	White	20
Bonnie	Diversified fruits and vegetables	46	White	23
Vermont				
Morgan	Diversified fruits, Value-added products	28	White	5
Julia	Diversified vegetables, Poultry	32	White	8
Lydia	Dairy, Maple Syrup	48	White	30
Sophie	Pork, Poultry	51	White	20
Charlotte	Diversified fruits and vegetables, Pork, Poultry	53	White	11

emerged. We used forceful and representative quotes from the interviews to represent the participants' unique voices and to support our claims as researchers (Owens, 1984)

Results

This study aimed to examine women farmers' communication practices, as well as the value of these practices to their extended farming communities. Through the analysis of 35 interviews with women farmers in sustainable agriculture, we uncovered many ways that women farmers' communication processes interact with and benefit farming communities of practice. Through participants' stories, it was apparent that women were not relying solely on other women farmers for support; many emphasized that they participated in coed networks and benefitted from interactions with both men and women farmers. In addition to gender, women farmers connected with others based on age, crop or livestock type, or farming experience. In this section, we present the ways that individual farmer, farm business, and community level resilience is developed and reified within women farmers' communication networks.

Farmer Resilience

Many women farmers found that their communication networks developed and supported their personal resilience as farmers. Women reported that at times they were challenged by loneliness, feelings of self-doubt, and the complexities of balancing farm life with home life. Connecting to others provided critical support for enduring the day-to-day and more episodic emotional challenges of farming.

Women farmers reported seeking out and drawing on their existing communication networks to feel connected to others and for support with daily stress. Laura, a farmer in North Carolina in her late 20s, said, "you're at that low, low point, exhaustion and just like confusion. And, you know, you just need some reassurance that everything's gonna be ok." Laura continued to explain that "it's just so uplifting being with people who know exactly what you're going through, the good and the bad....it's just the most healing I think." Meredith, a cattle farmer from Iowa, 15 years her senior, de-

scribed the emotional benefits of her network: "You know, we don't have in common what livestock we're raising,...It's really kind of a therapy session, like 'what's new in your world?' And whatever that person responds with it's just a matter of kind of talking them through like, what they're doing and you're doing to just get by in this world really." While there are no definite answers to the farm-related challenges, for Meredith and Laura, realizing that they are not alone changes the reality of their situation. Instead of feeling defeated, women farmers feel empowered to continue.

While some women reported feeling happy, or at least comforted, by interactions with communication networks more generally, many women mentioned feeling best when interacting with specific sub-groups within their networks. For example, women farmers talked about the challenges of being a parent farmer. A mom and farmer from Illinois, Abby, says "we're always talking about how we're juggling being a mom and how she's juggling her business, managing a crew, and managing customers." Bonnie shared that she "commiserated with other growers via Instagram of just realizing that, you know, we weren't the only ones that lost our whole strawberry crop because it was raining so much." While Abby referred to connecting with other moms around stressors related to work-life balance, Bonnie explained how the support of fellow strawberry growers was instrumental in her ability to cope and develop resilience to adverse weather events. Similar to Abby and Bonnie, other farmers found affinity groups, such as groups exclusively for goat farmers or elderberry growers, to have functional benefits to providing support too. Maddy, an herb farmer in Massachusetts, said that "It feels really comforting to be able to talk about those struggles with other people who get it...You don't have to spend a lot of time explaining or breaking down preconceived ideas." Morgan, who grows fruit in Vermont, similarly explained that "It's also really comforting to say, 'Okay, we're in the same boat here.' And then there's like this collective push to figure it out. So, so much of farming is isolating." Groups with comparable experiences were sources of comfort because participants could commiserate quickly. Supporting the resilience of farmers' emotional wellbeing was

an unspoken value of the networks. As Morgan said,

It's nice to be able to have that interface where you can engage with people for both information but also the emotional piece, which is not obviously advertised, right? It's not like 'Hey, come here for emotional support.' I think it's something intentional that naturally occurs.

Laura, a young farmer, felt particularly uplifted when a woman peer of hers encouraged her to step in for a guest speaker who did not show up for an event and felt especially encouraged because this peer had only ever met her once before. The peer expressed encouragement such as "do it" and "I believe in you," which inspired Laura to sign up to talk about her farming experience at a conference in the future. According to Laura, this type of positive reinforcement from someone she was not particularly close to gave her hope that she was doing the right thing. Morgan and Laura's comments highlight the complex nature of resilience. The need for and ability to offer emotional support was connected. Though these communication networks formed based on shared professions or common interest in a task, the networks also provided emotional support to contribute to the resilience of its members. While Morgan and Charlotte's stories highlight a one-way exchange of support, other farmers' stories demonstrated that resilience practices are complex processes. For example, Julia, an organic vegetable and egg producer in Vermont, highlighted the feeling of community that she gained from using mediated communication (communication over technology channels such as cell phone or computer) with other farmers. She explains, "It makes you feel like you're a part of a bigger network and like there's support out there. And you're not doing it on your own, which is really important."

Similarly, Charlotte, a Vermont farmer, recounted how after her presentation at a meeting, fellow members of the community often reached out to her to "say 'hey, by the way, that helped me' or 'I'm struggling too' and hearing that was validating." Julia and Charlotte's stories demonstrate that

providing support does not just help the resilience of the recipient(s) of the message. Rather, the source of the message also built their own confidence and reified their sense of resilience through their participation in the network.

Farm and Business Support

Seek and Share Information

The sharing of technical support and farmer to farmer information was central to women farmers' networking practices in sustainable agriculture. For example, Bonnie, a farmer in North Carolina, hosted events to help new young woman farmers "start to feel like there's more of a community group that each other can come to with, like, problems or anything else, friendship." In addition to hosting meals, Lydia, a dairy farmer in Vermont, thought it was important to provide networking opportunities to help farmers access resources, stating, "We try to host some workshops and learning opportunities for other farmer members." Lily, a woman farmer in Alaska, said that her Facebook seed group was able to "come up with constantly creative solutions from the advice they give others and learning about their space." Describing similar conferences and workshops, Liz, a Maine organic vegetable farmer, said, "I think that [networking at conferences] greatly, greatly supports our resilience as farmers both relationally and technically... We're always learning. We take away some gems from anytime we see another farmer, and we ask them a question."

Similarly, Bernadette, a first-generation tree fruit farmer from Massachusetts, said "I just wouldn't know where to start if it weren't for, you know, being able to reach out to other growers or to my extension." These women's experiences help highlight how women farmers in a variety of geographic areas are using networking. In addition, they establish a norm of reciprocity that supports communication networks and the participants' resilience.

Building and maintaining communication networks using communication technologies emerged as particularly useful for many women farmers who did not always have other farmers close by to ask. Karen explained that interactions

within her communication network “feel really powerful to me and helpful, because, especially looking for information, you get a quick response to a question especially if it has a time consideration.” For Karen, the ability to get information quickly from her online network was important because many of her concerns required timely responses. Tasha, a diversified crop farmer in Maine, said agricultural listservs provide a forum to ask questions on a variety of topics such as “insect control, or QuickBooks issues, or labor issues, and sometimes, like, a new tool or implement that somebody wanted to try and is asking if anybody has one to see what their opinion is on it.” Similarly, Charlotte, an organic farmer in Vermont, explained that “the hashtag capacity of Instagram enables me to be networked with everyone...and get a lot of information from farmers via that process.” For Tasha and Charlotte, mediated communication was valuable because it allowed them to access a variety of information more quickly and efficiently than they could do otherwise. Social media features, like hangtags, allowed them to refine the relevance of conversations within their networks even further.

In addition to being able to access information quickly, women farmers reported using mediated communication networks to overcome challenges related to geographic space. Lilly, a woman farmer in Alaska, explained how mediated interactions with other farmers allowed her to transcend the isolation of her rural setting. She explained that face-to-face communication was not a reliable source of support because there was not a “single person to ask in the surrounding area.” Instead, Lilly relied on social media platforms, such as Facebook, to connect with others and gain valuable information and technical support. Similarly, Daphne, an experienced woman farmer in North Carolina, said that there were not many small farmers in the region, and those that are there are very spread out. She said she goes to the potluck gatherings and conferences to “connect” with like-minded farmers and ask “questions across the board about all aspects of farming.” Because these networking events included small groups of small-scale farmers in the region, Daphne felt as though the information and support exchanged during

networking events was unique and very helpful to her resilience.

In addition to gaining access to valuable information they would not have otherwise had easy access to, women farmers explained that communication networks provided them with critical spaces for collaborative problem solving and business practices. For example, sick animals are a major stressor to an animal farmer that demand quick responses. Email listservs were commonly used for solving problems related to animal health. Margaret, a New Hampshire poultry farmer, spoke of using a listserv to diagnose illness in her chickens. “If my chicken is sick, you know, [I’ll ask] what does this look like? People are like, ‘oh, it looks like bumble foot’... It’s very helpful, not just chit chatty.” Similarly, Susan, a shepherdess from New Hampshire, talked about how a grazers listserv helped her triage her animals. She said:

It could be, ‘I’ve got a weak lamb, I don’t know what’s wrong with it.’ And then they talk about white muscle disease and some professor somewhere will give you links to find out more about that. Or somebody will say, ‘Call a vet immediately. This is not something for the list.’

Both farmers found communication within their networks valuable because it helped them make sense of the problems and identify potential solutions. Susan’s comment is interesting because in her story, someone said that the topic transcended the expertise of the network, so Susan should seek outside, expert help immediately. While communication networks were helpful to protect the resilience of participants, there were still some boundaries that the groups had to navigate. Participants are aware of the collective’s expertise and therefore self-monitor information sharing to protect members.

Collaborative Practices

In addition to benefiting as individual farmers from information sharing, women farmers and their farms drew on their communication networks to collaborate and coordinate. Many women farmers said that they shared business strategies and devel-

oped collaborative business practices within their communication networks. Betsy, a fruit and vegetable grower in North Carolina, said that farmers are “working together, and often will buy things together like fertilizer, soil or things where we can save money if we buy in bulk quantity.” Similarly, Julia told an analogous story about her farm in Vermont, saying that multiple farms often placed orders together to save on shipping costs. It was also common for the networks to seek and offer help with labor-intensive tasks or in the wake of a natural disaster. Many women farmers participated in “barn-raising events” or got together to build hoop houses, where farmers provided snacks or a meal in return for help establishing these structures. Cassi, a vegetable farmer in Alaska, talked about a particular farmer in her area that needed 20,000 bulbs planted at her farm each fall. During this time, an informal network of farmers she built through a local farmers’ market coordinated to “go over there and just bang it out in one day.” Without the help of the people in her network, this work would have taken weeks. Getting the work completed quickly allowed Cassi to focus her attention on other areas of her farm. Owning and operating a farm involves financial uncertainty due to market challenges and difficult-to-anticipate externalities that affect yields. Collaboration and help, made possible by their communication networks, provided financial breaks that were critical to the resilience of women farmers and their farms. During times of crisis, on-farm help becomes more time-sensitive and heightens the need for efficient communication. Tasha talked about a time when she received a message for help from another farmer via their local organic growers association after wind caused the plastic of a hoop house to blow off. As she recalled, “they emailed and said, ‘Hey. I’m in a pinch right now. I need to get the plastic back on. Can you come help?’” In another interview, Erin from Minnesota recounted local farmers’ reactions to recent massive flooding on surrounding farms:

We were all trying to reach out to each other, mostly by text or email..., and just try and figure out how everyone was doing... ‘How’s this person’s farm?’ ‘How’s this person’s farm?’ So,

we had this email thread of like, you know, ‘Erica’s farm, everything washed away. Can we try and get people over to, you know, replant, see what she needs?’

Tasha and Erin’s stories demonstrated how, when already established, women farmers can draw on their communication networks to support each other’s weather-related farm resilience. Similar to identifying relevant information quickly, mediated communication within the networks proved an efficient way of identifying needs and organizing volunteers during times of crisis.

Resilient Communities of Practice

While networks directly supported women farmers and their businesses by sharing informational and collaborative practices, women also discussed the notion of wanting to do so to promote the values of sustainable agriculture. Specifically, women farmers reported that their mentoring and information sharing practices violated expectations that businesses should be competitive. Operating under norms and goals that violated the expectations of profit-oriented values, these farmers perceived their networks as strengthening the resilience of the sustainable agriculture community more generally.

Mentoring the next generation of farmers was an emerging theme within the stories of supporting the resilience of the sustainable agriculture community. Many women interviewed in the study valued farm models that provided opportunities for volunteers and mentorship. For example, some farmers worked on land that was designed to have older, more experienced mentors training new farmers. This was typically on a temporary basis, where farmers would eventually move on to acquire their own land. Cassi, a vegetable and poultry farmer, explained that the purpose of hosting volunteer and mentorships is “to help teach people, the next generation..., it doesn’t even matter what age group, help pass on knowledge that I have about how to farm, and just sort of inspire others on whatever scale.” On-farm mentoring provided less-experienced farmers with opportunities to learn the skills and information needed to help their businesses and farms succeed. In addition to

learning, mentorships and volunteering supported the resilience of farmers. Maddy, an herb farmer in Massachusetts, said she built lasting relationships with former employers and mentors who are still her “biggest source of support” today. For Maddy, the support helped her launch her farm business and keep it viable beyond the initial startup. Helping less experienced farmers is a means of increasing or maintaining the number of farmers in sustainable agriculture.

In addition to directly contributing to the resilience of individual newcomers, women farmers reported contributing to the resilience of the sustainable agriculture community by creating norms of support. As Morgan said in her interview, “I got advice from other people, so I feel obligated to say, ‘Okay, I’ll give you the 20 minute phone call and tell you what I’ve learned and what I’m learning.’ And it’s not always the most convenient, and sometimes it can feel burdensome. But once again, just giving back to the farmer to farmer model.” Morgan’s comment reflected how feeling supported by others encouraged her to pass on what she has received to others. Morgan and Cassi’s stories stressed the importance of perpetuating farming knowledge for the continued support and growth of the sustainable agriculture sector.

Many farmers’ stories emphasized the importance of information sharing within the greater farming communities. For example, many interviewees reported sharing business plans and marketing strategies, including names of local restaurants and markets well-suited for farm sales. Milly, an organic poultry farmer from Alaska, explained how communication within her network deviated from that which she experienced with men farmers. She explained:

Well, I think farmers sort of have always held their cards close to their chest, where they don’t really wanna share too much information because it’s seen as a competition kind of thing. But I think that’s changing somewhat, and I do think that women farmers, at least in my experience, are more open to that sharing of information, and not...and I don’t know if it’s just the nature-nurture thing or what it is, women are just nicer than men, I don’t know.

But yeah, there does seem to be more willingness to sort of really invite people to come over and see what you’re doing, and to help build...just because you’re helping somebody else build up their farm, it helps you build up your farm. So it’s not like, “If you’re selling more produce, then I’m gonna sell less. “It’s, “If you’re selling more, then I’m gonna sell more,” because that increases sort of the public awareness of the whole thing. So I do think that female farmers are better at that than our male counterparts.

Jess, a vegetable grower from Minnesota, used to feel uncomfortable asking for advice from a local farmer selling the same crop. “We’re such a competitive society,” she said, “you think, are they really gonna wanna give you advice when you’re like right down the road, and you’re trying to sell the same stuff?... Like, no. They’re fine with it. And then you try to pay it forward, too.” Milly and Jess’s experiences suggested that their communication networks prioritized the collective well-being of farm businesses, even at the cost of any individuals’ financial edge. Milly, unlike Jess, attributed this difference to the gendered identities of the participants. Both Jess and Milly recognized that their communication networks adopted practices that were in opposition to mainstream culture in the U.S., specifically, competitive business models. Both women suggested that the alternative forms of communication caused some initial uncertainty around asking for information or help. However, witnessing or experiencing norms of generosity and reciprocity within resilience communication seemed to ease those tensions and assimilate the women into the network. In other words, generosity within the group inspired other members to do or want to do likewise. Because members of the group were contributing to each other’s individual resilience, each member could trust that their business’ resilience would be supported if threatened.

In addition to trusting that others would be supportive, some farmers suggested that openness and trust were important to support the resilience of the sustainable agriculture community in the face of a common opposition. Betsy, a farmer in North Carolina, explained that it is in the best in-

terest of participants to contribute to each other's farm and business resilience because they are all trying to defend themselves against powerful competition. She explained, "it's not really us [other farmers] we're in competition with, we're in competition with Walmart, and, you know, big grocery stores and stuff." Charlotte, a farmer from Vermont, called it a "win-win-win" when you help other farmers. By this, Charlotte indicated that the benefits extend beyond her own economic well-being through practices that benefit the environment and simultaneously build resistance to organizations with competing ideologies.

The values of trust and sharing among farmers were common among interviewees, but not universal. Some women discussed tensions surrounding when, what, and how much to disclose to other farmers. These typically did not reflect the values of the participants themselves, but of nearby farmers with whom they had interacted. For example, Bernadette, a farmer in Massachusetts, mentioned, "not everybody gives up their [growing] secrets." Mary, also a farmer in Massachusetts, reported that she was willing to "share anything with anybody," but that some farmers "are kind of secretive and want to keep their knowledge to themselves because it may gain them something, but I'm not really like that." By emphasizing that they share information, but not everyone does, Bernadette and Mary's comments reflected their network's value of sharing. However, comments like these are also important reminders that farmers participating in these networks have competing financial and social considerations that they must navigate.

In addition to supporting the farm and business, our interviewees felt that their communication practices helped retain members of their farming communities. Julia, from Vermont, said the support provided in networks was particularly vital for new farmers. She explains, "There's a lot of people who get into farming, and then after a few years, they quit for one reason or another." She explained that there have been issues of poor mental health and farmer retention in her farming community. In response, she says, "We try to bring people, connect people together."

Similarly, Bonnie, a farmer in North Carolina, said that she hosted events to help new young

woman farmers "start to feel like there's more of a community group that each other can come to with, like, problems or anything else, friendship." Both Julia and Bonnie described how, in addition to providing information and help with the farm business, the networks try to help women farmers overcome physical and social isolation through community-building activities. The assumption was that women farmers would stay in the profession longer and would have stronger mental health if they were in the community. This communication pattern reflects an unspoken responsibility of the group to protect the sustainable agricultural community as a whole by serving as the protectors of each other's happiness and health. The community is responsible for the resilience of the community.

Discussion

From potlucks to social media discussions to workshops and formal networking events, women farmers found a variety of ways to build and maintain communication networks. These networks included both all-women and coed groups, and women found support through interaction with men and women. Conversation within women farmers' communication networks contributed to and reified the resilience of the individual farmers, their farm business, and the greater sustainable agriculture community. Women were able to build and maintain networks and support their resilience through seeking and sharing information and collaborative business practices daily. If networks were already in place, women farmers could also draw on their networks for quick and effective hands-on support during times of crisis.

Theoretical Implications

Buzzanell (2010) theorizes that maintaining and using communication networks helps enable individuals to persevere either in response to a catastrophic event or in the face of consistent and recurring challenges. For farmers in our study, these challenges included feelings of isolation, crop failures, unexpected weather events, financial challenges, or the constraints of working in a male-dominated industry. This study contributes to Buzzanell (2010) and provides deeper insight into understanding the value of communication networks

in maintaining resilience. Women farmers developed and maintained communication networks to support their resilience in sustainable agriculture. Farmers are typically either geographically isolated from their neighbors or, if not, their neighbors may not understand the unique challenges this population faces. Therefore, having someone close by to talk to and make sense of challenges is not always an option. Transcending time and geographic space, mediated forms of communication in these networks were critical to women farmers' resilience.

Our findings also complement and contribute to Houston's (2018) theory of community resilience. As Houston argued, a community of resilient individuals does not automatically constitute a resilient community. Rather, "dynamic interactions" make a collective of individuals a resilient whole (p. 21). We agree with Houston's (2018) argument, the collective engagement of resilient women farmers contributes to and reifies the resilience of their larger network and sustainable agriculture community. Participants grew as they received and gave support. The giving and receiving of support had a generative effect, supporting the continued resilience practices of the group.

Our study's most valuable contribution to resilience theorizing is extending Houston's (2018) argument to include communities of practice, not just communities of place. Instead of being motivated through a shared connection to a local community, support within the communication networks was fostered through the shared goal of advancing the sustainable agriculture movement. Our findings are consistent with a study done by Hassanein and Kloppenburg (1995), which suggests that networks of information sharing propel the sustainable agriculture movement on dairy farms in Wisconsin. Our study advances this work by exploring the dual benefits of communication networks on both individual and broader community resilience. Future research should continue to explore how communities of practice in agriculture and other fields can foster resilience for members and the community.

Prior scholars have argued that farmers in sustainable agriculture operate within a separate paradigm, one that is concerned more about

connecting to and protecting the earth than about money (Bell, 2004; Trauger et al., 2008). While women farmers emphasize norms of openness, generosity, and collaboration, we also identified counter cases that suggest hesitation, or an unwillingness to disclose techniques or engage in dialogue with other farmers. Future research should examine how communication within the sustainable agriculture community helps farmers make sense of this tension as well as the impact of that sense-making on a farmer, farm business, and sustainable agriculture's resilience.

Practical Implications

This study demonstrates how building and maintaining communication networks contributes to women farmers and their greater community's resilience. Women farmers and professionals supporting women farmers should prioritize communication by seeking ways to initiate and develop networks, as well as ways to foster access and active engagement within the networks. This study's findings highlight the imperative of providing equitable access to networking opportunities for women farmers. In particular, interviewee stories included direct accommodations that relevant organizations could implement to increase farmer participation:

1. Support informal networking events, as well as formal networking events. Women farmers reported gaining information at formal events such as extension workshops and conferences. However, informal networking activities, such as social media activity or potlucks, provided space for information and resource sharing as well as relationship building. Encourage relationship building and self-organized activities that transcend the actual event and help build or maintain a communication network.
2. Within networks of farmers, women reported that they found support through interactions with all genders. This is important information for organizations to know, as women were more likely to seek support from others based on similar expe-

riences than by gender. They discussed seeking out other women when the challenges were related to being a woman farmer. However, given the frequency of crop, livestock, or financial challenges, women farmers were also seeking others with a similar farm or business type.

3. The findings of this study highlight the need for increased farmer access to communication technologies and wifi. For women farmers who felt isolated due to geography or the nature of small-scale farm work, internet platforms such as email listservs and social media were critical for access recourses and support. Policy-makers and other organizations that advocate for farmers should note this importance. In addition to increasing access, educators can facilitate training on how to use communication technologies or the different types of support that can be provided. Future research should examine if farmers prefer organizations to host online networking activities or if they prefer to self-organize.
4. Interviewees provided positive feedback for on-farm mentoring models. Farms that encouraged mentoring and hosting volunteers not only increased the depth of learning for beginning farms but forged strong bonds between multiple generations within agriculture. This is particularly important given that most farmers within this movement have been first generation.

Limitations and Future Research

Based on recruitment strategies for this project, it is likely that participant farmers are systematically more connected to agricultural networks than non-participants. Key informants from each state were typically affiliated with their state's extension or a local farming association. Therefore, farmers they identified for the study were ones they would know through these networks. By nature of being identifiable, we can assume that farmers have larger net-


works than their non-identifiable peers. Another reason that participants may have been disproportionately engaged in social networks is that most were in their first ten years of farming. Over a quarter of farmers in the U.S. fall into this "beginning farmer" category (USDA, 2019). However, as a population, this subgroup may be disproportionately more likely to tap into their support networks compared to their more seasoned peers because they have a smaller stock of knowledge for problem shooting.

Since all participants in this study are white, our analysis lacks the experiences and perspectives of women of color who operate farms. While 95% of women farmers in the U.S. are white (USDA, 2019), organizations should be careful not to assume the findings of this study apply to all U.S. women farmers. Future research should focus more attention on the intersection of gender, race, sexuality, and socioeconomic status within the food chain.

Our findings are also limited in their ability to conceptualize resilience communication fully because all the interviewees were still participating in agriculture. They are practicing resilience in some form. The design of this study did not allow for the voices of those who had exited farming, by choice or otherwise. Future research should add to the richness of our findings by expanding the sample to learn why women farmers chose not to continue their participation and the support they did or did not find.

Conclusion

Women farmers' numbers are continuing to increase, as well as their prominence in conversations within sustainable agriculture. This study highlighted the ways in which our interviewees used their communication practices within in-person and online forms of agriculture networks to maintain individual resilience as farmers, while collectively supporting the growth and interactive nature of the sustainable agriculture movement. The findings from this study and subsequent developments will help ensure continued support for these resilience processes.



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Differences in crop selection, resource constraints, and crop use values among female- and male-headed smallholder households in Kenya, Tanzania, and Uganda

SPECIAL ISSUE: MORE THAN
VALUE\$ IN THE FOOD SYSTEM



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Abstract

A growing body of research suggests female- and male-headed households in low- and middle-income countries differ in terms of crop choices,

access to resources for growing different crops, and values placed on crops for home consumption versus market sale. To better understand relationships between gender of the household head, household resources, individual values, and crop choices, we draw on original survey data collected

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from 1,001 rural households in Kenya, Tanzania, and Uganda. Bivariate and multivariate analyses suggest that female-headed households are less likely to grow cash crops, reflecting a combination of resource constraints and social norms. However, on average, female-headed households plant more diverse food crops per hectare of land to which they have access, consistent with past findings suggesting crop diversity is a strategy employed by resource-constrained female-headed households to meet household food security needs. We also find that women surveyed on behalf of their households place a higher value on crops for food security, while men more frequently emphasize income potential. These results provide novel cross-country evidence on how female- and male-headed households, and women and men farmers within households, may prefer different crops and also face different levels of access to resources needed for market-oriented agriculture. Such findings support recent calls for development practitioners to carefully consider how market-oriented programs and policies may differentially affect female- and male-headed households and individuals residing within them. We also underscore the importance of collecting gender-disaggregated data to capture meaningful differences in preferences and constraints across women and men at the inter- and intra-household level.

Keywords

Agrobiodiversity, Smallholder Farmers, Gender, Crop Selection, Commercialization, East Africa

Introduction

Smallholder farmers worldwide, and especially in sub-Saharan Africa, are particularly vulnerable to poverty and food insecurity (Food and Agriculture Organization of the United Nations [FAO], UNICEF, WFP [World Food Program], & World Health Organization [WHO], 2019; IFAD, 2016; Niles & Salerno, 2018). Consequently, many development organizations have called for “pro-poor” agricultural development strategies, often centered on improving market access for smallholder farmers (Hellin, Lundy, & Meijer, 2009, p. 16; Horton, 2008). Such approaches suggest that market-oriented development strategies can effectively

address persistent rural poverty and food insecurity among diverse populations of smallholders operating in different social and agroecological contexts (Gengenbach, Schurman, Bassett, Munro, & Moseley, 2018; Pingali, 2015; Toenniessen, Adesina, & DeVries, 2008). To understand the applicability of these market-oriented approaches across different groups of smallholders, this paper investigates whether female-headed and male-headed smallholder farmer households in three countries in East Africa differ in terms of the crops they choose to grow, and the opportunities and constraints they face.

Some of the most marginalized and food insecure populations in sub-Saharan Africa are women smallholders (Koppmair, Kassie, & Qaim, 2017; Perez et al., 2015). Scholars and development organizations alike identify discrepancies in access to resources (e.g., land, agricultural inputs, credit) as key factors underlying production constraints and high rates of food insecurity among female-headed households (FAO, 2019; Peterman, Quisumbing, Berhman, & Nkonya, 2011; Quisumbing et al., 2014). Some advocate market interventions targeting female-headed households as a development priority (Rubin & Manfre, 2014). Gengenbach et al. (2018) note that market-oriented agricultural development approaches in Africa often focus on empowering female smallholders, as a means of increasing regional farm output and addressing household food and nutrition insecurity. However, they and several authors highlight limits of market-oriented interventions in promoting and achieving gender equity goals (Gengenbach et al., 2018; Meemken & Qaim, 2018; Tavenner et al., 2019).

Some observers raise a concern that too often policymakers and development experts assume that most households will respond similarly to policies and development interventions, overlooking important differences across and within households (Quisumbing et al. 2014). The preferences and constraints of female-headed smallholder farm households can be very different from those of male-headed households; relatedly, the preferences and constraints of individual women (within either female- or male-headed households) can also be very different from those of men (Doss, Kovarik,

Peterman, Quisumbing, & van den Bold, 2015; Doss, Meinzen-Dick, Quisumbing, & Theis, 2018). Such findings highlight a need to better understand how farm household livelihood choices, particularly those of female- and male-headed smallholder households, demonstrate different preferences and constraints across development contexts. A more nuanced understanding of differences in crop portfolios across household types, as well as differences in women's and men's individual crop choices within households, can inform development approaches in sub-Saharan African countries seeking to help households and individuals meet their goals and improve their wellbeing (Gengenbach et al., 2018).

In this paper, we use survey data from 1,001 smallholder farm households in East Africa to examine the degree to which female- and male-headed households differ in the number and variety of crops they grow, the land and market constraints they face, and their values around crops for food security versus market sale. Specifically, the objectives of this paper include:

- a) Describe the demographic profiles of female- and male-headed smallholder households in study communities in three countries—Kenya, Tanzania, and Uganda—where smallholder agriculture remains an important rural livelihood strategy, and rates of food and nutrition insecurity remain high (FAO et al., 2019; IFAD, 2016).
- b) Characterize the crop portfolios of female- and male-headed households in the sample, including the relative prevalence of food crops versus cash crops;
- c) Identify relationships between household characteristics, particularly the gender of the household head, and household crop portfolios;

- d) Establish whether relationships between gender and crop choices persist when accounting for differences in resource constraints among female- and male-headed households, with a specific focus on land access; and
- e) Determine whether female- and male-headed households differ in the importance that they place on the crops they grow primarily for home consumption versus the crops they grow for income.

Collectively, these objectives allow us to provide insights into if and how female- and male-headed households differ in their crop preferences and use, providing further understanding of how the gender of the household head relates to households' livelihood strategies. This analysis aims to contribute to broader scholarly debates around how different types of households are positioned to take advantage of market-oriented development approaches in sub-Saharan Africa. If the goal of enhancing market opportunities for smallholder women is to stimulate their competitiveness and empower them to transition out of poverty, then understanding what crops female-headed households grow and how they differ from male-headed households can help better align the assumptions of development theorists and practitioners with the realities of households' specific livelihood strategies.¹

Literature Review

Since the 1960s, scholars have underscored the importance of including women in development efforts and advancing gender equity (Singh, 2007). These ideas gained traction in the 2000s among major development organizations, including the World Bank, FAO, USAID, and the CGIAR Consortium. All these organizations emphasize the need to overcome barriers women face in the

¹ Most of the data used in this study are at the household level. However, as we discuss in the literature review, we recognize there are important differences between household and individual characteristics, such that, for example, the preferences and constraints of male-headed households do not necessarily reflect those of the women who reside within those households (Quisumbing et al., 2014). Where possible, our analysis examines these differences empirically, including by asking how women and men *respondents* (including a large number of women responding on behalf of a male-headed household in our survey) differ in the importance that they place on the crops they grow.

agricultural sector in order to realize poverty alleviation and food security goals. Often these organizations' gender strategies have a substantial market focus. For example, the World Bank has outlined ten policy priorities to close the gender gap in African agriculture, with more than half focused on improving women's access to agricultural inputs (e.g., improved seed) or output markets (e.g., sales of high-value cash crops) (O'Sullivan, Rao, Banerjee, Gulati, & Vinez, 2014). Rubin and Manfre (2014) further highlighted the need to develop gender-equitable value chains (defined as all the activities and processes to bring a food product from conception to consumption and disposal) (Kaplinsky, 2000).

Developing competitive value chain opportunities for smallholders has become a hallmark strategy of major development organizations in sub-Saharan Africa (Gengenbach et al., 2018), with efforts focusing on a diverse array of crops from cassava leaves (Andersson, Lodin, & Chiwona-Karlton, 2016) and tea (Loconto, 2015) in Tanzania to pigeonpeas in Malawi (Me-Nsope & Larkins, 2016) and potatoes and sweet potatoes in Uganda (Horton et al., 2010). But empirical evidence consistently points to difficulties in changing existing dynamics among men and women in terms of control of resources and power relations across these varied value chains (Loconto, 2015; Malapit & Quisumbing, 2015; Meemken & Qaim, 2018; Rubin & Manfre, 2014). Research examining intra-household gender dynamics suggests that men and women can differ in their crop preferences and adoption of crop varieties. For example, although both men and women consider production traits such as yield when selecting crops, men more often emphasize commercial potential while women more often highlight food processing and preparation traits (Bentley et al., 2017; Christinck, Weltzien, Rattunde, & Ashby, 2017; Mudege & Walsh, 2016). In Kenya, Pincus, Croft, Roothaert, and Dubois (2018) note that women seed producers of indigenous vegetable varieties emphasize the importance of seed saving for household food security significantly more than men. At the household level, the gender of the household head also appears to influence crops grown and the

resulting livelihood outcomes. For example, Jones, Shrinivas, and Bezner-Kerr (2014) find that female-headed households in Malawi have a stronger association between higher crop diversity and household dietary diversity than male-headed households. Across Africa, women have been found to be key conservers of crop diversity (Amri & Kimaro, 2010; Wooten, 2003), although in some instances better access to land and other productive resources appear to facilitate a more diverse portfolio of crops for men than women (Nuijten, 2010).

Gengenbach et al. (2018) and others (Carr & Thompson, 2014; Jost et al., 2016; Quisumbing et al., 2014) recognize that gender intersects with an array of individual, institutional, and contextual factors in shaping crop choices across households. Teeken et al. (2018) demonstrate the complexity of these interactions when they find no differences across preferences of men and women cassava farmers for some traits (high yield, root size, early maturity, and dry matter content) regardless of the geographic region in Nigeria, but strong regional differences in the importance rankings of these traits, such that farmers in regions more oriented towards markets place higher importance on yield and early maturing, while farmers in regions with more focus on home consumption highlight cooking time to a greater degree. For other traits, the authors find significant differences between women and men producers (e.g., women prioritize cooking and processing traits while men emphasize agronomic traits) regardless of region. Similarly, Waldman, Ortega, Richardson, Clay, & Snapp (2016) conclude that gender is one among several variables, including income and geography, that determines the adoption of and preferences for legumes in Malawi. Differences in crop selection may also reflect institutional constraints limiting women's access to improved varieties, inputs, and information. In Uganda, Fisher and Carr (2015) find that men more commonly adopted drought-tolerant maize, due to differences in land, credit, and information access that better position men to invest in these crops. Zimmerer, Carney, and Vanek (2015) note that men's emphasis on market sales in some regions of Africa could reduce

women's access to land, cultivation of traditional crops, and maintenance of agrobiodiversity. In a large survey in Ethiopia, Kenya, and Tanzania, Tavenner et al. (2019) find that while greater on-farm crop and livestock diversity are associated with greater female control over resources, higher rates of commercialization are associated with more male control across all farming systems studied.

A recent review by Ampaire et al. (2019) concludes that although development efforts and agricultural policies in East Africa have increased awareness of gender differences, actual implementation has not addressed structural inequalities. Rather, the diverse and context-specific relationships between gender and agricultural production systems are often overlooked (Carr & Thompson, 2014). Furthermore, while a growing body of literature focuses on gendered differences related to crop selection—with findings consistently suggesting women's crop production is constrained by resource limitations—most studies are limited in geographical scope. By analyzing data across three East African countries using an identical survey instrument, this study provides comparable find-

ings across diverse study contexts. It thus adds to the base of empirical evidence needed to enhance context-specific understanding of gendered implications of market-centered agricultural development efforts.

Materials and Methods

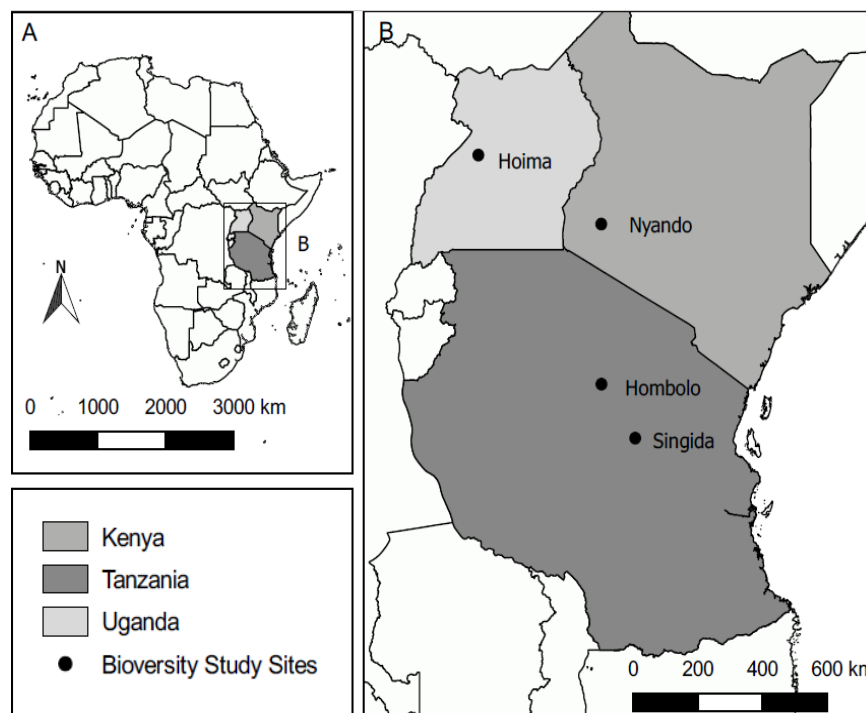
Site Description

Eastern Africa has some of the highest rates of undernutrition and childhood stunting globally (FAO et al., 2019). Within the region, Kenya, Tanzania, and Uganda are ranked 87th, 98th, and 89th of 113 countries in overall national food security, respectively (The Economist Intelligence Unit, 2018). Case study countries and study sites were selected by the international agricultural research institute, Bioversity International, to be representative of the primary agroecological systems in the region, and include four sites: Nyando in Kenya; Hombolo and Singida in Tanzania; and Hoima in Uganda (Figure 1).

As in many other parts of sub-Saharan Africa, smallholder agriculture is the primary livelihood strategy for rural populations in the study areas.

And although there is high agricultural potential across all three countries, large yield gaps remain between that potential and what is actually produced. Policymakers and development practitioners have thus placed a strong emphasis on market-oriented development efforts. Between 2007 and 2016, all three countries were among the highest national recipients in terms of the number of grants provided by the Alliance for a Green Revolution in Africa [AGRA] (2017), and both Kenya and Uganda are Feed the Future countries with which the U.S. government partners to target food insecurity. Important regional staple crops have also been

Figure 1. Study Communities in Kenya, Tanzania, and Uganda



identified as holding potential for value chain development including maize, sweet potato, rice, sorghum, millet, beans, pigeonpeas, cassava, and groundnuts. Agricultural characteristics of the study sites are summarized in Table 1.

Sampling Design

The research team adopted a snowball sampling approach common in network surveys (Sudman & Kalton, 1986), with researchers initially interviewing two nodal farmers,² a male and female, identified during focus group discussions in each village as having influence or leadership roles in their community. As part of the survey, farmers were asked whom they had either received seeds from or given seeds to—establishing the next cohort of farmers to interview. Participants were also asked to name the varieties of sorghum, millet, and bean seeds they had used in the last year and where they sourced the seed (e.g., local markets, research and extension services, private companies, or other farmers). Enumerators then surveyed farmers named by the first two respondents, and this sampling continued iteratively until interviewed farmers began mentioning the same names, or until no remaining farmers stated sourcing seed from others in the village.

The survey team then randomly selected a new set of interviewees in the next village and repeated the process until the target sample size was attained.

Data Collection

Survey data were collected from July through October 2016 using the Open Data Kit (ODK) survey platform, which allows data to be immediately entered and coded using tablets on site.

The survey collected household-level data, including the gender of the household head, farmer age, educational attainment, sources of on- and off-farm income, and households' gender and age composition. Farm-level data included farm assets, total land area and area of cropland managed by the household, and the geographic location of the farm, including distance to the nearest paved road and distance to market. The network survey module also included sources of expert information and farmers' contact with experts and extension services.

At the crop level, survey data included the number and type of crops grown for 22 specific crops plus one "other crop" category. As shown in Table 2, we also consider the number of different food groups grown by each household, classified according to the household dietary diversity score (HDDS) defined by Kennedy et al. (2011) on behalf of the Food and Agriculture Organization of the United Nations (FAO). This food group diversity score ranges from 1 (household grew only one crop or a combination of crops all from one HDDS category) to 5 (household grew at least one each of Cereals, White roots/tubers, Legumes, Dark leafy vegetables, and Other vegetables or

Table 1. Summary Information for the Study Sites in Kenya, Tanzania, and Uganda

	Kenya		Tanzania		Uganda
	Nyando (Lower)	Nyando (Upper)	Hombolo	Singida	Hoima
Farming system	Mixed subsistence	Mixed subsistence to commercial	Mixed subsistence	Mixed subsistence	Mixed subsistence
Agroecology	Semi-arid / sub-humid	Sub-humid	Semi-arid	Semi-arid / Sub-humid	Sub-humid
Average rainfall (mm)	800	1220	400	600	1200
Temperatures (degrees C.)	18–34	12–30	12–35	12–30	12–32
Altitude (m. above sea level)	1100–1300	1200–1400	1100	1500	1120
Market accessibility	Very good	Very good	Poor	Moderate	Very good

² Nodal farmers are prominent farmers within a given community, expected to have a large number of connections with other farmers (i.e., to be "nodes" within a relatively large network).

fruits).³ Finally, we further classify crops according to whether they are grown for primarily home consumption (i.e., staples) or if they are more typically grown for a combination of home consumption and market sale—including some commonly sold cereal crops, as well as higher-value vegetable, fruit, and other cash-crops (Table 2).

Data Analysis

All statistical analyses were conducted in Stata 15.1. We first present basic descriptive statistics to summarize the demographic profiles of the households of survey respondents (objective a) and the crop portfolios of households according to the gender of the household head (objective b). We use independent samples t-tests, ANOVA, bivariate linear regression, or Pearson Chi-square tests for initial bivariate analyses considering the number

and type of crops grown by farmers as a function of farm and household characteristics. Then, to further examine relationships between household characteristics and crop selection with a focus on the gender of the household head (objective c), we use multivariate models including ordinary least squares (OLS) regression in the case of continuous outcome variables, or ordinal logistic regression in the case of ordered categorical response variables.

Our first outcome of interest is crop diversity—measured by the number of crops planted by the household (N_{crops}). This is a simple sum of the number of different crops planted, a continuous variable ranging from 1 to 23. We hypothesize that female-headed households might plant fewer crops than male-headed households, due to a combination of resource constraints and gender norms that lead male-headed households to

Table 2. Crop Classification by Household Dietary Diversity Score (HDDS) Categories and Common Local Usage

HDDS Category	Crops	Primarily home consumption	Mixed consumption and market sale
Cereals	Maize		√
	Millet		√
	Rice		√
	Sorghum		√
White roots and tubers	Banana	√	[√ in Uganda]
	Cassava	√	[√ in Uganda]
	Sweet potato	√	[√ in Uganda]
Legumes	Beans		√
	Cowpea	√	
	Groundnut	√	
	Pigeonpea	√	
Dark green leafy vegetables	Dodo (Amaranth)	√	
	Sukuuma wiki (Collard greens)		√
	Nakati (<i>Solanum aethiopioum</i>)		√
Other vegetables	Butternut	√	
	Cabbage		√
	Onion		√
	Pumpkin		√
	Tomato		√
Other fruits	Watermelon	√	
Other crops	Coffee		√
	Forages		√
	Other crops		√

Source: Household dietary diversity score (HDDS) categories from Kennedy, Ballard, and Dop (2011); crop uses are derived from author knowledge of the study area.

³ We consider the category “Other crops” separately as these are less common in the sample and tend to be grown as cash crops (e.g., coffee) or are non-food (e.g., forages).

plant more relatively new crops—e.g., other vegetables, other fruits, and other crops (e.g., coffee) for market sale—at higher rates than female-headed households. The Model 1 regression takes the form:

$$N_{crops_i} = \beta_0 + \beta_1 x_{GenderHH_i} + \beta_2 x_{AgeHH_i} + \beta_3 x_{EducHH_i} + \beta_4 x_{OffFarmInc_i} + \beta_5 x_{AdultsHH_i} + \beta_6 x_{Dependency_i} + \beta_7 x_{Landholding_i} + \beta_8 x_{Distance_market_i} + \beta_9 x_{Mobile_i} + \beta_{10} x_{Network_i} + \varepsilon_i$$

(Model 1–2)

Demographic variables hypothesized to relate to crop choices in addition to the gender of the household head (*GenderHH*) include the age of the household head (*AgeHH*), and the educational attainment of the household head (*EducHH*), an ordinal variable including four levels ranging from no education to completion of some secondary school or above. Access to off-farm income (*OffFarmInc*) is a binary variable coded as 1 if the household had access to any off-farm income sources. To control for on-farm family labor, we use two variables: the number of adults in the household (*AdultsHH*) and the dependency ratio (*Dependency*), defined as the percentage of dependents aged less than 15, or over 60 (Hadley, Belachew, Lindstrom, & Tessema, 2011) in the household. As both a measure of wealth and access to productive agricultural resources, we also include *Landholding* (hectares). *Distance to market* (kilometers) is included as a proxy for market access. Access to information and broader social capital is accounted for via two variables: ownership of a mobile phone (*Mobile*) and extent of social networks (*Network*), as measured by the number of other farmers from whom respondents received seed in the previous year. In Model 2 we further consider the number of different HDDS-based food crops (N_{hdds}), ranging from 1 to 15, using the same regression model specification as Model 1 but focusing only on food crops traditionally grown in the study area.

In Model 3 we then consider aggregated HDDS food crop categories (N_{hdds_cat}) grown by the household, measured as a scale ranging from 1 to 5. We hypothesize that female-headed households

might be more likely to plant a more nutritionally diverse portfolio of crops—composed of at least one each of cereals, white roots/tubers, legumes, dark green leafy vegetables, and other vegetables and fruits—while male-headed households either specialize in certain food crops or allocate more resources to modern crops (including cash crops) rather than more diverse staples.

$$N_{hdds_cat_i} = \beta_0 + \beta_1 x_{GenderHH_i} + \beta_2 x_{AgeHH_i} + \beta_3 x_{EducHH_i} + \beta_4 x_{OffFarmInc_i} + \beta_5 x_{AdultsHH_i} + \beta_6 x_{Dependency_i} + \beta_7 x_{Landholding_i} + \beta_8 x_{Distance_market_i} + \beta_9 x_{Mobile_i} + \beta_{10} x_{Network_i} + \varepsilon_i$$

(Model 3)

Due to the limited number of possible values for the outcome variable N_{hdds_cat} , we applied ordinal logistic regression models for Model 3. However, for ease of interpretation, we present OLS regression estimates, which yielded qualitatively similar findings to ordinal logistic regression methods.

We then seek to understand the degree to which the relationships between gender of the household head and crop choices identified in the above analyses hold when accounting for land access (objective d). In Model 4, we consider a revised dependent variable constructed to account for land constraints disproportionately shaping women's crop choices: the number of HDDS-based food categories grown per acre available land ($N_{hdds_cat}/landholding$). This is a continuous variable reflecting the diversity of food crops grown per unit of household land resources. We hypothesize that female-headed households might be relatively more likely than male-headed households to cultivate a more diverse portfolio of food crops after accounting for land resource constraints. Owing to the heavy right-skew of the variable, we use a log transformation in the OLS regression models:

$$\ln \left(\frac{N_{hdds_cat}}{Landholding} \right) = \beta_0 + \beta_1 x_{GenderHH_i} + \beta_2 x_{AgeHH_i} + \beta_3 x_{EducHH_i} + \beta_4 x_{OffFarmInc_i} + \beta_5 x_{AdultsHH_i} + \beta_6 x_{Dependency_i} + \beta_7 x_{Landholding_i} + \beta_8 x_{Distance_market_i} + \beta_9 x_{Mobile_i} + \beta_{10} x_{Network_i} + \varepsilon_i$$

(Model 4)

The land variable *Landholding* is omitted from the right-hand side of the equation to avoid multicollinearity for HDDS-based food categories grown per acre available land.

A final set of multivariate analyses (Models 5-8) focuses on objective e: whether female-headed households' crop choices reflect gendered preferences around crops primarily grown for household consumption and nutrition versus crops primarily grown for market sale. Namely, we compare rates of planting crops grown primarily for home consumption (Table 3) versus those grown for a combination of home consumption and market sale, including high-value vegetable, fruit, and other cash-crops (coffee, forages). These models are applied across female-headed and male-headed households in the sample using regression models identical to those previously used for food crops, but with the outcome variables total consumption crops grown ($N_{consumption}$), and total mixed consumption and income crops grown (N_{mixed}). We also model the logged outcome variables $\ln(N_{consumption}/landholding)$ and $\ln(N_{mixed}/landholding)$ —to consider the number of consumption crops grown per hectare of landholding, as well as the number of mixed consumption and income crops per hectare—to account for possible land constraints shaping crop choices.

Lastly, to further explore the degree to which differences in crop choices across female- and male-headed households might reflect different preferences regarding food crops versus income crops (objective e), we examine responses to two sets of survey questions. We asked respondents to report, for each crop planted among the 23 crops on the survey, the importance of that crop for (i) household food security, and (ii) household incomes. Enumerators collected responses on a 3-point Likert scale, with the categories “Not Important,” “Somewhat Important,” and “Very Important.” We hypothesize that due to social norms and resource constraints, female-headed households might be relatively more likely to assign high value to food security criteria when making choices about which crops to plant, while male-headed households might place more emphasis on income-generating potential.

Alternative Gender Measures and Limitations

We acknowledge that a wealth of recent scholarship critiques the over-reliance of development research on the household as the unit of analysis, arguing that a unitary household model (i.e., assuming that the responses of the household head represent the interests of the household members) misses important power differentials within rural households (Anderson, Reynolds, & Gugerty, 2017; Quisumbing et al., 2014). As a result, measurements to account for women's empowerment and gender parity within female- and male-headed agricultural households have recently appeared and are being increasingly implemented (Larson, Castellanos, & Jensen, 2019; Malapit, Kovarik, Sproule, Meinzen-Dick, & Quisumbing, 2015). Our analysis relies on the household as the unit of analysis, with the respondent identifying the person in the household who serves as the head. Though we acknowledge this does not reveal dynamics within the household, it does provide insight into how the gender make-up of households may influence crop choices—and thus contributes to better understanding the complexities of gender and its effects on decision-making and resource allocation in rural agrarian contexts.

In addition, recognizing that preferences and priorities identified at the household level may obscure the perspectives of individuals residing within those households (Doss et al., 2018; Gengenbach et al., 2018; Quisumbing et al., 2014), in the final bivariate tests comparing rankings of relative importance assigned to the nutritional versus income values of the food and cash crops grown by gender of the household head, we further compare importance rankings by gender of the survey respondent. Although 67% of households in the sample had a male head-of-household, women provided responses for 41% of the male-headed households surveyed (responding on behalf of a male household head). In exploring how the responses of women in male-headed households might differ from male household heads' own self-reported importance ratings, we can begin to see how values around nutritional versus income benefits from crops might differ across genders (rather than across gender of the household head alone).

Results

Objective a: Demographic profile of the sample

Table 3 provides summary statistics disaggregated by country and gender of the household head. Roughly one-third of sampled households in each country are female-headed, ranging from 28% in Kenya to 36% in Tanzania. Female household heads are on average older than male household heads in Kenya ($t=2.71$, $p=0.004$), but this is not the case in Tanzania or Uganda. Consistent with national trends, female respondents in all countries have lower education rates; in Tanzania and Uganda, female-headed households are also less likely to have off-farm income ($\chi^2 = 6.60$, $p<0.010$). Female-headed households also generally have fewer adults present (except in Uganda) and have significantly fewer land resources in all three

countries ($t = 5.09$, $p<0.001$). Female-headed households are on average further away from markets, although this difference is only significant in Uganda ($t = 1.55$, $p<0.061$). In Kenya and Tanzania, female-headed households are also less likely to own a mobile phone ($\chi^2 = 4.10$, $p<0.043$). The extent of social networks—measured by the number of farmers from whom a household received seeds—varies across countries. Female-headed households reported more network ties than male-headed ones in Uganda ($t=1.53$, $p=0.064$), but there were no reported network differences across household types in Kenya or Tanzania.

Objective b: Household crop production by country and gender of the household head

We next turn to descriptions of the crop produc-

Table 3. Sample Descriptive Statistics by Country and Gender of the Household Head

Gender of household head:	Kenya (n=364)		Tanzania (n=334)		Uganda (n=303)	
	Female (28%)	Male (72%)	Female (36%)	Male (64%)	Female (35%)	Male (65%)
Age of head (%)						
15–20	0	0	1.7	0.5	1.9	1.5
21–30	5.9	7.7	10.1	5.6	14.4	13.2
31–44	22.6	38.7	32.8	33.5	36.5	41.1
≥ 45	71.6	53.6	55.5	60.5	47.1	44.2
Education of head (%)						
None	25.5	7.3	39.5	21.9	17.9	11.2
Basic	22.6	26.3	19.3	14.9	26.4	25.9
Primary	34.3	24.8	37.0	54.4	33.0	35.0
Some secondary	16.7	36.6	2.5	6.1	21.7	25.9
Secondary or greater	1.0	5.0	1.7	2.8	1.0	2.0
Off-farm income (yes=1)	0.41	0.39	0.60	0.74	0.36	0.51
Labor availability (mean)						
Household members	5.90	6.42	5.28	6.51	6.55	6.10
Adult female	1.84	1.78	1.82	1.64	2.10	1.52
Adult male	1.67	1.98	1.37	1.95	1.48	1.69
Dependents	2.32	2.95	2.36	3.03	2.98	3.25
Dependency ratio (% dep)	43.8	47.3	45.1	45.6	44.6	50.2
Landholding (mean acres)	5.58	6.25	5.14	8.08	5.57	6.94
Cropland (mean acres)	2.32	2.47	4.28	6.58	3.53	5.41
Distance to market (mean km)	10.18	9.07	3.65	3.57	4.74	4.11
Mobile phone (yes=1)	0.79	0.90	0.61	0.71	0.86	0.90
Network ties (mean)^a	0.66	0.73	0.79	0.82	0.59	0.46

^a Network ties represent the number of other farmers from whom the respondent received seed (including zero for farmers receiving no seed from others), in the network module of the survey.

tion of the households in the sample across genders (gender of the household head) and countries. We summarize households' crop portfolios in several ways, beginning with a basic count of the number of species grown, followed by the percentage of households that grow each kind of crop. We then proceed to a breakdown of crop production according to HDDS food crop categories.

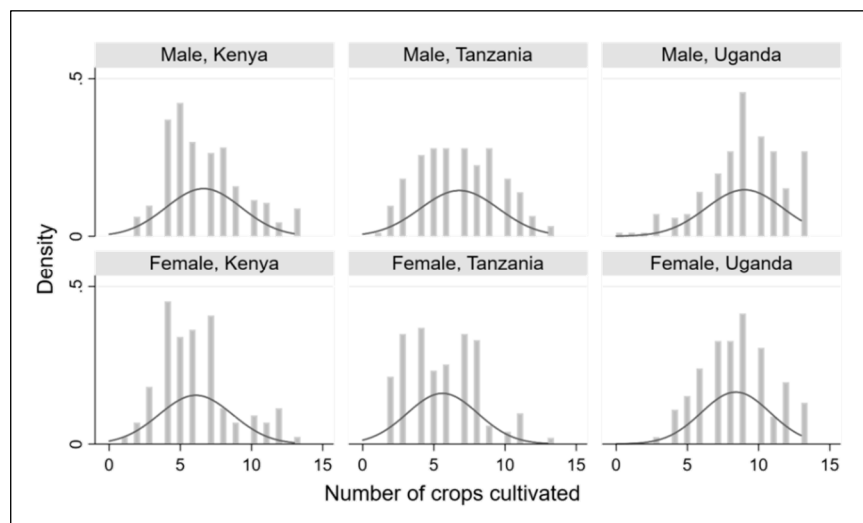
As shown in Figure 2 and consistent with past findings from the region (Tavenner et al., 2019), both female- and male-headed households in the sample overwhelmingly plant multiple crops. On average, male-headed households plant more crops overall: in bivariate t-tests having a female head is associated with 0.55 fewer crops planted in Kenya ($t=1.79, p=0.037$), 1.19 fewer crops in Tanzania ($t=3.91, p<0.001$), and 0.61 fewer crops in Uganda ($t=1.95, p=0.026$).⁴

Table 4 shows the frequencies with which female- versus male-headed households grew specific food crops in each country. Differences in crop portfolios are apparent across countries, reflecting regional agroecologies, cultural food preferences, and/or local market demand. These differences are also reflected across genders within countries, possibly reflecting gender norms and

differences in resource access. Among grain crops, maize is the most commonly grown in all households and countries. Sorghum is common in Kenya, relatively uncommon in Uganda, and somewhat common in Tanzania, but more so among male-headed households. Millet is grown by roughly one-third of female- and male-headed households in Kenya but less so in Tanzania or Uganda. Though relatively uncommon for respondents in all countries, rice is most likely to be grown by male-headed households in Tanzania or Uganda. Among the remaining food crops, several others are also more likely to be found in male-headed households including cowpea, cabbage, pumpkin, and tomato in all countries, as well as groundnut, pigeonpea, and sweet potato in Tanzania, sukuma wiki (collard greens) in Kenya, and nakati (*Solanum aethiopicum*) in Uganda. Such patterns may reflect many of these crops being considered to be more “men’s crops” than “women’s crops” in these country contexts—indeed the only crop substantially more common in female-headed households is groundnut in Uganda (grown by 84.9% of female-headed households versus 73.6% of male-headed).

However, in any categorization of “women’s crops” versus “men’s crops,” it should be noted that within any given household, both women and men may participate in crop production. For example, Nakazi et al. (2017) describe how both men and women in Uganda widely contribute to the production of beans, even though this has traditionally been identified as a “women’s crop.” Relatedly, “women’s crops” may be cultivated by women within male-headed households and vice versa. Thus, the household-level summary findings we present

Figure 2. Number of Crops Grown by Sample Households



⁴ In Kenya the median count of crops per household was 6 in both female- and male-headed households. In Tanzania and Uganda the median male-headed households planted more crops than female-headed, with a median of 7 (male) versus 6 (female) in Tanzania, and a median of 9 (male) versus 8 (female) in Uganda.

Table 4. Food Crops Grown, Percent of Households by Country and Gender of the Household Head

Category	Crop	Kenya (n=364)		Tanzania (n=334)		Uganda (n=303)	
		Female	Male	Female	Male	Female	Male
Cereals	Maize	97.1	96.9	94.1	92.6	92.5	89.8
	Sorghum	90.1	92.7	67.2	76.7	13.2	15.7
	Millet	31.3	37.4	16.8	17.7	17.9	16.2
	Rice	1.0	0.4	6.7	12.6	9.4	19.8
Legumes	Bean	81.4	86.2	47.9	43.3	100.0	97.8
	Groundnut	33.3	30.9	68.9	78.6	84.9	73.6
	Cowpea	56.9	64.8	47.9	54.0	25.5	33.0
	Pigeonpea	7.8	8.0	11.8	29.3	32.1	36.5
White starch	Sweet potato	27.4	26.7	10.1	19.5	94.3	93.9
	Cassava	25.5	23.3	4.2	8.8	96.2	95.4
	Banana	30.4	35.9	2.5	2.8	79.2	76.1
Dark green	Dodo	13.7	16.0	12.6	15.8	69.8	68.0
	Sukuma wiki	20.6	37.0	0	4.7	1.9	4.7
	Nakati	16.7	17.5	16.8	24.7	47.2	62.9
Other vegetables	Butternut	2.9	6.9	27.7	33.5	0	0
	Cabbage	9.9	13.7	1.7	4.7	4.7	10.7
	Onion	25.5	27.1	2.5	3.3	4.7	9.6
	Pumpkin	21.6	26.7	48.7	60.9	17.0	25.8
	Tomato	18.6	20.6	5.9	15.8	8.5	13.7

may mask individual-level differences in cropping choices across genders within households (a distinction we revisit below).

When considering the aggregated HDDS food crop categories, for cereals, white starches, and legumes, we find little variation on average across female- and male-headed households in the sample—both appear equally likely to grow at least one cereal, white starch, or legume within a given

country context (Table 5). In Uganda, more than 94% of both female- and male-headed households grow at least one cereal *and* at least one white starch and legume. In Kenya and Tanzania, white starches are less common overall. Dark green vegetables are most commonly grown in Uganda, followed by Kenya, and more common among male-headed households in all three countries.

Some of the most striking differences across

Table 5. Crop Categories Grown, Percent of Households by Country and Gender of the Household Head

Crop	Kenya (n=364)		Tanzania (n=334)		Uganda (n=303)	
	Female	Male	Female	Male	Female	Male
Cereals (any)	99.0	100	99.2	99.1	93.4	93.9
White roots and tubers (any)	52.9	56.9	15.1	23.7	98.1	97.5
Legumes (any)	98.0	97.7	97.5	94.4	100	98.5
Dark green leafy veg (any)	36.3	49.2	20.2	32.6	71.7	77.2
Other vegetables	37.3	47.3	52.1	66.0	23.6	39.6
Other fruits	2.9	6.5	25.2	32.6	0	2.5
Other crops	4.9	5.0	41.2	50.7	2.8	9.6
Coffee	1.0	0.8	0	0	47.2	59.9
Forages	10.8	15.3	2.5	5.6	1.9	1.5

household types in Table 5 are for crops commonly grown for market. Male-headed households are more likely to grow other vegetables (including various horticulture cash crops) across all study sites. In Uganda, male-headed households appear more likely to grow other fruits and other crops at much higher rates than female-headed households. Among sampled households in Uganda, where coffee cultivation is relatively more common, coffee is grown by nearly 60% of male-headed households—but only 47.2% of female-headed households. In Kenya, forages are more commonly grown than coffee, but are again more common among male-headed households. In aggregate, we see strong evidence of diverse cropping portfolios across countries and household types, with male-headed households overall more likely to plant several key food and cash crops.

Objective c: Relationships between household characteristics and crop production

Our analysis proceeds to consider relationships between a household's characteristics and crop production, with a focus on the gender of the household head. In multivariate models for the total number of crops grown by households, we again see female-headed households on average grow significantly fewer crops than male-headed ones, even after controlling for a range of other individual and household characteristics (Table 6). Across all households in the sample, older household heads and those with more education grow more crops on average, as do those with access to off-farm income and larger landholdings. Access to a broader social network of other farmers is also associated with a larger number of crops planted (though the causal direction for this relationship is

Table 6. Correlates of the Total Number of Crops Grown (OLS Regression Models)

	Model 1: N _{crops}		
	All Households	Female-headed	Male-headed
Household head gender (female)	-0.352*	—	—
Age	Young adult (15-30 years)	—	—
	Middle-age adult (31-45 years)	0.435	0.240
	Elder (>45 years)	0.757**	0.847*
Education	None	—	—
	Basic education	0.502*	0.705*
	Completed primary school	0.484*	-0.031
	Some secondary school	0.617**	0.390
	Beyond secondary school	0.847	1.118
Farm / Household	Off-farm income	1.094***	1.518***
	Adults in household	0.012	0.118*
	Percent dependents	0.344	0.158
	Landholding	0.131***	0.094***
	Distance to market	-0.019	-0.047
	Mobile phone	0.128	0.149
	Network ties	0.319***	0.074
Site	Kenya	—	—
	Tanzania	-0.488**	-0.786*
	Uganda	2.326***	2.288***
	Constant	4.259***	3.870***
	Valid N	927	305
	Adjusted R ²	0.260	0.281
			0.240

ambiguous). Finally, we see significant differences across the three countries even after controlling for household characteristics, with more crops planted per household in Uganda, and fewer in Tanzania (relative to the reference country Kenya).

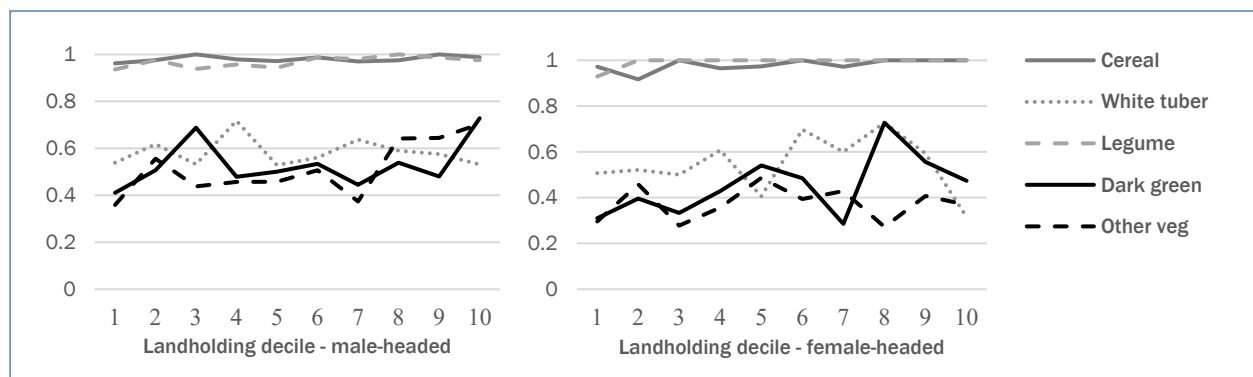
The gender-disaggregated regression models in Table 6 further suggest that female-headed and male-headed households in the sample face different constraints on the number of crops they grow. Age, for example, is significantly positively associated with the number of crops grown in female-headed households, but not in male-headed households. Education, meanwhile, is positively associated with the number of crops planted by male-headed households, but less so among female-headed (perhaps because constraints other than education weigh relatively more heavily on female-headed households). Both female- and male-headed households plant more crops when they have access to off-farm income, possibly reflecting market access for more diversified crop portfolios. Both female- and male-headed households also plant more crops when they have access to more landholdings—although for female-headed households, access to labor (as measured by the number of adults in the household) is also a strong predictor of the number of crops grown, while male-headed households appear less responsive to family labor availability. This last finding may reflect male-headed households on average having more labor available than female-headed households (and hence potentially seeing diminishing marginal returns to additional labor). This difference in responsiveness to labor availability may

also be due to male-headed households' relatively greater orientation towards diversified commercial crop production (regardless of available labor).

Objective d: The moderating effect of land access on relationships between household characteristics and food crop production

Given that resource constraints have been found to disproportionately affect production decisions among women smallholders (Quisumbing et al., 2014), we next seek to assess further how land availability might moderate relationships between gender of the household head and crop planting. As shown in Figure 3, landholding is significantly associated with the number of HDDS food crops planted among sample households (for the moment excluding cash crops such as coffee and forages). In simple bivariate tests, an additional hectare of landholding is associated with an additional 0.14 food crops in male-headed households ($F(1,672)=46.36, p<0.001$) and an additional 0.12 crops in female-headed households ($F(1,325)=10.79, p<0.001$) across the full sample. In female-headed households having more than the median landholding is strongly associated with more food crop diversity, with women in the eighth or ninth decile of landholding most likely to grow four of the five HDDS food crop groups considered here. Households in the bottom decile of landholding grow the fewest different food groups across household types. Among both female- and male-headed households, however, we also see a decline in the cultivation of white roots and tubers at higher levels of landholding,

Figure 3. Proportion of Households Growing Food Crop Groups, by Deciles of Landholding



suggesting less food crop diversity with greater landholdings among at least some households.

Multivariate models for the total number of HDDS food groups grown by households in the sample are shown in Table 7. While the previous regression in Table 6 suggests female-headed households on average plant fewer crops than male-headed households, in Model 2 in Table 7, we see no significant differences across female- and male-headed households in terms of the number of HDDS food crops planted. Rather, higher levels of education, access to off-farm income, greater landholding, and greater social network ties are the household attributes more consistently associated with the number of food crops grown. In Model 3, we do find a small negative association between gender of the household head and the number of aggregated HDDS food categories grown, with female-headed households on average planting

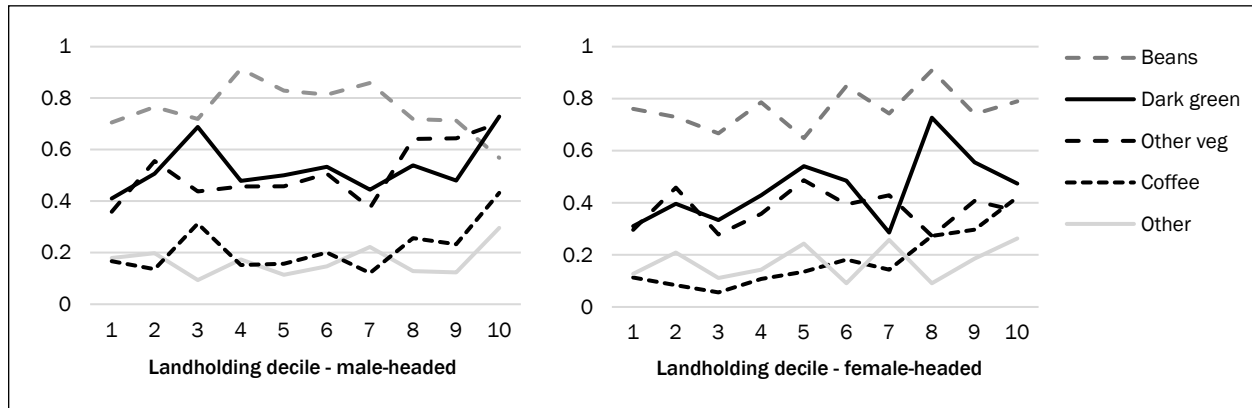
0.152 fewer HDDS food groups than male-headed households ($p=0.029$). But in Model 4 we find a strong *positive* association between female household heads and the number of HDDS food crop categories planted per hectare of land available to them—suggesting that, after accounting for land resource constraints, female-headed households may be more likely to plant a diverse portfolio of food crops than male-headed households. On average female-headed households in the sample plant 17.5% more HDDS food crop categories per available hectare of land than male-headed households ($\text{Exp}(\beta)=1.175, p<0.001$). Significant cross-country differences remain in all models.

Objective e: The importance of crops for market and home consumption among female- and male-headed households

Our final set of regression analyses explores if and

Table 7. Correlates of the Number of HDDS Food Crops (hdds_crops) and the Number of Different Food Groups (hdds_cat) Grown, Both Overall and Per Hectare of Landholding

	Model 2: N _{hdds_crops}	Model 3: N _{hdds_cat}	Model 4: ln(N _{hdds_cat} / Landholding)
	B	B	Exp(β)
Household head gender (female)	-0.284	-0.152**	1.175***
Age	—	—	—
	Young adult (15-30 years)	—	—
	Middle age adult (31-45 years)	0.057	0.895
	Elder (>45 years)	0.160	0.828**
Education	None	—	—
	Basic education	0.579**	1.295***
	Completed primary school	0.614**	1.135*
	Some secondary school	0.753***	1.108
	Beyond secondary school	1.122**	1.237
Farm / Household	Off-farm income	0.880***	0.998
	Adults in the household	0.018	0.968***
	Percent dependents	0.198	0.913
	Landholding	0.130***	—
	Distance to market	-0.015	0.990**
	Mobile phone	0.176	0.840**
	Network ties	0.343***	1.027
Site	Kenya	—	—
	Tanzania	-0.807***	0.818***
	Uganda	1.895***	1.124*
	Constant	4.150***	0.786
	Valid N	927	922
	Adjusted R ²	0.237	0.067

Figure 4. Proportion of Households Growing Income Crop Groups, by Deciles of Landholding

how female- and male-headed households value crops for home consumption versus for market sale differently. As with crops grown for food security, access to land remains a key constraint on the number of income crops planted by both household types (using consumption versus mixed consumption and income crop groupings shown in Table 3). Male-headed households appear more likely to allocate land to income crops. As shown in Figure 4, across almost all landholding deciles, male-headed households are more likely to grow income crops than female-headed households. Among both female- and male-headed households, those in the lowest (bottom decile) of landholding grow the fewest different income crops. However, female-headed households with limited landholding are much less likely to grow income crops than their male-headed counterparts. Bivariate tests suggest that, on average, an additional hectare of landholding is associated with an additional 0.08 income crops in male-headed households versus an additional 0.04 in female-headed households ($p < 0.001$).

In multivariate models for the total number of consumption crops versus mixed consumption and income crop groups grown, we again find a significant negative association between the household head being female and the number of crops grown, but only for more market-oriented crops (Table 8). In Model 5, female-headed households are no less likely than male-headed households to grow larger numbers of food crops primarily for consumption, but in Model 6, female-headed households appear

less likely to plant additional income crops. After accounting for landholding, in Model 7, female-headed households are more likely to plant greater numbers of consumption crops on a given area of land, but not more likely than male-headed households to plant greater numbers of mixed consumption and income crops. Taken together, Models 5 through 8 suggest that given the same amount of land and other resources, female-headed households plant more crops for home-consumption, while male-headed households are relatively more likely to plant crops for mixed consumption and income. In all models, socioeconomic variables relating to education, off-farm income, land resources, market access, and social networks are the predictors most consistently associated with increased planting of mixed consumption-income crops. Again significant differences across countries remain after controlling for farm and household characteristics.

Extension: Female and male individual perspectives on crop contributions to food security and household incomes

Given the prominent differences in crop choices among female- and male-headed households observed through both bivariate and multivariate analyses, especially between crops typically consumed as food versus crops used for a mix of consumption and market sale, we further examined two survey questions that specifically asked respondents to report their perspectives on the food security importance of different crops, and

Table 8. Correlates of Staple Food Versus Mixed Food-Income Crops Grown

		Model 5: N _{consumption}	Model 6: N _{mixed}	Model 7: ln(N _{consumption} / Landholding)	Model 8: ln(N _{mixed} / Landholding)
		β	β	Exp(β)	Exp(β)
Household head gender (female)		-0.050	-0.312***	1.051**	1.039
Age	Young adult (15-30 years)	—	—	—	—
	Middle age adult (31-45 years)	0.487***	-0.058	1.071*	0.926*
	Elder (>45 years)	0.833***	-0.095	1.101**	0.896***
	None	—	—	—	—
Education	Basic education	0.192	0.409**	1.067*	1.120***
	Completed primary school	0.472***	0.069	1.084**	1.038
	Some secondary school	0.665***	0.075	1.076*	1.011
	Beyond secondary school	0.690**	0.976*	1.178**	1.141*
Farm / Household	Off-farm income	0.728***	0.351***	1.059**	0.999
	Adults in the household	-0.002	0.027	0.989***	0.990**
	Percent dependents	0.237	0.055	0.997	0.968
	Landholding	0.048***	0.115***	—	—
	Distance to market	0.002	-0.016*	0.997	0.995**
	Mobile phone	0.002	0.068	0.953	0.942*
	Network ties	0.143**	0.251***	1.031**	1.031**
Site	Kenya	—	—	—	—
	Tanzania	0.208	-1.101***	1.016	0.926**
	Uganda	2.742***	0.031	1.432***	1.026
	Constant	0.364	4.264***	1.506***	2.167***
Valid N		927	927	923	923
Adjusted R ²		0.414	0.169	0.198	0.044

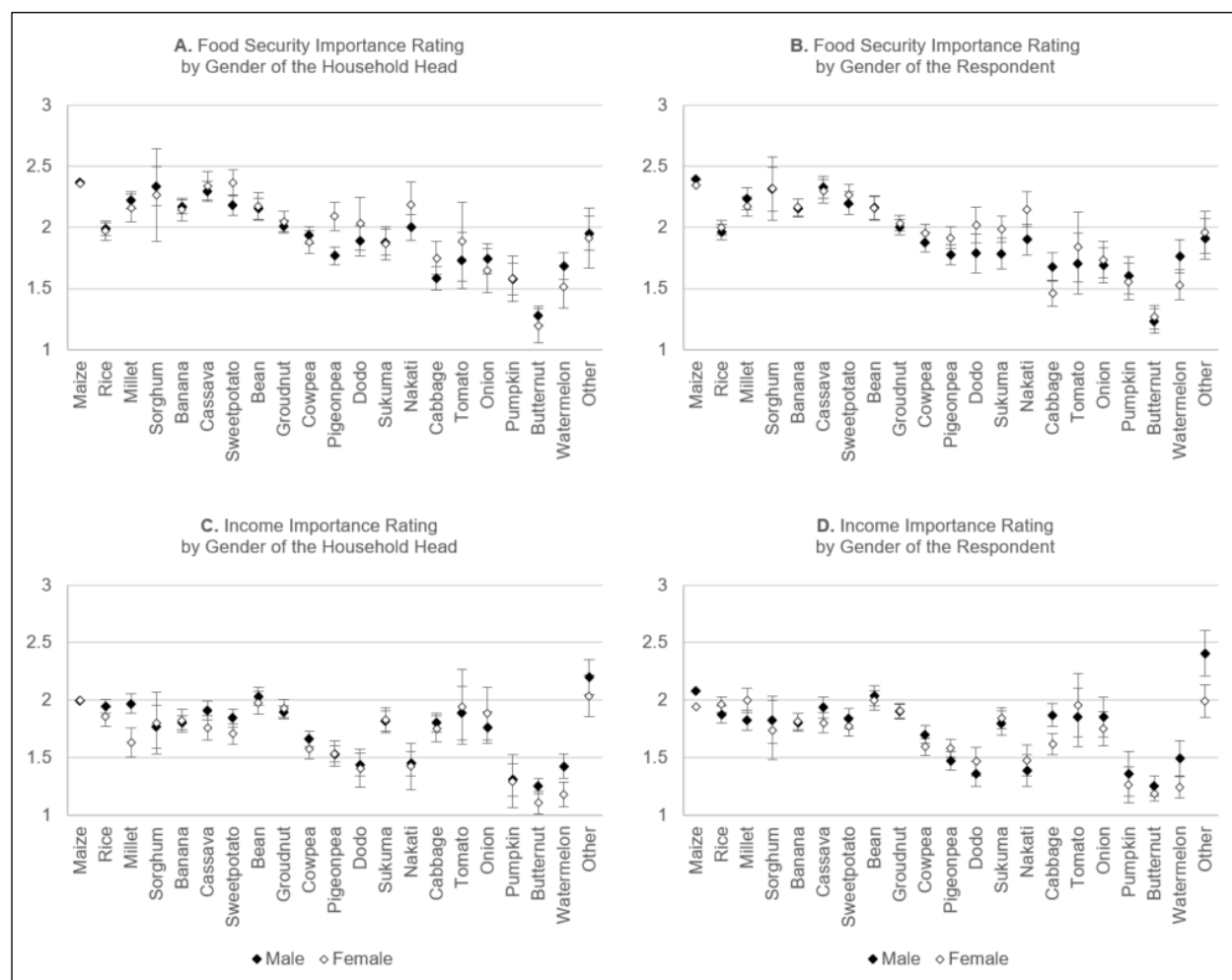
the income security importance of these same crops, as summarized in Figure 5. Owing to the way these questions were asked—i.e., asking respondents to state their perception of the importance of each crop to the household in terms of food security and income—we can disaggregate responses by gender of the household head (67% male and 33% female in the sample), but also by gender of the survey *respondent* (41% male and 59% female in the sample, with 41% of male-headed households represented in the survey by a female respondent). While the former allows us to examine differences in gendered preferences around crops at the household level (Figures 5A and 5C), the latter provides insights into individual preferences by respondent gender (Figures 5B and 5D).

Two key findings emerge from these summary responses. First, we see relatively few statistically significant differences in food security importance

scores or income importance scores when splitting responses by gender of the household head (Figure 5A and 5C). However, the pattern is broadly consistent with expectations: female-headed households appear to emphasize the food security value of crops more than male-headed, and male-headed households are more likely to emphasize income importance of the crops than female-headed households. With limited exceptions, however, female-headed and male-headed households appear to exhibit similar attitudes around the relative importance of different crops for food and income security.

Second, however, we also find that estimates of perceptions of the importance of crops for food and income security appear to depend, at least in part, on how gender is analyzed (gender of the *household head*, or gender of the *respondent*). When dividing the same survey responses by gender of

Figure 5. Importance of Different Crops for Household Food Security and Incomes, by Gender of the Household Head and by Gender of the Survey Respondent



the survey respondent (Figure 5B and 5D), several more significant differences in responses emerge. Women assign higher food security importance than men for a range of traditional food crops, including cowpea, pigeonpea, dodo, sukuma wiki, and nakati, and less food security importance than men for cash crops like cabbage and watermelon. Country-specific findings (shown in Appendix A) reveal even more striking differences—suggesting that women in female-headed households may see certain crops as food security crops, while women in male-headed households are more likely to see them as income-generating crops.

When comparing responses to the question about the importance of each crop for household income, contrary to expectations that gender

norms might lead male-headed households to assign a higher value to the income potential of different crops, we see relatively few significant differences in terms of income importance ratings given to crops by female- versus male-headed households. However, considering the gender of respondents rather than the gender of household heads, women *respondents* in the sample on average see less income value in a range of crops than men, including maize, cabbage, watermelon, and other crops—perhaps reflecting gendered differences in access to the income from commercialization of these crops among women in male-headed households. Country-specific results in Appendix A again show that the way gender is captured—either looking at the gender of the household head or the

gender of the individual respondent—has important implications for which crops appear most important for food and income security among women smallholders.

Discussion

This study draws on a detailed original dataset applying an identical survey instrument across rural communities in three countries to explore how the gender composition of smallholder households in East Africa relates to their cropping choices. Building on many previous studies of gender and smallholder decision-making using a range of methods in a variety of contexts (Amri & Kimaro, 2010; Anderson et al., 2017; Bentley et al., 2017; Fisher & Carr, 2015; Me-Nsope & Larkins, 2016; Nuijten, 2010; Pincus et al., 2018; Teeken et al., 2018), our analysis provides two key findings: female-headed households that generally have less access to land and other resources are more likely to diversify their food crop production than male-headed households, and that gender must be considered alongside other variables such as country context and socioeconomic status to more comprehensively understand decisions around crop cultivation.

Results from this analysis of cropping patterns and preferences among female- and male-headed households in Kenya, Tanzania, and Uganda suggest that while female-headed households grow fewer crops overall than male-headed households, the story is more complex after accounting for crop type (food versus income) alongside land resource constraints that disproportionately affect female-headed households. Consistent with previous literature (Teeken et al., 2018; Tobin, Jones, & Thiede, 2019; Waldman et al., 2016), crop choices generally reflect regional crop preferences, likely resulting from a combination of agroecological suitability, cultural preferences, market access, and/or local demand, shaping the common agricultural practices among smallholders in the study countries. However, we also see significant differences in crop choices according to the gender of the household head. In addition to the general trend of male-headed households cultivating more crops overall, we see a higher percentage of male-headed households cultivating both crops that are

generally used for home consumption (cowpea and banana in Kenya, sorghum and sweet potato in Tanzania, rice and cowpea in Uganda), as well as market-oriented crops where for most crop categories male-headed households are more likely to be producers of crops for market sale. While the tendency for male-headed households to produce more commercially-oriented crops is expected based on previous findings (Bentley et al., 2017; Christinck et al., 2017; Mudege & Walsh, 2016), they also produce subsistence crops at higher frequencies in our sample, which appears to contrast with the notion that female-headed households more commonly emphasize crops for home consumption (Pincus et al., 2018).

Furthermore, despite the general global trend of women being important keepers of agrobiodiversity (Howard, 2003; Zimmerer et al., 2015), our findings suggest that male-headed households are significantly more likely to grow a larger variety of crops. We hypothesize—though cannot test with these data—that male-headed households’ production of both subsistence crops and more diverse crop portfolios at higher rates than female-headed households may in part be a reflection of both resource access as well as intra-household dynamics in which women who reside in male-headed households are also exerting some decision-making power over cropping choices (or, in other cases, in which women in male-headed households are expected to grow “women’s crops” to meet family needs). In other words, the relatively greater diversity of crop portfolios in male-headed households may reflect a combination of male-headed households’ historically greater resource and market access as well as both men’s and women’s crop preferences.

These findings become even more nuanced when we consider female- versus male-headed households’ relative access to key productive resources like land. Multivariate regression results suggest female-headed households grow more HDDS food groups per unit of land available than their male-headed household counterparts. Past research suggests that when faced with resource constraints, female-headed households may be more likely to utilize crop diversity as a strategy to meet livelihood needs (FAO, 2019; Quisumbing et

al., 2014). This pattern is reflected in our findings, which suggest in the face of limited market access and disproportionate land resource constraints, female-headed households emphasize food crops for home consumption, and plant more diverse portfolios of food crops, compared to male-headed ones (Pincus et al., 2018; Tavenner et al., 2019). Though our findings do not allow for deeper explanations of whether food crop diversification among female-headed households occurs out of necessity due to resource barriers or because of a greater valuation of agrobiodiversity, we provide some preliminary evidence that women farmers—whether in female-headed or male-headed households—do place a greater value on the food security importance of crops, and less on the income importance, than their male counterparts in Kenya, Tanzania, and Uganda.

Situating these findings within the context of current research, policies, and programs advocating market-oriented development approaches in sub-Saharan Africa, our study joins others who have called for caution in assuming that a focus on more market opportunities will necessarily spur improvements in wellbeing among female-headed smallholder households. The findings in this study suggest that female-headed households who are constrained in their land access are more likely to use alternative strategies like crop diversification for home consumption rather than crop specialization for market sale. If they do not have the resources, including sufficient land to meet the demands of newly accessible markets, then growing markets may do little to benefit many female-headed households. Following the insights of previous work (Peterman et al., 2011; Quisumbing et al., 2014), our study contributes to the growing evidence base that alleviating gendered barriers to access to resources such as land may be a necessary prerequisite to the success of development interventions pursuing market-oriented approaches.


Importantly, however, our findings are also in line with previous research emphasizing that gender constitutes just one of the many factors intersecting to explain varying outcomes among smallholders (Gengenbach et al., 2018; Loconto, 2015; Quisumbing et al., 2014). When considering correlates of on-farm crop diversity (number of

HDDS food groups grown) while controlling for gender and land availability, we find household heads' age, educational status, off-farm income sources, and social networks are all significant predictors. Younger households and those with low educational status might grow a more diverse range of crops because few other options exist, while households with an array of income sources, higher educational status, and more social ties may grow multiple crops to diversify further their portfolio of livelihood activities. As previous scholarship suggests, though critically important, gender is but one among many factors that shape how rural smallholder households structure their livelihoods (Gengenbach et al., 2018; Rubin & Manfre, 2014).

Conclusion

The crop portfolios of female-headed households have been linked to higher dietary diversity within households (Jones et al., 2014) as well as to the conservation of agrobiodiversity (Zimmerer et al., 2015); there are thus important reasons to understand gendered differences in crop preferences and how different constraints affect female- and male-headed households in low-income countries. Our findings echo the results of previous studies showing significant gendered differences in crop choices and resource access across multiple contexts in sub-Saharan Africa; the findings presented here also raise questions for future research as market-oriented rural development efforts continue across the region. Consistent with previous studies, our findings suggest that male-headed households have greater access to land for crop cultivation, and also tend towards income-oriented crops more than female-headed households (Bentley et al., 2017; Christinck et al., 2017; Mudege & Walsh, 2016). On the one hand, this may lend support to widely held perspectives that more market opportunities for female-headed households are needed, but on the other hand, these findings may also suggest the gender dynamics that occur as rural agrarian communities shift from a focus on crops for home consumption to more market sales must be carefully monitored. Indeed, as Tavenner et al. (2019) find, the historical patterns and current social norms providing men greater access to input and output markets for commercial crop cultivation

may actually lead to worsening gender inequality in rural communities as crop commercialization expands. Our findings also align with previous evidence that resource-constrained female-headed smallholder households emphasize crops for home consumption more than male-headed households (Pincus et al., 2018). An understudied but important area for future research is the underlying values driving men's and women's choices around crop production. One hypothesis is that with equal opportunities, women's choices would align with men's—in other words, that all smallholders would pursue increased production of market-oriented crops and increased commercialization if they could. A more critical line of inquiry, however,

might question whether women's tendency to produce crops for home consumption is in part due to valuing a diverse crop portfolio that provides for home consumption and conserves locally-preferred crop varieties. As further studies of these important questions are pursued, there will be a need to consider multiple explanatory factors in addition to gender (e.g., access to resources, income, agroecological context, cultural norms), as well as to assess gender dynamics within households (e.g., preferences and constraints of wives versus husbands), in order to understand how agricultural policies and rural development programs may affect women and men farmers. 

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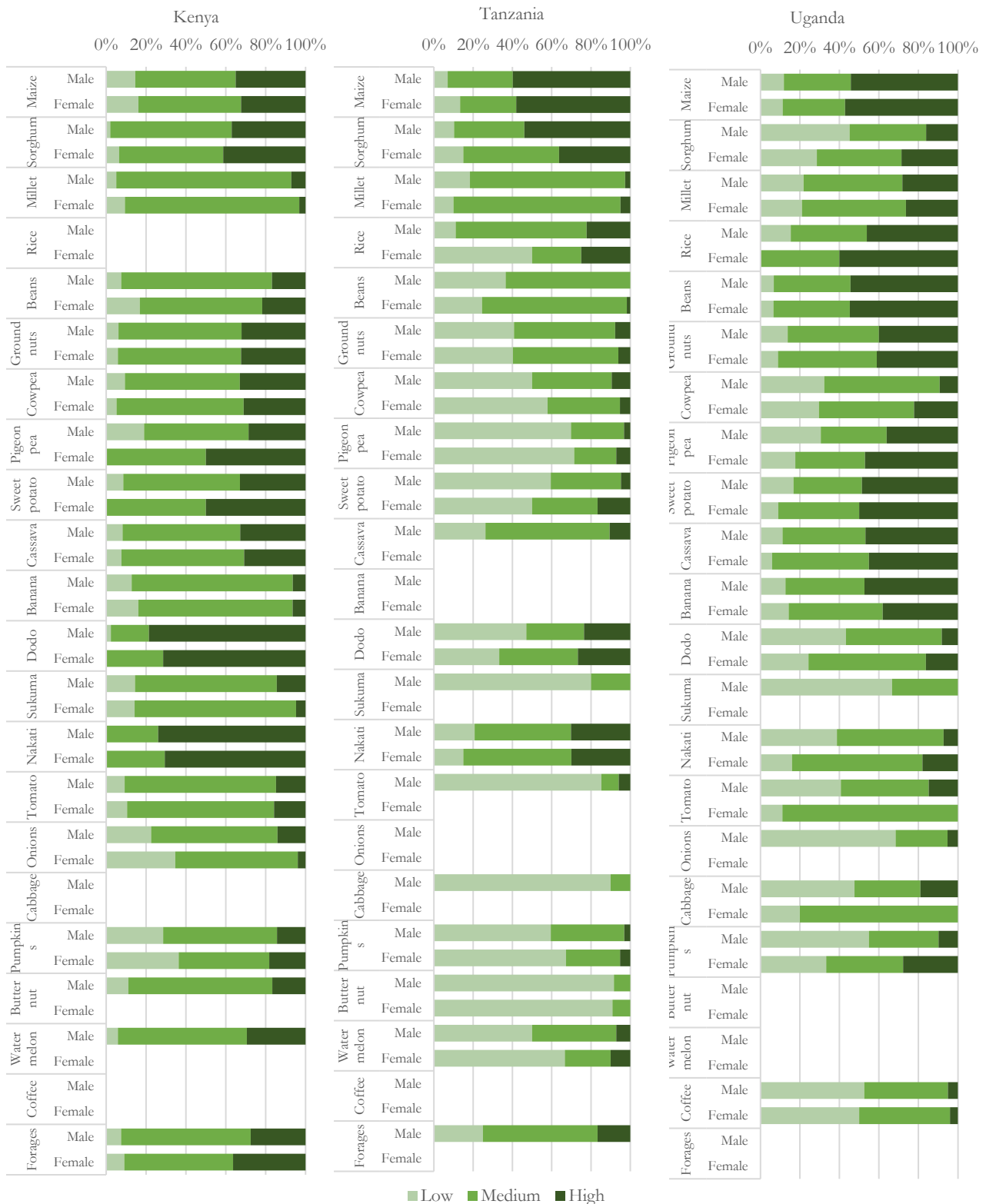
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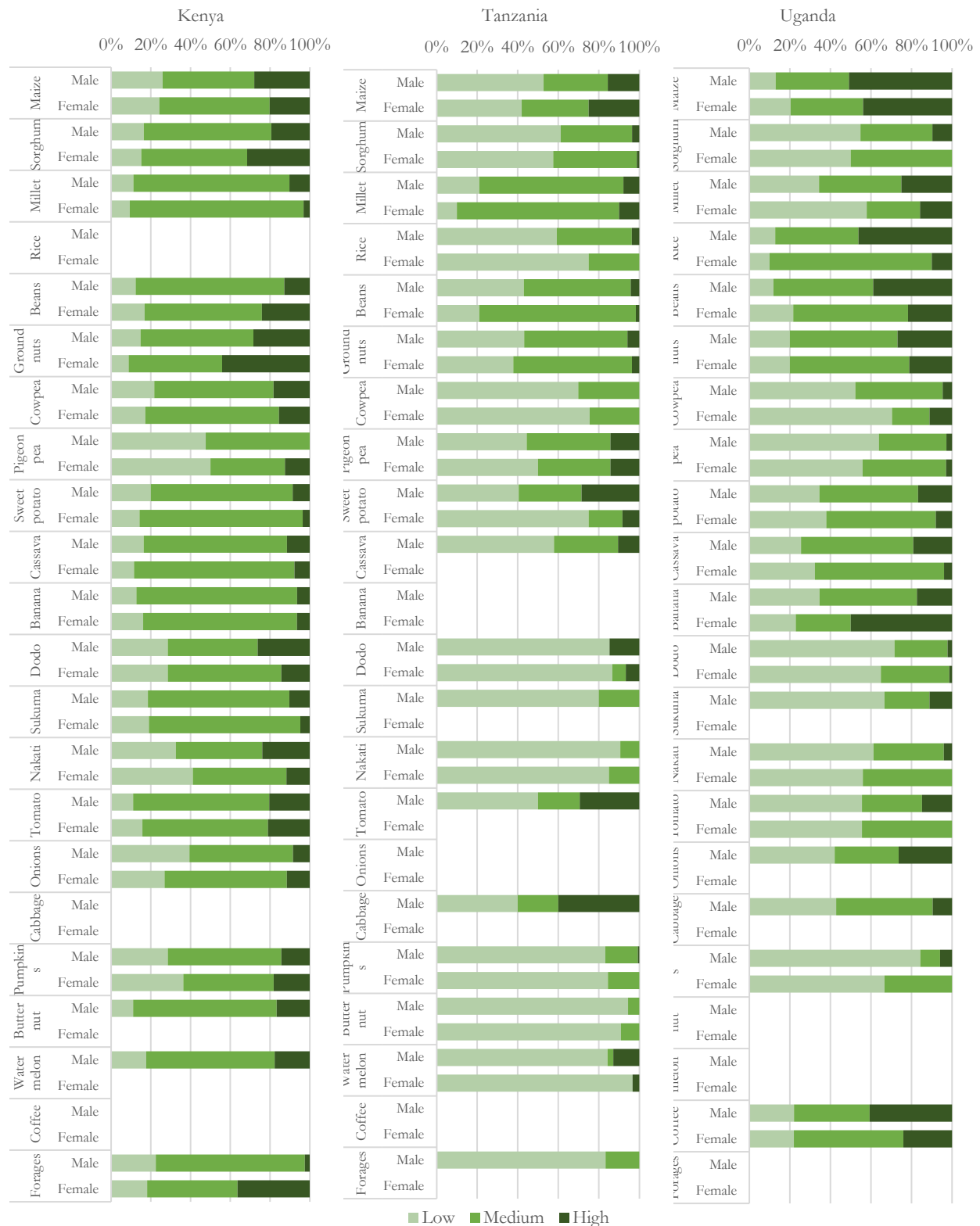
Appendix A1. Crop Importance for Food Security (Low, Medium, High) by Country and Gender of the Household Head



Appendix A2. Crop Importance for Food Security (Low, Medium, High) by Country and Gender of the Survey Respondent



Appendix A3. Crop Importance for Income (Low, Medium, High) by Country and Gender of the Household Head



Appendix A4. Crop Importance for Income (Low, Medium, High) by Country and Gender of the Survey Respondent



Helping farmers with continuation planning for cost-offset community support agriculture to low-income families

SPECIAL ISSUE: MORE THAN
VALUES IN THE FOOD SYSTEM



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Abstract

To improve low-income families' access to fresh local produce, some farmers offer subsidized or "cost-offset" community supported agriculture (CO-CSA) shares. We evaluated a structured

planning and implementation process conducted during the final intervention year of the Farm Fresh Foods for Healthy Kids (F3HK) study, which aimed to help participating farmers ($N=12$)

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to sustain a CO-CSA program after study funding ended. The process included training webinars, planning tools to develop CO-CSA continuation funding and recruitment strategies, regional coaching teams to provide technical assistance, and periodic group conference calls to facilitate shared learning among F3HK farmers. Our evaluation explored the content of farmers' CO-CSA continuation plans, their experiences during implementation, their opinions about the planning process, and their future plans regarding their CO-CSA. We found that F3HK farmers used diverse methods to plan, recruit, and raise funds, with each farm adapting strategies to fit their local conditions and farm business. Many farmers found success with word-of-mouth advertising and CSA member donations. Yet lack of farm resources—time, money, and expertise—was a continual barrier to moving forward. As with full price CSAs, reciprocity was a key factor: farmers needed to consider the needs and preferences of low-income consumers, and CO-CSA members needed to understand their financial responsibility to the farmer. In general, F3HK farmers appreciated the continuation planning process, but expressed a desire for more technical assistance with grant writing. Farmers were committed to the success of the CO-CSA continuation planning process, and most intended to continue the CO-CSA the following year.

Keywords

Cost-Offset CSA, Entrepreneurship, Evaluation, Community Supported Agriculture, Farmer Training, Supplemental Nutrition Assistance Program, Subsidized Direct-to-Consumer

Introduction

Community supported agriculture (CSA) may help address childhood obesity by increasing consumer access to, and consumption of, fresh produce (Vasquez, Sherwood, Larson, & Story, 2017). However, for low-income families, who are at increased risk for obesity (Larson, Story, & Nelson, 2009; Lovasi, Hutson, Guerra, & Neckerman, 2009; Robert & Reither, 2004), the upfront cost of a CSA may be a barrier to participation (Freedman et al., 2016). Thus, the Farm Fresh Foods for Healthy Kids (F3HK) study was designed to test whether a

subsidized, or cost-offset CSA (CO-CSA), when combined with tailored nutrition education, could increase fruit and vegetable consumption by low-income families, while also opening a new market segment for CSA farmers (Seguin et al., 2017).

Between 2016 and 2018, a CO-CSA was implemented as part of the F3HK study at 12 farms in four states: New York, North Carolina, Vermont, and Washington. The study provided farmers with new customers for the CO-CSA in the form of low-income families participating in the study, and also provided the 50% upfront subsidy for each CO-CSA share.

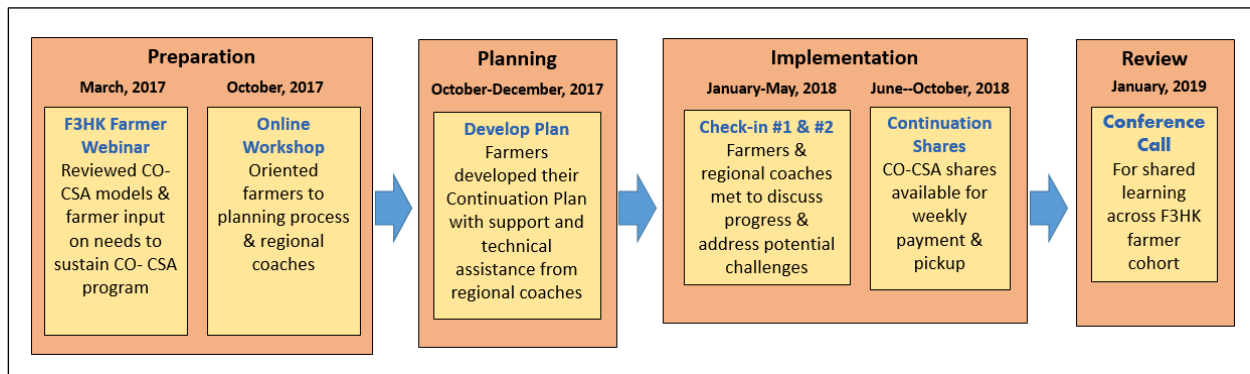
Previous papers from this study have described formative research and farmer experience with CO-CSA implementation (Hanson et al., 2019; McGuirt et al., 2019; Morgan et al., 2018; Sitaker, McGuirt, Wang, Kolodinsky & Seguin, 2019; Sitaker et al., 2020). This paper describes findings from an evaluation of a structured planning and implementation process conducted during the last intervention year of the study that aimed to help F3HK farmers sustain the cost-offset portion of their CSA after study funding ended.

CO-CSA Continuation Planning Process

We held a webinar for F3HK farmers in March 2017 (Figure 1) to share current academic and market research (Galt et al., 2017; Pole & Kumar, 2015) on low-income consumer needs and preferences regarding direct market channels, along with funding and marketing strategies gleaned from a literature review and environmental scan of CO-CSA programs (Hinrichs & Kremer, 2002; Hoffman et al., 2012; Quandt, Dupuis, Fish & D'Agostino, 2013). At the conclusion of the webinar, we asked farmers what information and technical support they would need to continue the CO-CSA after the study ended. Their input was used to develop a structured process to help farmers learn and practice skills for the continuing acquisition of funds and customer recruitment for the cost-offset CSA, which had previously been provided by the study.

The process included a set of tools with step-by-step instructions for developing a CO-CSA continuation plan, to be implemented in the third and final year of the F3HK intervention. The tools included ten planning worksheets on such topics as

Figure 1. CO-CSA Continuation Planning Process for F3HK Farmers



identifying potential funding strategies, setting funding targets, marketing assessment, and outreach (Sitaker, 2018). We also established and trained a regional coaching team in each state to support farmers as they planned and tested strategies over a year-long period. The teams consisted of an agricultural extension coach who helped farmers identify and access local partners and resources, and a member of the F3HK research team who collected process evaluation data. Coaches met with farmers at four time-points: during the planning phase in November 2017, during two check-in meetings by phone or in person during the implementation phase, and during a postseason debriefing.

We conducted an online training workshop for farmers in October 2017 to describe the continuation planning process and introduce the regional coaching teams. The workshop included a panel discussion with three farmers who had successfully operated a CO-CSA for several years, followed by a question-and-answer session with panel members and general discussion. Over the next two months, farmers used the worksheets to develop a CO-CSA continuation plan, with assistance from their regional coaches. Farmers began implementing their plans in January 2018 and teleconferenced with their regional coaches to report their progress and receive technical assistance as needed prior to the CSA season. Farmers participated in post-planning and post-season group conference calls, which facilitated shared learning across the cohort of F3HK farmers.

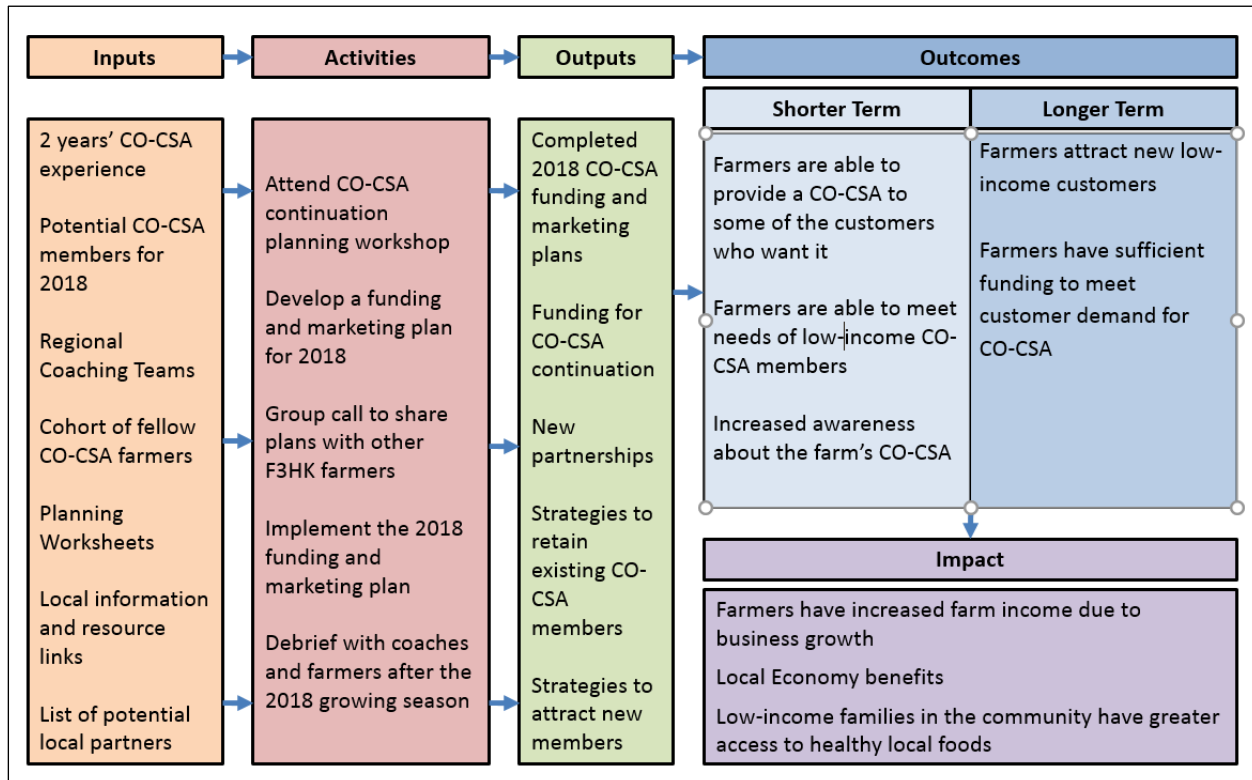
Since F3HK study participants had been randomly assigned to either an intervention group or a

delayed-intervention control group, only delayed-intervention families received a CO-CSA supported by study funds in the final year of the intervention. Yet farmers said that some of the former F3HK participants (for whom CSA membership was no longer subsidized by research funds) still desired a CO-CSA share. These were potential customers for the continuation CO-CSA. It was up to the farmer to reach out to these families to sign them up, and farmers could also recruit additional families outside of the F3HK intervention trial if they wished. Each F3HK farmer was responsible for using strategies from their continuation plan to actively obtain funds to subsidize continuation shares.

Evaluation Questions

Our evaluation questions were based on the logic model for the continuation planning process shown in Figure 2. Moving from left to right, the logic model shows inputs and activities that lead to immediate outputs (expected preseason), followed by outcomes in the shorter and longer time frames, as well as the ultimate impacts on farm revenue, local economies, and access to locally grown produce for low-income families. The underlying theory of change (Julian, 1997) is that by providing stepwise instructions, tools, and resources, along with technical assistance and support from their learning cohort, CO-CSA study farmers would successfully plan and implement funding and marketing strategies to continue the CO-CSA when study funding ended.

As we followed farmers only during the 2018 CSA season, this evaluation focused on the outputs

Figure 2. CO-CSA Continuation Planning Logic Model

^a This evaluation focuses on short-term outcomes only, measured immediately after the intervention ended. This logic model also shows outcomes and impacts expected in the longer term that were not measured.

and some short-term outcomes of the continuation planning process. The questions to be answered in this evaluation were as follows:

1. What funding and outreach strategies did farmers select for their 2018 continuation plans?
2. What were farmers' experiences during implementation?
3. What did farmers perceive as their biggest successes?
4. Which aspects of the continuation planning process did farmers find useful as they created and implemented plans to continue CO-CSA on their own?
5. What are farmers' future plans regarding their CO-CSA?

Methods

The data collected during the continuation planning process included (1) farmers' continuation

plans, (2) notes from two preseason check-ins, (3) notes from post-planning and post-season group calls with farmers and regional coaches, and (4) audio-recorded post-season debriefing interviews with farmers. This study was approved by the institutional review boards at Cornell University and the University of Vermont. Written consent was obtained from all subjects.

Data Collection

The research member of the regional coaching team made notes of their observations during check-in meetings to document progress in implementing funding and marketing components of each farmer's continuation plan, along with the problems and potential solutions encountered. (See Appendix B for the structured note-taking guide.) The agricultural coaching team member conducted postseason debriefing sessions, which were audio-recorded by the research team member. (See Appendix B for the debriefing guide.) Audio-

recordings were transcribed verbatim for subsequent analysis.

Analysis

We conducted content analysis of the continuation plans, abstracting information on each farmer's planned funding and outreach strategies, partners to be engaged, and action steps to be taken, along with the timeline for completion. We also reviewed structured notes taken during preseason check-ins with the coaching team, along with notes of the farmers' comments during two group conference calls. Transcripts of the post-season debriefing sessions were imported into NVivo qualitative data analysis software (QSR International Pty Ltd., Version 11), and coded by question. The first two authors selected a subset of transcripts for open coding, and then met to discuss the coding process and emergent ideas. These discussions informed the development of a preliminary descriptive codebook reflecting the farmers' experience with CO-CSA continuation planning and implementation. We then iteratively and collaboratively revised and refined the codebooks by using it to code the remaining transcripts, discussing and then resolving any coding discrepancies. Once we reached consensus about the code definitions, we coded all interviews. Qualitative data from debriefing interviews were then analyzed by reviewing, organizing, and summarizing codes. Data from the multiple sources were then triangulated to answer each evaluation and elaboration question (see Appendix A for the sources used to answer the questions).

Results

Farmer Plans and 2018 Implementation Experience

In this section, we first describe logistical and operational arrangements the farmers made regarding CO-CSA continuation shares, including how they estimated the funding targets for subsidized shares. Next, we review the farmers' plans and experience implementing various funding strategies, followed by their plans and experience implementing various strategies for outreach and retention, including their efforts to engage the support of community partners.

Description of CO-CSA Continuation Logistics

In 2018, farms still had active F3HK study participants (on average, about seven per farm) who were subject to study protocols regarding CO-CSA operations, described in Seguin et al., (2017). Thus, for convenience, F3HK farms applied most of the F3HK study logistics to the continuation shares. For example, they allowed continuation members to pay the CO-CSA balance in weekly installments at the time of share pick-up. They also asked continuation share members to give them a refundable preseason deposit, equivalent to two weeks of installment payments, to cover the cost of any missed pick-ups. Farms used the same pick-up locations for continuation share members as for their traditional CSA members and F3HK study participants. For example, four held pick-ups onsite, three at farmers markets, and three at community locations. Four farms had multiple pick-up sites.

Most farms used the F3HK income eligibility guidelines for new continuation share subscribers (income $\leq 185\%$ of the federal poverty level), although one farm planned to accept slightly higher incomes for families that appeared to be struggling financially. As in the F3HK study, farmers planned to accept Supplemental Nutrition Assistance Program (SNAP) payments through electronic benefit transfer (EBT) from continuation share subscribers; seven farms explicitly planned to encourage SNAP beneficiaries to pay for three weeks' payments using one SNAP EBT transaction (allowable under SNAP rules for shares picked up within 14 days).

Farms based the estimated number of continuation shares for 2018 on the number of former F3HK participants they thought would sign up; this ranged from three to 20 participants, 11 on average. Ten farms planned to continue to offer a 50% offset as in the F3HK intervention, but one farm planned to offer an offset of 25%, and another of 33%. Farmers used the estimated number of continuation share subscribers, percentage of price to offset, and share prices to calculate the funds needed, which ranged from US\$650 to US\$4,800, US\$2,468 on average.

Continuation shares were offered on a first-come, first-served basis, with returning F3HK

participants receiving priority. The number of available continuation shares depended on the amount of funds raised. If there were more interested CO-CSA applicants than available shares, farmers communicated that they would either start a waiting list or offer their market-priced shares in a smaller size or payable in installments. Referrals to other CO-CSA farms or to other community

resources such as a food bank were options also mentioned.

Fundraising Strategies

Table 1 displays each farm's experience with various funding strategies, indicating those originally planned, those planned but later dropped, and those not originally planned but adopted later.

Table 1. Fresh Foods for Healthy Kids (F3HK) Farmers' Experiences with Strategies to Fund Cost-Offset (CO) Community Supported Agriculture (CSA) Continuation Shares

Farm ID	Member Donations	Community Donations	Grants	Fundraising Events or Merchandising	Self-Funding by Farm
1	Dropped			Planned but changed: Raised US\$5,000 from specialty drinks	Adopted later: Would self-fund if needed
2	Dropped: Sliding fee scale		Dropped: Writing with nonprofit		Adopted later: Would self-fund, but decided not to offer shares
3	Planned: Allow early-bird discount	Dropped: Church as partner			Adopted later: Gave produce of equal value to those who donated
4	Planned: Raised funds for one CO-CSA				Adopted later: Would self-fund if needed
5	Planned: Raised US\$500 from CSA members	Planned: Raised US\$500 from church members			Adopted later: Farm made up remainder of CO contributions
6	Planned: US\$1,000 from donations of early-bird discount	Dropped: Appeals at co-op and via non-profit			
7	Dropped	Dropped: Appeals to local banks	Dropped: Grants from local banks	Dropped: Community fundraiser event	
8		Planned: Two generous donations	Planned: Nonprofit gave 25% CO match	Planned: 25% CO match when partners helped organize event	
9			Planned: Nonprofit gave 25% CO match		Adopted later: Internal budgeting, based on available funds
10	Planned: Raised funds for one CO-CSA share	Dropped: Food bank as partners	Adopted later: Grant funding CO shares		
11	Adopted later: Raised US\$200 from member		Adopted later: Grant funding CO shares	Dropped: T-Shirt merchandise sales	Adopted later: Would self-fund if needed
12			Adopted later: Grant funding		Dropped: Self-fund one CO-CSA

Note: Shaded cells indicate strategies that yielded funding for continuation shares.

Shaded cells indicate strategies that yielded results that were used to fund the continuation CO-CSA. Most farmers initially planned to pursue two or more strategies, though many altered, dropped or added strategies during the preseason period. The most frequently planned fundraising strategy for 2018 was soliciting donations from CSA members and the wider community, followed by grant-writing, hosting fundraising events, selling merchandise, and self-funding.

Donations: Eight farms planned to solicit donations from current and former CSA members, using direct email appeals, notices on social media and farm websites, and donation jars at the farm stand. Two farms planned to start a sliding-fee scale program, while two others gave members the option to donate their early sign-up discounts to a CO fund. To enhance their donation requests, two farms planned to feature quotes from CO-CSA members. Another farmer planned to show an explicit breakdown of farm expenses, believing that this would encourage members to increase their donations once they gained a better understanding of production costs.

Prior to the season, a ninth farm decided to adopt a donation strategy, but three farms abandoned their original plans regarding member donations. Overall, six farmers reported moderate success, with individual CSA member donations ranging from a few hundred dollars to US\$1,000.

Community Donations: Six farmers planned to solicit donations from the wider community and ask community partners to either donate themselves or to pass along donation requests to their constituents. Potential partners included churches, nonprofit organizations, schools, co-ops, banks, businesses, and food banks. Prior to the season, however, farmers had difficulty finding time to cultivate partner relationships. In all, four decided not to continue with this strategy. Two farms found success, with one receiving donations from two generous donors that covered all continuation shares, and another receiving US\$500 from a local church congregation.

Fundraising: Four farms had originally intended to hold community fundraising events or merchandise sales; one decided to postpone its event until 2019 and another farm dropped its

merchandising plans to focus on CSA member donations instead. One farm found success with a strong community partner that helped it organize a successful fundraiser. Another scaled back plans of hosting an on-farm barbecue in favor of offering to donate a portion of each farm-brewed beverage sold to support a continuation share, a strategy that garnered US\$5,000 for its CO-CSA fund.

Grants: Four farms initially planned to subsidize shares through grant writing. At check-in, two reported that they were unable to find suitable funding opportunities and needed help with grant writing, as they did not have sufficient time or skills. With assistance from the regional coaches, three additional farms in Washington received a grant from the state department of agriculture to fund as many former F3HK participants as enrolled, up to US\$5,843 per farm. These farms appreciated the funding but found it burdensome to negotiate contracts, record transactions, and prepare invoices as required by the funder.

Self-funding: In all, eight farms considered self-funding continuation shares, with most using it as a backup if other strategies were unproductive. One farm supplemented member and community donations to fund the CO-CSA, while another provided produce of equal value to CSA members' donations. Additionally, one farm made up the balance from its "internal budget, based on available funds."

Two farms used surplus funds from the previous year to fund some or all of the continuation shares, while another decided not to fund any continuation shares at all when no funds were raised.

In summary, soliciting member donations was a popular strategy that was easy to implement and yielded modest amounts for six farmers. Direct community appeals and fundraising events were more challenging, due to the time and effort required to cultivate community partnerships. Nevertheless, these efforts yielded substantial sums for four farms. Seven farms attempted to obtain grants, although this required skill and time investment; for three, this was a very successful strategy.

Farmers who were initially ambitious about grant writing, event planning, or working with community partners during the planning stage often had to revise or scale back their plans due to

pressing farm responsibilities. Even for strategies that were fairly easy to incorporate, however, fundraising was challenging because it was difficult to know how much would be raised and when funds would be received. As one farmer said,

[It] took a while to figure out what we were going to do because of . . . not knowing if we'd be able to accept EBT next year and so then not knowing how much money we were going to be trying to raise. (Farm 7)

For wider community fundraising campaigns, social media was a simple yet effective way for farmers to reach more people and increase the number and amount of contributions. Donations were boosted by featuring stories and quotes from both subsidized and market-rate subscribers, and by placing a donation option on the online sign-up form.

Farms unable to raise sufficient funds to meet the demand for continuation shares sometimes opted to reduce the number of continuation shares offered, putting potential customers on a waiting list. Others attempted to make full-cost CSA shares more accessible by reducing other barriers for low-income families. For example, one farm decided to forego plans to institute a sliding-fee scale and instead offered a smaller deposit and weekly payment option to low-income members. Another offered half-shares at market rate to low-income members. A third farm lowered the cost offset fee to 10%, and covered it itself as a farm expense.

Outreach and Retention Strategies

For the 2018 season, seven farmers planned to contact former F3HK study participants before trying to recruit new customers for the continuation CO-CSA. Most took an individual approach, sending emails to each former F3HK participant on their membership roster.

Nine farms had formal plans to recruit new continuation CO-CSA members. Most began by notifying their current and former CSA members, encouraging them to tell friends and neighbors about CO-CSA continuation shares. As one farmer noted, former F3HK participants in particular were "great spokespersons for the CO-

CSA program." This word-of-mouth approach turned out to be the most effective and widely used outreach strategy; it was what farmers fell back on when other forms of outreach failed. A few farms also planned active outreach at community events, churches, farmers markets, and local nonprofits. For example, one farm successfully hosted meet-and-greet demonstrations, "tabling" at a community event to speak about its CO-CSA and provide sample vegetables.

Farmers also planned to market the continuation CO-CSA on social media and the farm website. Seven intended to distribute flyers (including in Spanish for two farms) with the help of outreach partners at food banks, Head Start programs, Women, Infants and Children (WIC) programs, and SNAP Education programs, county extension offices, food co-ops, YMCAs, and local health departments. One farm reported that mentioning installment payment options in its marketing materials elicited more responses, while another noted that accepting SNAP, WIC, Farmers' Market Nutrition Program coupons, and flexible payments seemed to bring in more customers.

During postseason debriefings, two farms reported successful recruitment as a result of partner collaboration; however, five others noted little progress, mainly because they lacked the time to cultivate the partner relationships needed to support outreach. In general, farmers said that recruitment was challenging, noting that it was difficult to find "the right people that are gonna benefit from the program..." (Farm 1). Another farmer noted,

Just to explain the concept, was a hard thing, and then we realized you can't expect someone who's low income to pay in advance. They just can't do it, so then we went to, "OK, well then, if they pay weekly." . . . We worked pretty hard at it and it was really hard to recruit people. (Farm 4)

Recruitment was intimately tied to fundraising; several farmers decided not to conduct outreach beyond the former F3HK participants they already had, explaining, "I would have to fundraise more" if additional members were recruited (Farm 8). Thus, the number of CO-CSA continuation shares

sold was dependent on the amount raised, and contributions tended to come in slowly. Farmers were sometimes uncertain about how many CO-CSA shares they would be able to offer until the last moment, as they waited for donation pledges to arrive. There were eight farmers who chose not to seek new CO-CSA members, and instead emphasized flexible payments and EBT acceptance on market-rate CSAs as options for low-income subscribers.

Farmer satisfaction with continuation planning process

Most farmers said that F3HK study participation was beneficial (Sitaker et al., 2020); many also said the continuation planning process was useful, as it helped them set goals and determine a course of action:

I thought the [continuation planning] session that I had with [regional coaches]...last year, that was helpful, kind of to get things moving forward, thinking about the future. . . . And, [the regional coaches] got a list of resources that I have hiding away someplace that I know will be useful at some point. (Farm 12)

I think having a continuation plan, like fundraising goals and all of that in place, is really helpful. And just the whole process over the last few years of seeing what can happen and strategizing around how to make it happen. I don't think it's something [the farm] would have just done on its own. (Farm 11)

Additionally, the process encouraged them to reach out to new community members:

I think it was a great program. We really appreciated being a part of it and involved—we sure learned a lot. It helped us to get to know new community members that we wouldn't have otherwise met. (Farm 2)

The planning process was perceived as less impactful by farmers who were already experienced in CO-CSA management, fundraising, and customer outreach. Still, one such farmer said that the process helped with “identifying people who can

use the program” (Farm 9). This farmer noted that the F3HK study participants constituted a small portion of their membership, which included full-pay members and subsidized members who were not part of the study.

Additionally, conversations with regional coaches during the preseason check-ins were helpful for some farms:

It's very helpful to have someone to talk it out with and, someone to ask questions and someone, I feel like in my discussion with you I do a fair bit of complaining about the things that are hard. And that's also helpful because sometimes it feels especially frustrating when I'm trying to collect cash this far out. Like, why am I doing this? But to have someone to chat about it with is helpful. (Farm 8)

Farms that received grants appreciated that regional coaches provided technical assistance with reports to funders:

I just needed to report monthly to [funder], basically that time sheet that [the regional coach] had created, that we signed in the end. That was critical that [the regional coach] did that. (Farm 12)

Some farmers found that periodic conference calls with other F3HK farmers engaged in developing and implementing their CO-CSA continuation plans were helpful:

I thought it was good to hear, to you know, be on the call just to hear a little bit from some of the other farmers across the country. I just thought that was interesting. (Farm 12)

When asked what additional information or assistance was needed for the continuation process, some farmers said the process adequately met their needs. However, Farm 12 said that more help identifying local funding resources and potential community partners was needed. Farm 7 said it would be helpful to have a template with language for a payment plan agreement, and also help with tracking various payment sources,

including SNAP EBT:

At a certain point we had those payments coming in—we had Square, we had an online QuickBooks thing, we had cash, we had credit cards. It was just like seven different payment types coming in and I just couldn't keep track of it in the middle of the summer. (Farm 7)

Another farmer was able to find supplementary information on their own:

I can't say . . . that there's, there's anything that you guys could have done or shared that would have . . . made anything different necessarily . . . I've done a lot of my own independent research and seen some good ideas. It's a matter of finding something that works for our customers and for us. (Farm 3)

Finally, a few farmers expressed interest in learning about best practices that emerged from the study, particularly learning from other farmers:

Well, I think any sort of report that comes out of this program with best practices—I think that will be useful for future. Like let's say it's a new farm that hasn't done this before, best practices would be useful, things to consider. Having a good organization of who has paid in full and who is still paying so that you're able to capture that. And those weekly checklists for who signs in and who doesn't . . . Any types of marketing campaigns that are successful like that farms have, I'd love to see how other farms market it. (Farm 2)

Farmers' plans

Nine of the twelve F3HK farms planned to continue the CO-CSA in 2019. In postseason debriefings, they described plans for fundraising, outreach, and program logistics for the upcoming year, describing successful strategies they would repeat as well as new ideas to try.

Fundraising: Five farmers mentioned specific plans to continue to solicit member donations, explaining that dedication to the CSA model seemed to motivate members to fund the CO-

CSA. Plans included following up with a church that had expressed interest, allowing members to contribute their “early-bird” discount toward a CO-CSA, offering a holiday buy-one, give-one box, and increased use of social media and other technology to make donating online easier. Three farms were planning fundraisers, such as a fermentation workshop, in collaboration with other local farms. One farm hoped to be included in a community grant application to USDA for 2019, while two others were assured of continuing Washington State Department of Agriculture (WSDA) grant funding. As of the postseason debrief, two farms (Farms 3 and 5) had already started accumulating member donations for the following season, and a third had set aside rollover funds. A fourth farm said it planned to raise a little extra to cover CO-CSA subscribers who drop out early.

Outreach: As of the postseason debriefings, few farmers had a formal CO-CSA marketing plan for 2019. Three farms planned to contact returning CO-CSA members and two planned outreach to SNAP recipients among current membership. Four said they would rely on word of mouth to find new subscribers, while others planned to advertise the program on farm websites and social media. One farm intended to enlist Head Start partners for help with outreach, while another planned to work with food banks and WIC offices, with help from an extension nutrition educator. Farmers also hoped to attract low-income and migrant populations by highlighting SNAP EBT acceptance and promoting culturally appropriate produce in their CO-CSA marketing materials.

Because fundraising and marketing the CO-CSA require significant effort on top of a farm's existing heavy workload, one farm recommended that a staff person be hired by the farm, if possible, to coordinate CO-CSA program operations.

Logistics: Farms offered several suggestions to streamline payment transactions in 2019. One farm planned to get rid of written forms and accept online payments only. Another planned to institute a policy that would allow them to retain a customer's credit card information for automatic monthly payments, with the customer's written permission. A third farm had plans to automate payment reminders:

This year we're going to set up online, you either pay or you submit a form that goes straight into our sign-up database where it's a form that you can fill out telling me when you're going to pay things. And it's going to give me alerts like each week, if someone says they're going to pay in four installments or something, I'm going to put in there to schedule those dates and it's going to give me an alert that says *Email so-and-so to tell them this is when they're going to give me their next payment.* (Farm 8)

Summary and Discussion

F3HK farmers made it clear that the CO-CSA continuation process was valuable, as it prompted them to think strategically about how to continue the CO-CSA program after grant funding ended and provided tools and resources that helped them do so. They appreciated having regional coaches on hand to discuss strategies during planning and help problem-solve during implementation. Farmers valued periodic group conference calls with other F3HK farmers as a way to hear about what others were doing, as well as a means to share solutions to common problems. When asked what could be improved in the process, farmers said they wanted more assistance with identifying local funding resources and potential community partners, grant-writing, and obtaining tools for tracking various payment sources, including EBT, and CO-CSA member agreement templates.

Most farmers planned to use two or more fundraising approaches, although many altered, dropped, or added strategies along the way. Soliciting donations from CSA members and the wider community was the most popular fundraising strategy, easy to implement and garnering modest yet reliable results. Some farmers had intended to write grants, host fundraising events, or sell merchandise, but due to lack of time and staff resorted to simpler methods of soliciting donations and self-funding the CO-CSA. Still others decided they would not offer continuation shares, but instead would emphasize the availability of installment payment plans and SNAP EBT acceptance in their marketing materials. Three farmers received state grant

funding to cover all their continuation shares, though they found reporting requirements to be burdensome. Two other farms received unusually large donations from a few generous community donors. These last two examples represented the highest amounts raised, but were not necessarily predictable approaches to fundraising.

To enroll participants in the continuation CO-CSA, more than half the farmers had planned to contact former F3HK study participants first, and then rely on word-of-mouth advertising to attract new customers. Word-of-mouth outreach has been described by Wholesome Wave (n.d.) as the most effective mechanism for outreach, which in addition to spreading the word about the CO-CSA builds trust and awareness among potential customers. Farmers also used social media, and hoped to cultivate relationships with community partners who would help to spread the word, although farmers had less time to do this than they had anticipated.

Strategies that required more effort over longer periods, such as community appeals, marketing campaigns, fundraising events, and grant writing, were harder to execute. Similarly, strategies that depended on community partnerships experienced setbacks when farmers found it hard to find time to cultivate these relationships. In addition to the day-to-day time demands of farming, farmers cited unexpected extreme weather events, equipment breakdowns, and staffing transitions as impediments to implementing their continuation plans.

The timing and coordination of fundraising and recruitment activities were critical, since determining how many CO-CSA shares to offer depended on the amount of funds raised. Funding sometimes came in small increments, requiring ongoing record-keeping. Farmers were often still waiting for funds to come in after the season began. Self-funding was sometimes the default solution when other funding strategies failed, although some farmers were reluctant to use it.

While farmers generally felt that the CO-CSA continuation process helped them, there were three areas where they asked for additional support: identifying specific funding opportunities, cultivating community partnerships, and developing member agreement templates to ensure that customers

had a clear understanding of their responsibilities as CO-CSA members.

CO-CSA farmers may benefit from more information about two fundraising models that require minimal time to maintain once they are set up: sliding-fee payments and revolving loan funds. *CO-CSA Continuation Planning for Farmers*¹ provides information to F3HK farmers who wished to implement sliding-fee scale models. A sliding-fee scale, which sells shares at a variable price according to members' ability to pay (Guthman, Morris, & Allen, 2006; Henderson & Van En, 2007), was initially considered by two farms, who later declined to pursue it. In a revolving loan fund, fundraising covers the full cost of shares in advance of the season, and installment payments are used to replenish the fund for the following year (Wholesome Wave, n.d.). Farmers might also benefit from grant-writing workshops and technical assistance to help them prepare proposals to businesses, hospitals, and private foundations, as well as state and federal sources.

Most farmers were already aware of the local nonprofits, businesses, and public organizations who could help them with fundraising and outreach activities; in some cases, farmers had previous experience working with partners on farm and community food events. However, links to practice-based guides such as *How to Start a CSA Nutrition Incentive Program* (Wholesome Wave, n.d.) or *Sowing the Seeds of Food Justice* (Lennon, 2018) may provide additional resources to inspire farmers. For example, the latter resource manual describes the grassroots-organizing approach to outreach successfully implemented by Soul Fire Farm, as well as an in-depth discussion of the strengths and expertise that social service agencies and nonprofits can bring as outreach and fundraising partners.

Our experience aligns with that of other researchers (Guthman et al., 2006; Hinrichs & Kremer, 2002) who report that many farmers know and understand the needs and preferences of low-income families and have developed their own ways of accommodating this consumer group (Sitaker et al., 2020). Still, farmers experienced dropouts, late payments, and missed pickups

(Sitaker et al., 2020), and sometimes struggled with initiating "difficult conversations" with CO-CSA members about these issues. As other research affirms, customer commitment to the CSA model ensures better compliance and retention (Galt et al., 2017; Pole & Kumar, 2015). For example, Wholesome Wave (n.d.) advises CO-CSA farmers to "enroll community members who are excited about the program" (p. 26) and have a clear understanding of their responsibilities as CSA subscribers. Our research indicates that F3HK farmers understood their responsibilities and wanted to formalize them as part of the member agreement.

Former F3HK participants entered the continuation phase with an understanding of their CO-CSA member responsibilities, conveyed through the F3HK study recruitment and enrollment materials' explicit expectations for members. Knowledge and skill barriers to CO-CSA retention were addressed through the skill-building nutrition classes, while interactions during pickup helped to cement the reciprocal farmer-member relationship. During the continuation phase, some F3HK farmers took additional steps to help their CO-CSA members better understand the CSA model and the challenges that CSA farmers face in general. To build on those efforts, educational materials that explain CSA concepts, in a format accessible to low-literacy populations, could be made publicly available to CO-CSA farmers who wish to tailor them to fit their own operations. *How to Start a CSA Nutrition Incentive Program* (Wholesome Wave, n.d.) and *Sowing the Seeds of Food Justice* (Lennon, 2018) contain excellent advice on how to build reciprocal relationships with low-income subscribers; additionally, local nonprofits and social services partners can be a source of advice and mutual support.

The present study provides insights into farmers' experience with a structured process to guide planning and implementation of a CO-CSA continuation plan. While executing fundraising and outreach activities was sometimes challenging due to pressing farm responsibilities, most farmers were committed to offering the CO-CSA after study funding ended. As previously reported,

¹ <http://collections.evergreen.edu/s/repository/item/6979>


F3HK farmers were strongly motivated to ensure equitable access to the food they grow, and saw CO-CSA as a way to do this (Sitaker et al., 2020). Nevertheless, a question remains regarding the economic impact of adding a CO-CSA program to a farm business' revenue stream (Sitaker et al., 2020). This question is not addressed in either F3HK or other studies, although one economic modeling study reported on potential statewide impacts of policy support for CO CSA programs (Becot et al., 2020). Further, given the modest profit margins of small and midsized farms and the economic struggle to maintain these farm businesses, it seems unfeasible and unfair to expect farmers to shoulder the burden of addressing equity in CSA access on their own (Sitaker et al., 2020).

Fortunately, recent policy changes in SNAP rules have made it easier for recipients to use their benefits to pay for a CSA, which may be a very efficient way for most CSA farmers to increase CSA access for low-income families while having a positive impact on farm revenue. Indeed, Becot et al. (2020) found that a policy that encouraged SNAP EBT recipients to purchase a CO-CSA with their benefits could add to the state economy between US\$0.70 and US\$0.90 per dollar spent. There are also indications that third-party entities are stepping in to take on the fundraising, outreach, and coordination tasks of operating a CO-CSA, tasks that are both outside the skill set of most farmers and that are often pushed aside by single-farm CO-CSAs when farm duties take precedence. Cohen and Derryck (2011) were among the first to conduct an in-depth case study of a CO-CSA operated by a nonprofit food hub, while Abbott (2014) and Hoffman and her colleagues (2012) evaluated CO-CSAs operated by a food bank and a nonprofit food system organization, respectively. It would be instructive to examine observational data from a cross-section of CO-CSAs operated by single farms and third-party entities in order to gain insight into the effectiveness of various organizational models, specifically regarding effects on farm businesses and on food access and dietary quality for low-income families.

Conclusions

This paper describes the experiences of farmers wishing to continue a CO-CSA program previously funded by a research study (Seguin et al., 2017). Farmers used many methods to plan and recruit, and to raise funds. Most found that soliciting donations from CSA members and word-of-mouth advertising were easy-to-manage approaches that yielded modest results. However, one size did not fit all; each farm had to adapt potential strategies to fit its local conditions and farm business. Furthermore, for most strategies resource constraints were a continual barrier to moving ahead. For example, eight of the 12 farmers had planned to ask community partners for help with fundraising and outreach, but found that the demands of farming often made it hard to find time to develop necessary relationships. There were surprises, such as the three farmers who had not planned to seek grant funding but then found a funder willing to subsidize all their cost-offset shares. And some found that planning, while important, did not predict future success. As noted in previous studies (Galt et al., 2017; Pole & Kumar, 2015; Sitaker et al., 2019; Sitaker et al., 2020), farmers recognized that finding the "right" customer was a prerequisite to success. Farmers needed to consider the needs and preferences of low-income consumers, and CO-CSA members needed to understand that CSA entails certain responsibilities.

The F3HK farmers were highly committed to the CO-CSA continuation planning process. While some were not able to implement all the fundraising strategies they planned or to gain traction on developing community partnerships, continuation planning prompted them to articulate their intentions and lay the groundwork for actions they could complete over the following seasons. For many, CO-CSA continues to be a model they want to support, as shown by the high proportion of F3HK farmers who planned to continue their CO-CSA program after study funding ended. Organizations hoping to increase low-income consumers' access to locally grown produce through a CO-CSA might look to the findings of this study to assist farmers in their communities.



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Appendix A. Data Sources to Address Each Evaluation Question

Evaluation Questions	Pre-planning Webinar	Farmers' Plans	Check-Ins	Debrief	Conference Calls
1. What strategies did farmers include in their Continuation Plans?		X			
2. What was farmers' experience during implementation?			X	X	X
3. What did farmers perceive to be their biggest Continuation Plan successes?				X	X
4. Did the Continuation Planning process meet farmers' needs?	X			X	X
5. What are farmers' future plans regarding their CO-CSA?				X	X

Appendix B. Evaluation Materials

The Research member of the coaching team will be responsible for collecting evaluation data at four time points between October 2017 and October 2018: (1) Post-Planning Observations; (2) Notes from two check-in conversations with each farmer; and (3) Audio files and notes from a post-season debriefing session with each farmer.

I. POST-PLANNING SESSION OBSERVATIONS:

Instructions: After you have held the planning session (sometime between October and late November 2017), use the form below to record your observations. Print and complete one form per farmer. The coaching team should send a copy of all Post Planning session observation forms to Marilyn Sitaker, and keep a copy for themselves.

Farm ID#: _____ Name of Researcher: _____ Date: _____

1. What are your overall impressions of your planning session with this farmer?
2. Please record the duration of the planning session: _____ hours and _____ minutes
3. What aspect of planning seemed to resonate most with the farmer?
4. What aspects of planning seemed to resonate least with the farmer?
5. Were there specific worksheets they seemed to be particularly interested in? If yes, what were they?
6. Were there any worksheets that the farmer seemed to have difficulty with? If yes, what were they?
7. Were there any planning aspects the farmer requested, that were not covered in the CO-CSA planning process?
8. Do you have any other impressions you would like to share?

II. FARMER CHECK-IN SHEET

Instructions: Coaches should schedule two check-ins per farm, either in person or by phone, to take place between January and March 2018. Make sure to have a copy of the farmer's plan with you, so you can refer to it during the check-in. At this meeting, ask the following questions about progress toward completing activities under the CO-CSA Funding and Marketing components of the Plan, using the forms below to record your notes and observations. The coaching team should send a copy of both check-in forms for each farmer to Marilyn Sitaker, and keep a copy for themselves.

Farm ID#: _____ Name of Researcher: _____ Date: _____

CO-CSA FUNDING COMPONENT

1. Have you worked on any activities for this component? [Use farmer's plan to probe each activity]
 - a. (If No), Why not? (record answer)
 - b. (If yes): Please list the activities have you worked on for this component (record name of each activity):
 - i. _____
 - ii. _____
 - iii. _____
 - iv. _____
 - v. _____
2. What specific actions have you taken for:
 - a. [Activity i]
 - b. [Activity ii]
 - c. [Activity iii]
 - d. [Activity iv]
 - e. [Activity v]
3. Record brief notes on problem-solving discussions, and decisions reached regarding modifications to activities for this component:
4. Any additional observations about implementation of CO-CSA Funding plans?

CO-CSA MARKETING COMPONENT

5. Have you worked on any activities for this component? [Use farmer's plan to probe each activity]

a. (If No) Why not? (record answer)

b. (If yes) Please list the activities have you worked on for this component? (record name of each activity):

i. _____

ii. _____

iii. _____

iv. _____

v. _____

6. What specific actions have you taken for:

a. [Activity i]

b. [Activity ii]

c. [Activity iii]

d. [Activity iv]

III. POST-SEASON DEBRIEFING SESSION WITH FARMER

Instructions: Coaches should schedule a final debriefing session with each farmer, either in person or by phone, to take place in October 2018. Make sure to have a copy of the farmer's plan with you, so you can refer to it during the check-in. At this meeting, ask the following questions about the CO-CSA Funding and Marketing components of the Plan, using the forms below to record your notes and observations. The session will be audio recorded, and the research member of the coaching team will take notes. The researcher should upload audio file to a secure location on Cornell Box, and send a copy of the Final Debriefing notes for each farmer to Marilyn Sitaker.

Farm ID#: _____ Name of Researcher: _____ Date: _____

1. In general, what was your experience with implementing your Continuation Plan in 2018?

2. Specifically, tell me how implementation of your plans went this season for:
 - a. funding the CO-CSA?
 - b. CO-CSA logistics (if applicable)?
 - c. CO-CSA outreach (if applicable)?
3. Regarding implementing your plan, what were your biggest successes?
 - a. What factors (facilitators) contributed to the success you mentioned above?
 - b. What factors (barriers) got in the way of implementation?
4. What do you think were your biggest challenges with implementing your plan?
5. What information or assistance would have helped you with Continuation Planning during the 2018 season?
 - a. Do you plan to continue the CO-CSA next season (2019)?
 - b. If yes, what funding, logistical or outreach activities will you do to support your CO-CSA?
6. Are there any other comments you'd like to share about your experience with Continuation Planning?

Farm Fresh Food Boxes: A pilot that examined relationships in value chain partnerships

SPECIAL ISSUE: MORE THAN
VALUES IN THE FOOD SYSTEM



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Abstract

The Farm Fresh Food Box (F3B) project is a market innovation that aims to capitalize on successful characteristics of direct-to-consumer (DTC),

values-based supply chains (VBSCs), and traditional supply chains with the goals of expanding producer sales and improving rural food access. In the F3B model, farmers sell boxes of fresh produce in rural retail outlets to bring food to customers with limited access to locally grown foods. We

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present pilot findings on indicators of relationship quality, communication of embedded value, and food environment, and compare these with extant research to assess whether F3B behaves like a DTC, VBSC, a traditional supply chain, or something else entirely. Unlike much of the previous value-chain research, this work places a unique emphasis on the importance of the *farmer-retailer* relationship. We merge existing knowledge of DTC strategies and barriers with those of VBSCs and traditional supply chains to understand better the process of expanding into new outlets and consumer populations. We find that while the F3B model reduces some resource constraints, it adds a layer of complexity that requires time and expertise to develop a quality relationship between producers and retailers. Additionally, it is apparent that the F3B model must be tailored to fit local contexts of farmers and retailers participating in F3B market innovations.

Keywords

Direct to Consumer, Alternative Food Systems, Farming, Food Retail, Values-Based Food Chains, Food Access, Relationships

Introduction

The transformation of the American food system over the last century has generated an array of interconnected challenges that bridge economic, ecological, and social spheres. The growth of large farms has challenged livelihoods on small- and medium-sized farms (Chase & Grubinger, 2014), while the proliferation of national supermarket chains has negatively affected the survival of independent stores in rural communities (Hanawa Peterson & Procter, 2019; Lyson, Stevenson, & Welsh, 2008). Together, these trends threaten rural agricultural economies and communities (Jilcott et al., 2010).

Further, loss of retail outlets impacts the health of residents through diminished access to the fresh, affordable produce needed to support a healthy lifestyle (Blanchard & Lyson, 2006; Liese, Weis, Pluto, Smith, & Lawson, 2007). The relationship between the consumption of fresh, whole foods and the risk of nutrition-related chronic diseases lends a sense of urgency to the situation

(Andreyeva, Middleton, Long, Luedicke, & Schwartz, 2011; Bailey, 2010).

In response to these trends, several market and social institutions have pursued the development of alternative food networks (AFNs) that seek to reduce the number of intermediaries and spatial distances between producers and consumers (Bloom & Hinrichs, 2011; Valchuis, Conner, Berlin, & Wang, 2015). AFNs use both direct-to-consumer (DTC) sales and innovations such as values-based supply chains (VBSCs) to distribute foods with qualities often missing from industrially produced foods (Feenstra & Hardesty, 2016; Dimitri & Gardner, 2019). In DTC venues, farmers convey product characteristics through a direct relationship with consumers, while in VBSC, each actor is responsible for conveying this to the end purchaser.

After several decades of growth in AFN venues like farmers markets and community supported agriculture (CSA), DTC sales appear to have flattened (U.S. Department of Agriculture National Agricultural Statistics Service [USDA NASS], 2014). Additionally, many barriers that limit the efficacy and reach of AFNs remain.

The Farm Fresh Food Box (F3B) is a market innovation that has the goals of expanding producer sales, stabilizing rural retail outlets, and improving rural food access (Smith, Wang, Chase, Estrin, & Van Soelen Kim, 2019). It has the potential to increase vegetable consumption and provide revenue for farms and stores. F3B offers CSA-style produce boxes in the unique setting of rural retail outlets, with the aim of reaching new consumer segments. This implies an additional step inserted between farmers and consumers that defines the DTC approach. It also requires the development of new relationships between farmers and retailers, a topic that has not been extensively studied in the literature. In this paper, we describe the development of F3B producer-retailer relationships and assess their quality to explore how this affects their ability to convey the embedded values of the product to the consumer. Then, we compare our findings with existing knowledge of DTC and VBSCs to inform how the use of F3B can help farmers and retailers expand into new consumer populations.

Literature Review

Competition from large-scale farms and agribusinesses challenges small and mid-scale farmers to maintain sustainable livelihoods (Andreatta, Rhyne, & Dery, 2008). Large centralized farms and firms, which benefit from technological efficiencies and economies of scale, have grown to outcompete smaller players (Lyson et al., 2008; USDA NASS, 2019). As these trends continue, it has become increasingly difficult for small and mid-sized farmers to find markets appropriate for the volumes these farmers can provide, at a price that sufficient for them to remain viable (Lerman, 2012).

Small retailers are challenged by distributors who require large-volume orders or refuse out-of-the-way deliveries, and by retail regulations written with larger businesses in mind (Bailey, 2010). Moreover, changing transportation patterns, facilitated by expanded road networks and near-universal automobile ownership, have affected rural shopping habits (Bailey, 2010; Jilcott et al., 2010; Stoffle, 1972). Further, the spread of national supermarket chains, dollar stores, and e-commerce has undercut prices and altered consumer shopping habits, forcing rural grocery store closures (Donahue, 2018; Rothstein, 2019). For example, between 1995 and 2005, the number of Iowa grocery stores decreased by almost half, while grocery supercenters increased by 175% (O'Brien, 2008).

Many rural residents living in agricultural communities lack access to the foods grown in their communities (McEntee, & Agyeman, 2010; L. Morton & Blanchard, 2007). As more rural retailers go out of business, local residents experience diminished access to a diverse array of healthy foods and consequently consume fewer fruits and vegetables (Andreyeva et al., 2011; Hanson et al., 2019; Rose & Richards, 2004; Timperio et al., 2008; Zenk, Schulz, & Odoms-Young, 2009). Further, lack of a healthy diet resulting from living in food deserts is associated with obesity and chronic diseases, both of which are higher in rural settings (Bodor, Rice, Farley, Swalm, & Rose, 2010; Moore, Diez Roux, Nettleton, & Jacobs, 2008; Morland, Diez Roux, & Wing, 2006; O'Malley, Gustat, Rice, & Johnson, 2013; Rose & Richards, 2004).

Generally thought of as an umbrella term, alternative food networks (AFN) were developed

to counteract the diverse social, economic, and ecological externalities of a globalized food system (Valchuis et al., 2015). Compared to foods in traditional supply chains, AFN foods aim for better nutritional quality and taste, use sustainable growing practices or animal welfare standards, and prioritize community economic well-being, farmer livelihoods, and environmental stewardship (Murdoch, Marsden, & Banks, 2000; Sage, 2003; Selfa & Qazi, 2005; Sitaker, Kolodinsky, Jilcott Pitts, & Seguin, 2014; Valchuis et al., 2015). AFN efforts to re-localize and re-orient priorities within local food systems have taken many forms, including DTC channels like farmers markets, farm stands, and CSA arrangements. DTC channels have also been used to address healthy food access in urban communities with some success (Cohen & Derryk, 2011; Freedman et al., 2016). Yet, despite rapid growth over the past few decades, DTC sales appear to be leveling off as markets have become saturated, and farmers are looking for strategies to expand to new markets (Woods, Ernst, & Tropp, 2017).

In an attempt to capture new markets and overcome the constraints of DTC markets, some farms have begun to explore sales through VBSCs (sometimes called "value chains"), an AFN distribution innovation that emphasizes relationships, fairness, and equitable distribution of power across the supply chain. VBSCs seek to broaden local product distribution beyond DTC channels, conveying embedded product attributes while retaining the connection between farmers and consumers (Conner, Izumi, Liquori, & Hamm, 2012; Porter, 1985). The VBSC concept, originally conceived in business literature and later extended to agri-food systems (Stevenson, & Pirog, 2013), is described as:

a network of business enterprises operating in wholesale markets, moving goods differentiated by . . . production practices (e.g., organic and pesticide-free), adherence to specific ethics (e.g., humane animal treatment or fair trade), origin in a particular location (e.g., local or a region known for the product), or the identity of the farm or ranch from which it came. (Lerman, 2012, pp. 4–5)

The “values” in VBSCs refer to both the quality of products sold and the values reflected in the operational decisions about the way product moves through the supply chain (Block et al., 2008; Hoshide, 2007; Stevenson & Pirog, 2013). In an ideal VBSC, farms, businesses, and institutions engage in collaborative partnerships characterized by shared values, trust, transparency, and shared governance (Bloom & Hinrichs, 2011; Conner et al., 2012; Renting, Marsden, & Banks, 2003; Stevenson & Pirog, 2013). Like other AFN models (farmers markets and CSAs), VBSCs seek to offer potential price premiums over commodity markets (Conner, Campbell-Arvai, & Hamm, 2008; Diamond & Barham, 2011; Hoshide, 2007; Jablonski, Perez-Burgos, & Gómez, 2011) and include goals that extend beyond profit maximization (Conner et al., 2012; Lerman, 2012). The difference is that they bring in the intermediaries with similar values to effectively market and distribute the product (Bloom & Hinrichs, 2011; Stevenson & Pirog, 2008).

In addition to creating new opportunities for smaller farms, VBSCs can address the geographic and cultural barriers rural consumers may face with DTC venues, as demonstrated in farm to school supply chains (Conner & Garnett, 2016; Jablonski et al., 2011; Lerman, 2012). Despite the potential benefits, however, achieving fair and affordable pricing (Abatekassa & Peterson, 2011; Cohen & Derryk, 2011; Feenstra, Allen, Hardesty, Ohmart, & Perez, 2011; Zajfen, 2008) and meeting consumer demand (Bloom & Hinrichs, 2011) can still pose challenges.

Overall, most VBSC research has examined sales to institutional markets or market intermediaries such as co-ops or food hubs. F3B is an example of a very short VBSC, one that can bring broad benefits (health, farm, and rural store viability), but whose relationships and nuances have not been well studied.

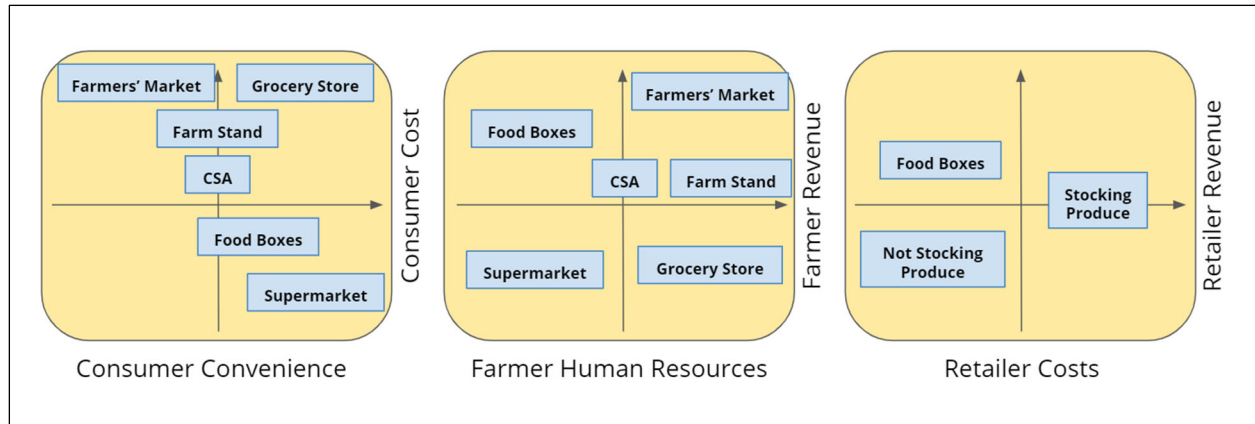
Farm Fresh Food Boxes: Addressing Challenges in the Food System

The Farm Fresh Food Box (F3B) is a market innovation that combines features of the DTC model with characteristics of VBSCs, to expand producer sales, stabilize rural retail outlets, and

improve rural food access. In F3B, farms sell CSA-style boxes of fresh food through familiar, convenient retail venues (gas stations, general stores, and convenience stores), where boxes are ordered and picked up on a week-to-week-basis. As in a CSA, the farmer is responsible for setting box size and price, determining box contents, packing, and delivering. Retailers are responsible for managing orders, collecting payments, and overseeing pick-up by customers. Farmers and retailers work together to market F3B at point of sale and in the community. For farmers, F3B offers an opportunity to earn revenue and reach a new audience for their products. Retailers benefit from being able to offer customers a selection of fresh produce, without investing in perishable stock, space, or cooling equipment; they may also see increased foot traffic and collateral sales. Customers benefit through increased access to a variety of fresh, healthy local foods, without the long-term commitment and up-front expense, in convenient locations along usual travel routes. F3B's potential social benefits include new connections between farmers and retailers and the revitalization of retail sites as community gathering places. As shown in Figure 1, F3B has the potential to fill a new market niche that compares favorably with similar models with respect to benefits to consumers, farmers, and retailers.

We developed a conceptual framework to locate F3B on the spectrum of food system market channels, from DTC to VBSCs to traditional supply chains (Figure 2). The framework uses three primary themes from the literature to characterize agricultural supply chains: relationships, communication of differentiated food values, and food environment (Bloom & Hinrichs, 2011; Conner et al., 2012; Valchuis et al., 2015). These dimensions incorporate ideas from two existing frameworks: the VBSC framework, which describes the elements and indicators of food system value chains (Bloom & Hinrichs, 2011; Conner et al., 2012) and the stacked beliefs framework, which outlines common trade-offs and barriers that affect people's willingness and ability to participate in alternative food systems (Valchuis et al., 2015).

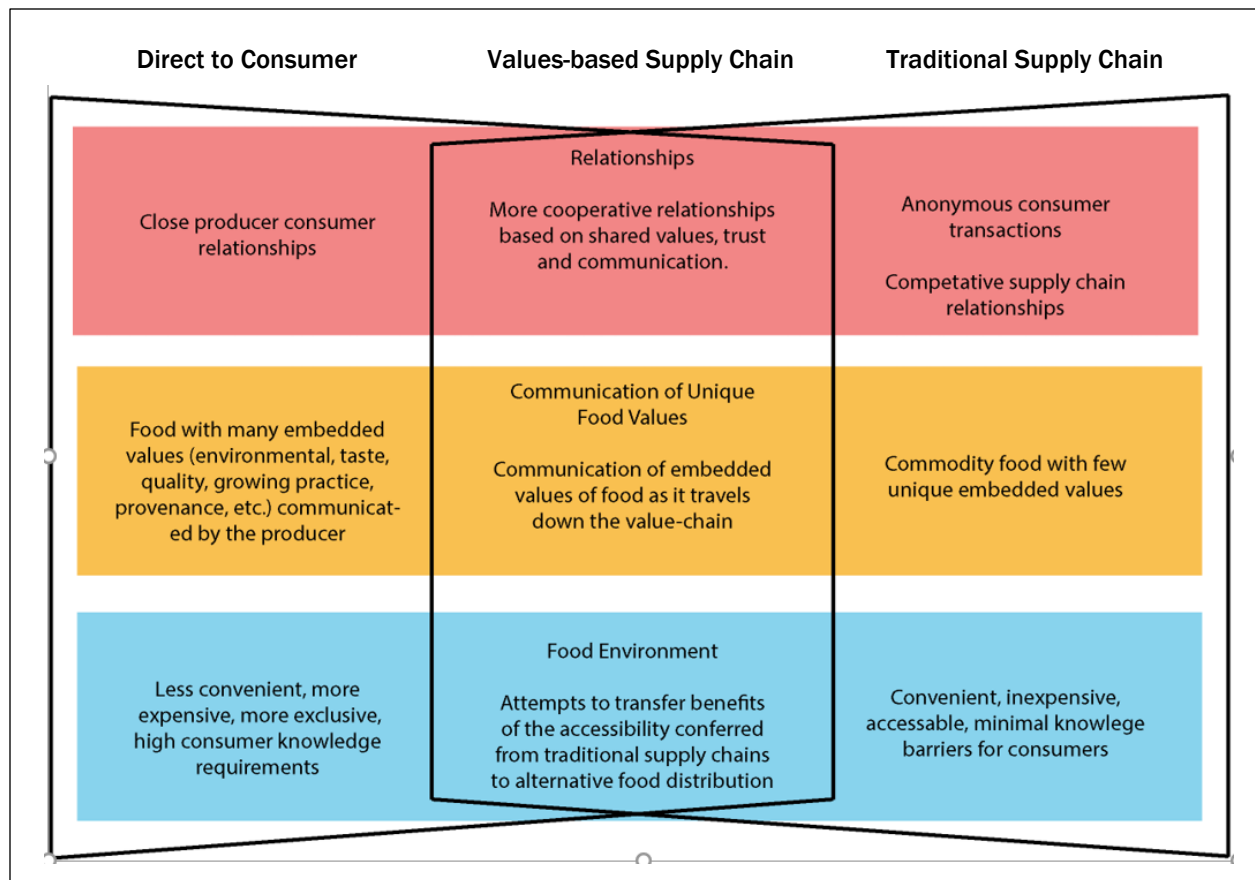
In our framework, F3B is situated between DTC and VBSCs (Figure 2). F3B has some charac-

Figure 1. Comparison of Different Alternative Food Systems Models for Consumers, Farmers, and Retailers

teristics of DTC: the farmer is responsible for growing, packing, pricing, and distributing the food, and retains ownership of the product until it is purchased by the consumer. Yet F3B decidedly has characteristics of a (very short) VBSC, in that F3B is more convenient than a CSA and requires

more communication, coordination, and shared decision-making between the farmer and retailer to organize logistics and convey embedded values.

Comparing F3B relationship characteristics to those of the three models shown in our framework, we first note that F3B inserts an additional

Figure 2. Comparison of Direct-to-Consumer, Values-Based, and Traditional Food Supply Chains

actor (the retailer) between the producer-consumer dyad of the DTC model. Introducing a CSA-style product (F3B) into the context of a short VBSC necessitates building new collaborative relationships between partners who have not worked together before. New partners must find ways to relate to one another beyond a purely transactional basis, as actors would in a traditional supply chain. In this analysis, we examine F3B partner-retailer relationships in terms of the following qualities: shared values; shared decision-making; and trust, transparency, and communication (Bloom & Hinrichs, 2011; Conner et al., 2012).

Next, we consider the communication of unique food values to the consumer. In DTC venues, the farmer interacts directly with consumers to communicate product differentiation (Conner, Dewitt, Inwood, & Archer, 2015; Lasley & Lobao, 1991; Lyson & Welsh, 2005; Schmidt, Kolodinsky, DeSisto, & Conte, 2011). While traditional supply chains market food that is uniform and interchangeable, VBSCs actively support product differentiation, as partners work closely with one another to communicate the unique identity of the food as it travels down the supply chain (Conner et al., 2012; USDA, 2015). In our analysis, we explore how retailers represented the unique attributes of foods sold through F3B to the end consumer, and the extent to which the identity of participating farms was conveyed.

The final theme we consider is the environment in which the food is sold and how this affects the viability of the VBSC in that location. It is widely understood that consumers value convenience, location, and price when buying and preparing food (Pole & Kumar, 2015; Sitaker, McGuirt, Wang, Kolodinsky, & Seguin, 2019; Tropp, 2013). Price and convenience have been cited as trade-offs in AFN participation (Valchuis et al., 2015), which F3B was designed to address by providing lower prices than farmers markets and selling through gas stations, convenience stores, and “country stores.” However, participation in AFNs is hampered by consumers’ lack of knowledge about nutrition, cooking, and local food systems (Valchuis et al., 2015). Thus, siting F3B in a market venue that mainly serves clientele with limited food knowledge might offset its price and convenience

advantages over the DTC environment.

In this analysis we are curious to understand (1) the degree to which F3B farmers and retailers developed relationships characterized by common values, good communication, and shared decision making; (2) how relationship quality affected the movement of embedded values down the VBSC; and (3) whether F3B price, convenience, and communication of embedded values were sufficient to attract shoppers in rural retail sites.

Setting and Methods

Setting

The F3B project is a tristate collaboration of extension and research partners from the University of Vermont (UVM), Washington State University (WSU), The Evergreen State College (TESC), and the University of California (U.C.). In the spring of 2017, each state’s extension partner identified at least three farmer-retailer pairs to trial a full-season F3B pilot project. Though California was unable to complete the pilot due to wildfires in the region, recruitment efforts successfully enrolled three farms and three retailers in Vermont and three farms and four retailers in Washington. Over the course of the season, one Washington farm ended its partnership with one of its two retailers due to low sales. The results presented below are from six farmer-retailer pairs, three in Vermont and three in Washington State.

Extension partners invited interested producers to participate, then reached out to recruit neighboring retailers. Prior to the start of the season, extension helped each farmer-retailer pair determine project logistics, which included setting mutually agreed-upon days for taking and delivering orders, and determining how retailers would track orders and payments and communicate this to farmers. Farms set the box sizes and price. Extension provided tailored marketing materials, which were adapted in consultation with the farmer-retailer pair to meet local requirements. Extension also provided ongoing technical support throughout the season.

The specific logistical and marketing elements varied by location, community demographics, and store culture. Overall, farms were small and

independently owned and sold through at least one DTC market channel. Some farms also raised animals for meat and sold through wholesale markets. Three of the retailers had gas stations at their stores, two were independent general stores, and one was a farm and feed store. The stock of merchandise varied from items typically found in a “convenience store” (gas station) to very few items for human consumption (farm and feed store), to a wide variety of merchandise, including food items (general store).

Methods

The extension and research teams collaboratively developed research instruments to assess project facilitators, challenges, and outcomes. The data collection instruments used in the wider project included firmographic surveys, tracking spreadsheets, and semistructured qualitative interviews. This paper uses data from the qualitative interviews.

The preseason firmographic surveys, administered online through the web application LimeSurvey, included descriptive questions about each partner’s business. F3B partners recorded quantitative, logistic, and descriptive information on tracking spreadsheets throughout the season. Guides for the semistructured interviews were developed collaboratively by the research and extension teams (Wengraf, 2001) with questions about partners’ motivations, values, and experiences with the F3B project. The qualitative interview guide was piloted with two non-participating farmers.

Six farmer and six retailer interviews were conducted between November 2017 and March 2018. All interviews were conducted over the phone, recorded, transcribed verbatim by a third-party contractor into Microsoft Word, and de-identified. Transcripts were structurally coded according to the interview guide. The research team developed a codebook made of collated themes from the VBSC framework and the stacked beliefs framework (Bloom, & Hinrichs, 2011; Conner et al., 2012; Valchuis et al., 2015). Two of the transcripts were independently coded according to this framework using the qualitative data analysis software NVivo version 11 (QSR International Pty

Ltd, 2015) by two researchers. Differences in data interpretation were discussed and resolved by the research team through consensus, with intercoder comparisons yielding a kappa coefficient of 0.85 or greater (Hanson et al., 2019). The remaining interviews were coded by one researcher according to the agreed-upon standard. Results were discussed by state (e.g., Washington [WA]), respondent number (e.g., 4), and whether the respondent was a farmer or retailer.

Results

Below, we present results regarding indicators of relationship quality, communication of embedded value, and food environment. We then compare these with extant research to assess whether F3B behaves like a DTC, a VBSC, or a traditional supply chain.

Relationships

To assess farmer-retailer relationships, we considered the three characteristics shown in Figure 2: shared values, communication, and trust and transparency.

Shared values and mutual regard

During postseason interviews, farm-retailer pairs demonstrated alignment of some values, as expected among partners in a VBSC, and divergence for other values.

Farmers articulated social values that were intertwined with their farm’s business goals. Farmers saw their core business as growing high-quality products with exceptional taste that provide nutritional benefits to customers. Yet this was combined with environmental values, as evidenced by farmers’ use of organic or sustainable production practices. Five F3B farmers included social values when they described their mission to grow high-quality food in a way that

maintain[s] the health of the land, ourselves, and our workers, and provide[s] a nutritious source of food for people in the community. (Vermont2 [VT2] Farmer)

For participating farmers, F3B was seen as a way to help community members gain better access

to healthy foods, while also expanding their customer base. Two farmers (VT1 and VT2) specifically mentioned wanting to make fresh produce more accessible for low-income community members.

For retailers, the main focus was maintaining their business. Washington retailers perceived their stores as filling a niche for local customers who wanted a go-to place for convenience items. Vermont retailers saw their stores as essential or “anchor” businesses, but also said they served as a community gathering place, or “a hub for people” (VT4A Retailer). Additionally, two Vermont retailers said part of their motivation to try F3B was to support other local businesses, as evidenced by their commitment to carrying locally made products:

We like to try to make an effort to help grow, you know, a local business, or in this case, a local farm, which is a business. (VT2B Retailer)

Further, while most retailers expressed no opinions or support for sustainable cultivation practices or land stewardship, one Washington retailer said their previous CSA membership deepened their appreciation of the embedded value of local foods, which motivates them to try F3B;

... bringing small farmers together with other people in the community is great. (WA1B Retailer)

Farmers and retailers shared the belief that F3B had the potential to benefit their business. Farmers saw F3B as a way to expand their customer base, and retailers saw F3B as a low-risk way to expand their selection of fresh produce while bringing people into the store. Both cared about the contributions their business made to the welfare of the community. Four farmer-retailer pairs expressed positive feelings about their relationship and about one another, even when they described challenges in their working relationships. The other two F3B farmer-retailer pairs faced more challenges, as described in the following sections.

Fair, stable pricing of value-differentiated products

Commitment to fair pricing reflects a willingness to distribute profit and risk equitably, a value that distinguishes VBSCs from traditional supply chains. Shared decision-making also indicates co-creation and innovation of new models and partnership styles.

Retailers and farmers seemed equally committed to ensuring the mutual benefit of the F3B venue. Retailers were willing to go the extra distance to ensure success for farmers by paying for extra advertising or purchasing extra display boxes:

... for, like our pump toppers and some of our signage, it was us [that paid for it] ... We do that a lot for a lot of things and whether it benefits us or not down the road. We like to try to make an effort to help grow, you know, a local business, or in this case, a local farm, which is a business. (VT2B Retailer)

Farmers seemed less clear on how F3B would benefit retailers, as evidenced by their lack of comment on the topic. For example, while F3B clearly expanded farmers' existing markets, allowing them to receive prices less than DTC but higher than wholesale, the benefit of ancillary sales for retailers was not guaranteed. However, one retailer felt that advertising F3B on social media

... got some people, maybe, more aware of our store. (WA1B Retailer)

and another felt that F3B

... had the potential to change the local public's perception of us as a place to buy produce. (VT4A Retailer)

In postseason interviews, farmers and retailers noted that although they believed F3B had the potential to be profitable, it had not yet done so in its first pilot as an innovation. Given the early stage in the project and low box sales, this may have created an imbalance in financial benefits for farmers and retailers, as the direct financial reward for retailers was delayed. While retailers did not report dissatisfaction with the lack of direct and

immediate benefit, the burden of risk may have been disproportionately allocated, indicating that F3B performed below the VBSC ideal.

Trust, transparency, and communication

The depth and quality of farmer-retailer partnerships varied greatly, despite the presence of common values (the support for wider food access and sale of locally produced products). Many relationships appeared underdeveloped, as indicated by reports of insufficient communication, poor relationship quality, and discrepancies in how each within a retailer-farmer pair viewed their relationship. In most cases, the partnership would have benefited from a closer working relationship and more consistent communication.

For example, despite mutual regard between partners, one farmer was disheartened by the retailer's casual attitude toward regular communication, which interfered with the farmer's workflow. The retailer characterized the relationship as positive, never realizing the extent of the farmer's frustration:

The biggest thing was that [the retailer] doesn't communicate over email, and so he [would] . . . stop by the farm to tell us that there was an order, or something like that. Like, he didn't give, he didn't call us or email. (VT1 Farmer)

Oh, very good. We've been doing business back and forth here, probably, for the last couple years or so, anyways. . . . Actually, they were very accommodating, because if I had somebody that couldn't be here for the day for the pick-up, I could run up and . . . they'd put a box together for me. (VT1A Retailer)

In another example, the farmer had an appreciation for the retailer's energy, enthusiasm, and communication skills, saying that things went smoothly,

. . . once we ironed out who emailed who, when. (VT2 Farmer)

Yet this farmer's retail partner described their relationship as "nonexistent." Both partners

reported issues that arose during the season that were never addressed, which both attributed to a failure in communication. The retailer perceived the coordination of box logistics to be weak, a critical issue that could have been resolved through ongoing collaboration between the partners.

At the site with the fewest F3B sales, both parties described a poor relationship experience. The farmer felt that store employees found F3B burdensome, and said they had minimal interactions with the owner. The farmer wished the retailer had taken time to get to know the farm at the beginning of the season,

. . . because they don't really know anything about us. (WA2 Farmer)

This farmer's impression was confirmed in the interview with the retailer, who appeared to have little sense of who the farmer was or the farmer's role in the project. When asked whether they coordinated F3B logistics with the farmer each week, the retailer said:

I think they were coming and change the sign. I'm not sure if they called in or they came. (WA2A Retailer)

Further, when asked whether they had met the farmer, they said:

Let me think. I can say I don't remember, maybe I did. (WA2A Retailer)

The site with the most F3B sales was also where the farmer-retailer pair expressed mutual, positive feelings about one another. The farmer spoke at length about the quality of their relationship with the retailer and its critical role in the success of their F3B enterprise. Congruently, the retail partner described the relationship as "real easy" and the farmer as "very accommodating." As the farmer summarized,

. . . the relationship between a grower, a retailer and the people who actually eat. . . . It can make or break it. (WA1 Farmer)

In summary, four out of six farmer-retailer pairs held mutual regard for one another, acknowledging good intent and shared values. Yet some partners never met and did not co-determine their workflow or logistics. The inability to establish good communication initially seemed to make it difficult for some farmer-retail pairs to solve problems together as they arose throughout the season. In general, many F3B partnerships were not sufficiently developed to display the team approach to adaptive management through continuous co-learning that is characteristic of VBSCs.

Communication of Embedded Food Values

Successful DTC food marketing requires communicating to consumers those product qualities that distinguish it from conventionally grown foods: superior taste, certifications, growing practices, and other attributes. Traditionally, DTC venues depend on producer-consumer relationships to convey these values. However, in value-chain models, all intermediaries along the chain are responsible for communicating embedded values. Below, we consider F3B product attributes, the way in which they were marketed, and the extent to which retailers conveyed farm identity and embedded values.

Farm attributes

Participating F3B farms were small- to mid-sized operations growing diversified vegetables, either organically certified or using organic practices. Farmers valued land stewardship and community involvement, and some said the superior taste of their food was a key selling point, believing that “once folks taste it, they become regular customers.” Additionally, farmers believed their customers wanted to support them because customers valued the freshness and quality of their product and sustainable cultivation practices used to grow it.

People are looking for what they see as a healthier product. We’re known for quality, so people appreciate that freshness and that quality. And then a big part of it is, they really wanna support local. (VT2 Farmer)

Marketing efforts

Nearly all retailers and farmers identified marketing as an area for improvement. Most used only the sandwich boards and in-store posters provided by extension, sometimes augmented by social media. Yet some failed to follow through on even these simple methods: one retailer chose not to use the outdoor sandwich board, and another declined to display the poster. A further challenge was that it was hard for customers to see what they were buying since the box, being sold by pre-order, typically had no display sample. However, some stores decided to display an empty F3B box, and one retailer purchased F3B boxes in advance to display for same-day purchase (VT4A).

One retailer supplied additional printed materials and advertisements on their gas pumps but felt that critical marketing days were sometimes lost during the presale period, due to farmer delays in communicating the box contents for the upcoming week.

I’ve been doing this for years between wine and beer, and we learned that most people don’t shop wine for main brands or anything like that; they’re shopping labels. . . . [commenting on the lack of visible vegetables during the time of sale] Execution is by far the most important part of trying to grow (sell) something. (VT2B Retailer)

Similarly, two retailers who advertised through a television segment and print article also felt their efforts were less impactful because they were not timed to coincide with the availability of the F3B (VT2B, WA2A).

Finally, one of the most successful retailers (WA1) stressed that repeated messaging was sometimes necessary for potential customers to fully grasp the F3B concept:

I think, you know, a lot of people didn’t know what it was. They didn’t really understand what it was and how it worked, and people would see the sign and . . . our board that we would have listed every week with the stuff on it, but they still didn’t really understand it . . . and then after a while people kind of asked

questions about it. . . . I think the reaction was pretty good once people started figuring out what it was. (WA1B Retailer)

Retailer representation of embedded values

In postseason interviews, four of the six farms mentioned the importance of the retailer's commitment to representing the embedded value of F3B food.

But really it always has a lot to do with store personnel. You know, the store manager, or store personnel, they've gotta be excited about it, or it's just gonna be, like, you know, a sack of potatoes in the back room for them. And I do know, by experience in selling to other stores . . . if you get one buyer who's into it, sales really spike up. (VT4 Farmer)

WA1 attributed their success to the retailer's authentic relationship with customers as well as a "mom and pop" ambiance that was conducive to buying whole foods, more so than an overstimulating convenience store.

. . . the folks who run that store, it's very much still a kind of country mom-and-pop store, which, despite a lot of people trying to create that sort of image as a marketing tool, like, as a genuine thing . . . so I think a lot of the credit would go towards them and just the people they are, and the way they're able to structure and operate their business, and the people that they have to run it for them. (WA1 Farmer)

However, F3B farmer-retailer pairs displayed great weakness in conveying embedded values to the customer, a key characteristic of VBSCs. This ties back to retailers' lack of familiarity with farm identity and product values to poor communication between partners. Retailers also appeared to lack a full understanding of their role in marketing F3B to customers, all of which resulted in a dilution of the embedded value as it moved down the VBSC.

I think the challenge was that a relationship between our retailer and us wasn't really established, wasn't really strong. And so that proba-

bly affects, I think, the ability for them to both, say, want to market it and know how, because maybe they needed a better story about who we are and who our farm is. (WA2 Farmer)

Another farmer similarly felt the retailer did not understand her farm's story and sensed that the retailer considered the project to be burdensome. This retailer seemed to view F3B as just another interchangeable product, as in a traditional supply chain.

Like I said before, you need to have more products in there for the price. Check what prices are around, like all the supermarkets now, they carry organic food and they are way cheaper. (WA2A Retailer)

Food Environment

Lastly, we considered how F3B performed in the surrounding food environment in terms of price, convenience, and consumer knowledge of how to use seasonal, whole foods.

Price

Many F3B farmers believed that the high price of their food was a real or perceived barrier for some consumers. For example, farm VT2 noted that many of their products were more expensive than similar items of lower quality sold at supermarkets, and farm VT4 partially subsidized their box to make it more affordable. WA3 voiced the sentiment of the remaining F3B farms by saying that they had priced food to be as affordable as possible, without entirely sacrificing profitability. As F3B farmers were the partner in control of pricing, they were also the partner who bore more risk when reducing their profit margins.

The tension between price and farmer profitability may have been amplified by selling F3B outside of traditional DTC venues, where higher prices are expected and accepted. F3B were frequently sold in convenience stores where pricing on most items was reportedly above supermarket prices but still less than DTC pricing (Figure 1).

This is an area where farmer and retailer values seemed to diverge. Farmers wanted their product to be accessible to a wide variety of consumers but

needed to balance that with a reasonable return on food that entailed higher costs of production. For retailers, affordability was stated as a valued attribute:

We're trying to be a place where . . . people recognize our prices are reasonable. (VT4A Retailer)

Yet the fact that most convenience stores charge higher prices compared to supermarkets suggests that retailers also cared about balancing affordability with a profit margin.

Farmers were also disappointed that F3B was incompatible with SNAP (food stamp) rules because it was a prepaid box sold in retail locations. Farmers noted that allowing farmers markets and CSAs to accept food stamps has enhanced affordability for their consumers and made it easier for farmers to attract low-income customers.

Convenience

We had hypothesized that selling F3B through small rural retail outlets would increase their convenience and accessibility over DTC market channels. Several F3B retailers noted that their customers choose their store for its convenience, and one described their store as “the only option in town.” Five out of six F3B sites had a supermarket within 5 miles (8 km) of the store, but for half of the F3B retailers, the distance to the closest farmers market was 17 miles (27 km) or more (Sitaker et al., 2019). Thus, while most F3B sites were no more convenient than traditional supply-chain competitors, half the retailers were more convenient than DTC. However, any advantages in convenience may have been offset by requiring two trips to the store for F3B pre-order and pick-up, which may have deterred customers.

The one thing that made it difficult is that, you know, I would have some people that would come in and ask about it and they wanted something for me to have available for them right then, not just once a week where they pre-order or anything like that. (WA3A Retailer)

Consumer knowledge

Some farmers and retailers said that a lack of cooking knowledge was a barrier to purchasing F3B. For example, two retailers (VT2B, WA3A) observed that their customers seemed challenged by preparing F3B produce, particularly if it was unfamiliar.

The only thing that I and, like I said, I addressed it with the farmer, is that some of the more unique products, because, you know, some of the just different things, just to throw in ideas, or how to cook or, you know, anything like that because I know some folks were like, “I didn't eat that because I didn't know what to do with it.” (WA3A Retailer)

One farm (VT1) noted that lack of cooking skills and food knowledge were also barriers for their CSA and farmers market customers and described the significant efforts they made to educate their customers in these areas. Yet aside from including recipes in the F3B, there were no formal mechanisms to address this barrier.

Discussion

We posited that F3B moves the distribution and sales of locally grown produce toward a VBSC model while retaining some characteristics of the DTC model. Specifically, we examined the relationship between farmers and retailers, a link not extensively examined in the VBSC literature. Using data from the post-pilot-season interviews with farmers and retailers, we examined indicators of relationship quality, communication of embedded value, and food environment impacts for F3B, and compared these with extant research on DTC and VBSC models. Our findings suggest that F3B did share characteristics with both market strategies and was subject to the myriad challenges and possibilities relative to food distribution and access in each (Bauman, Shideler, Thilmany, Taylor, & Angelo, 2014).

Extant research identifies defining characteristics of VBSCs that are critical to their success, including mutual regard between partners; fair and stable pricing; value differentiation of products; and co-learning, trust, and communication (Bloom,

& Hinrichs, 2011; Conner, Colasanti, Ross, & Smalley, 2010; Conner et al., 2012; Valchuis et al., 2015). Given their shared values and motivations, F3B farmer-retailer relationships resembled those in VBSCs (Conner et al., 2010; Izumi, Wright, & Hamm., 2010; Sage, 2003) more than traditional supply chain relationships. Yet after the pilot year of F3B implementation, some characteristics that F3B needed to perform effectively as a VBSC remained underdeveloped.

For example, F3B partnerships were often marked by a lack of consistent, timely, and effective communication, lack of mutual understanding of one another's business models, and inability to co-adapt in response to challenges throughout the season. Some failed to establish good communication habits early on, as evidenced by lack of collaboration to co-determine project logistics, discuss communication needs and constraints (such as their preference for phone or e-mail, time availability, etc.), or describe the inner workings and values of their businesses to one another. This hampered their ability to develop the shared decision-making practices that characterize VBSCs. The challenges that partners described in postseason interviews were manageable for the most part, but an inability to discuss potential solutions made them hard to overcome.

For most DTC outlets, the relationship established between farmers and customers provided the context for communicating embedded food attributes. Often, these foods were sold for a higher price that reflected additional care for food quality, land, and labor (Conner et al., 2015; Lobao, 1990; Lyson & Welsh, 2005; Schmidt et al., 2011). When shifting from a DTC to an intermediated value-chain model, all actors in the VBSC must become responsible for conveying these less-visible attributes. In F3B, a lack of familiarity with the farm's attributes, confusion about the retailer's role, and generally weak communication contributed to a loss of product differentiation as the food moved down the VBSC.

Failure to effectively communicate embedded values may have undermined F3B marketing efforts in some sites. Valchuis et al. (2015) found that "to elicit participation in the alternative food system, these [consumer] beliefs must outweigh the

barriers" (p. 226) of price, convenience, lack of knowledge, and cultural incongruity. Without insight into the unique attributes of F3B's food that differentiated it from conventional produce, consumers may have lacked the necessary motivation to try F3B if they perceived it as too expensive, inconvenient, elitist, or difficult to cook.

As documented by Valchuis et al. (2015), the F3B pilot showed that cultural setting, level of convenience, and availability of cooking knowledge were relevant factors. Adapting the ordering and pick-up logistics might have created more convenience for consumers while retaining characteristics that make the model favorable for the value-chain partners. Because F3B required two visits to the store for ordering and pick-up, it is possible that the food box was not especially convenient for consumers. Thus, some project sites experimented with stocking additional boxes to offer on-the-spot sales; perhaps more experimentation in this vein could help some consumers overcome these barriers.

Finally, providing information about how to prepare box contents may have enhanced access and retention for F3B. Of the many barriers to F3B, information about how to cook the food might have been the simplest to address. Many F3B farms included customer education in their DTC venues, so it is clear that farmers are aware of this need at the outset. Had the retailers and farmers discussed this challenge, perhaps they might have been able to respond during the season. However, once again, the lack of a foundational relationship seems to have impeded resolution of even this simple issue.

Our findings echo those found in other VBSC research, even though the F3B model is a very short value chain. Foundational to many of these issues is the importance and challenge of building real relationships between actors across the value chain. These challenges can be amplified by differences in work cultures found in alternative and traditional supply chain settings (Clancy & Ruhf, 2010; Lerman, 2012; Zajfen, 2008). Lack of knowledge about how to work within a VBSC partnership has also been found to limit their efficacy and has prompted the involvement of outside actors, like nonprofits and universities, who aim to help

with the formation and functioning of these arrangements (Lerman, 2012).

Implications and Future Research Needs

A few implications emerge from this work. First, relationship-building starts by getting to know one another's businesses, including farm visits, with explicit discussion of values and ground rules for communication agreed upon by both partners before the season starts. During the busy growing season, regular communication is critical even though it is more challenging. Weekly check-ins and preferred communication modes (phone, email, etc.) should be established in the preseason planning meetings.

Second, greater promotion of local products is needed in each store. Emphasis should be placed on the embedded values that justify higher prices, particularly for consumers who are unfamiliar with buying local food through DTC venues. Given the lack of resources farmers and retailers have to devote to promotion, they may wish to ask for technical assistance from extension, academic internships, and nonprofit organizations. The F3B team has developed a toolkit to address marketing and other aspects of model implementation and

now offers an online webinar and three-part short course for interested farmers, retailers, nonprofits, extension, and others wishing to initiate a food box project in their community.¹

Third, the lack of convenience could be addressed by setting up online or phone ordering, holding inventory for on-the-spot purchases, and other mechanisms.

The extent to which the F3B model was able to overcome the inherent challenges of a limited food access environment remained somewhat unclear after the pilot year, requiring more consumer research and model development. Simply stocking fresh produce in new locations, without deep attention to the array of access barriers, is insufficient. As noted by Bloom and Hinrichs (2010), identifying and achieving a price that is affordable to consumers (in reality and perception) and yet also profitable for farmers and retailers is difficult. The pilot for F3B clearly showed that a one-size-fits-all approach would not work for this innovation. More experimentation and research are needed to identify best practices related to relationships, communications, and other aspects, as well as an assessment of transferability to a variety of contexts.

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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

Economic security assessment of San Jorge, Samar, Philippines, as it experiences coronavirus

**JAFSCD
Responds to
the COVID-19
Pandemic**



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Abstract

This study assesses the economic security of the city of San Jorge, Samar, Philippines, in terms of livelihood, income, and health in order to analyze the extent of the effect of the novel coronavirus (COVID-19) on the populace. The study evaluates the responses provided by the government, private nongovernmental organizations (NGOs), and international nongovernmental organizations (INGOs). It also looks at how people coped with the crisis during and after the community quarantine. Families received cash and food assistance from local government and other concerned INGOs, which was given to augment the expenses for food, health, and education of their children. The families coped with the food shortage by reducing the number of daily meals and by replacing rice in meals with root crops and vegetables.

Introduction

The community of San Jorge is a 4th class municipality (with an annual income of 10–15 million¹) in the province of Samar, Philippines. According to the 2015 census by the Philippine Statistics Authority (PSA), it has a total of 17,184 in population in 41 villages (PSA, 2015).

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¹ 1 Philippine peso (P1)=US\$0.02 as of this writing.

The town was battered by the COVID-19 pandemic, with a substantial impact on lives and harm to the livelihoods of the population. The agricultural sector had just been recovering from the effects of typhoon Kammuri (or Tisoy) in December 2019. The coconut industry is the primary source of cash income in the area, so the livelihoods of coconut farmers from upland and farm laborers have been affected negatively by the pandemic. For the staple food crop of rice, farmers were affected since they had just planted rice when the typhoon hit (Department of Agriculture, 2019).

Methodology

I collected secondary data from government offices and conducted an ocular survey, direct observation, focus group discussion, and individual interviews with residents who were affected by the COVID-19 pandemic.

Figure 1. The Philippines and San Jorge, Samar



Results

All residents of San Jorge were affected by the pandemic. Their livelihoods were completely stopped, and this affected their living conditions. Residents received food assistance from local government and concerned NGOs and INGOs. They coped with the food shortage by eating root crops and leafy vegetables and making rice porridge eaten with dried fish. Furthermore, food security was uncertain for families who rely solely on farm labor as their livelihoods. Families who are members of the government's Conditional Cash Transfer received cash grants to improve the health and nutrition of their children and to continue the education of their children. Rice farmers were most affected because they had planted their rice recently when the pandemic occurred, and they were not permitted to visit their farms.

Coping Strategies

Through my focus group and individual interviews with residents, I found that the following strategies were used by many residents:

- Reduce the quantity of food served per meal;
- Reduce the number of meals per day (the normal three meals a day dropped to two meals a day);
- Replace rice with root crops and vegetables;
- Borrow money from small sari-sari shops (neighborhood sundry shops) whenever there was no income generated;
- Receive support from Conditional Cash Transfer and food relief;
- Sell assets to have ready cash in case of health emergencies.

Food Consumption

Food insecurity was experienced in San Jorge communities, especially the poorest sectors. Before the crisis, a family usually ate three times a day. A family of five typically consumes at least two to three kilograms of rice eaten with fish, canned goods, and vegetables, or sometimes other meat on some occasions. During this pandemic, a family usually ate root crops, porridge, dried fish, and vegetables. They tried to extend their food supply by eating twice a day and by eating less, and by substituting rice porridge and sometimes porridge mixed with root crops and dried fish. At times, the adults eat minimally, giving priority to small children.

Food Production

Food production is diversified; most of the households engage their owned coconut farm. Only 3% of rice farms are irrigated, which allows for two croppings. The average harvest of rice per hectare is 50 cavans (5,512 lbs. or 2,500 kg) for rainfed and 70 cavans (7,716 lbs. or 3,500 kg) for irrigated. Most farmers also grow root crops, banana, and vegetables as source of food and cash. Villages along the river have been able to harvest freshwater fish and shells. The pandemic has worsened the situation as farmers have not been able to visit their farms to take care of the existing plants or do any additional planting.

Income

Normally, a coconut farmer who owns 1 hectare of coconut has an average income of P2500/month. Unskilled laborers who work at least 15 days a month earn P3,750 a month, and skilled workers earn P5,000-P6,000 per month. The tenant and owner usually have a 50/50 sharing arrangement for the income, which depends on the volume of production. During this pandemic, most people have been completely dependent on cash assistance.

Nutrition Situation

Prior to the start of the pandemic, the municipality of San Jorge had a malnutrition prevalence rate of 16.78% (Republic of the Philippines Department of Health, 2019). The malnutrition prevalence rate was increasing during the pandemic due to decreases in food production and family income to sustain basic food needs. Vulnerable families have difficulty in meeting the recommended 2400 kilocalories per person per day, and this is especially true for large, low-income families.

Access to Functioning Markets and Institutional Services

The market is still accessible for a family's daily needs from the central market in the town though a representative from every village. There are rural banks in the area and other money-transfer services.

The government depends mainly on its calamity fund to respond to the immediate needs of affected residents. The Department of Social Welfare and Development immediately provided food and cash, whereas the Department of Agriculture distributed a few packs of vegetable seeds.

Conclusions

- Farm laborers and farmers who rely solely on coconut production did not expect any income, and their families extended their food supply by limiting their food consumption.
- Food production for the coming season will be insufficient, since people were prohibited from visiting their farms.
- Malnutrition definitely will increase if food consumption drops further.
- Affected families will continue to depend on relief in order to purchase food.
- Children and the elderly will continue to have increased susceptibility to community transmission of COVID-19.
- People should always practice excellent sanitation, wear face masks, and maintain social distancing.
- People should obey the local and national laws and advisories.



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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

“Informalization” of food vending in China: From a tool for food security to employment promotion

JAFSCD
Responds to
the COVID-19
Pandemic



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Abstract

The central government of China required local governments to allow street food vending on May 27, 2020, which is essentially a policy of “informalization” in urban food governance. Before this, some local governments such as Nanjing Municipal Government had already relaxed the implementation of regulations for street food vending. The original purpose of allowing street food vending was to help ensure food security. Currently, it is used for increasing informal employment as a response to unemployment caused by the COVID-19 pandemic. The temporary informalization is important for mitigating food insecurity, which demonstrates China’s adaptability in contexts of crisis.

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While lockdown policies in South Africa in response to the COVID-19 epidemic have reinforced the bias against the informal food sector (Battersby 2020), which is considered less modern, China has recently adopted an opposite policy stance to promote the informal food sector, overturning regulations that had clamped down on street food vending in China over the past 25 years.

As of May 27, 2020, the Chinese central government required local governments to allow street food vending.¹ In the months before the central government issued this requirement, some local governments such as Nanjing had already relaxed the implementation of regulations for street food vending. For instance, after the lifting (or degrading, to the second grade) of some quarantine measures for battling the COVID-19 epidemic, restaurants in Nanjing have been *de facto* allowed to sell their cooked food in front of residential neighborhoods.

The original purpose of this change in street food vending regulations was to help ensure food security—specifically food access—due to the slow recovery of food retailing capacity in public markets. Public markets are the most important food retail outlets in China (Zhong, Si, Crush, Scott, & Huang, 2019). Nanjing implemented quarantine measures for battling COVID-19 starting on January 24, the day before the Chinese Spring Festival of 2020. More than half of food vendors in public markets in Nanjing are migrants to the city. Normally, most of these nonlocal food vendors operating inside public markets would go back to their hometown for the Spring Festival and return to work one week later. However, this year, nonlocal food vendors were required to self-quarantine for two weeks upon return to Nanjing, and some food vendors could not, or were reluctant to, return Nanjing because of travel restrictions. Therefore, the food retailing capacity in public markets was not as high as usual. The Nanjing Municipal Government intentionally relaxed the prohibition on street food vending in order to boost food access. Local authorities who patrol the streets (*chengguan*) turned a blind eye to street vending, which signaled tolerance and a relaxation of the prohibition. This flexible implementation somewhat alleviated the problem of having fewer vendors—and thus less supply—at public markets.

Allowing street vending at this time is not only used as a tool for improving food access, but also for increasing informal employment. By the end of May 2020, all the wet markets had returned to normal operations, and all nonlocal food vendors within public markets had returned to work. Thus, it was not solely to improve food access per se that street food vending was tacitly permitted. Rather, it was important for low-income households to earn an income from street food vending. According to our online survey, conducted in March, more than 20% of surveyed households in Nanjing experienced income loss due to the COVID-19 pandemic. This affected the food security of some of these households. Therefore, the central government's policy of allowing street food vending not only encourages economic recovery but also will bolster food security in low-income households.

There are challenges regarding how to maintain physical distancing and ensure food safety for street food vending. Increasingly, a number of local governments have made some policies to address those challenges caused by informalization. Local government could find a good way to maintain the physical distancing of food vendors; however, it is not as easy to control the food safety risks posed by informalization. Thus, informalization is essentially a trade-off between food safety and employment promotion.

Local governments in China have made long-term efforts to formalize the informal food sector for the sake of food hygiene and safety. In the 1980s, most wet markets were informal roadside (outdoor) markets. Since the mid-1990s, local governments have made efforts to formalize these practices by building covered, open-air marketplaces and then building enclosed, indoor public marketplaces. Currently, most public markets in Nanjing are indoor, while the outdoor informal food sector instances make up a very small portion of the urban food system in the city. No matter how small, the informal food sector

¹ See https://www.guancha.cn/politics/2020_05_27_551945.shtml

never disappeared in Nanjing (Dai, Zhong, & Scott, 2019). There has been a flexible implementation of the regulation prohibiting street food vending for many years in Nanjing. The flexible implementation has been skillfully used as an informal means of compensating landless farmers who lost farmland due to land expropriation, as it has enabled them to conduct informal food vending instead (Dai et al., 2019). The ongoing plan (established prior to COVID-19) is to construct new public marketplaces to keep pace with urban population growth and to provide employment for more food vendors. The central government's current special permission granted for street food vending is temporary.

The temporary informalization demonstrates China's adaptability in contexts of crisis. Food vending could be the easiest way for low-income households to earn income in the context of the COVID-19 pandemic. Temporary "informalization" of food vending certainly bolsters low-income households' food security, which is worth the food safety risks posed by informalization. The COVID-19 pandemic has made the world uncertain, but the world certainly can mitigate food insecurity through adaptive governance, such as temporary informalization.



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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

Food supply pressure in France and Germany during COVID-19: Causes from manufacturing

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The food supply has been disrupted by COVID-19. Shopping in supermarkets and grocery stores in the pandemic may not be a pleasant experience, as it can often lead to disappointment and anxiety since a lot of food items are not available or out of stock. The pandemic's impact on the food supply has attracted attention from scholars and practitioners alike, and there have been many studies based on evidence from developing countries (e.g., Zurayk, 2020). However, there is still a lack of research based on the experiences of more developed and industrialized economies such as France and Germany. This is an important knowledge gap to be bridged, as people in developed countries tend to consume more food than those in developing countries (Delgado, 2003). Developed countries are also usually in the center of global food supply chains due to their stronger influence in trade.

Little has been discovered in particular regarding the reasons for the food supply crisis in developed high-income countries, especially France and Germany. It is beyond popular belief and the existing academic knowledge to notice that France and Germany, the two largest economies with the most developed agriculture and the highest income levels in the European Union (EU), have experienced a shock to their food supplies since March 2020. Especially in the early period of the COVID-19 outbreak in these two countries, the shortage of the food supply became a major challenge to people's daily lives

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and normal business operation. For example, it was difficult for households to buy sufficient preserved food and long-life milk from the supermarkets and grocery stores they usually visit, and shops had to set quotas on customers' purchasing of many products. The situation seemed to improve after strong measures were taken to restore the food supply in France and Germany. For example, food delivery has been an approved exception to the governmental travel restrictions during the pandemic. Nevertheless, varieties of food and drinks were still in short supply or out of stock during the pandemic, especially at the early stage, as shown in Photos 1 and 2. Therefore, the reasons for the food supply crisis in France and Germany are worth exploring.

Photos 1 and 2. Empty Supermarket Food Stock in France and Germany



Source: Xinhua News (2020a, 2020b). Note: Picture 2 has been cross-posted via WeChat.

Although the panic from the COVID-19 pandemic is perceived as a catalyst for the pressure on the food supply, there could be other interpretations. As noted by the Food and Agriculture Organization of the United Nations (FAO, 2020), COVID-19's disruption to agriculture is minimal, and the food market is largely stable. Furthermore, in France and Germany, technology is widely applied in the agriculture sector, and therefore COVID-19 is unlikely to have significant impact on the countries' agricultural activities, which are not highly labor-intensive. In addition, media have reported that excessive amounts of milk have been produced and producers have to reduce the milk supply in France and Germany (Stöcker, 2020), but in the supermarket milk is often sold out.

Therefore, in France and Germany, if the sudden increase in demand is not the only reason for the strain on food supply, and COVID-19's impact on agricultural activities is minimal, what could be the other reasons? A less mentioned yet important reason is the shrinking of manufacturing, and particularly of a few sub industries closely related to food production and delivery.

Data from the United Nations Industrial Development Organization (UNIDO) provides evidence to support this argument. As shown in Table 1, the manufacturing of food products in both France and Germany dropped in March 2020. Specifically, in France, manufacturing of food products fell by 2.3%, compared to February 2020. Similarly, Germany observed a reduction (-4.1%) in manufacturing of food products in March 2020 compared to March 2019. Since the sub-industry 'manufacturing of food products' mainly includes the 'processing and preservation' of food and dairy products (United Nations Statistics Division, 2008), it is not difficult to explain why long-life milk and preserved foods were quickly sold out in supermarkets in France and Germany. The shrinking of beverage manufacturing was much more notable in France than in Germany. In short, the reduction in manufacturing of food and beverages (industries with low technology intensity that were therefore more significantly affected by COVID-19) (UNIDO, 2019) is fueling the pressure on the food supply in France and Germany.

Table 1. Manufacturing Production in France and Germany, March 2020


Country	Manufacturing sub-industries	Index of Industrial Production (2015=100)	Compared to previous month	Compared to same month previous year
France	Manufacture of food products	97	-2.3%	-0.3%
	Manufacture of beverages	86.6	-12.7%	-15.8%
	Manufacture of motor vehicles, trailers, and semi-trailers	52.1	-49.1%	-54.4%
	Total manufacturing	85	-18.3%	-19.3%
Germany	Manufacture of food products	99.8	-1.1%	-4.1%
	Manufacture of beverages	101.2	-6.6%	0.9%
	Manufacture of motor vehicles, trailers, and semi-trailers	60.7	-31.1%	-37.7%
	Total manufacturing	89.5	-11.5%	-14.5%

Source: UNIDO, 2020.

Another reason for the strain on the food supply is the sharp decrease in the manufacturing of motor vehicles, trailers, and semi-trailers (MTS). MTS manufacturing is noteworthy because these vehicles are the most widely used tools to deliver food products from producers to customers, including intermediary customers such as supermarkets and grocery stores. Although it is sometimes perceived that the existing fleets of MTS may be sufficient to satisfy the needs under normal circumstances, this is not the case during the pandemic. The demand for delivery services using MTS increased sharply amid COVID-19 health concerns (Kendall, 2020), which may lead to longer-running shifts and higher frequency of MTS use. Hence there will be more depreciation, scrapping (writing-off), and repairing of MTS, which reduces the availability of MTS to meet the soaring demand of food delivery services. As the pandemic effectively shuttered the manufacturing of MTS, Europe's freight market is predicted to shrink significantly (van Marle, 2020), especially in the delivery of food products. This has been exacerbated by the 'just in time' manufacturing model that has emerged in recent years and the fact that many companies do not keep extra resources for unexpected disturbances (Bloom, 2020). That is why refrigerated vehicles used for storing dead bodies during the pandemic have been reused for food delivery (Crump, 2020). Fleets of supply trucks owned by some business closed in the pandemic are also to be used for food delivery (Bloom, 2020).

Table 1 shows that in France, the manufacturing of MTS dropped by over 50% in March 2020 compared with the same period in 2019. The decrease of MTS manufacturing in Germany is also substantial (-37.7%). A sudden and significant reduction of the MTS manufacturing would strain to food supply chains. This explains an aforementioned imbalance, where the production of food and beverages has been excessive, but such a huge supply cannot be transported to the market due to the lack of MTS. Therefore food and beverages are easily sold out in the supermarkets and grocery stores. This lack of MTS is also an important factor in the long wait times for online food delivery in France and Germany (Reimann, 2020).

This brief commentary demonstrates that the reduction in manufacturing production, especially that of food, beverages, and MTS, is an important reason for the pressure on the food supply chain in France and Germany during the pandemic. This commentary also has a few implications. The examination of the food supply should not be restricted to agriculture and service sectors; and it should also be extended

to manufacturing, which plays a critical role in the food supply chain. This commentary therefore calls for more interdisciplinary inquiries. In addition, more research on the food supply in developed countries during the pandemic could enrich the knowledge of how COVID-19 affects the food system. 

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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

COVID-19 and food security in Bangladesh: A chance to look back at what is done and what can be done

JAFSCD
Responds to
the COVID-19
Pandemic



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The COVID-19 pandemic has created a global health crisis, and the long-term impact of the pandemic is predicted to reach far beyond today. In a lower-middle-income country with upward economic growth, such as Bangladesh, it is essential first to understand the present situation in order to create a proper recovery plan. Bangladesh has made significant progress in poverty reduction over the last two decades. Its poverty rate dropped to 23.2% in 2016 from 48.9% in 2000 (Bangladesh Bureau of Statistics [BBS], 2018), which has also helped improve the country's food security status. Bangladesh has made remarkable progress over the last few years (Roy, Dev, & Sheheli, 2019) in most of the four dimensions of food security: food availability, food access, food utilization, and food stability.

However, travel restrictions, local lockdowns, and social distancing measures being in place for a prolonged period will set back the country's progress towards achieving food security. One of the concerning issues is that while people consider achieving food security to be a critical challenge, they hardly consider pandemic issues to be a big challenge. Our past experience with epidemics and

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pandemics does not seem to have done enough to make us seriously consider pandemic issues in our preparedness plans (Anwar, Nasrullah, & Hosen, 2020). Although the government always states that it is well prepared for any crisis, the current COVID-19 pandemic in Bangladesh has presented mixed results in terms of food security (World Health Organization [WHO], n.d.).

What Steps Are Being Taken to Ensure Food Security?

Food security is very much dependent on supplies from the agricultural sector, as this ensures food availability. The government's attempt to subsidize farm machinery to help farmers harvest agricultural produce in a timely manner was useful. With proper attempts made by the ministry of agriculture and the field-level agriculture extension workers, farmers were close to success in harvesting and marketing enough rice and other agricultural products. According to the Ministry of Agriculture, there are sufficient cereals and other food products stored in the country, which is a good sign for food security.

If we reflect on the access dimension of food security, the government took some commendable steps to solve the problem temporarily. Although the planning was done before the pandemic hit Bangladesh, the steps were improvised during the COVID-19 crisis. Through its local administration, the government provided food and assistance to poor people. It is estimated that more than 5 million ultra-poor people got support from this initiative. The government requested that the rich people in society help the needy people, and a lot of rich people responded to this urge and helped needy people by providing food and essentials. Further, the government has taken a hardline stance to control prices in the food market so that people can buy necessary foods for a fair price. The government also launched a web portal, named Food for Nation,¹ which was created solely to deal with food supply and customer access. The website is the first of its kind in Bangladesh, creating an open, web-based agricultural marketplace and making a direct connection between producer and customer. Besides this, another web portal, named Corona Info,² also provides services related to food relief. The government listed all of the contact numbers for online food delivery services and essential food suppliers in this web portal so that people can easily access them. Another admirable attempt at increasing food security, through Corona Info, was opening a simple online application system for food relief where poor people, or their neighbors on their behalf, can request emergency food supplies. However, it is unclear whether online platforms are helping the food security cause in Bangladesh, as most of the needy and food-insecure people are not able to connect with such platforms.

Nonetheless, these attempts are praiseworthy for increasing people's food access. The government is trying, furthermore, to influence people to consume diversified foods, such as milk, eggs, rice, oil, and meat, as these products are in surplus production inside the country. The government likewise tried to include these products in its food relief program, which is an indication that it is attempting to promote proper food utilization and nutrition. However, it is clear from reports that not everyone, and particularly not poor people, are guaranteed to get food. When there is no surety of food, which is especially the case during the pandemic, it is expected that many people will not have proper food utilization nor nutrition.

Moreover, Bangladesh has experienced some hiccups in efforts at food stability. At the very beginning of the lockdowns, we observed an upsurge in the purchase of essential goods, and food products were the main target for people. Before announcing the lockdown, the government failed to plan how people would lead their lives under these new guidelines, and this is reflected in the price hikes and the frequency that essential food products were out of stock at the beginning of the pandemic. After the


¹ <https://foodformation.gov.bd/>

² <https://corona.gov.bd/>

lockdown was put in place, the poor bore the brunt of the hardship; daily wage laborers, in particular, suffered, given that their income source was gone. These people are always at risk for food insecurity, and the pandemic further exacerbates their situation. This exemplifies that the government's system to maintain food stability is flawed.

What Should We Look Forward To?

If we look closely, all of these efforts, at their core, are attempts to increase the survival of poor people. However, food security is not the only factor in their survival. The COVID-19 pandemic gives us an uncertain future, but also provides limitless opportunities to start over in building a sustainable food system. The pandemic exposed the flawed system of government and society, which initially forgot to recognize the influence of pandemics on food security. It also showed that the government's efforts were not enough to ensure the basic need of food for the people of Bangladesh. COVID-19 changed the context of our economic attention. It gives us a chance to restructure our efforts to make a food-secure society. The post-coronavirus rebuilding program must listen first to the lived experience of affected people. The government needs to unfold the potential of learning from people's social, cultural, and economic practices while dealing with the prolonged crisis. Food is the first basic need of human beings, and food should be at the center of any recovery or social safety plan. Relatedly, agriculture should be given the foremost priority for rebuilding packages. The government should encourage farmers, prioritize agricultural marketing, and create spaces for farmers to share their views. They should also prepare to build a farmer-consumer oriented producing-processing-marketing-selling system to lead a comprehensive recovery and increase preparedness for dealing with food insecurity.



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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

Solidarity policy in defense of life: A hope in Brazil's pandemic

**JAFSCD
Responds to
the COVID-19
Pandemic**



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The current Brazilian political situation together with the advance of coronavirus (COVID-19) has reinforced inequalities to food access in Brazil, generating uncertainties about satisfying basic human needs. Before the COVID-19 boom, Brazil had already been showing the effects of a long political and economic crisis, largely a result of the 2016 coup, which has led to more than 11% of the population unemployed and more than 40% in informal work.

Brazilian President Jair Bolsonaro's statements have made explicit his denialist policy by prioritizing the economy over life. Bolsonaro's government has been undoing social security and food security policies through the reform of the social security system, the dismantling of public universities, the shut-down of agrarian reform, the disassembling of food supply policies, and the end of the National Council for Food and Nutrition Security. Bolsonaro starts from an authoritarian policy, based on the neoliberal ideology and fear in which agribusiness and other large private corporations are prioritized rather than strengthening the collective alternatives that could help ensure a healthy diet for the Brazilian population. The COVID-19 pandemic, therefore, adds another societal stress factor, bringing back food insecurity and “the ghost of hunger” in Brazil.

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In this context, social movements and political organizations such as the Levante Popular da Juventude (Youth Popular Uprising), the Movimento de Trabalhadoras e Trabalhadores por Direitos (Workers Movement for Rights), the Consulta Popular (People's Consultation), Movimento de Trabalhadores e Trabalhadoras Rurais Sem Terra (Landless Workers Movement), Movimento dos Atingidos por Barragens (Movement of People Affected by Dams) and Movimento dos Pequenos Agricultores (Small Farmers Movement) have reinforced solidarity and mutual aid in the territories, acting to guarantee the defense of life and denouncing Bolsonaro's death policy, the attempt to save the economy instead of the Brazilian people in these COVID-19 times.


Solidarity for Brazilians is not something new; it is part of the population's daily life and is a political practice of social movements and organizations. Mutual assistance among people of the same territory is one of the collective forms for surviving in the peripheries of Brazilian urban centers and is also part of the reciprocal relations between peasants and common traditions.

If solidarity is a decisive factor in the maintenance of life during normal times, in the times of Bolsonaro and COVID-19, it becomes a bigger challenge. With social seclusion, part of the Brazilian population has to live a dilemma, choosing between precarious isolation in small houses with a large number of residents, or exposure to the risks of contamination to achieve incomes that guarantee, minimally, access to food and hygiene.

In this sense, the solidarity policy that is being built by social movements and political organizations for this period is based on the development of a dialogue network between the most diverse sectors of society that can contribute to improving hygiene conditions, food access, and awareness about the recommendations for coping with COVID-19. In addition, there is an urgency for the network to bring awareness about the need for political struggle in defense of life.

The actions developed, therefore, start in two correlated ways. The first is to raise awareness about COVID-19 prevention mechanisms and the need to fight for the guarantee of life through methods that do not compromise social isolation. To this end, debates, courses, and discussion groups are held through social networks. The internet is being used as a tool in the battle of ideas, to encourage political debate and social engagement. Informative materials, banners, and posters are being produced to share on the streets.

The second is to construct channels that ensure food and hygiene items for people who are socially vulnerable. Food and hygiene materials are acquired through donations received by social movements and political organizations or from donation boxes throughout the city. Then the donations are sanitized and distributed to families identified by this network. The distribution of breakfasts, lunches, and soups and the construction of networks for the commercialization of agroecological products are other actions being developed as ways to guarantee the income of peasants in this period.

It is worth noting that these actions cannot cover the scope of the challenges that the Brazilian population has been going through. While the role of the state in guaranteeing basic rights is necessary, it is a way to reinforce solidarity as a guiding principle for social transformation, the valorization of human life, and the commitment to the Brazilian people. If the Bolsonaro government has strengthened the concentrated and globalized food system, the social movements and political organizations of Brazil have shown that there are ways to build a healthy diet and solidarity relations, although they will only become a reality for the whole population through social engagement and political struggle. These actions are based on a policy of class solidarity in the construction of a new food system for the Brazilian population, built on the guarantee of food sovereignty, agroecology, a fair supply system that enables the revaluation of heritage food, and creativity. Those are the essential foods of social transformations. 

COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

COVID-19 containment and food security in the Global South

JAFSCD
Responds to
the COVID-19
Pandemic



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Abstract

Population-level COVID-19 containment strategies have been particularly hard on the urban poor and vulnerable population groups such as female-headed households, children, youth, the homeless, informal sector employers and employees, casual workers, the unemployed, and migrants and refugees. As a direct result of the COVID-19 outbreak, a secondary pandemic of hunger and food insecurity is now impacting many of these groups. An effective and sustainable global response to the COVID-19 (and any further) viral pandemics must ensure that food security is an essential piece of the containment and mitigation puzzle.

Keywords

Food Security, Food Security Policy, COVID-19, Pandemic, China, Global South

A primary indirect consequence of the growing COVID-19 pandemic across the Global South is a dramatic increase in the prevalence of hunger and food insecurity (HLPE, 2020). The Food and Agriculture Organization of the United Nations (FAO) (2020) has called the food security consequences a crisis

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within a crisis, while the World Food Program calls it a hunger pandemic, warning that 30 million people could die of starvation during the pandemic (Husain, Sandström, Greb, Groder, & Pallanch, 2020). The number of severely food insecure people could more than double, from 130 million to 265 million, by the end of 2020. The disruption to food systems has important implications for epidemic control and the current and future food security of urban residents. Impaired food security may increase susceptibility to infection and worsen the well-being of the infected (HLPE, 2020). The interconnections between food insecurity and the outbreak highlight the urgent need to examine and improve food security interventions, both during and in the aftermath of the pandemic (Husain et al., 2020).

The dramatic increase in urban food insecurity is partly a function of the disruptions in national and globalized food supply chains (Clapp, 2020). Food access is highly contingent on the importation of food from the hinterland or global markets. While food production, distribution, and retailing are generally considered ‘essential services,’ many states have allowed formal retailers, such as supermarkets and their supply chains, to remain operational while shutting down the informal food sector on which the urban poor depend. In addition, restrictions on internal movement and international travel have negatively affected informal cross-border trade in foodstuffs.

Governments in the Global South have responded to COVID-19 with a range of containment, economic, and public health strategies. The Oxford Coronavirus Government Tracker (OxCGRT) identifies 18 separate government measures (Table 1). We have added another eight common measures observed in the Global South to the OxCGRT list. As Hale et al. (2020) note, government responses to COVID-19 within each category exhibit “significant nuance and heterogeneity,” and their impact is “highly contingent” on local political and social contexts (Hale et al., 2020). For example, C7 measures range from complete residential

Table 1. Government Responses to COVID-19


No.	Name
Containment and closure measures	
C1 ^a	Behavior change (social distancing, mask-wearing, hand-washing)
C2	School closing
C3	Workplace closing
C4	Cancel public events
C5	Restrictions of gathering size
C6	Close public transport
C7	Stay at home requirements (including lockdowns, quarantine, curfews)
C8	Restrictions on internal movement
C9	Restrictions on international travel
C10 ^a	Closure of public spaces (parks, beaches, etc.)
C11 ^a	Closing food markets (wholesale, retail, informal, wet)
C12 ^a	Banning informal sector vending
C13 ^a	Banning sales of alcohol, cigarettes
Economic measures	
E1	Income support
E2	Debt/contract relief for households
E3	Fiscal measures
E4	Giving international support
E5 ^a	Social grant support
E6 ^a	Food distribution
Public health measures	
H1	Public information campaign
H2	Testing policy
H3	Contact tracing
H4	Emergency healthcare investment
H5	Investment in COVID-19 vaccines
H6 ^a	Investment in COVID-19 research

^a Added to the original table.
Source: Adapted from Hale et al. (2020).

lockdowns, as in Chinese cities and migrant worker hostels in Qatar and Singapore, to general appeals by politicians about hand washing and social distancing (Crush, 2020).

Contextual variables include the ability of lower-tier governments (state, municipal) to comply with national policies; the degree and type of enforcement; and the response of people themselves to measures that restrict their mobility, income, recreation, and social life. Some countries, such as South Africa, have deployed the army to enforce containment. Further complicating the picture, each measure is dynamic rather than static, and subject to change, modification, and partial or wholesale relaxation. While some countries, such as China, continued with these policies until the coronavirus was under control, others have opted to loosen restrictions due to the severe economic toll of COVID-19. Further waves of infection are widely anticipated in these jurisdictions.

Containment measures have had an immediate impact on food security in many Southern cities, through the disruption of food supply chains, partial or complete bans on informal food markets and street vending, controls on movement, layoffs, and unemployment, a precipitous decline in household income, and the shuttering of school feeding programs. Most poor urban households live in conditions where individual social distancing measures are impossible to implement. Particularly vulnerable are the urban poor in low-income and informal settlements and, within these areas, population subgroups such as female-headed households, older adults, day laborers, workers in the informal sector, the homeless, and migrants and refugees. Hunger is driving desperate people to defy containment measures and turn to causing social unrest, including looting of food outlets and delivery trucks. Some governments have introduced or ramped up existing social protection and food distribution programs, while others have focused on ensuring compliance through force.

The **Hungry Cities Partnership** (HCP) focuses its attention on the transformation of food systems accompanying rapid urbanization and the vulnerability of urbanizing populations to food insecurity. In early 2020, HCP began a project on the food-security consequences of the COVID-19 pandemic in China. We are now upscaling this research to six additional sites in Africa and Latin America. We will be exploring how containment responses to COVID-19 have impacted urban populations in six cities with a combined population of over 20 million people. In scaling up this research, we are focusing on cities and populations with low levels of pre-COVID food security to discern whether public health policy responses have exacerbated food insecurity and, if so, in what ways. 

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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

Digital media to guarantee food security in Colombia during COVID-19

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Responds to
the COVID-19
Pandemic**



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Abstract

In Colombia, quarantine and biosecurity measures were decreed to avoid contagion due to the COVID-19 pandemic beginning on March 24, among which is the promotion of social distancing. This has caused the use of digital media to carry out activities that were previously carried out in person, such as marketing. For this reason, people started looking for alternatives that would avoid social contacts, like digital media, which have become a channel that promotes food security, fair trade, and direct purchases from small producers in the cities.

Keywords

COVID-19, Pandemic, Digital Media, Food Safety, Colombia, Bogotá

Before the quarantine caused by the COVID-19 in Colombia began, I used to go on weekends to buy food from supermarkets and large stores in the city. However, I have not visited one for more than four months. Due to the biosecurity measures recommended by the World Health Organization (WHO), I try not to leave the house or visit closed spaces. That is why, since the beginning of the quarantine until the present, my family and I have supplied ourselves with food through delivery services requested from mobile peasant markets that sell their products in the city.

My family and I are not the only ones who have changed their habits in the purchase and provision of food. Due to the social distancing measures derived from the current situation, many people have

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begun to look for alternatives that allow them to continue food access without having to leave their homes.

Thus, in Colombia and, more specifically, in Bogotá, supermarkets and neighborhood stores' delivery services have increased, as well as online direct purchases from farmers and local markets (Dinero, 2020; Solano Alarcón, 2020). It leads me to thinking of the different digital platforms (web pages, WhatsApp, Instagram, Twitter, YouTube, apps, etc.) as a channel that promotes food security, fair trade, and direct purchase from small producers in the country.

According to Google Trends, the search for “market delivery service”¹ in Bogotá increased during the week of March 29 to April 4, the week after the President had decreed quarantine. Both producers and consumers had to turn urgently to digital media to make possible the continuous supply of food—even if they were establishments and people who had never considered digital media necessary for their businesses or they did not have internet service before. Therefore, diverse initiatives began to emerge for promoting the creation and generation of digital content through profiles on social networks and web pages by families and peasant markets.

“Nubia e Hijos” is a YouTube channel² created by a peasant family from Chipaque, Cundinamarca. Seeing that their crops were lost and losing money due to the pandemic, they decided to teach people how to grow at home and to promote their products (fresh vegetables, fruits, milk, and some value-added foods like cakes, yogurt, desserts, lasagna, and sauces, depending on the season) through social networks. As they were responding to the current needs of people in the city, they quickly obtained many subscribers on their channel. Today they have more than 500,000 followers on their YouTube channel, have a profile on Instagram,³ Twitter,⁴ Facebook,⁵ and a website⁶ where customer can order and pay for their products online, and Nubia's family and their collaborators picks them up and takes them home. Their products are typical of the region and are cultivated and reaped by Nubia and her children. “Nubia e Hijos” literally delivers food from the field to the table.

On the other hand, “Mercados Campesinos Móviles” (Mobile Farmers Markets), whose motto is “our farmers markets at a click!,” is an initiative created by the Secretariat of Economic Development of Bogotá's mayoralty. It is a virtual platform that allows people to buy fresh produce from farmers in the Cundiboyacense savannah without any intermediary, grouped according to the buyer's location. This initiative has a website⁷ as well as accounts on Instagram, Facebook, and Twitter, and it is currently promoting the launch of its app to speed up the purchase process.

These initiatives embody a great challenge and progress for the rural population in the country, since, according to the Ministry of Information Technology and Communications of Colombia, only 17% of the rural population has internet connectivity (Frega, 2020). Considering the current situation with COVID-19, a lack of internet service would aggravate the connection, employment, communication, and provision of food between the cities and the Colombian countryside; that is, it would directly affect national food security. Furthermore, it is necessary to recognize the mutual relationship between Bogotá and the countryside, in which the food produced by the peasant population feeds the city, and a large part of the peasants' economic income comes from the products that they manage to market in the city (Ministry of Agriculture, 2016).

¹ “Mercado a domicilio” in Spanish.

² YouTube channel: <https://www.youtube.com/channel/UCeUlkW2mOytSyH-7GerzeLQ>

³ Instagram profile: @nubiahijos

⁴ Twitter profile: @nubiahijos

⁵ Facebook profile: <https://www.facebook.com/Nubia-e-hijos-102454284792175/>

⁶ <https://www.nubiahijos.com>

⁷ <https://www.mercadoscampesinos.gov.co>

It is important to highlight that the road is still long, and it is necessary to close the existing gaps between the city and the countryside in terms of connectivity, information, technology, and internet access. However, we are all taking the first steps to move forward and looking for the best solutions to deal with the COVID-19 pandemic. In this sense, I want to highlight the work that different people are doing through digital media to continue guaranteeing food security for all of us: responsible, collaborative, and technological work in favor of access, availability, use, and stability of food for all in difficult times.



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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

The future of food after COVID-19 through the lens of anthropology

JAFSCD
Responds to
the COVID-19
Pandemic



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Abstract

This commentary uses the lens of anthropology to imagine the consequences of COVID-19 for the food system. It explores the different cultural meanings of food and presents the pandemic as a social phenomenon. All of these elements suggest the possibility of a deep and widespread impact and urge economic actors to consider the broader context.

Keywords

Future, Food, COVID-19, Strategic Planning, Foresight, Anthropology

Food production and consumption are not immune to the COVID-19 phenomenon. We could be led to think this, however, given that even during the quarantine there were no interruptions in the food supply chain in Italy. However, the pandemic has claimed many victims and placed limitations on individual freedoms that are comparable to wartime. In isolation, food in Italy has become our positive obsession, a sort of authorized relief valve. In the confusion that this situation generates, even those who work professionally in the sector end up thinking in silos: farmers are worried by the lack of workers for the harvest, food industries by the increased standards of work safety, large-scale retailers by the social sensitivity of their role, and restaurants by the loss of revenues.

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Author Note

An earlier version of this commentary (Ginanneschi, 2020) was published on April 29, 2020 at the peak of the pandemic in Italy, on the online bulletin of Accademia dei Georgofili, an Italian agriculture research institution established in 1753.

Yet, looking beyond the short term is important in order to make strategic decisions, to start investing, to innovate, and to adapt to a long coexistence with the virus. Since we are not in a situation comparable with any past crisis, we cannot rely on experience: the disruption that COVID-19 and the necessary containment measures have caused is without precedent in human history. What hypotheses can we formulate regarding the influence of the pandemic phenomenon on the future of food?

In waiting for more articulated contributions by strategic planning and foresight, it could be helpful to look at the reality in progress through the lens of anthropology (Peacock, 2001). We will focus briefly on the many cultural values of the concept of food in order to imagine holistically the possible consequences of COVID-19. In doing so, we will follow a classification of food meanings, elaborated by Mintz and Du Bois (2002) and conceived for an interdisciplinary use.

Let us firstly consider food in terms of *security*, that is, as an accessible resource, a means of support, and a human right sanctioned by the Universal Declaration of 1948. The challenge for mankind is reflected in the Expo 2015 slogan, “feeding the planet,” that is, satisfying the food demand of 8.5 billion humans in 2030 and 9.7 billion in 2050 (Godfray et al., 2010; United Nations, Department of Economic and Social Affairs, Population Division [DESA], 2019). The Food and Agriculture Organization of the U.N. (FAO) (2017) expressed optimism about the possibility of achieving this goal, under the condition that “vertically coordinated, more organized food systems” (p. xii) become available. The COVID-19 pandemic, which has already resulted in 17.8 million confirmed infections and 686,145 deaths worldwide (World Health Organization, 2020), however, challenges this plan. The spread of the virus to the poorest countries in the world increases the risk of generating serious famines with millions of victims. Even in more developed countries, obstacles to foreign workers’ cross-border commuting jeopardize harvests, while the working of restaurants at half-capacity penalizes fresh and high added-value products that often come from short supply chains. The picture would not be complete without considering another aspect of food security. Given the growing difficulties of obtaining supplies from abroad—since all global trade has slowed—agricultural produce is recovering its strategic and political values. National states could thereby claim their sovereignty over food production, not so much to protect local farming, but to defend a broader national interest (Friedmann, 1993). The calls to consume national products, at the expense of foreign ones, are already multiplying. Today’s food sovereigntists could be tomorrow’s protectionists. The damage to the world production capacity resulting from this action would be enormous and the poorest countries would pay the highest price.

Examining food as a *mirror of society* is another important analysis filter. In recent years, the social changes that food has incorporated have been innumerable: the tendency to eat out, the fast food boom, the mass production of processed foods, the spread of ready meals, the commodification and branding of food, for instance. COVID-19 poses a challenge to this food dimension. Social distancing measures, including the consequent reduction in the movement of people and the increase in smart working, will make catering and collective consumption more problematic, while favoring food preparation at home and online purchases. It is going to be a revolution in terms of ingredients, processing, packaging, and places of consumption. It is useful to remember that wars have often led to important and lasting changes in food consumption, and the economic impact of COVID-19, as time passes, is getting closer to that of a war conflict.

Even food as *identity*, a signifier of ethnicity and a sign of belonging to food groups or tribes, could undergo a transformation. The rebirth of borders and limitations to the movement of people for public health reasons, as well as the consequent sharp slowdown in foreign tourism, will favor ethnocentrism (the preference given to national foods). Production chains, which have lengthened as a result of globalization, will shorten again. On the other hand, traditional foods will be negatively affected by the lack of foreign tourism.

Finally, we should not forget the *ritual value* of food. The rite, a repeated act of approaching the sacred or the magical (De Martino, 1972), survived, albeit in a subdued way, in our increasingly secular conviviality. But COVID-19 can lead from a latency to a higher tendency of more than one phenomenon of this type. Think about the global spread of remote lunches and aperitifs hosted by WeParty, Zoom, Jitsi Meet and others, all new applications downloaded millions of times during the quarantine. This phenomenon of virtual conviviality undeniably has an eschatological component. When confronted with the threat of death and physical isolation, the human being tends to create salvific rituals that help restore his identity with respect to others, the sense of belonging to a group, and the social order. Purchases in large department stores and supermarkets already adjusted to this, with the emergence of new consumer trends. The legacy of COVID-19, one day, will also be measurable in these terms.

In conclusion, the widespread requirement for social distancing is definitely transforming this epidemic into a global event with ideological, political, and socioeconomic dimensions (Stark, 1977), which will deeply affect food as a cultural product.

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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

The impact of food supply chain disruptions amidst COVID-19 in Malaysia

JAFSCD
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Abstract

Over the last 10 years, the food supply has been secured in Malaysia through a combination of local food production and supply of imported food. The occurrence of COVID-19 has disrupted the food supply chain with the lockdown restriction known as the Movement Control Order (MCO) put in place to break the transmission mode of COVID-19. This article outlines the chronological events that took place in Malaysia after a COVID-19 outbreak due to a religious gathering. The impact of MCO on the food supply chain, particularly to urban residents, is also described, with recommended approaches to mitigate the situation.

Keywords

Food Supply Chain, COVID-19, Pandemic, Food Security, Malaysia

Malaysians first took notice of COVID-19 when Wuhan, Hubei, China, went into lockdown at the end of January 2020. The initial reaction to this unprecedented lockdown in a city with a population of 11 million was mixed. Many opined it to be an impractical strategy to curb the virus. In retrospect, however, the Wuhan lockdown was a clear warning to the world that the infectious disease would not be an easy one to subdue.

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Malaysia's number of COVID-19 cases began to increase at the end of February due to an outbreak of 22 cases occurring in a huge *tabligh* religious gathering of 16,000 people in Sri Petaling, a town close to the capital city of Kuala Lumpur. As new infections rose and the World Health Organization (WHO) announced COVID-19 as a pandemic on March 11, the Malaysian government declared a movement control order (MCO) on March 16, and subsequently a nationwide lockdown on the 18th.

The rapidity and ferocity of the COVID-19 spread necessitated this quick action but left many with little time to plan ahead. In the first week after the implementation of the MCO, food supply chains (particularly those in urban areas) were disrupted due to the restrictions on traffic and market opening hours (Surendan, 2020). Food supply to the cities in Malaysia is mainly reliant on land transport such as lorries to carry the products from farms, which are normally located a distance away from the cities. The farm products are transported to wholesale markets before they are redistributed to be sold in shops, malls, and markets. In addition, there are local wet and night open markets whereby the food products sold are mainly from the smallholder farms located on the outskirts of the cities. These farmers usually bring their products directly to the local open markets to sell.

With the sudden imposition of the MCO, the food supply chain to the local open markets was hugely affected. Due to the difficulty in exercising social distancing in those markets, they were not allowed to open during the lockdown. Thus, on one end of the food supply chain there were multiple reports of farmers giving away or dumping their farm produce due to the perishable nature of the produce (Ng, & Wahid, 2020). On the other end of the chain, there were reports of consumers, especially foreign workers, refugees, and those from lower-income groups, facing difficulties in accessing food to meet their daily dietary requirements.

During this critical time, the government's Welfare Department intervened to help deliver food to underprivileged groups. Several volunteer groups were also set up to help in distributing food to the needy. However, this effort was sporadic, and data on people who are experiencing hunger could not be established.

Food security is a measure of the steady availability of food (ideally, healthy and nutritious food) to the population. It involves the stable supply of food even under catastrophic conditions such as earthquakes, floods, volcanic eruptions, tornados, and pandemics. Malaysia is a country blessed with rich natural resources and no natural disasters except for periodic short-term floods occurring in some parts of the east coast. After the country gained independence in 1957, the government developed strategic plans to achieve self-sufficiency in food production through the National Agriculture Policy (NAP) (Sundaram & Tan, 2019). Prior to the lockdown, food availability and access were not perceived to be issues for the majority of the population.


The onset of COVID-19 served as a wakeup call for all who had previously assumed that food accessibility and availability in Malaysia came naturally. Due to the implementation of the MCO, food security in Malaysia is under threat. It is imperative that policymakers take note of this situation and develop strategies to tackle similar shocks if they reoccur in the future.

One potential strategy is to make use of the advancements in communication technology to disseminate food production information to consumers rapidly and readily. Since internet connections are well established in most big cities in Malaysia, the majority of city dwellers can get access to information with a click of the button. Therefore, it would be beneficial to develop a public database of contacts and information about farm producers to directly link farm producers to consumers. This would provide a viable alternative for farm products to be delivered directly to consumers.

Another potential strategy is to look at ways we could provide incentives to farmers to grow food crops. Currently, Malaysia imports 20% to 30% of its food requirements annually, which amounts to approximately RM34.2 billion ringgit (Ministry of Agriculture, 2018). Even though local production for

food such as rice, meat, fish, eggs, oils, vegetables, and fruits have increased significantly over the years, our dependence on food imports remains heavy. This is partially because local food production is still not capable of meeting the demand of the country's growing population, which reached 32 million in 2019. However, the main reason for the lower local food production is due to lower import food prices, which results in farmers switching to growing cash crops instead of food crops (Sundaram & Tan, 2019). Achieving self-sufficiency in food production is crucial, especially under the current pandemic threat. Since overseas transportation was interrupted, the import of food has also been affected. This will, in turn, push up the food prices and affect the affordability and availability of food for the people.

We need a seed bank for food crops to ensure that their genetic germplasms are preserved for crop diversification. Since Malaysia is strategically located at one of the 17 megadiversity centers of the world, it could house the seeds of many plants, including food crops that are endemic to this region. The potential genetic variability provided by the seeds would be a rich resource for breeders and farmers to achieve agricultural resilience. The role of the seed bank would be to serve as a reserve for us to turn to in order to ensure the supply of a good starting growing material. In times like the pandemic, the government could select fast-growing food crops such as bayam and kangkong and distribute high-quality seeds to people to encourage homegrown food.

In short, Malaysia has achieved security in food by international standards. However, much work needs to be done to ensure the stable availability of healthy and nutritious food to the population so that we can be resilient against future threats and unforeseeable shocks similar to the Covid19 pandemic. 

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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

Florida fruit and vegetable growers' adaptation and response to COVID-19

JAFSCD
Responds to
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Abstract

While Florida is known for theme parks and beaches, its agricultural sector is the second largest industry in the state and accounts for a substantial proportion of the United States' annual production of many fruit and vegetable crops. Florida's farmers have capitalized on the fact that Florida is a top tourism destination, with 70-80% of large producers' sales targeting the theme-park, hotel, restaurant, and cruise line industries that were decimated by stay-at-home orders. With the exception of citrus, peak harvest for these crops is from March to May, which coincided exactly with the onset of the COVID-19 pandemic in the spring of 2020. Florida producers were left with hundreds of millions of pounds of produce with no available market. Florida farmers utilized innovative sales and market opportunities to sell as much of their highly perishable produce as they could. In addition, despite substantial personal hardship and financial losses, producers paid to harvest and transport produce to food banks and other hunger-relief organizations that were overwhelmed with demand from people who recently lost their jobs or were furloughed due to the closures of restaurants, hotels, theme parks, and cruise lines due to the pandemic. However, with the sheer volume of perishable produce left without buyers, some crops simply had to be tilled under or terminated. The COVID-19 pandemic increased awareness of and demand for Florida

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agricultural products among Florida residents, leading some grocery stores around the state to commit to buying more produce from Florida growers. A variety of programs and resources to help connect Florida growers to buyers were developed by the University of Florida, Institute of Food and Agricultural Sciences; industry groups; and state and regional organizations. This provides a valuable foundation to support food system resilience for future public health emergencies and natural disasters.

Keywords

COVID-19, Pandemic, Direct-to-Consumer Sales, Emergency Food Assistance, Cooperative Extension, Food Waste

Florida's Agricultural Sector

While it is known for theme parks and beaches, Florida's agricultural sector is the second largest industry in the state. It accounts for a substantial proportion of the United States' annual production of many fruit and vegetable crops, such as oranges (56%), grapefruit (54%), tomatoes (18%), watermelon (25%), cucumbers (33%), bell peppers (34%), squash (22%), and green beans (18%) (Florida Department of Agriculture & Consumer Services, 2017; USDA Economic Research Service, 2018). Aside from citrus, peak harvest for these crops is from March to May. During this time, which coincided exactly with the onset of the COVID-19 pandemic, the scale of Florida's crop production is difficult to comprehend. Collectively, South Florida growers ship approximately 60–70 million lb. (27–32 million kg) of vegetables to market *every day* at the peak of harvest. One growing region alone, Immokalee, accounts for approximately 400–500 semitrailer truckloads (or 15–16 million lb. or 7 million kg) of vegetables every day from March through mid-May. Florida's farmers have capitalized on the fact that Florida is a top tourism destination by focusing their production for sales to the theme park, hotel, restaurant, and cruise line industries.

The Impact of the Pandemic on Florida Agriculture¹

Shutdowns in response to COVID-19 in Florida and beyond decimated the foodservice market, which accounts for 70–80% of the sales for Florida's large growers. Because vegetables are highly perishable, after a few weeks, many producers needed to empty their coolers, dump produce, and terminate fields because there was no market for the millions of pounds of fresh produce at peak harvest season. The scale of the loss for Florida producers caused by COVID-19 is difficult to comprehend. Examples abound from South Florida. One grower in Belle Glade disked up 1 million lb. (453,500 kg) of green beans every three days. Another producer plowed under 2 million lb. (907,000 kg) of green beans and 5 million lb. (2.2 million kg) of cabbage. One farm dumped 100,000 lb. (45,000 kg) of tomatoes in one week. Another producer reported leaving 250 acres (101 hectares) of tomatoes unharvested, losing a US\$2.5 million investment.

Adaptation and Response

Direct Sales

In response to the pandemic, many growers, even large ones, explored alternative market channels, such as direct-to-consumer sales driven by social media campaigns. Traditional commercial farms in South

¹ This impact summary was prepared on the basis of information received by Gene McAvoy, who collected information from growers, distributors, and other industry partners throughout the peak harvest season during the COVID-19 pandemic and provided weekly reports from the week of March 23 through the week of May 4, 2020, for University of Florida administration, the Florida Department of Agriculture and Consumer Services, and local government stakeholders.



Photo 1. Mowing under the tomato crop. Photo by Gene McAvoy.



Photo 2. Flaming the tomato crop. Photo by Gene McAvoy.



Photo 3. Cucumber field before mowing. Photo by Gene McAvoy.



Photo 4. Cucumber field before mowing. Photo by Gene McAvoy.



Photo 5. Volunteers gleaning vegetables in Homestead, Florida. Photo by Gene McAvoy.

Florida were overwhelmed by the support for the sales at their packing houses. A packing house in Homestead opened on weekends for direct sales of US\$10 boxes to consumers and had cars stretched for half a mile in front of the packing house. They sold 120,000 lb. (54,500 kg) of squash, tomatoes, beans, and cucumbers. That packing house partnered with a central Florida farmer to sell 30,000 flats of blueberries at 12 pints for US\$20. One grower in Immokalee opened for direct sales to consumers and had a line of cars stretched for over a mile from before they opened until they closed, with a wait of over an hour and a half. That grower sold 25,000 lb. (11,000 kg) of vegetables that day, although this had limited overall impact—that amount was less than one semi-load,



Photo 6. The cars lined up to receive vegetable boxes in Immokolee, Florida, stretched over a mile. Photo by Gene McAvoy.



Photo 7. Handing out produce boxes, from farm to family. Photo by Gene McAvoy.

and that producer would normally ship 10–12 semi-loads a day, every day, at that time of year. Similar efforts were conducted by other farms, packing houses, and nonprofit groups around the state.

Donations

Despite their substantial financial losses and personal hardship, Florida's growers and shippers went above and beyond by paying to harvest and transport produce to food banks, instead of simply leaving produce in the field. Florida farmers donated millions of pounds of produce to organizations that were overwhelmed with demand from people who recently lost their jobs or were furloughed due to the closures of restaurants, hotels, theme parks, and cruise lines due to the pandemic.

One farm donated 220,000 lb. (100,000 kg) of fresh strawberries—equivalent to nine semi-loads—to a food rescue and distribution organization. One tomato grower donated 42,000 lb. (19,000 kg) of tomatoes to Meals on Wheels PLUS, helping supply 100 food pantries and agencies. Other producers donated tens of thousands of pounds of fresh green beans, sweet corn, and cabbage to food banks throughout the state. Florida's sugar producers, who are also major producers of other vegetables such as sweet corn, green beans, cabbage, and leafy greens, provided thousands of crates of fresh, locally grown produce to their employees, food banks, churches, and healthcare centers in South Florida. Growers in Immokalee donated more than 3 million lb. (1.4 million kg) of vegetables to a Southwest Florida food bank, overwhelming their ability to store, transport, and distribute the produce. Unfortunately, there is only so much perishable food that charities—with limited numbers of refrigerators and volunteers—can absorb.


Florida sugar producers went beyond crop donations by supporting a program that provided 15,000 hot meals from local restaurants to local residents. One sugar producer donated 15,000 N95 masks to local hospitals and first responders. Finally, one sugar producer had a unique response to the coronavirus



Photo 8. Food distribution in Immokolee, Florida. Photo by Gene McAvoy.

pandemic by donating 42,500 lb. (19,000 kg) of sugar to a rum distillery to make into hand sanitizer for donation to first responders, hospitals, nursing homes, and essential food supply employees.

What This Means for the Future

The catastrophic impact of the pandemic has led to increased public awareness of Florida's agricultural industry. It also led to a variety of support programs to help connect Florida growers to buyers, which provides a valuable foundation to support food system resilience for future public health emergencies and natural disasters.² In response to consumer demand, some grocery stores around the state have committed to buying more produce from Florida growers and now actively advertise using the Fresh from Florida labeling, a state marketing program for Florida agricultural products. Finally, many growers are engaging with new direct sales opportunities and using technology to connect with consumers who are newly aware of the importance of supporting Florida farmers. Looking to the future, these initiatives connecting producers to consumers will yield a more resilient food system in Florida. 

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² See, for example, Florida Department of Agriculture and Consumer Services (FDACS) "Florida Farm to You" program (<https://www.fdacs.gov/Agriculture-Industry/Florida-Farm-To-You>), the Southwest Florida Fresh website (<https://www.swflfresh.com/>), developed by University of Florida, Institute of Food and Agricultural Sciences Extension in collaboration with the Southwest Florida Regional Planning Council.

COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

Beyond COVID-19: Turning crisis into opportunity in Nigeria through urban agriculture

JAFSCD
Responds to
the COVID-19
Pandemic



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Introduction

Since the outbreak of the novel coronavirus (COVID-19) all over the world, countries have tried several strategies to minimize its impacts on their citizens and the economy. The first case in Nigeria was reported on February 27, 2020, and since then the infection has been spreading like wildfire, making Nigeria one of the three most affected African countries in Africa and the most affected in West Africa (Food and Agriculture Organization of the United Nations [FAO], 2020-a). To slow down its pace, governments at all levels have taken measures to curb its impacts. Measures taken include mandating social distancing, curfews, and, in some cases, complete lockdowns. The lockdown of virtually all sectors of the economy, especially the agricultural sector, has exacerbated food shortages in the country, especially among urban dwellers. Unfortunately, agriculture in most developing countries is highly related to physical, rather than mechanized, labor. The labor shortage due to movement restrictions (both intra- and interstate) and social distancing as a result of COVID-19 are starting to affect agricultural producers in the hinterlands, thus worsening the food supply to urban centers that are coincidentally the epicenters of the disease.

As public life is forced to shut down under the strain of the pandemic, serious concerns over the food supply are making the headlines. This is because agriculture and the food system were under a critical strain before the pandemic. Consequently, the pandemic will worsen an already bad situation—one in which one out of nine people globally do not have sufficient food to eat, meaning that about 820

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million people faced continuous hunger before the pandemic (Food Security Information Network [FSIN], 2020).

With the COVID-19 pandemic, food and nutrition security are expected to nose-dive, while poverty and malnourishment could become worse. The number of the world's hungry are expected to double as an estimated 265 million people around the world are predicted to experience severe food deficit this year alone due to the COVID-19 pandemic (FSIN, 2020). The Economic Communities of West African States (ECOWAS) estimates that COVID-19 pandemic increased the risk of food insecurity and malnutrition for 50 million people between June and August 2020. This is because the pandemic is expected to cause financial stress, inflations and sustained disruption of the food supply system. This will not only affect food availability, but also its affordability, and thus will increase food insecurity across the globe (FAO, 2020-b). This leaves over a quarter of a billion people at the edge of starvation.

Cities and agriculture seem like two incompatible worlds. COVID-19 has clearly demonstrated that change can happen suddenly and dramatically. The pandemic has changed the way people, especially urban dwellers, think about their food supply. The sudden disruption of food supply chains as a result of lockdown shows how easily the food supply can be disrupted and causes many to rethink where and how to get their food. As one consequence, COVID-19 has pushed many urban dwellers to grow their food at their homes, providing a potentially lasting boost to urban agriculture (UA). This increase in UA may be out of boredom or not wanting to be idle during the lockdown, or as a necessity for an alternative food supply.

Impacts of COVID-19 on Food Supply and Demand in Urban Centers

In Nigeria, the mitigation strategies adopted by governments to curtail the impacts of the COVID-19 pandemic include complete lockdown and partial lockdown approaches. In the complete lockdown approach, all activities are expected to close down (excluding essential ones like health services), while in the partial lockdown approach, a curfew is imposed and transportation between urban centers and rural communities is limited, but the rural economy and essential businesses continue. In essence, both lockdown approaches impose heavy economic costs on the populace with major impacts on the food supply and demand system in urban centers.

The food supply is negatively affected by the lockdown through self-isolation, movement restrictions of rural and urban farmers leading to farm-hour loss, and eventually low productivity of essential food crops during the period. There are also challenges in terms of logistics involving the movement of food crops, leading to perishable goods grown within and around urban areas rotting away. Consequently, the prices of food items in markets skyrocketed due to limited supply, making them unaffordable for many urban dwellers. Livestock is also affected due to reduced access to animal feeds, especially the poultry business and including the supply of eggs to urban dwellers. All these are likely to adversely affect the healthy dietary habits of groups vulnerable to the virus, especially the elderly and young children, thereby lowering their immunity.

In terms of food demand, uncertainty made people to spend less on quality food, resulting in noticeable declines in sales and consequently in production. Visits to major food markets also decreased drastically, especially in areas with partial lockdowns because of the contagious nature of the virus.

Potential of Urban Agriculture

UA has been known previously to contribute significantly to achieving the United Nations' Sustainable Development Goals (SDGs), particularly SDGs 1, 2, and 17, which relate to reducing urban poverty, achieving zero hunger, and ensuring environmental sustainability (FAO, 2007).

The urban poor constitute a large percentage of urban dwellers. Those in this group spend 50% to

70% of their income on food (FAO, 2007). To these people, UA offers the opportunity for a better diet and an increased free fund from either spending less to buy food or additional income from selling some of their produce. These funds can then be spent on other needs (Rabinovitch & Schmetzer, 1997).

Research indicates that UA was one of the successful strategies employed to combat the negative impacts of the Structural Adjustment Program (SAP) that plagued most African countries in the 1980s (Kareem & Raheem, 2012).

Before the discovery of oil in 1970, agriculture contributed considerably to the gross domestic product (GDP) of Nigeria and employed about 80% of the work force (Adebisi & Monisola, 2012). With the right innovation and institutional framework, UA holds unlimited opportunities, as Nigeria is blessed with fertile land and a good climate for crop production.

UA also offers the potential of improved climate by acting as windbreaks, providing shade, absorbing CO₂, and maintaining biodiversity (Konijnendijk, Gauthier, & van Veenhuizen, 2004). UA also adds aesthetic qualities to cities by helping to beautify them. The application of waste to grown crops can make a considerable impact in easing the existing problem of waste disposal management.

Policy Support to Promote UA in Nigeria

A policy that integrates and regards UA as an integral part of urban income, employment, and the food system will go a long way in tackling some of the challenges faced by UA and a step to innovatively support UA. This will totally change the public's outlook toward UA. Some of the policy supports may include but are not limited to:

- Recognizing UA as a vital land category in the metropolitan area by integrating UA into city planning and establishing greenbelt zones in city master plans;
- Increasing the enlightenment of urban residents on the benefits of UA;
- Establishing appropriate agencies at local and metropolitan government levels to regulate and coordinate UA activities and to provide access to agricultural loans they can disburse to interested urban dwellers;
- Setting up facilities to turn urban waste into compost for large-scale food production within and around cities; and
- Training of urban farmers by extension workers on improved methods of cultivation and developing and implementing curricula in UA at the secondary and tertiary educational levels.

Conclusion and Recommendation

A shortage of food is evident across the world during the COVID-19 pandemic period, but manifests itself more in African countries and especially in urban centers. As we move and/or navigate toward the next phase of the pandemic and accept the new norm it has created, the practice of UA could become a more viable tool to help tackle the problem of food shortages in urban centers under a well-managed system. It holds great prospects for alleviating urban poverty as well as solving the food insecurity challenge in urban centers in Nigeria. It is recommended that governments at all levels should not only take advantage of but also promulgate policies to invigorate UA with the aim of sustaining the food supply in urban centers.



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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

Farmers markets: Working with community partners to provide essential services during COVID-19

**JAFSCD
Responds to
the COVID-19
Pandemic**



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I will do whatever it takes to keep it open.

—Farmers Market Manager in San Luis Obispo County on
efforts to keep the markets open during the pandemic

In San Luis Obispo (SLO) County, California, the SLO Food System Coalition hosts an Electronic Benefits Transfer (EBT) at Farmers' Markets Workgroup. Workgroup partners include representatives from food banks, public health departments, social services, University of California (UC) Cooperative Extension (UCCE), and local farmers market associations. The workgroup aims to increase the use of CalFresh (formerly known as food stamps, known nationally as SNAP) at farmers markets in SLO

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County to foster (1) equitable access to healthy foods, and (2) support for local farmers.

In SLO County, there are 14 year-round, weekly farmers markets. Of those markets, eight accept CalFresh¹ benefits and seven offer the Market Match² incentive program. Market Match is California's healthy food incentive program, which matches CalFresh shoppers' benefits dollar for dollar, providing additional money to spend on fruits and vegetables at participating farmers markets. As the COVID-19 pandemic unfolded and shelter-at-home was mandated, markets strove to operate as essential food outlets. The pandemic forced many to think about the security of global supply chains and the role that local farmers markets play in supporting food security and public health.

The COVID-19 pandemic has led to income loss for many individuals and households, which increases their risk of food insecurity and related poor health outcomes. CalFresh is one of the largest and most effective tools at reducing food insecurity (Mabli, Ohls, Dragoset, Castner, & Santos, 2013) while stimulating economic activity, particularly during economic downturns (Canning & Stacy, 2019). However, there is evidence that these benefits do not reach low-income qualifying households equitably. A 2018 study found that CalFresh participation among farmworkers in California was disproportionately low compared to other regions and documented that Latino farmworker immigrants in all regions studied are 40% less likely to participate in SNAP than comparable households headed by non-Latinos (Medel-Herrero & Leigh, 2018). CalFresh is a federally funded food assistance program. Funds ranging from US\$16-US\$194 per person per month are issued on an EBT debit card to be used at many grocery stores and farmers markets. At the start of the pandemic, to address food insecurity the federal government issued an additional US\$365 per child for qualifying families through a Pandemic EBT program, and a COVID Emergency Allotment for CalFresh recipients, during April and May 2020. Comparing April data from 2019 to 2020, SLO County saw a 22% increase in the number of individuals receiving CalFresh.

Innovation

Recognizing the importance of farmers markets that accept CalFresh in supporting the health, food security, and economy of the local community, the workgroup collaborated to ensure that markets could stay open. In the days immediately following the shelter-at-home order, local SLO County market managers joined many across the country in implementing safety measures that included installing barriers and directional tape to manage traffic flow, increasing space between vendor stalls, and posting information about how to avoid the spread of COVID-19. Local market managers provided gloves and hand sanitizer to all vendors and customers. Vendors were trained in proper glove use and handling money with one hand and produce with the other. Customers were no longer permitted to handle products, and signs were posted to let them know that the vendor would hand them their requested food items. Vendors were prohibited from providing tasting and samples, and procedures for managing lines to allow social distancing were implemented, including placing signage and tape to allow six feet of distance between nonhousehold members. Vendors were also innovative. Some used large tongs to grab produce for customers, and others prepackaged produce items for grab and go. In addition, several markets provided early shopping hours for elderly or high-risk patrons.

As these new procedures were established, market managers sought support from the workgroup to ensure the consistent implementation of safety practices and to increase the promotion of markets. Workgroup partners requested that county disaster service workers (DSWs) be deployed to help manage social distancing. In addition to training and supervising the DSWs, partners created bilingual signage,

¹ <https://www.cdss.ca.gov/food-nutrition/calfresh>

² <https://marketmatch.org/>

generated content for print³ and social media outreach, and developed flyers and promotional videos⁴ to let CalFresh recipients know that farmers markets are open and a safe place to shop with their CalFresh card. This work was promoted by all workgroup partners at food bank distributions, social service offices, through social media channels, and in local media. With the help of the DSWs, market staff enhanced signage at points of entry, set up a portable handwashing station, enforced limits on customer entry, and reminded vendors and customers to follow safety protocols. To onboard the DSWs, the workgroup chair utilized best practices from the Farmers Market Coalition website.⁵ Additional factsheets from the UCCE office were provided, including *Supporting Worker Safety in Agricultural Operations during COVID-19 Outbreak*,⁶ *Food Safety Guidance during the COVID-19 Outbreak*,⁷ and CDC information about why six feet is important.⁸ The DSWs wore vests with name tags to identify them as farmers market staff, and they were provided face coverings upon request, gloves, hand sanitizer, and social distancing enforcement tools, such as tape, markers, and a six-foot (2 m) section of PVC pipe to measure out increments for social distancing areas.

Challenges

Challenges with managing markets during the pandemic are ongoing and include managing conflicting community perceptions and increasing safety and accessibility as regions begin to reopen. In the beginning, some local customers shared complaints publicly that markets were not doing enough, while other customers expressed their anger to the market manager that there were too many safety procedures in place. Additionally, the DSWs were pulled into other job assignments at the last minute, and it was difficult to fill their shifts at the farmers market, leaving market managers scrambling to find help. Markets that do not accept CalFresh benefits were frustrated that they were ineligible to receive workgroup support.

An ongoing challenge, amplified as additional households qualify for CalFresh benefits due to the impacts of COVID-19, is creating farmers markets that are reflective of communities and include people of all income levels, languages spoken, races, and ethnicities. Alkon and McCullen (2011) argue that farmers markets have the potential to be spaces for equitable and inclusive food movements, yet are predominantly white, “racialized spaces” and affirming of white, affluent, and liberal identities. This “racialized space” inhibits the participation of people of color and makes invisible the injustices in our food system, including the oppression of predominantly low-paid Latino/a workers who carry out the bulk of food cultivation. A 2016 systematic review (Freedman et al., 2016) found that low-income shoppers perceived that farmers markets do not accept food assistance programs, that there was limited food variety, and that there was a lack of racial/ethnic diversity in the market space. In addition, Colasanti, Conner, and Smalley (2010) found that Latina women report feeling disrespected and their children unwelcome by vendors and consumers at farmers markets, especially compared to white children. In focus groups with people who speak Spanish and have participated in CalFresh in SLO County (not yet published), barriers to shopping at farmers markets included that they did not know they could use CalFresh and Market Match there, that markets that did have these programs were located very far away, and that markets mostly carry produce that is familiar to white consumers.

³ See examples of print promotion at

<https://www.ksby.com/news/local-news/central-coast-farmers-markets-provide-affordable-produce-for-cal-fresh-participants>

⁴ <https://www.emergencyslo.org/en/food-assistance.aspx#Market-Match-at-Farmers-Markets>

⁵ <https://farmersmarketcoalition.org/covid-19-crisis-farmers-market-new-guidelines>

⁶ <https://ucanr.edu/sites/SLO/files/323154.pdf>

⁷ <https://ucanr.edu/sites/SLO/files/322022.pdf>

⁸ <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html>

Impact

From March to June 2020, workgroup members coordinated and trained 14 DSWs, who provided more than 140 hours of support to partnering farmers markets. This collaboration allowed markets to stay open and provide a safe and reliable source of food for CalFresh clients throughout SLO County. Without this partnership, some markets that accept CalFresh benefits would have closed.

There is evidence that markets have seen an increase in customers since the shelter-at-home order went into place. According to one market manager, “[The pandemic] has ... revived farmers markets. It seems like we have the highest numbers ever as far as gross overall in the market and we don’t even have all of our seasonal vendors yet.” Actual client numbers to evaluate the impact will be available in September. Customers are grateful, according to the manager: “People are thankful. They say thank you for ... all of your efforts.” Others have expressed how important their farmers market is to them right now as a place where they can be outside, see people in their community, and have access to healthy food.

Looking Forward

COVID-19 will continue to affect farmers markets and our communities for the foreseeable future. The DSWs will not be available after July 1, 2020, as they return to their work duties. The workgroup continues to evaluate how to leverage resources so farmers markets can become more accessible to all customers, to anticipate higher demand as more people become eligible for CalFresh, and to work toward the ideal of becoming a space for a just food movement. To that end, the workgroup is developing a Market Navigator⁹ project modeled after the Michigan Fitness Foundation Food Navigator program and developed in collaboration with local promotores (community health workers). The goals of the project are to improve farmers market accessibility through community engagement, training of bicultural community leaders, improvements to the market environments, and enhanced and targeted market promotion to low-income communities and Spanish speakers. In addition, the workgroup is planning to investigate the location of markets that offer the financial incentive Market Match in relation to low-income census tracts locally. Concurrently, workgroup members are forming another alliance to address access to Market Match in low-income areas in Santa Barbara County. Farmers markets have an essential role to play in regional food security during COVID-19 and also have a long way to go in terms of creating a more just and equitable food system.

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COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

Conceptualizing the nexus of migration and food security during COVID-19

**JAFSCD
Responds to
the COVID-19
Pandemic**



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Abstract

Migration has been a part of the livelihood strategy and risk diversification to relieve crises. Food insecurity as a consequence as well as a cause of migration demands review during the COVID-19 pandemic. This paper is an attempt to explore the dynamics and vulnerabilities that ensue from the nexus of migration, food security, and COVID-19, as the economic crisis of COVID-19 seems more intensive when viewed through a migration lens. The vulnerability of the economy based on food imports and remittances is heightened by COVID-19. The whole nexus of migration and food security has shifted; even the positive aspects of migration are predisposed to vulnerabilities.

Keywords

COVID-19, Pandemic, Migration, Food Security, Vulnerability

Introduction

Migration is a complex and multifaceted reality, driven by various push and pull factors (Food and Agriculture Organization of the United Nations [FAO], International Fund for Agricultural Development [IFAD], International Organization for Migration [IOM], & World Food Program [WFP], 2018). Push (or conditional) factors include unemployment, income inequality, conflict, food insecurity, crime, and natural calamities, while pull (or prospective) factors include decent jobs, education, security and safety, and gender equality. Food insecurity has been one of the major determinants of national and international migration, driving people to abandon their livelihoods and migrate in search of food security,

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strong social networks, and better livelihood opportunities (Sadiddin, Cattaneo, Cirillo, & Miller, 2019). It also has been argued that migration improves the food security of households by providing the capital necessary for agricultural investment or the economic means to buy food. In addition, research also shows that remittances from migrants to their homes of origin are a crucial instrument for meeting household food security during food crises (Obi, Bartolini, & D’Haese, 2020).

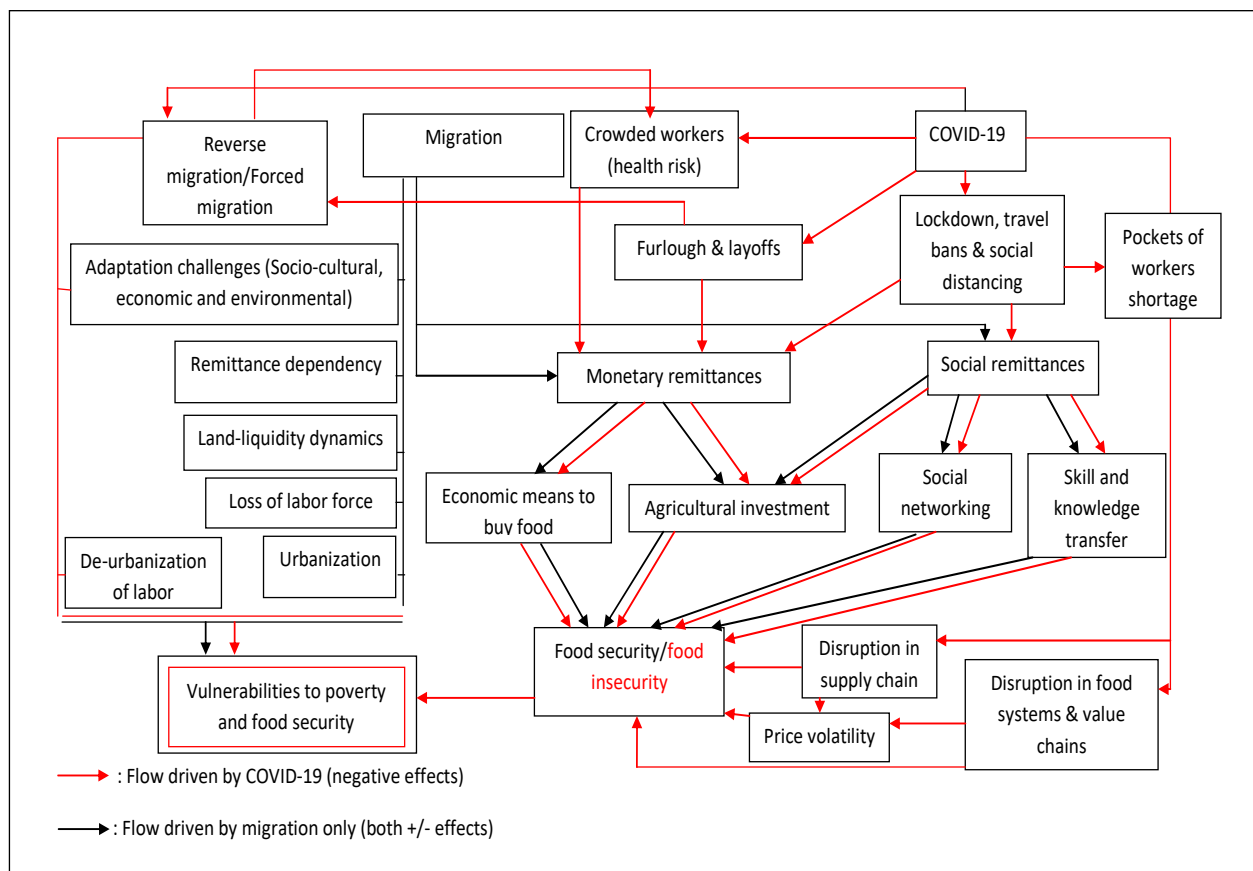
Mobility and migration have been greatly affected by the COVID-19 crisis, making 272 million international migrants vulnerable (IOM, 2020a). Likewise, “the magnitude of internal migration is about two-and-a-half times that of international migration” (World Bank, 2020, p. viii). Migrant workers play a crucial role in global food production and supply chains, doing over 25% of the work (IOM, 2020b). As a result, countries heavily dependent on food imports and remittances would be hit hard by malnutrition and hunger due to the crisis.

The Nexus of Migration and Food Security during COVID-19

Food insecurity can be a cause as well as a consequence of migration because the impact of migration has both associated vulnerabilities and benefits (Figure 1). The interplay of vulnerabilities and benefits produces net effects that can be positive, negative, or mixed. Worldwide, migration is part of structure change and development processes, leading to rural-to-urban migration.

Rapid urbanization is one of the reasons for the vulnerability of migrants to poverty and food insecurity (Satterthwaite, McGranahan, & Tacoli, 2010). In addition, in many cases the agriculture sector in the countryside becomes more vulnerable and unproductive, leaving farming for women and the aged

Figure 1. Nexus of Migration, Food Security, and COVID-19



(Craven & Gartaula, 2015). Other vulnerabilities associated with migration are adaptation challenges at the socio-economic and environmental levels, the need to provide remittances, changes in land-liquidity dynamics, and the outflow of qualified labor (brain drain). Land liquidity is one of the factors encouraging migration decisions (Chernina, Castañeda Dower, & Markevich, 2014), while at the same time adjustment and settlement costs of migration reduce the purchasing power of individuals or households, pushing them toward vulnerability. These vulnerabilities, which could be physical, social, economic, or environmental, are interlinked, leading to a vicious cycle, and could destabilize the food system as a whole.

Migration helps food security through economic remittances and social benefits. Economic remittance works in two ways: increasing the means to buy food and increasing agricultural investment in lands, inputs, or entrepreneurship. This ultimately enhances household food security in both the short term and long term. In terms of positive social outcomes, migration has also been a means to empower women because of the outmigration of men, through direct engagement in migration for economic purposes, and experiencing freedom in terms of enhanced decision-making and mobility and diminished social restrictions. One of the highest youth-migration countries in South Asia—Nepal—is a striking example (Maharjan, Bauer, & Knerr, 2012; Shakya & Yang, 2019). The role of women empowerment in food and nutritional food security is well understood. In addition, social benefits include social networking and the transfer of skills and knowledge, which are an important part of long-term food security.

With the emergence of COVID-19, the whole nexus of migration and food security has shifted; even the positive aspects of migration have become predisposed to the vulnerable side. Migrants in typical settings are susceptible to COVID-19 because of the health risks associated with overcrowding and poor sanitation. Food security is affected harshly according to three major security perspectives: the four pillars concept, the food system approach, and food entitlements (Devereux, Béné, & Hoddinott, 2020). From the four pillars concept and the food system approach perspectives, the availability and accessibility of food are restricted because of impediments to open-air markets, the supply chain, and economic activities. However, Sen's "entitlement approach" places less emphasis on the supply side of food and more on food accessibility arising from the four legal sources at the individual or household level: production-based, labor-based, trade-based, and transfer entitlements (Sen, 1982). The economic functioning of all these bases has already been affected by this pandemic.

Many big companies and enterprises have already called for furloughs and layoffs of workers. For example, two-thirds of the three million Venezuelan migrants in Colombia, Ecuador, and Peru have seen their jobs disappear (WFP, 2020). The lockdowns, travel bans, and social distancing imposed to counter the spread of COVID-19 have temporarily stopped migration and created pockets of labor shortages. Internal labor migration restrictions have limited seasonal income-earning opportunities and crop production. Since the system of lockdowns and social distancing is not a sustainable or long-term strategy, the challenges of repatriation and reintegration are immense, particularly when the future of migrants working abroad is uncertain. The countries with no innovative solutions for internal migrant workers are forced to reverse migration, sending migrants back to their homes from their working places. Most of these locations do not respect lockdowns and social distancing, which further enhances the risk of infection. Large-scale international reverse migration with uncertain futures for migrants at their places of origin could bring social unrest and hunger if they are not able to get work. About 40% of international remittances are sent to rural areas (FAO, 2020), which means that reverse migration will hit hard, mainly at the rural level. The de-urbanization of workers demands adaptation to new socioeconomic and environmental conditions. Poor migrant workers of countries such as Nepal, who have already sold their land for visa application and labor permits, will experience further food insecurity.

Monetary and social remittances are being severely diminished. Remittances are a larger portion of GDP for "poor countries (8.9 percent in 2019), small island developing states (7.7 percent), and those in

fragile and conflict-affected situations (9.2 percent)” (World Bank, 2020, pp. 6–7). Further, it has been estimated that “remittance flows to low- and middle-income countries are expected to drop by around 20 percent to [US]\$445 billion, from [US]\$554 billion in 2019” (World Bank, 2020, p. viii). Family members who depend upon remittances have already been grappling with malnutrition and hunger. The forcible repatriation of Ethiopian and Nepalese migrant workers in the Middle East and Asia, respectively, are two examples. In addition, disruptions of supply chains, food systems, and value chains have disturbed the whole economics of the production system and value chain structure. Pockets of labor shortage have already disrupted farm production, processing, harvesting, and other supply-chain activities, thus putting pressure on prices. For instance, COVID-19–related travel restrictions and illnesses are estimated to have resulted in a shortage of 80,000 agricultural workers in the UK, Spain has a shortage of around 70,000–80,000 workers, and Italy has a shortage of 250,000 workers (International Organization for Migration, 2020b). Every aspect of the nexus of food security and migration is now affected by the COVID-19 pandemic, exacerbating food insecurity.

Recommendations

Policy recommendations in response to the current pandemic and its effects on migrant workers have already been proposed by the FAO (2020):

- “Extend expiring working visas of migrant workers employed in all agricultural sub-sectors.
- “Ensure the safe movement of agricultural workers within countries, including during lockdown, and between countries, allowing exceptions in granting working visas to seasonal agricultural workers.
- “Regularize migrants present in the territory and grant temporary work permits to all.
- “Match the demand for labour of the agricultural sector with the migrant labour supply.
- “Ensure occupational safety and health measures are put in place and are accessible to all migrants.
- “Ensure the inclusion of all migrants in the pandemic response and in the measures that are being introduced to mitigate the economic recession caused by COVID-19, regardless of the migratory or working status.” (FAO, 2020, p. 4)

Summing Up

Migrant farmworkers—“unsung heroes”—are structurally more vulnerable in multiple ways, and this consequently seems to have deep and pervasive effects on the economy. First, lockdowns and travel bans have resulted in pockets of labor shortages that have disrupted food systems and supply chains, and have affected market prices globally. Second, large numbers of migrant workers and their families are vulnerable to health risks, poverty, exploitation, and food insecurity due to their dependence on remittances. Third, COVID-19 has shown the fragile nature of the labor system and the inefficiency of systems to handle the crisis. Thus, it is now vital to reflect, rethink, and redesign working conditions and labor management in order to save many migrant workers from food insecurity.

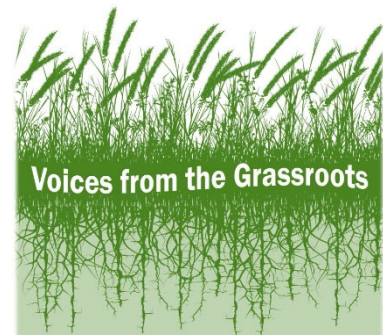
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Seeding the world

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Debra Williby-Walker has a great story to tell, and it's living under her roof in Mercer County, West Virginia. With her is eight-year-old Brady, her charismatic grandson, who has given away more than 6,000 packets of vegetable seeds to families around the world.

Williby-Walker, 52, and Brady live in Oakvale, population fewer than 125, just a few miles west of a mountain range separating the Mountain State from far southern Virginia.

"Brady learned to plant seeds around the age of two or three from his Poppy, my Dad, who has two big gardens that connect to my property. One is just for potatoes, and the other? My mom cans

everything they grow. They feed all of us in the family.

"Brady came to live with me when he was three, and at four, we started going everywhere together because I didn't have anybody to babysit. I've always done charity work—sending food to Ghana, stuff like that—and one day, we went to Heaven Sent Ministries,¹ a Christian nonprofit in Princeton, West Virginia. There, we packed rice for children around the world.

"There were pictures of the hungry children who were going to get the rice and other nutrients. I believe it was there that he got the idea that if other kids and people learned to plant seeds, they can grow their own food and feed themselves.

"He was really inspired, so I said, 'If you want to do that, you have to do all the talking,' and so he began speaking to people about it. He calls it Sowing Seeds of Love.² I put it on Facebook, and people began donating seeds.

"That's how it started," Debra said. Brady's idea was to help people grow food instead of simply receiving food from others. "Soon, he began collecting seeds here and in Canada, sending

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¹ <https://www.hsminc.org/>

² <https://www.100daysinappalachia.com/2020/04/sowing-seeds-of-love-one-west-virginians-project-to-combat-hunger/>

more than 900 of them to a friend of mine named Ursula Candasamy in Uitenhage, South Africa, who died last October 2019. Ursula had a nonprofit called Heaven's Missing Angels.³

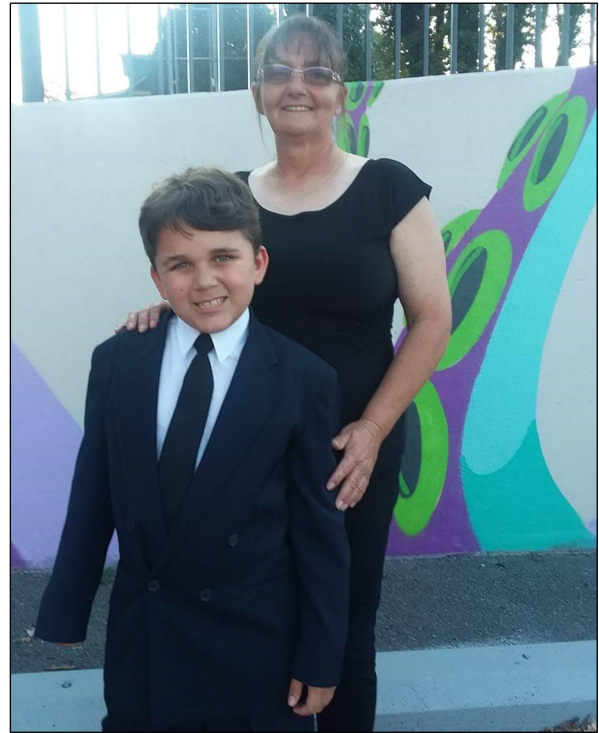
"Brady saw pictures of all the kids she was feeding at her soup kitchens and started sending seeds for tomatoes, carrots, lettuce, collards, all kinds of herbs, sage, and rosemary along with squash and cucumbers. Ursula grew the seeds in a greenhouse and then gave away the food.

"To pay for seeds and shipping, Brady recycles aluminum cans and has some litter pick-up jobs. He also has made a little extra money selling the book Ursula wrote about his Sowing Seeds of Love⁴ project. People always ask if there are problems with sending seeds through the mail, and as of now, there haven't been any.

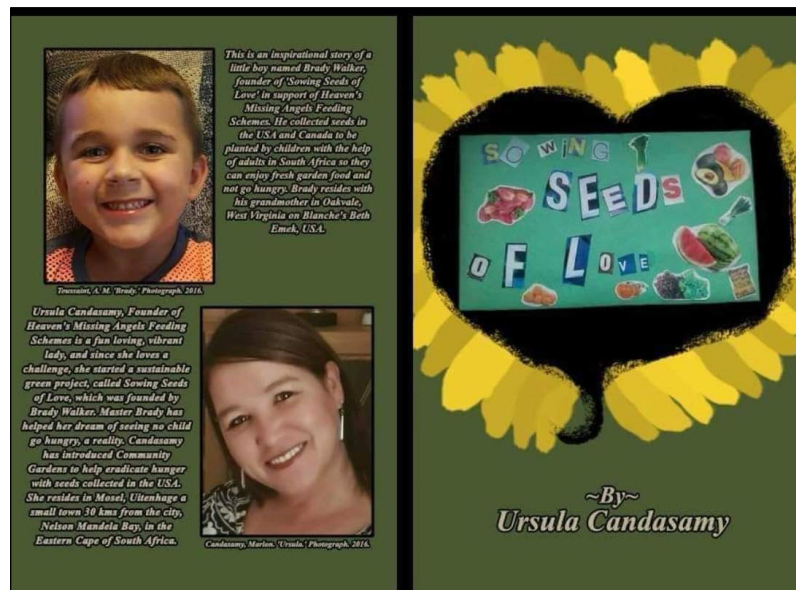
"Soon, people started contributing to Brady's work and made contacts with state agricultural agents in some counties near us, and they distributed seeds for him too. It's nice to have that kind of help, but Brady doesn't seem to care if anybody helps or not. He'll just do it himself. This March and April [2020] he's sent out 4,350 packets to counties all over West Virginia.

"It's common knowledge in our area through newspaper articles and TV that Brady collects garden seeds. Many people in Oakvale and the rest of Mercer County donate seeds. It sounds unbelievable, but folks in our neck of the woods have followed Brady and donated to his cause for four years now. This planting season, he will meet his goal of sowing seeds in all 55 West Virginia counties.

"So far, his grand total of seed packets sent out, including this planting season, is 6,650. When he sent seeds to a woman in Bedford, Pennsylvania, she took some of them and sent them to other parts



Brady Walker with his grandmother, Debra Williby-Walker. Photo courtesy of Debra Williby-Walker.



Ursula Candasamy of Uitenhage, South Africa, who passed away in 2019, ran a nonprofit called Heaven's Missing Angels. Sales of her book about the Sowing Seeds of Love project help fund the project's work. Photo courtesy of Debra Williby-Walker.

³ <https://www.latest.facebook.com/HarmonyForHope/posts/3433017316739679>

⁴ <https://www.facebook.com/solhma/posts/ursula-candasamy-founder-heavens-missing-angels-proudly-displays-the-ton-of-seed/1799347407010175/>



Members of the Create Your State Kids program have decorated shoeboxes to leave in various locations to allow the public to take as many seeds as they can use. Photo courtesy of Debra Williby-Walker.

of Pennsylvania, Detroit, and Maryland where people needed them.

"Even people in Canada have found out and donated. The brands are too numerous to name, and people send what they wish. The last shipment of donated seeds [were purchased from] High Mowing Organic Seeds⁵ in Wolcott, Vermont.

"It's his project, his idea," Debra said. "The only thing I do for him is post the stories on Facebook. [The recipients] send pictures of them planting when the seeds arrive, and then pictures of harvesting."

More than once, Brady has told his Marmee, "I can speak for myself; I know what I want to say." He takes the phone to answer the simplest, most beautiful of questions:

What's it like to see something grow?

"It's magical. I was watching strawberries grow when I was around four or five and then I ate them," said Brady, who turns nine on July 28, 2020, and is going into the fourth grade. "The kids we send the seeds to hardly have any stuff and we have all this stuff. We send our seeds to them because we already have so much. I feel proud of myself and it makes me happy to help them get what



Brady Walker taking a shipment of donated seeds to the post office. Photo courtesy of Debra Williby-Walker.

they need."

Are you going to run a charitable nonprofit when you get older?

"I think I'll be a singer, actor, and artist who does charity work."

To that end, while continuing to collect and distribute seeds, Brady has been practicing singing like Tom Jones for an upcoming production of "Alice in Wonderland" in which he plays Humpty Dumpty.

As Brady gives the phone back to his grandmother, she says, "I don't think he really knows the magnitude of what he's done. Brady has fed thousands of kids with those seeds."

The COVID-19 global pandemic that has convulsed the world at the start of 2020 has not affected Brady's seed project, said his grandmother.

⁵ <https://www.highmowingseeds.com/>

“We’ve had to make adjustments,” she said, noting that the seed project continues to grow despite the spread of the virus. “His project has grown beyond us, and he was fortunate that he had the seeds before this pandemic really hit and people started scrambling to find seeds for themselves. They seem to be selling out of them since the virus hit.

“Because he had so many, he recruited kids from a program called Create Your State,⁶ mostly from the southern part of West Virginia. Brady and CYS founder Lori McKinney started Create Your

State Kids and began giving away seeds through that, too.

“The people he met through the Create Your State Kids project met for the first time last December and started decorating shoeboxes to leave here and there with a sign on the top of the box: ‘Take what you wish...’

“They were supposed to get back together this past March but, you know, it had to be cancelled. Right now, they’re thinking about a virtual gathering and hope they can meet in person later in the year.”



⁶ <https://createyourstate.org/home>

Episcopal Farmworker Ministry and disaster response to COVID-19

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**JAFSCD
Responds to
the COVID-19
Pandemic**



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Farmworkers in the U.S. confront numerous challenges. They receive poverty wages and have high rates of wage theft, precarious immigration status, and a high risk of injury and fatality (Smolski, 2019). They also face rampant food insecurity, with 40 to 70 percent of farmworkers experiencing a lack of reliable access to nutritious meals (Minkoff-Zern, 2014). Add to these challenges poor mental health from social isolation for guest workers who hold H2-A visas for agricultural work, the potential of working under dangerous and abusive conditions, and substandard housing. The general picture is of a workforce vulnerable to exploitation that does not

receive the same benefits and protections as other workers due to agriculture's exemption from many labor regulations. These challenges have been exacerbated by the current pandemic, which has hit farmworker communities particularly hard (North Carolina Department of Health and Human Services [NC DHHS], 2020; Wozniacka, 2020).

Episcopal Farmworker Ministry (EFWM) is on the front lines of addressing these challenges. EFWM is a joint ministry of the Episcopal Diocese of North Carolina and the Episcopal Diocese of East Carolina. EFWM provides direct services, leadership development programs, and educational and advocacy programs aimed toward a systemic change of the policies that affect farmworkers and their families. Located in Dunn, North Carolina, EFWM has four staff members who work in the North Carolina community. In this *Voices from the Grassroots* essay, we highlight challenges and EFWM's strategies for supporting farmworkers during the COVID-19 pandemic crisis.

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A major challenge for EFWM currently is conducting outreach to H-2A farmworkers. Outreach is important to provide information about rights, distribute donations, tell workers about the various resources and services available to them, and provide information about pesticide exposure and heat-related illnesses. During the pandemic, outreach is also important to inform workers about how to access health care, basic information about the virus, and what they should do if they think that they are sick with the virus. Farmworkers are especially vulnerable because they live in congregate housing that does not offer private rooms or bathrooms. Farmworker camps can consist of a small group of people or groups of hundreds of people. Lack of information about the virus, medical centers, and workers' rights amid the pandemic can increase the capacity for COVID-19 to spread through farmworker communities. Because many farmworkers come to the United States to make money to support themselves and their families in

their home country, they have an incentive to work through their illness. Additionally, there is solidarity among workers, whereby they do not want to cause a quarantine of workers that would amplify the economic loss. Farmworkers do have the right to up to 80 hours of COVID-19–related sick pay or paid leave to take care of a sick family member. But employers with fewer than 50 employees can apply for an exemption from paid family leave, and it is unclear how widely known and used paid leave is by farmworkers.

The risk is further amplified by a lack of personal protective equipment (PPE) for farmworkers. And, even with adequate PPE, there is a need for training on how to use PPE properly and how to protect one's health while living and working in congregate living settings. With farmworkers often in multigenerational, multifamily, or worker barrack living conditions—in close quarters and with high occupancy—housing can become a hotspot for the spread of COVID-19. As of June 5, 2020,

Figure 1. The Episcopal Farmworker Ministry (EFWM) Facility in Dunn, North Carolina



Photo courtesy of Episcopal Farmworker Ministry.

five migrant farmworker housing facilities in North Carolina had COVID-19 outbreaks (NC DHHS, 2020). According to our current understanding, NC DHHS only reports *outbreaks*, defined as two or more cases in a congregate living facility and only in migrant labor camps with more than 10 occupants. That is problematic, because of 1,877 migrant labor camps in the state, 1,011 are certified for fewer than 10 occupants. Thus, current reports most likely underestimate the current level of COVID-19 in farmworker communities.

Another challenge is that there is less work for farmworker communities because growers have been changing their hiring practices in order to implement physical distance and planting fewer crops due to economic uncertainty. This has made growers more willing to hire H-2A guest workers, over whom they have more contractual control, leaving seasonal and undocumented workers with

little or no work. The solution of preventing workers from getting sick by having fewer workers and increasing physical distance has meant increasing levels of social isolation for guest workers, who often work Monday until Saturday, with only Sunday as a time to leave the labor camp.

By reducing freedom of movement, social isolation can negatively affect farmworkers' ability to purchase and consume food. Some of the workers cannot leave labor camps and may have to rely on a person appointed to purchase food, food sales through labor contractors, or food sales organized by growers. This is problematic because of a history of abuse around food sales, with issues arising over poor food quality, loss of money, more isolation, and less control over their own lives. All of this can lead to increased food insecurity and heightened stress.

EFWM is confronting the crisis and these challenges through a disaster management response

Figure 2. Food Distribution to Families



Photo courtesy of Episcopal Farmworker Ministry.

model. That model involves four action areas to assist and H-2A workers and families:

1. Mitigation: For future pandemics, this could involve advocating for policies such as building codes and housing standards that address the spread of infectious diseases.
2. Preparedness: Outreach, education, and training carried out via phone calls, mass text messages, printed materials, remote trainings, videos, and social media.
3. Response: Free mental health services in Spanish, food distribution, and an emergency fund to support farmworker families.
4. Recovery: Adaptation of services for sustained recovery and planning for future disasters.

The disaster management model is based on experiences from the hurricanes that frequent North Carolina. During those catastrophes, similar problems arise, such as food insecurity and eco-

nomie loss. Two important disaster response interventions have been the distribution of food and emergency financial aid to the farmworker community.

Food distribution has been carried out in two ways. The first is through a biweekly distribution from EFWM facilities to 250 families. The recipients line up in their cars, and no one gets out of their vehicle. Instead, they unlock their trunks, and food boxes are placed in them. This helps to maintain physical distance. EFWM staff and volunteers wear PPE to reduce the possibility of further contagion. Another food distribution method has been direct drop-offs to farmworkers, operating with similar safety measures in place for social distancing. As noted, farmworkers are often isolated at labor camps without cars and limited time off, making this on-site distribution an important strategy. Instead of directly distributing to farmworkers, the boxes are stacked by EFWM and then the farmworkers retrieve them. H-2A workers have had some difficulties purchasing large quantities of food and hygiene items, and some of them have

Figure 3. Food Distribution to Farmworkers



Photo courtesy of Episcopal Farmworker Ministry.

Figure 4. Volunteers During the Pandemic



Photo courtesy of Episcopal Farmworker Ministry.

not had much work either. Thus, the distribution of food has become a key activity in addressing the increasing food insecurity in agriculture worker communities due to the pandemic's impacts on supply chains and financial well-being.

The emergency financial aid supports guest workers and undocumented people, who are the majority of farm laborers (USDA, 2020), and who have been largely excluded from stimulus payments and unemployment benefits. That exclusion is part of a larger agricultural exceptionalism, with farmworkers often not included in rules that protect workers in other industries, such as those pertaining to minimum wage, overtime, the right to organize without retaliation, unemployment, and child labor laws (Rodman et al., 2016). In a sense, what the pandemic has done is to highlight this inequity. During the pandemic, farmworkers who have not been getting work due to changes in grower hiring practices or those who are quarantined and do not get paid sick days are in a very precarious economic situation. EFWM has carried out a fundraiser to disburse financial aid to agriculture workers and

their families, raising US\$60,000 as of this writing. This financial aid is a form of nonprofit economic stimulus—a stand-in for failures in public policy, themselves the result of neoliberalization's decades-long negative effect on the social safety net.

EFWM has risen to meet the crisis within its means and with prior experience in disaster response. It is part of a network of organizations in North Carolina, through the Farmworker Advocacy Network and North Carolina's Council of Churches, working to bring about safe places to live, safe places to work, strengthening labor protections, and strong enforcement of our existing laws (Farmworker Advocacy Network, n.d.). We must recognize that farmworkers are essential workers, whose labor provides society its most fundamental element: food. Essential protections, services, and benefits should be provided to this population.

For more information about the Episcopal Farmworker Ministry or to donate to support its work, visit

<https://episcopalfarmworkerministry.org/>.



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How southeastern North Carolina is building more resilient food systems after COVID-19

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Feast Down East is a regional nonprofit dedicated to creating a healthy, accessible local food system that supports economic growth in southeastern North Carolina. We began as The Southeastern North Carolina Food Systems Program at the University of North Carolina Wilmington (UNCW), founded by Leslie Hossfeld and Rev. Mac Legerton, to address poverty and high job loss in the Southeastern North Carolina region—one of

the three major areas of poverty in the state. Now known as Feast Down East, our nonprofit has developed a vast network of partnerships with both private and public agencies in 11 counties.

Today, three main programs make up the heart of our organization: farmer support, produce distribution, and the Local Motive Mobile Farmers Market. Each of these programs is essential to our nonprofit's overall mission. We support local farmers by connecting them with educational opportunities and technical services through either our organization or others in our statewide network. We also work with farmers to promote local food and their products through marketing tactics and consumer education. Alongside these efforts, Feast Down East helps farmers distribute their products through our food hub, providing farmers with reduced distribution costs and added income. To

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encourage new farmers, we have an Emerging Farmers program, which provides classes to a cohort of new farmers to help them successfully expand their farm businesses.

Our food hub is a USDA-designated, GAP-certified center for the processing and distribution of local food products. It eases the burden on small to medium-sized farms in our area when it comes to processing and distributing their goods. On a weekly basis, farmers bring their produce, meat, dairy, and other food products to the food hub to be sold to wholesale buyers in the Wilmington area, including restaurants, grocers, and other businesses. Our food hub is not-for-profit, like all other Feast Down East programs, and relies on donors and grantors to operate.

Finally, our Local Motive Mobile Farmers Market works to support residents of food-insecure areas by providing access to fresh, healthy local foods. Operating weekly, year-round in underserved areas, we accept SNAP/EBT, debit, and cash and offer a matching program for those using SNAP/EBT to get double the amount of produce for what they are spending.

COVID-19 Adaptations

The arrival of COVID-19 in our area has presented its own challenges, and we have had to adapt quickly to continue serving those in need of our programs. For health and safety reasons, we began by closing our Local Motive Mobile Farmers Market; however, recognizing the need of the communities we serve, we adapted by delivering free bags of food items to those who are elderly or immune-compromised. Thanks to the help of donations, we were able to deliver 1,262 bags of food, weighing an estimated 6,890 pounds (3,125 kilograms), by April 16, 2020, to those most threatened by COVID-19. As the state of North Carolina entered its reopening phases, we ended this program on May 7 and reopened our Local Motive Farmers Markets on May 21. We implemented the following strict health and safety procedures to help serve but also protect not only our team but members of our community: staying six feet apart; making handwashing stations and sanitizing spray available for keys, wallets, phones, and other personal items; allowing just one cus-

tomers at a time to approach the market; disinfecting after each payment exchange; and reducing the exchange of cash when possible.

But those receiving our delivery bags were not the only ones in need of help after the COVID-19 pandemic hit. We partnered with many restaurants and foodservice businesses in our area to create a program called FarmsSHARE, which delivers fresh produce to restaurant workers currently unemployed as a result of COVID-19. The boxes are packed and distributed in partnership with New Anthem Brewing and UNCW and funded by the Carolina Farm Stewardship Association (CFSA). The products for this program, and all of our other programs, are coming directly from our local farmers.

Our largest markets for the food hub products are restaurants and schools. As these closed, farmers suddenly did not have anywhere to sell their goods: on the morning of March 17 we saw fairly normal agricultural sales, but almost no sales by the following afternoon. We saw that area residents were minimizing trips to the grocery store to limit their exposure to COVID-19 and realized that we could help farmers by giving them an outlet to sell their produce while at the same time giving locals an opportunity to support local farmers and get fresh produce in a low-risk environment. We created the Farm to Fork Community Supported Agriculture boxes to be sold to community members for US\$35. Purchasers simply drove up to the location of our refrigerated truck, and the box was loaded into their car through contactless delivery. This allowed us to continue providing healthy, local food to the area while ensuring that the farmers are supported. We now have the capacity to sell 100 boxes each week, and we always sell out. We are purchasing products from our farmers for the mobile market, FarmsSHARE, and Farm to Fork CSA boxes. The CSA and FarmsSHARE program support eight to ten small, local farmers on a weekly basis.

Challenges

When COVID-19 arrived, we faced several challenges. We tried using our current fundraising software to set up the CSA box program, but it just wasn't created for this type of use. The ordering

and packing process became challenging, so we ended up purchasing a new software system that is specific for food hub sales.

We needed to try several approaches to identify seniors and immune-compromised individuals in need of home delivery for our bags. We asked our partner organizations who work with seniors and the community at large who knew of folks who were at higher risk due to COVID-19 closures and safety concerns. Our mobile market employees, who work very closely with the community and the Wilmington Housing Authority staff, were also able to help us identify recipients. In response to the impact of COVID-19, the Cape Fear Food Council (our local food council) convened food-service organizations, the hospital, local government, and funders on a weekly call to address community needs. Through these calls, we were able to connect with more organizations that helped us identify vulnerable people in need of the food bags, as well as volunteers who offered to help deliver the bags. Some community members also volunteered to deliver bags.

As restaurants continue to open up, wholesale demand will increase, and farmers are concerned about managing the CSA, FarmsSHARE, and wholesale. Farmers have said that they can grow more but need storage, and livestock farmers need access to processing. We are trying to figure out how to support those needs. One way involves our Farmer Advisory Council. We hosted a Farmer Advisory Council meeting virtually in May to talk through what farmers need in response to the growing demand for local food. We are investigating how we can offer dry, cool storage, and we are partnering with the New Hanover County extension office to raise funds to start a meat-processing operation.

Our food hub staff members are also continuing to offer technical assistance to our farmers for crop planning and business forecasting. Some of our farmers are already growing products specifically for our CSA boxes.

Planning for the Future

As restaurants begin to reopen and once again purchase from our food hub, we anticipate that we will keep the CSA program going due to over-

whelming community support. Perhaps we will even expand it by hiring someone to manage that program specifically. We are also expanding our mobile farmers market, previously located mainly in public housing neighborhoods, to reach new areas that might need assistance. As people become more interested in and committed to local food, Feast Down East is spending time exploring options to meet the consumer demand and support the needs of the farmers to meet the demand.

COVID-19 has drawn attention to the widespread problems in our current food system. While we see large farmers destroying product, dumping milk, and euthanizing their livestock, our small farmers were able to quickly pivot to ensure that food reached our community. These same small farmers live below the poverty line, struggle to access sufficient healthcare, and are one disaster away from losing everything. They don't have the same resources as large farmers because many programs are not meant to support small farms. Even meat processing poses challenges for small farmers due to the sizes of their orders.

COVID-19 has brought the issue of food insecurity to the attention of a much larger audience. For example, a local newspaper is publishing articles on COVID-19 and food insecurity, interviewing some of Feast Down East's team to learn more. This attention to food insecurity during the pandemic is a good thing, but a lot of the people who are food insecure now were food insecure before COVID-19. The pandemic will increase food insecurity for everyone and make it even more difficult for those who were already food insecure.

Our work in the community during this time has made more people in our region aware of what it is that Feast Down East does. We hope to leverage that support to expand our programs to reach more of those in need in our region. We hope that the community will continue to support locally sourced food in a meaningful way. More specifically, we hope that local markets and small co-op grocery stores will gain customers, restaurants who focus on sourcing food locally will have more patrons, and our small, struggling farmers will have more opportunities to sell their products.



Resources

Newspaper article:

- Darrough, M. (2020, May 26). Virtual roundtable: Food insecurity expands its reach due to Covid-19. *Port City Daily*. <https://portcitydaily.com/local-news/2020/05/26/virtual-roundtable-food-insecurity-expands-its-reach-due-to-covid-19/>

Feast Down East:

- About us: <https://www.feastdowneast.org/about-us.html>
- Farmer support: <https://www.feastdowneast.org/farmer-support.html>
- Local Motive Mobile Farmers Market: <https://www.feastdowneast.org/local-motive-mobile-farmers-market.html>
- Produce distribution: <https://www.feastdowneast.org/food-hub-distribution.html>

COMMENTARY

Pathways to the revitalization of Indigenous food systems: Decolonizing diets through Indigenous-focused food guides

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Abstract

The 2019 Canadian Food Guide (CFG) was launched in January 2019 with a promise to be inclusive of multicultural diets and diverse perspectives on food, including the food systems of Indigenous communities. Some scholars argue that federally designed standard food guides often fail to address the myriad and complex issues of food security, well-being, and nutritional needs of Canadian Indigenous communities while imposing a dominant and westernized worldview of food and nutrition. In a parallel development, Indige-

nous food systems and associated knowledges and perspectives are being rediscovered as a hope and ways to improve current and future food security. Based on a review of relevant literature and our long-term collaborative learning and community-based research engagements with Indigenous communities from Manitoba, we propose that Indigenous communities should develop their food guides considering their contexts, needs, and preferences. We discuss the scope and limitations of the most recent Canadian food guide and opportunities to decolonize it through Indigenous food guides, including their potential benefits in enhancing food security and well-being for Indigenous communities. We propose to design and pilot test

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such Indigenous food guides in communities Fisher River Cree Nation in Manitoba as community-based case study research that supports Indigenous-led and community-based resurgence and decolonization of food guides.

Keywords

Community-Based Research, Decolonial Approach, Food Guide, Indigenous Food Security, Health, Indigenous Knowledge Systems, Nutrition, Self-Determination

The Canadian Food Guide and its Limitations

There have been many tools developed to address the food insecurity and well-being needs of the Canadian public, including Indigenous communities, such as the Canadian Food Guide (CFG). Health Canada (2019a) describes food guides as “basic education tools that are designed to help people follow a healthy diet,” (p. 4) utilizing dietary analyses, data from surveys, and food supply and demand with the overall goal of translating nutritional science to a practical food choice. The guide is not only created to inform individuals on how to eat healthily, but also to help policymakers create policy and support programs related to food and nutrition in Canada.

Brief History of the Canadian Food Guide

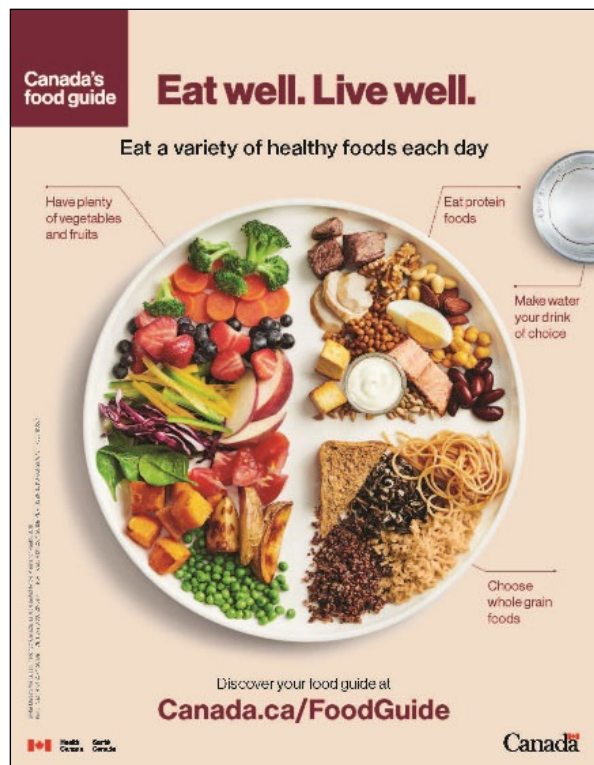
The first Canadian Food Guide (CFG) was titled the Official Food Rules and was released in 1942. It was initially designed to prevent nutritional deficiencies due to food rationing from the War. The Official Food Rules identified six food groups at the time—milk, fruit, vegetables, cereals and bread, meat, and eggs—along with serving size suggestions. Since its inception, it has been made over several times to accommodate evolving science-based health and nutrition recommendations, social and economic fluxes, and the overall health statistics in Canada.

The revised version released in 2007, titled Eating Well with Canada’s Food Guide, was created due to several factors including the rise in nutrition-related chronic diseases, findings from consultations with experts, focus testing, and the evolving food supply and demand chains. The

same year, Health Canada released a parallel Indigenous version of the guide to address the growing Indigenous health issues related to food and nutrition, which failed to make any significant changes (Mundel, 2010). The 2007 Indigenous Food Guide (IFG) was produced in several Indigenous languages, including Anishinaabe, Plains Cree, Woods Cree, and Inuktitut. It also included depictions of several foods typically associated with Indigenous peoples in Canada, such as bannock, berries, wild game, and canned milk. This food guide aimed to engage Indigenous populations through schools and health facilities as well as developing policies that affect Indigenous peoples.

In 2019, Canada released the most recent version of the CFG with a new focus on plant-based proteins, lowering dairy intake, eating more fruits, vegetables, and whole grains, and drinking water. The 2019 CFG provides examples of different foods based on their recommendations, along with a visual representation of what a typical plate of food should look like (see Figure 1). There was no

Figure 1. The 2019 Canadian Food Guide



Source: Health Canada, 2019b.

release of an IFG; instead, the guide was translated into several Indigenous languages.

The Guide's Limitations

The CFG is a one-size-fits-all model, designed to provide recommendations for healthy eating and food choices for all Canadians, with the user to interpret the recommendations to the best of their ability. The OSF model of the CFG does not represent the incredibly diverse population in Canada and does not tackle essential barriers to accessing healthy food, which leads to the marginalization of diets and food practices (Amend, 2017; Duignan, 2019). Amend (2017, p. 2) uses the example of many people of color, in which they assume their Indigenous or cultural foods are “unhealthy” because they are not represented in the guide. The Eurocentric ideals around healthy eating are often positioned in a scientific or unbiased way to “shield the document from outside influences deemed non-scientific” (Amend, 2017, para. 31), such as cultural food preferences.

Indigenous nurse Marie Martine stated that the guide would be difficult for people to use, especially those on low or fixed incomes, as many of the recommended foods are inaccessible due to food deserts within urban centers and Indigenous communities. One result of food deserts is that the prices of many of the recommended foods are higher than that of their unhealthy counterparts (CBC, 2007). The failure to combine or incorporate Indigenous food systems in food guides demonstrates the long history of Western and colonial food practices including how they have undermined Indigenous food systems, infringed on Indigenous peoples' livelihoods, and prevented their ability to self-govern and determine. Damman, Eide, and Kuhnlien (2008) argue that the right to food and the right to culture go hand in hand for Indigenous peoples, which suggests that by providing both, you are providing the best possible solutions to counteract chronic diseases and food insecurity. When asked to address the issue, Mary Bush, the head of nutrition policy at Health Canada in 2007, argued that “creating many different food guides to address Canada's diverse ethnic and cultural groups was both impractical and unrealistic” (paraphrased in Amend, 2017, para. 10).

Health Canada (2019b) states that the 2019 food guide is essential for three reasons. The first is that what we eat influences our health, as our diets are a leading contributor to many chronic diseases like heart disease, cancer, and diabetes. The agency also mentions that the burden of chronic disease varies across Canada, with Indigenous peoples in Canada facing a more significant burden than the general population. In its discussion around this reason, it also mentions that Indigenous peoples face a high number of barriers to manage those chronic diseases but offers no more on the subject. The second reason it is essential is that the food environment influences what we eat. Mostly, the foods available to us have a tremendous impact on what or how we eat. Health Canada does acknowledge the barriers Indigenous peoples face regarding food availability and Indigenous foods, but again offers nothing more on the subject. Ironically, it is here that it mentions that the constant stream of changing and conflicting messages around food can contribute to unhealthy eating, but does not mention how the guide contributes as well. The third reason behind the importance of the food guide is that supporting healthy eating is a shared responsibility; however, the guide takes no responsibility for supporting Indigenous health. It is the very reason that Health Canada deems the guide necessary, which are also limitations for Indigenous people in Canada.

The current CFG model also fails to consider the socioeconomic barriers to healthy food choices. Historically, the food guide and its revisions and recommendations over the last 60 years have been rooted in economic agendas such as pressure from the agriculture industry in Canada. Many of the recommendations made have “closely mirrored the interests of agricultural producers” (CBC, 2012). Nevertheless, it fails to consider the economic, social, and cultural barriers to accessing healthy foods. With the current discourse around reconciliation in Canada, CFGs, especially the most recent two (2007 and 2019), have failed to take into context the considerable barriers to accessing healthy foods. These include remote living, loss of land, loss of cultural traditions, lack of economic stability, and a myriad of issues stemming from colonization that Indigenous peoples face in gain-

ing access to affordable and culturally relevant healthy foods.

Indigenous peoples in Canada represent unique perspectives and diverse knowledges regarding their Indigenous food systems (Kuhnlein et al., 2006; Shukla et al., 2019). In Indigenous cultures, these food systems go hand in hand with health and healing, and it is about time that these knowledge systems be nurtured because of their potential to have positive effects on Indigenous health, well-being, and food security. We argue that weaving local and Indigenous food systems and associated knowledges and perspectives in the development of a food guide can have many positive effects at local, national, and international scales for protecting food environments, restoring Indigenous foodways and cultures, improving food security and accessibility, and promoting local economies through community-based social enterprises.

Braiding Indigenous Food Knowledge: A Tool for Food Sovereignty and Decolonization

Traditional, Indigenous, or country foods (also known as Indigenous foods) are defined as those “from the local, natural environment [and that] are culturally acceptable” (Kuhnlein, & Receveur, 1996, p. 417). The Indigenous food knowledges surrounding these foods include several culturally meaningful processes such as harvesting, processing, distributing, preparing, and moral teachings. It also involves spiritual and cultural factors that are incredibly important to Indigenous ways of being and make up cultural food preferences (Kerpen, Humbert, & Henry, 2015). When creating food guides, it is crucial to incorporate these factors. Tabitha Robin (personal communication, January 29, 2020) also stated that “the healthiest foods are the ones that have the most relationships.” Culture influences attitudes and beliefs around food choices, and by incorporating healthy and culturally appropriate foods, food guides can affirm Indigenous cultures while also supporting healthy decisions. Healthy food lifestyles go beyond just healthy eating, and many Indigenous peoples associate Indigenous foods with the feeling of good health, so why not affirm those feelings (Kerpen et

al., 2015; Raine, 2005; Willows, 2005)?

Discussions around food sovereignty in the food guide sector are in their early stages, which means that designing policies and programming in the food systems landscape is also challenging to do. There are so many areas of food policy that demand attention from this food sovereignty framework. However, there are still no practical examples of how to bring food sovereignty into the conversation in a sustainable way, especially when the discourse around Indigenous food systems is often separated from non-Indigenous or Western food systems (Desmarais & Wittman, 2014).

Kekiewicz and Rotz (2018) observed over several years that the discourse of engagement between Indigenous peoples and settlers when developing food-related tools quickly resulted in a high level of discomfort that non-Indigenous peoples have while discussing Indigenous issues and food policies. When moving toward reconciliation in Canada, having difficult and uncomfortable conversations around colonial impacts and giving up power in order to have Indigenous inclusion and involvement is necessary to make progress. Creating spaces for this type of discourse allows for Indigenous self-determination and meaningful partnerships.

Lessons from Indigenous Food Guides

Many Indigenous communities and organizations are using Indigenous and decolonial approaches, and there are several that can act as inspiration for this Indigenous food system discourse. An example of an effective Indigenous food guide (IFG) can be found in Liguori, Nassar, and Mehta’s (2014) research around interactive nutrition guides (ING) in the United States. The ING is an online spreadsheet that suggests nutrient-rich Indigenous foods to make recipes, offers Indigenous alternatives for non-Indigenous ingredients, and provides nutritional information and local prices for the Indigenous ingredients. It offers Indigenous alternatives to Western ingredients so individuals can adopt Western recipes to fit their contexts. Liguori et al. (2014) argue that local and Indigenous foods “contribute to sustainable agricultural practices, encourage healthful eating, and sustain culturally relevant foods” (p. 4). They can also connect Indigenous

peoples to their cultural food systems, encourage the community to holistically address health, and even protect local ecosystems.

Another example of an IFG comes from British Columbia, Canada, with the First Nation Health Authority (FNHA)'s *Healthy Food Guidelines for First Nations Communities* (2009). The goal of the guidelines is to address the nutritional environment through "modern choices that reflect traditional values such as giving, sharing, humility, wholeness, and land stewardship" (FNHA, 2009, p. 5). It provides suggestions for more cultural aspects of food consumption like feasts, large family meals, food sharing, and fundraisers. The most notable section of the FNHA (2009) guidelines is the section on improving local food security, and more specifically, on utilizing more local and regional foods. Unlike the ING, where they provide Indigenous alternatives to Western ingredients, the FNHA provides ways to incorporate healthy

Figure 2. Fisher River Cree and English Cookbook, *Traditional Cooking and Foods of Long Ago Gave Us Healthy Lifestyles and Helped Us to Live Long Lives*



Published by Fisher River Cree Nation & University of Winnipeg,
2019.

ingredients from both Indigenous and Western traditions into one's diet.

In 2014, after noticing the epidemic of food-related chronic illnesses in the country, Brazil released its innovative new food guide, *Dietary Guidelines for the Brazilian Population* (BFG) (Ministry of Health of Brazil, 2015). The guide moved away from the typical food group and caloric measurements to a more Indigenous style of eating: unprocessed food that is grown in Brazil, eaten in shared food settings. Marion Nestle, an advocate for inclusive food policies, applauded the BFG as it is “based on foods that Brazilians of all social classes eat every day, and consider[s] the social, cultural, economic, and environmental implications of food choices” (Nestle, 2014, p. 1). Further, the emphasis on local foods and group meals aligns well with Indigenous foodways and eating practices (Dawson, 2020).

In late 2019, community members of Fisher River Cree Nation (FRCN), in partnership with the University of Winnipeg, released the FRCN cookbook *Traditional Cooking and Foods of Long Ago Gave Us Healthy Lifestyles and Helped Us to Live Long Lives* (see Figure 2) (FRCN, 2019; FRCN & University of Winnipeg, 2019). The cookbook consists of 69 Indigenous recipes and highlights dozens of Indigenous foods practices within the community. It shares land-based stories of the teachings behind the recipes, underscoring the importance of Indigenous foods and associated values. For example, quotes in the cookbook share important values of the community, including food sharing: “as my mom used to say ... when they were growing up; they’d share a moose among the community” (p. 21); respect for the animal and environment: “when I eat wild meat it helps me think about our food, it helps me respect the animal” (p. 28); and serving size and food preparation: “we used to eat fish two or three times a day, it was never fried ... it was healthier that way” (p. 40) (FRCN, 2019). The book also provides a Cree syllabic translation of each page, so the cookbook can then be used as more than a food and recipe book in the kitchen; but it can be moved into the classroom as a language and educational tool for Cree food culture revitalization.

Toward Indigenous-led Food Security Innovation: Fisher River Cree Nation's Indigenous Food Guide

At this point, international approaches to Indigenous food guides and food systems, like those being undertaken in Canada, are relatively new, although there are several that are promising. However, with so many approaches being new and attempting to break the realm of Indigenous-led frameworks, it is hard to pinpoint what is a wise practice suited in one community context.

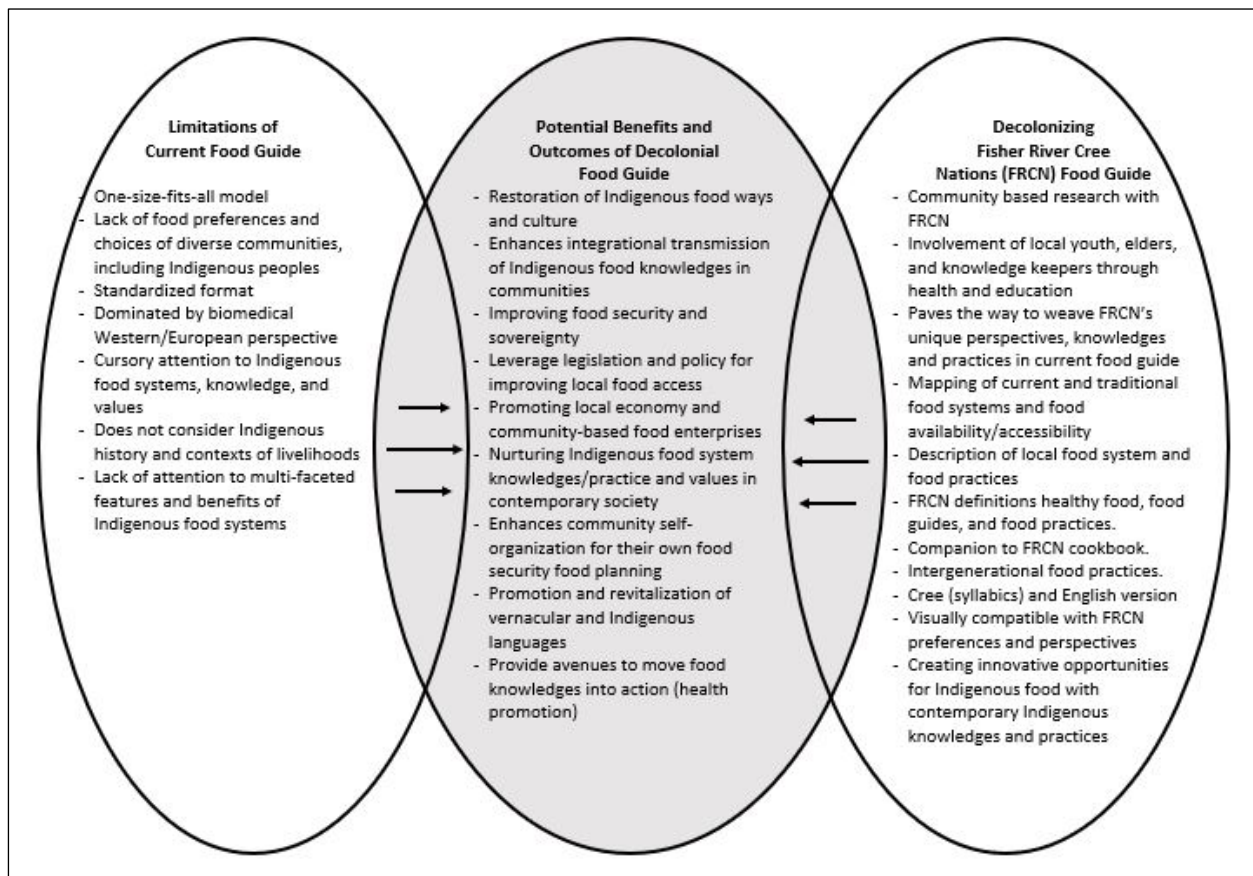
Contemporary nutritional sciences are beginning to acknowledge the importance of Indigenous food practices as a key to health, well-being, and Indigenous cultural revitalization and resurgence. There is also an emerging opportunity and need to learn from the underlying Indigenous food knowledges and perspectives that give rise to Indigenous food systems and associated knowledges.

An Indigenous food guide specific to each

diverse Indigenous group is a way for these communities to be empowered, work on community development, be self-sustaining, and improve their knowledge of nutrition in relation to their cultural food systems. It is a way for these communities to address accessibility and affordability in ways that are self-determining, creative, and relevant to their contexts.

Indigenous food knowledges and perspectives are central and critical in the debate and practice of the current and future of Indigenous food security and sovereignty. The first author of this commentary, who is an Ojibwe-Cree woman born and raised in FRCN along the southwestern shores of Lake Winnipeg, intends to design an Indigenous food guide uniquely suited to the needs, preferences, voices, perspectives and Indigenous food knowledges of FRCN community members for current and future generations. The FRCN food guide (see Figure 3) will be developed through

Figure 3. Food Guide Framework, Compiled by the Authors



community-based and -led collaborative research with the active involvement of youth and knowledge-keepers, and will follow the model of a wise practices approach that addresses the limitations FRCN community members have in making healthy food choices, accessing healthy and Indigenous foods, and sustainably revitalizing their cultural food practices. The FRCN food guide will build on the long-term partnership and experiences of the University of Winnipeg and will use the cookbook recipes as a starting point. We hope that

the lessons from this small-scale, wise practice-based Indigenous food innovation will inspire similar Indigenous food guides in Turtle Island, and elsewhere, and will enrich the debate and practice of current and future food security by privileging the perspective, visions, and voices of local Indigenous communities.



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Considering the role of life cycle analysis in holistic food systems research, policy, and practice

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Abstract

Researchers use life cycle assessment (LCA) to evaluate the environmental impacts of foods, providing useful information to other researchers, policy-makers, consumers, and manufacturers. However, LCA is ill-equipped to account for desirable, often normatively valued, characteristics of food systems, such as redundancy, that could be considered more sustainable from a resilience perspective. LCA's requirement of a functional unit also causes methodological bias favoring efficiency over resilience and other difficult-to-quantify prop-

erties. This efficiency bias results in favorable evaluations of conventional production techniques and plant-based foods since they typically have the lowest impacts per unit of output when compared to alternative agriculture systems and animal-based foods. Such research findings may drive policy-makers as well as consumers to prefer the more efficient options, with the possible outcome of diminishing resilience. This research and policy commentary explains why complementary assessment methodologies are necessary for comprehensive sustainability assessments that support

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researchers, policy-makers, and other relevant stakeholders in decision-making for food systems sustainability. In addition to LCA, researchers examining food systems sustainability issues should consider integrating other frameworks and methods such as life cycle sustainability assessments, sustainable materialism, backcasting and scenario building, and food systems assessments to help generate a holistic understanding of the systems being analyzed.

Keywords

Food Systems, Life Cycle Assessment, Research and Policy, Sustainability

Introduction

Food systems are necessary for the survival and health of humanity, but they can also pose risks. A key purpose of food systems is to transform raw materials into foods with sufficient levels of nutrients. The goal is to support health outcomes within biophysical and sociocultural contexts in which food is also pleasure, income, culture, and tradition (Sobal, Khan, & Bisogni, 1998). Food systems should also provide food security by ensuring availability, access, and utilization of food (Eriksen, 2008). Regardless of the framing of their operations and preferred outcomes, food systems are a significant contributor to environmental and related health problems (Campbell & Campbell II, 2006; Eakin, Connors, Wharton, Bertmann, Xiong, & Stolzfus, 2017; Food and Agriculture Organization of the United Nations [FAO], 2006; Weber & Matthews, 2008). Pursuing sustainability requires consideration of if and how food systems operations can be maintained consistently in the future in order to provide future generations with outcomes similar to those demanded today (Brundtland, 1987).

Both policy-makers and consumers play important roles in shaping the future of food systems as manufacturers react to laws, regulations, and consumer demand. This manuscript describes a commonly used tool, life cycle assessment (LCA), that can be used to inform those decisions, before moving on to describe limitations of this approach in isolation. Other methodologies that can be strategically combined with LCA to provide a more

comprehensive understanding of sustainable choices are then described. Consideration of such a combinatorial approach is timely because LCA is now widely used in food system analyses despite its unique methodological challenges. Some of these challenges include difficulty in accounting for the complexity and variability of production systems and consumption decisions, as well as an efficiency bias caused by the necessity of utilizing a functional unit. LCA is also poorly suited to address some important environmental and health concerns generated by modern food systems. In fact, LCA tends to support the refinement of existing systems, perpetuating the status quo rather than encouraging food systems transformation. Growing food-related trends, such as the proliferation of highly processed plant-based foods, and debate regarding the utility and danger of genetic engineering, ensure that LCA remains valuable for assessing specific claims of environmental superiority in relevant impact categories. However, researchers should acknowledge that there remain sustainability and resilience concerns that can only be addressed through other methodologies as part of a mixed-methods design. Such an approach can help advance solutions that satisfy a broader range of concerns rather than LCA's traditional focus on efficiency.

Life Cycle Assessment

LCA is the systematic quantification of the environmental impacts caused by the inputs required and outputs generated throughout the stages of a product's life cycle, including extraction, production, distribution, use, and disposal. LCA can be used to evaluate and compare foods and their production systems. It also attempts to capture all flows between the technosphere (human-made manufacturing processes) and biosphere (the natural world or ecosystem). These flows are then characterized and normalized in an effort to translate them into comparable and meaningful environmental and resource-related impacts. Researchers turn to LCA to quantitatively assess the sustainability of a given product, production system, or consumer choice (Andersson, 2000; Jungbluth, Tietje, & Scholz, 2000; Roy et al., 2009).

LCA and Food Systems

LCA's of foods and diets are intended to inform consumers, producers, policy-makers, and other stakeholders and enable them to make better choices by comparing the environmental impacts of products. Applied to food systems, LCA can provide evidence to help guide policy-making in some specific circumstances, such as evaluating the impacts of agricultural commodities or establishing carbon tax for individual foods (Gava et al., 2019). Although common metrics used in food LCA include global warming potential (GWP), eutrophication potential, land use, and water use, there are additional important environmental impacts of concern such as biodiversity loss and health impacts associated with dietary patterns, both of which are rarely if ever considered in food LCA (de Vries & de Boer, 2010; Roy et al., 2009). LCA frequently focuses on agricultural and farm-level production, as these stages are generally the largest sources of greenhouse gas emissions, eutrophication potential, and land use (de Vries & de Boer, 2010; Heller & Keoleian, 2003; Weber & Matthews, 2008).

Main Types of LCA for Food

Attributional LCA (ALCA) of foods typically characterizes the environmental impact attributed to a given functional unit (i.e., the quantified basis of comparison between environmental impacts of alternatives serving similar purposes) produced in an existing system. However, a detailed analysis of the current system does not serve the purposes of those who seek more than incremental change. The type of LCA known as consequential LCA (CLCA) is perhaps better suited for this goal because it estimates the environmental impact of a change in output of the functional unit. ALCA is therefore suitable for assessing the environmental burden of a product in a status-quo situation, i.e., the production of agricultural commodities, whereas CLCA is suitable for assessing environmental consequences of a change in demand (Thomassen, Dalgaard, Heijungs, & De Boer, 2008). CLCA also is more capable of capturing complexity, especially when coupled with the use of system expansion in which the inputs and outputs of a product are ascribed entirely to it, but the system is expanded to account

for products displaced by co-products of the main product, sometimes creating feedback loops as a result. One example of this is the “soybean-rape-seed-loop,” in which soybean meal has the co-product of soy oil, which displaces the need for rapeseed oil, which in turn is a co-product with rapeseed meal, which then requires its own system expansion in which it displaces soybean meal, starting the loop again (Dalgaard et al., 2008) (Dalgaard et al., 2008). Co-production like this, as well as natural processes, creates challenges for LCA of food.

Challenges in Food LCA

There are some unique aspects of food production systems that pose challenges for food LCA. First, agricultural systems do not lend themselves to simple point estimates or even reliable longitudinal averages because they are subject to high degrees of variability. Second, agricultural production blurs the boundary between the biosphere and the technosphere in ways that make identification and quantification of the material and energy exchanges required by LCA ambiguous. Finally, food products defy traditional evaluation using a single functional unit because individual foods are complex mixes of nutrients, tastes, and textures that can serve fundamentally different purposes in different contexts.

Variability

Completing a life cycle inventory (LCI) through data collection in the field is necessary to perform an LCA. However, geographic and seasonal variability may cause change over time and across similar but geographically dispersed systems. Farming is geospatially distributed across a wide variety of ecosystems and biomes, causing variability in data collected for inventories (Notarnicola, Sala, Anton, McLaren, Saouter, & Sonesson, 2017). There is heterogeneity at every stage of production in a food system, including temporal and seasonal changes to temperature, rainfall, and sun exposure, soil fertility, seed characteristics, harvest practices, and distributor and consumer preferences. Variability, therefore, limits the certainty and accuracy of applying LCA results calculated at a particular time and place to the same product produced in a different times and places.

Blurred Lines

One of the fundamental, albeit largely unstated hypotheses of Industrial Ecology, a discipline commonly associated with LCA, is that economic production takes place exclusively in the technological systems that are the product of the industrial revolution (Seager & Theis, 2002). The standard LCA practice of compiling an LCI of the material or chemical and energetic exchanges between systems assumes that an unambiguous separation of the biosphere and the technosphere can be drawn, which is typically considered the system boundary. That is, the scope of the LCI consists entirely of activities occurring within the technosphere and exchanges to and from the biosphere. However, agriculture blurs the line between the biosphere and technosphere through human intervention into ecosystems that utilizes biological processes alongside technology and artificial inputs.

Even in industrial agriculture production, including monoculture crops and confined animal feeding operations (CAFOs), variations based on soil, climate, and watershed characteristics exist, and it is unclear precisely where the system boundary should be drawn. In these cases, some ecosystem services such as aquifer replenishment, animal habitats, and an agrarian aesthetic are provided, but not necessarily quantified or clearly attributable to the production system. More complex systems of co-production that utilize crop rotation rely on high levels of expertise and more extensive manual labor. LCA is ill-equipped to disaggregate and allocate the impacts of this more extensive manual labor across co-products in a dynamic and interconnected agricultural system. Further, many benefits ascribed to alternative agricultural systems, such as better nutritional characteristics and taste, soil health, and long-term productivity of the land, are not captured by typical LCA metrics. Food always involves the co-production of other products, such as ecological habitat, which makes difficulties in the allocation of burdens inevitable.

Aquaponics and aeroponics, as well as cultured meat production, are possible exceptions where a controlled environment allows for a clearer boundary between technology and nature; however, they do not represent typical farming practices. Even in these cases, at least some aspect of the production

model relies on natural processes that are likely to have co-products. For example, cultured meat production byproducts may include alanine, ammonia, and lactate from the corn and soy used in providing glucose and amino acid (Mattick, Landis, Allenby, & Genovese, 2015). Advances in genetic engineering blur the boundary even further by treating nature as a design space, indefinitely extending the technosphere.

Wild LCA

Wild-grown and -harvested or -caught foods further complicate the boundary between the biosphere and the technosphere. In many cases, these foods exist in nature without any intentional inputs, but when humans take the animals or plants out of their ecosystems, the impact of the disruption of that ecosystem must be accounted for. An LCA including wild-caught cod noted a need for improved indicators for impacts of over-fishing, emissions from boats, use of antifouling agents to maintain equipment, and disturbances to the seafloor ecosystem for LCA to more accurately capture environmental impacts of wild fishing (Ellingsen & Aanonsen, 2006). Cod grow and procure food independently, but humans expend resources to find and capture them to be processed and sold for consumption, which interrupts a non-human food web. This disruption to larger-scale patterns occurs from more common agricultural practices as well.

Beyond the Farm

While all human structures or modifications to the land surface result in disruption to ecosystem services, agricultural activities present additional issues that are not well captured by existing LCA inventory and impact characterization methods. Beyond individual farms and crops, swaths of land are characterized by vast fields of corn and soy. These vast fields change the landscape for entire communities and watersheds, such as the Mississippi River basin, about 58% of which was used as cropland as of 2000 (Goolsby & Battaglin, 2000). The proper scale for assessment is difficult to determine in such cases where an individual unit of operation exists amid many other units engaged in the same production. In the case of fertilizer, eutrophication

is the potential environmental impact of concern. Fertilizer applied within the Mississippi River Basin can cause eutrophication leading to an algae bloom and hypoxia that impacts both a local stream and the Gulf of Mexico (Rabalais, Turner, & Wiseman, 2002).

When considering eutrophication potential, many LCA studies calculate a nutrient balance according to the physical boundary of the farm itself. This typically includes fertilizer, crop-based nitrogen fixation, nutrient content of feed and imported livestock, and release of nitrogen from decomposition; however, it may or may not include associated inputs and impacts from off-farm activities (Costello, Xue, & Howarth, 2015). Estimates of eutrophication potential can be based on converting total nutrient inputs using a normalization factor, using physical models to estimate nutrient fluxes, or applying empirically derived multipliers to the net nutrient farm-balance (Costello et al., 2015). This variety of approaches demonstrates that there is not a consistent and correct way to account for eutrophication potential across studies. This problem is largely a result of the difficulty and ambiguity in delineating a clear system boundary for an agricultural production system (Morelli et al., 2018). There is a tendency to shrink system boundaries rather than expand them, as this allows for easier data collection and more certainty in the assessment performed.

Post-harvest LCA

Modeling limitations and lack of data availability hinder post-farm gate analysis of food manufacturing, distribution, consumption, and disposal stages, meaning that many food LCA's are only cradle to gate. Increasingly sophisticated post-harvest technologies complicate food supply chains and cause higher environmental burdens for later stages of the food life cycle. Processes including packaging, refrigeration, distribution, and cooking are potentially significant. However, they are not captured by most food LCA studies, thereby ignoring a potentially large portion of the total life cycle environmental impact. Although it is more challenging, time-consuming, and expensive to perform, food LCA researchers should make an effort to assess the environmental burdens of more complex food

products, especially those making claims regarding their environmental superiority to more traditional foods. It is also important to ensure comparisons are being made on as reasonably fair a basis as possible.

Functional Units and Food

Functional units are based on the obligatory properties of items or systems being analyzed, without which the item would not fulfill its intended purpose (e.g., a beverage container should not leak) (Weidema, Wenzel, Petersen, & Hansen, 2004). Using a consistent functional unit, such as mass (e.g., 1 kilogram of a product) allows comparison of environmental impacts of products across different production systems by providing a common basis for quantifying the necessary inputs and outputs to produce equivalent functional units of the product.

When considering the obligatory properties of food, assigning a functional unit is difficult because foods typically serve multiple purposes, which also vary based on the person consuming them. For example, both a tomato and banana provide the nutrients potassium and vitamin C along with calories. However, only one is used in making pasta sauce, and only one is used in a banana split because they have very different flavors, textures, and appearances. Comparing diets or meals becomes even more complicated due to a larger number of potential reasons for food choices as well as co-benefits from eating certain foods together. The experience of the food, the culture surrounding it, and the direct economic support of community can be more important to the consumer than any other characteristic. In the face of these myriad possibilities, researchers often default to a seemingly neutral weight-based functional unit, which is useful for optimizing individual products or comparing similar products, but not for comparisons between products serving essentially different purposes. The comparison of alternatives based on a common functional unit is essential for LCA to work, but also results in an emphasis on efficiency in fulfilling that functional unit.

Functional Units and Efficiency Bias

Examination of the LCA methodology reveals that its structure inherently favors efficient resource use

age over other priorities. The use of LCA to examine existing production systems without consideration of alternative consumption possibilities strengthens this efficiency mindset (Garnett, 2014). Choosing a functional unit implies that all other aspects of a system should be optimized based on this primary purpose of the product. Impacts not directly tied to the functional unit on a quantitative basis (e.g., biodiversity) are at risk of being lost in the assessment, or may only be captured indirectly through other metrics (e.g., land use) (Kloepffer, 2008).

LCA's emphasis on efficiency was useful for its original purpose, which was to systematically improve mature manufacturing industries such as automobiles or petrochemicals (Seager & Theis, 2002). However, functional units frequently do not account for various, often intangible, qualities that people derive from consuming food, nor do they account for characteristics increasing the resilience of a system, both of which may be justification for lower efficiencies of production systems. For example, when considering a food systems transformation perspective, GWP is just one of many characteristics of the systems, which include the calories, micronutrients, fiber, fuel, labor, cultural contribution, status symbols, liquid assets, and resilience provided by the systems, making the functional unit an inadequate measure of success or sustainability (Garnett, 2014). Some LCA researchers have attempted to include elements that focus on the preservation of natural systems, such as biodiversity (Curran et al., 2010). However, as long as impacts are normalized based on a common quantifiable functional unit, as is necessary for LCA, the focus will remain on efficiently fulfilling the obligatory properties of the functional unit, potentially at the expense of a less sustainable overall system that might be prioritized from a resilience perspective. LCA therefore is not adequate for a holistic sustainability evaluation of alternatives, as it fails to account for other priorities such as food security, equity, and resilience. The next section serves as an overview and reminder of the multitude of environmental challenges presented by and to food systems, some of which are not captured by LCA.

Environmental Impacts from Food Systems

Due largely to reliance on fossil fuels and industrialized agriculture, humanity has exceeded Earth's "safe operating space" for multiple planetary boundaries (e.g., disturbance to nitrogen and phosphorus cycles from fertilizer and cultivation of leguminous crops) (Rockström et al., 2009).

Land-use change resulting from agricultural production is responsible for about 75% of global deforestation (Vermeulen, Campbell, & Ingram, 2012). Food systems account for 19-29% of global greenhouse gas emissions, including about half of methane emissions, much of which comes from ruminant livestock's digestion causing enteric fermentation (i.e., microorganisms breaking down carbohydrates in the rumen, the cow's first stomach, creating methane that is typically burped out) (Lassey, 2007; Vermeulen et al., 2012).

Agricultural run-off of excess nutrients (e.g., nitrogen and phosphorus) from agricultural production in the Mississippi River Basin is transported to the Gulf of Mexico, resulting in eutrophication (excessive nutrients in water) and subsequent hypoxia. Hypoxia is the condition of having low or depleted oxygen. In this case, hypoxia is caused by a eutrophication-induced algae bloom leading to the overgrowth and subsequent death and decomposition or digestion of phytoplankton by fish, the results of which sink to the bottom of the Gulf waters where it is decomposed by aerobic bacteria, depleting oxygen. The depleted oxygen causes fish to leave the area and bottom dwellers unable to leave die, leaving a lifeless area known as the Gulf of Mexico dead zone (Rabalais et al., 2002; Xue & Landis, 2010).

Global warming will result in regions with less productive crops that require more resource inputs but have a higher likelihood of failure, resulting in weakening food system resilience, and increase the potential for cascading system failures across the food-energy-water nexus (Berardy & Chester, 2017). Livestock production is an especially significant contributor to the environmental problems listed above due to its massive and growing scale, inefficiency in conversion of crops to protein, high land and water use, tendency to overgraze, contribution to biodiversity loss from mono-cropping to feed livestock, and high levels of associated green-

house gas emissions (FAO, 2006). Paradoxically, as people gain affluence and can afford more meat, their tastes change, and their demand for animal-based food products grows considerably (McMichael, 2001).

In terms of food use, about one-third of all food produced is wasted. This phenomenon exacerbates challenges across food systems by increasing the need for production while simultaneously directly contributing to methane emissions from food rotting in landfills (FAO, 2011; U.S. Environmental Protection Agency, n.d.). Despite this, many people suffer from food insecurity around the world, including an estimated 2 billion people with micronutrient deficiencies (Gödecke, Stein, & Qaim, 2018).

Adding to these challenges, food systems are under pressure to provide more food while making lower environmental impacts as the global population continues to rise (Godfray et al., 2010). Even further disconnected from LCA than such environmental impacts, but still of great importance to sustainable food systems, are impacts on human health, as explained in the next section.

Health Impacts from Food Systems

Food systems, as currently designed, encourage unhealthy eating habits, which lead to negative health outcomes and threaten sustainability (Willett et al., 2019). This problem is typically associated with developed nations but continues to spread globally across developing nations. The spread is largely a result of trends including increases in processed and high-fat, high-energy-density foods, more eating away from home, and higher intake of oils and sugary beverages, as well as reduced physical activity and increased sedentary behavior (Drewnowski & Popkin, 1997; Du, Mroz, Zhai, & Popkin, 2004). Westernized diets are associated with an increased rate of diet-related diseases (Campbell & Campbell II, 2006). The Western diet's overconsumption of fat, cholesterol, protein, sugar, and salt, as well as processed and fast foods, increases rates of obesity, metabolic syndrome, and cardiovascular disease, and may also promote autoimmune disease (Manzel, Muller, Hafler, Erdman, Linker, & Kleinewietfeld, 2014).

The mismatch between human physiology and

Western dietary patterns and lifestyle underlies the growing levels of diseases (e.g., "coronary heart disease, obesity, hypertension, type 2 diabetes, epithelial cell cancers, autoimmune disease, and osteoporosis," (Carrera-Bastos, Fontes-Villalba, O'Keefe, Lindeberg, & Cordain, 2011)) that are rare or absent in hunter-gathering and non-Westernized populations. Observations from countries transitioning from traditional to Westernized diets support the association between the Western diet and negative health impacts, even within a population maintaining a primarily vegetarian diet. The overall incidence of noncommunicable diseases in India, including an obesity epidemic, rose as the country shifted toward a Western diet, including decreased whole plant food consumption and increased consumption of refined carbohydrates, fast food, snacks, processed foods, and fried foods (Singh et al., 2014).

In addition to physical health problems like obesity, the Western diet also contributes to cognitive impairment and hippocampal dysfunction, including Alzheimer's disease (Kanoski & Davidson, 2011). A Western diet is also associated with higher indications of depression and anxiety (Jacka et al., 2010).

While LCA studies exist that compare environmental impacts of dietary preferences, their consideration of health impacts rarely extends beyond ensuring foods with similar nutrient characteristics are being compared. They typically do not address Westernized compared to traditional diets in any meaningful way but rather compare omnivorous to vegetarian diets (Baroni, Cenci, Tettamanti, & Berati, 2007; Risku-Norja, Kurppa, & Helenius, 2009; Scarborough et al., 2014). A recent trend that attempts to counter the negative health and environmental consequences of Westernized meat-heavy diets is the rise in the consumption of plant-based foods.

Plant-based Trends

Increasing environmental awareness along with health and ethical concerns inspired rapid growth in the consumption of plant-based foods in 2018 that was ten times the overall rate of growth for all foods (Plant Based Foods Association, 2018a). New meat analogs such as the Beyond Burger

drove US\$670 million in growth, and other dairy alternatives drove \$697 million in growth. On the other hand, more traditional plant-based foods like tofu and tempeh drove only US\$108 million in growth (Plant Based Foods Association, 2018b).

However, the amount of processing and technology required for some modern plant-based foods calls into question whether or not they appreciably lessen impacts on the environment, or people's health, compared with minimally processed animal-based foods. The plant-based Impossible Burger is a common target, in part due to the fact it uses genetically engineered ingredients, which itself is controversial (Robinson & Antoniou, 2018; Uzogara, 2000). Fortunately, LCA is well-suited to investigate quantifiable environmental claims of competing products serving similar functions and can help identify the environmental consequences of choosing one over another.

Tradeoffs in LCA

When employed appropriately, with an understanding of its limitations, LCA can prove useful as a tool for evaluating alternatives. It can even capture some, but not all, of the tradeoffs between competing visions for sustainable food systems. Analysis of highly processed foods that are the products of technologically advanced production methods compared to minimally processed foods from production systems relying on more substantial inputs of natural resources (e.g., plant-based meat analogs compared to biodynamic meat) could help highlight potential impacts of such competing alternatives. Figure 1 provides a visual representation of the potential tradeoffs made when shifting between high-intensity manufacturing and high-intensity farming to produce food.

LCA Limitations

As demonstrated in Figure 1, there are limited LCA's of more complex manufactured food products, restricting possible comparisons between foods available for consumption. This problem is compounded by the fact that new products are continuously being introduced, and many food items have dozens of ingredients, most of which do not have existing LCA data. Further, many food

products' ingredients are intentionally masked through vague labeling and ingredients lists, and their exact composition is proprietary data. Products can also be reformulated as manufacturers try to save money on ingredients or appeal to a new trend, changing the ingredients and invalidating the LCA work performed. Unfortunately, even among products for which LCA exists, many have not been evaluated in terms of their sustainability impacts from a broader environmental or human health perspective. Doing so requires tools in addition to LCA.

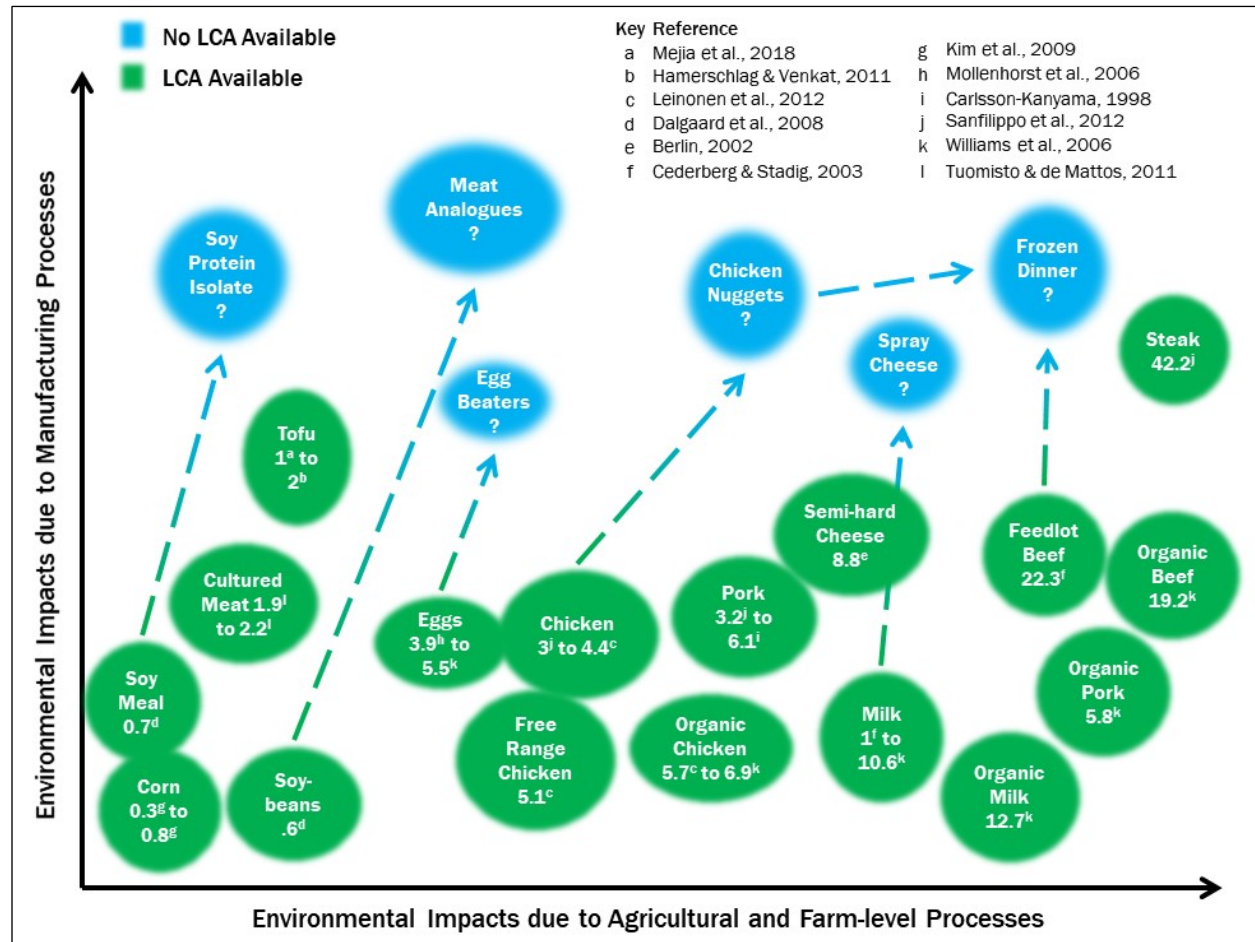
LCA and Sustainable Food Systems

Despite the value of a quantitative approach to evaluating alternatives, LCA alone is insufficient to determine the most sustainable option among alternatives because the methodology fails to capture other values that are still relevant. Although researchers have yet to reach a consensus regarding what the fundamental problems facing food systems are, what components of food systems are important to sustain, or what the ideal solutions are, some common priorities include food security, efficient resource usage, environmental preservation, and equity (Eakin et al., 2017).

The perspectives of efficiency-oriented, demand restraint, and food systems transformation reflect three emerging approaches to food systems sustainability that differ based on humanity's relationship with nature and technology (Garnett, 2014). ALCA supports an efficiency-oriented perspective since it examines the optimization of existing systems. CLCA is most supportive of a demand restraint perspective as it can help imagine alternative scenarios, including those with different consumption patterns (Garnett, 2014). However, food systems transformation requires consideration of components outside the scope of existing LCA methodologies, as it must account for the inequality and imbalance between actors within food systems and strive towards social justice (Garnett, 2014). Similarly, debates regarding controversial approaches to changing food systems such as genetic engineering cannot be resolved using LCA results alone. However, LCA can be useful to investigate the validity of claims against alternative agriculture, such as decreased yields and increased resource us-

Figure 1. Greenhouse Gas Emissions (kg CO₂ equivalents) from Selected Foods.

Most LCA evaluates commodities with minimal manufacturing processes. Value ranges are from references listed in the key (Berlin, 2002; Carlsson-Kanyama, 1998; Cederberg & Stadig, 2003; Dalgaard et al., 2008; Hamerschlag & Venkat, 2011; Kim, Dale, & Jenkins, 2009; Leinonen, Williams, Wiseman, Guy, & Kyriazakis, 2012; Mejia et al., 2018; Mollenhorst, Berentsen, & De Boer, 2006; Sanfilippo, Raimondi, Ruggeri, & Fino, 2012; Tuomisto & de Mattos, 2011; Williams, Audsley, & Sandars, 2006).



age in organic compared to conventional agriculture (Chatzisyseon, Foteinis, & Borthwick, 2017; Foteinis & Chatzisyseon, 2016).

Utility of LCA

LCA's greatest utility may be in ensuring there is a quantifiable justification behind assumptions that lead to behavioral changes to promote environmental sustainability, as this protects against the risk that counterproductive behaviors may be prioritized. For example, an emphasis on local food production and consumption to reduce food miles has far less of an impact on greenhouse gas emis-

sions than reducing red meat consumption (Weber & Matthews, 2008). Without this knowledge, consumers might choose to purchase locally raised beef with the incorrect impression that it has a lower GWP than imported chicken or vegetarian meat analogs. However, this does not invalidate the importance of local foods for other reasons, which can be investigated and demonstrated using other assessment tools. Research has shown, for example, that participating in community supported agriculture (CSA) may cluster with other sustainability-oriented behaviors, such as recycling and composting (MacMillan Uribe, Winham, &

Wharton, 2012). While, ostensibly, these activities contribute further to sustainability, LCA can only provide an assessment of quantifiable environmental tradeoffs.

Addressing Resilience

If efficiency is the dominating characteristic driving LCA, a countervailing concern is resilience. How tensions between such priorities are resolved will drive the future of the global food system, which requires accounting for competing values reflected therein (Berardy, 2015). Sustainability problems can also be characterized as wicked problems, in that they are difficult to formulate, have multiple, incompatible solutions, have open-ended timeframes, are novel or unique, and are subject to competing value systems or objectives (Seager, Selinger, & Wiek, 2012). One tradeoff that sometimes must be made is between efficiency and resilience, as optimization for efficiency often reduces the capacity for resilience (Korhonen & Seager, 2008). In fact, although it is inefficient, redundancy is a necessary component of a resilient system, as it increases the system's capacity to survive and adapt to disturbances (Worstell & Green, 2017).

Integrating resilience concerns into LCA is a complicated endeavor due to the inherent bias towards efficiency resulting from LCA methodology. Prominent frameworks share eight common qualities that define a resilient system. These qualities include being independent, yet connected, locally self-organizing, accumulating reserves and infrastructure, establishing back-ups and redundancy, fostering diversity and complementarity, encouraging conservative innovation, integrating with ecology to minimize imported and manufactured inputs, and embracing disturbance and transformation (Worstell & Green, 2017). The optimization orientation of LCA means that even resilience-oriented constraints will be reduced to the most expedient way to achieve their stated minimum requirements (e.g., the minimum redundancy required for a resilient system).

Although some resilience characteristics, such as diversity, may complement it, efficiency itself drives rigidity in contrast to resilience, making these opposing forces (Pizzol, 2015; Worstell & Green, 2017). Specifically, in agriculture, fertilizer

and pesticide application, as well as other modern production methods to optimize yield and efficiency, can undermine the provision of ecosystem services, biodiversity, and, ultimately, the long-term resilience of the soil and production system (Bennett et al., 2014). These priorities parallel the ethical tension in sustainability between preserving resources for the future by making sacrifices today and meeting the needs of all people in the present (Seager et al., 2012).

Exploration of these perspectives is necessary to achieve sustainable food systems that satisfy both practical and normative concerns. Unfortunately, many sustainable agriculture definitions and assessment tools focus on a range of specified criteria rather than taking a resilience approach. A resilience approach would focus on the ability of a system to withstand and overcome disturbance while maintaining its functionality (Worstell & Green, 2017). Ultimately, relying solely on LCA with its focus on efficiency will only serve to reinforce optimization of the status quo, decreasing resilience and increasing the risk of collapse. A more sophisticated understanding that integrates resilience concerns is required.

Improving LCA and Related Studies

Recognition of Problems and Solutions

LCA practitioners have a responsibility for transparency in modeling and reporting results, which includes acknowledging the limitations of LCA. However, they can also work to improve the tool to address some of the challenges outlined here. The challenges identified and some potential solutions are summarized in Table 1 and discussed below.

Nutrient Based Dietary Comparisons

The challenges associated with determining an ideal functional unit can be partially alleviated by providing multiple independent functional units based on quantifiable and justifiable obligatory properties. Translating impacts calculated with weight as a functional unit to impacts with nutrients as a functional unit is straightforward since the equivalent impacts are based on the amount of weight necessary to achieve the nutrient quantity established as

Table 1. Several Potential Solutions to Deal with Challenges Facing Food LCA

Food LCA Challenges	Potential Solutions
<i>Blurred boundaries</i>	Transparent methodology, recognition of issue
<i>Appropriate functional unit / LCA of diets</i>	Multiple functional units, Stochastic Multi-Attribute Analysis
<i>Geospatial variability</i>	Geographic Information System enabled LCA, fate and transport models
<i>LCA bias towards efficiency</i>	Utilize mixed methods
<i>Integrating qualitative methods</i>	Life cycle sustainability assessment, food systems assessments, sustainable materialism, backcasting, and scenario-building

a new functional unit. This allows researchers to present the range of impacts associated with products being compared in a way that demonstrates to the reader the sensitivity to the comparison basis. A recent publication demonstrated how even an advanced assessment of protein quality could be integrated into the interpretation of LCA results (Berardy, Johnston, Plukis, Vizcaino, & Wharton, 2019). In contrast with traditional LCA analysis, the integration of protein quality in the assessment resulted in some animal-based proteins being compared favorably with plant-based proteins (Berardy et al., 2019).

Stochastic Multi-Attribute Analysis

Multicriteria decision making is another option for more effective delivery of results when preferences are known or can be estimated. Stochastic multi-attribute analysis for life cycle impact assessment (SMAA-LCIA) performs internal normalization to facilitate tradeoff identification across multiple perspectives simultaneously and provide a rank ordering of alternatives (Prado-Lopez et al., 2014). The challenge of how to incorporate sensory and cultural preferences and values remains.

GIS-LCA

LCA can also incorporate geographical information system (GIS) enabled assessment to allow for better assessment of biodiversity and land use impacts (Geyer, Lindner, Stoms, Davis, & Wittstock, 2010). Due to regional variability, impacts such as eutrophication potential need to account for the watershed in which the production occurs, and if applicable, the physical landscape of the agricultural production site, including presence or absence of buffer strips. Variations in regions are reflected

in the results of GIS-enabled LCA, which finds significant variations in environmental impacts between locations when examining corn production across five U.S. states (Rodríguez, Citroth, & Srocka, 2014).

Fate and Transport Modeling

Addressing geospatial variability in LCA may be improved by the utilization of fate and transport models to estimate how inputs are dispersed in the surrounding ecosystem (Morelli et al. 2018). However, the application of fate and transport models to current practices will only point out hotspots for implementation of best management, not assist with resolving differences between efficiency and resilience. Fate and transport models demonstrate how a conventional farm compares to a novel food production approach that meets resilience values (e.g., permaculture) and/or can show annual variability in actual export of nutrients from the farm given climate variation. This model could highlight differences in how these systems interact with physical systems represented within the models, which may help to clarify the pros and cons of these relative approaches. While integrating these approaches with LCA can help address some of its challenges, a mixed-methods approach is required to perform a holistic sustainability assessment. Fortunately, there is a wide variety of established and emerging complementary methodologies that can be utilized.

Complementary Methodologies

LCA is just one tool of many that can be coupled with other forms of assessment to provide a more balanced and holistic analysis of a given product, production system, or consumer behavior. Sustain-

ability evaluation needs multiple methodologies that capture the diversity of factors important to all stakeholder viewpoints involved. Complementary methodologies should fill the gaps in the assessment that LCA is ill-suited to address, including concerns regarding resilience, food security, equity, and alternative food systems, as well as the potential for transformation. There is a need for tools and frameworks to help consumers, policy-makers, and other stakeholders make informed decisions about dietary choices, recommendations, and food systems operations. Some tools and frameworks exist that can provide necessary information for these stakeholder groups. However, given the complexity of food systems and food-related policies and behaviors, it is likely that current assessment tools must be combined and improved in order to support more holistic decision-making. Because competing ethical and other normative concerns arise in relation to perceptions of food system sustainability (Eakin et al., 2017), tools used to evaluate aspects of food systems are often qualitative in nature or include mixed methods that employ both quantitative and qualitative approaches. Some examples of tools and concepts that are useful in representing a broader set of perspectives include applications of life cycle sustainability assessment (LCSA), food systems assessments, sustainable materialism, and backcasting and scenario-building. Through multiple combined methods and frameworks, researchers can provide a more holistic vision of the foods, production methods, or behaviors being evaluated and enable potential decision-makers to understand their consequences in a way that aligns with their own values.

Life Cycle Sustainability Analysis

Life cycle sustainability analysis (LCSA) expands on LCA by adding consideration of concerns beyond typical environmental burdens, including animal welfare and food security and by utilizing multiple simulation models at the animal, crop, and farm level. LCSA attempts to provide a more holistic analysis by broadening the scope and integrating models, but its application is still limited, and aspects of its practice remain unclear (Guinée et al., 2011). LCSA broadens and deepens the scope of LCA to include economic and social concerns, ad-

dress sector-level instead of product-level questions, and examine physical, economic, and behavioral relations rather than just technological relations; however, it is still fairly uncommon and an evolving tool (Guinée et al., 2011). Despite this progress, assessing impacts from mitigation options across these categories is complex and uncertain (De Boer et al., 2011). Applications of LCSA to actual case studies are limited, but one paper that applied LCSA to three different used-cooking-oil-collection systems noted the difficulty of quantifying social components of the assessment and relating them to a functional unit, which itself posed a challenge for comparing inventories across the collection systems analyzed (Vinyes, Oliver-Solà, Ugaya, Rieradevall, & Gasol, 2013).

Food Systems Assessments

Food systems assessment is the most specifically food systems-oriented framework discussed here, as it has the explicit goal of evaluating and understanding the characteristics of a given food system to improve it. Food systems assessments provide a complex look at multiple dimensions of operating food systems using quantitative and qualitative data (Lacagnina, Hughner, Barroso, Hall, & Wharton, 2017; LaClair, 2016). They operate from a systems-level perspective, including multiple data sources and methods, and should involve community stakeholders and representatives throughout the process both to build trust and to reveal gaps and opportunities (LaClair, 2016). Food systems planning assessment tools include foodshed assessments, land inventory food assessments, comprehensive food systems assessments, community food security assessments, community food asset mapping, food desert assessments, local food economy assessments, and food industry assessments (Freedgood, Pierce-Quinonez, & Meter, 2011).

Asset mapping quantifies and spatially maps physical and other 'assets' in a community that promote community-driven values in relation to food. Asset maps can, for example, identify locations of farmers' markets and other local foods programs, note which of these locations support the purchase of healthy foods using food assistance programs (e.g., Supplemental Nutrition Assistance Program

(SNAP), Special Supplemental Program for Women, Infants, and Children (WIC)), and provide information on health- or sustainability-related services provided in a specified region.

Food systems assessments also often include qualitative and quantitative data collection among a variety of stakeholders who represent key areas of food systems. These stakeholders include producers, advocates, decision-makers, corporate and other business interests, and consumers themselves in order to consider the competing frames from which stakeholders value aspects of food systems and their outcomes. Methods used include interviews, focus groups, and sometimes other ethnographic-type methodologies such as participant observations, field notes, and surveys (Lacagnina et al., 2017; LaClair, 2016).

Finally, quantitative data collection and analysis of health and food security-related indicators might also be incorporated in food systems assessments. Key data may include rates of household food security, obesity and overweight, death, chronic disease (in particular cardiovascular disease, type 2 diabetes, and perhaps some forms of cancer), and healthy food access (which can include measures of food outlet density in a given area or even evaluation of food product mixes within food outlets in a given area), to name a few.

Health impact assessment is another tool that can be used for informing agriculture, food, and nutrition decisions (Cowling, Lindberg, Dannenberg, Neff, & Pollack, 2017). Likewise, a food policy audit can be performed to directly assess the presence or absence of important food-based policy provisions related to health, economic development, environment, equity, and land conservation (O'Brien & Denckla Cobb, 2012).

Data from these various assessment tools, along with asset mapping, can provide a richer understanding of sociocultural context as well as opportunities for community-driven improvements to food systems. They further can be leveraged to balance contending demands on food systems outcomes in order to plan for a more holistic vision of the future of local, regional, or larger scale food systems operations. As such, food systems assessments have been developed in multiple locations across the country in service of a host of different

interests in food systems operations and outcomes (Lacagnina et al., 2017; LaClair, 2016; McFadden et al., 2016).

Sustainable Materialism

Sustainable materialism incorporates socio-political concerns in ways many methodologies cannot. It focuses on changing everyday practices of circulation, including in food systems, to advance collective provision of basic needs, recognize the power in the circulation of things, information, and individuals, and acknowledge human immersion in non-human natural systems (Schlosberg & Coles, 2016). Interpreting the local foods movement through the lens of sustainable materialism creates an opportunity for a more holistic analysis that couples quantitative and qualitative methodologies and concepts.

A recent conceptual expansion of the growing interest in local food systems from the perspectives of consumer health and environmental impact was proposed by Schlosberg and Coles (2016). Moving beyond the fundamental notion of ethical consumerism as an individual-level approach to concerns about lifestyle and environment, they describe the growth of community commitments to alternative consumerism in the form of collective movements. These movements, generally characterized as sustainable materialism, include an implicit or explicit political motivation to reconceive materialistic, consumer behaviors as a form of ethical environmental activism (Schlosberg & Coles, 2016). Sustainable materialism includes three primary tenets as described by Schlosberg and Coles (2016):

1. Collectivist movements concerned with the material flow from nature to human realm as products and services
2. Resistance against conventional flows considered damaging to the self, community, and environment from which materials came
3. Engagement in alternative flows better aligned with self, community, and environment

Together, these tenets suggest first that individual-level actions can and are being elevated to

the level of movements, demonstrated by the increase in local foods programs such as CSA's and farmers' markets. Second, they imply the possibility that LCA-style data, in combination with qualitative or mixed methods approaches, could inform interested communities about the types of material flows that best align with their normative concerns about food systems. Findings from research regarding how programs operate and what they produce could inform how communities engage with local food programs. Engaging in actions such as these could be considered tools to move communities towards the preferred futures that are often identified through backcasting and scenario-building exercises.

Backcasting and Scenario-Building

A widely applicable framework for envisioning a desired future for a food system and taking steps to make it a reality is backcasting and scenario building (Heinrichs, Martens, Michelsen, & Wiek, 2016). Regardless of the outcome desired, backcasting allows stakeholders to envision practical steps towards that future. Backcasting and scenario-building is a key toolset that provides insight into the interests and values of those focused on the complexities of food systems operations in a sustainable world (Heinrichs et al., 2016). Backcasting provides an inclusive framework through which communities and stakeholders can come to a shared vision of future outcomes of food systems, then 'backcast' to present day in order to explore what scenarios and steps are necessary to work towards that future vision. The process, with appropriate and comprehensive input, can address the complexity of competing visions and values while taking into consideration real-world assets, opportunities, and barriers to achieving some future food systems goal. As such, this framework sets the stage for a broader and deeper consideration of individuals' and communities' roles in food systems optimization for single or multiple goals.

Mutual Benefit Solutions

Despite the conflict seen between efficiency and resilience, there are opportunities for solutions that promote both or at least advance one without deterring the other. Such multifinal solutions by na-

ture are restricted to a smaller solution space compared to agendas promoting one goal without concern for the other (Köpetz, Faber, Fishbach, & Kruglanski, 2011).

One such recently published example employed the use of LCA with dietary data related to protein quality, the digestible indispensable amino acid score (DIAAS) (Berardy et al., 2019). DIAAS has recently been adopted by the Food and Agriculture Organization of the United Nations in order to evaluate protein bioavailability better to identify protein foods that best meet the needs of a growing population, and thus help to avert problems of malnutrition and food insecurity (FAO Expert Consultation, 2013). The integration of DIAAS and serving size into the evaluation of LCA results rather than just providing a new functional unit allowed for representation of food characteristics important to a variety of stakeholder groups and for consideration of quality and potential health impacts alongside efficiency concerns and GWP.

An excellent example of a solution advancing both efficiency and resilience goals is the reduction of food waste, but significant work remains to be done in advancing that agenda. Specifically, household food waste behavior is a neglected topic with a strong need for future research (Porpino, 2016). Sustainable intensification of agricultural production systems is another solution that seeks to advance both efficiency and resilience by balancing demand moderation with yield increases while also preserving biodiversity, protecting the environment, and applying appropriate location-specific and rigorously tested techniques best suited for a given situation (Garnett et al., 2013).

Conclusions

LCA provides a tool well-suited to support advances in efficiency, particularly with regard to the prevailing commodity agriculture system, but ill-suited to support advances in resilience, encourage systematic transformation, or deal with the complexities, ambiguity, and variability inherent in food systems. Problems in determining system boundaries, appropriate functional units, and geospatially and temporally based variations hinder the utility of LCA when applied to food. Therefore, policy-

makers should not rely solely on LCA results when making decisions in all cases, and researchers should not make broad sustainability claims based on LCA alone. Multiple other frameworks, including sustainable materialism, food systems assessments, and backcasting with scenario-building, exist that provide more holistic evaluations or frameworks supportive of transformation. These methods can complement LCA through providing

a better qualitative understanding of the environmental consequences beyond a per-functional-unit basis. It is only through combining methods that a holistic understanding of the sustainability implications of food systems decisions can be ascertained. Reducing food waste and sustainable intensification are two paths forward that can advance efficiency and resilience simultaneously.



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Expanding food agency theory and measurement with mixed methods: A study from Philadelphia

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Abstract

This qualitative strand of a mixed-methods study investigates the experiences of a group of low-income residents of color and university students from Philadelphia, in conjunction with the development of the Cooking and Food Provisioning Scale (CAFPAS). The CAFPAS is a tool for understanding and intervening in people's ability to access and prepare food, an ability known as "food agency." Qualitative data identified in this study reveal aspects of food agency not measured by the scale, such as the constraints of the physical environment and lack of money, or strategic provisioning to overcome barriers to access. Physical distance from food sources combined with income and time barriers makes procuring and preparing food difficult to achieve. Pro-

visioning practices, such as strategic shopping and gardening, thus emerged as a means to mitigate such socioeconomic barriers to enacting food agency. Personal aspirations—to eat more healthfully, cook more skillfully, and have greater self-sufficiency—also emerged as an unexpectedly important way in which people related to their own food choices and actions. CAFPAS scores are perhaps best understood with accompanying contextual data to elucidate food agency in particular places and life circumstances. Likewise, a qualitative inquiry into food agency can be appropriately contextualized by connecting it to broader patterns in CAFPAS scores. For a full conception of food agency, if it is to be applied in community projects or policy decisions, we need to better understand individuals' preferred actions and the place-based structures that either support or inhibit them.

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Keywords

Food Agency, Food Systems, Mixed-Methods Research, Food Access

Introduction

While historically food has been studied in silos, there has been a recent move toward understanding food in the context of systems that are influenced by larger world forces (Francis et al., 2008). A food systems perspective moves across scales, from body to community to society. One such recent attempt at multiscalar, transdisciplinary food research is the development of “food agency” theory. Our research team’s conception of food agency aims to understand on-the-ground action: how people employ manual and cognitive skills and sensory perceptions, while navigating and shaping societal structures, to access and prepare food. As an individual, “to have food agency is to be *empowered to act* throughout the course of planning and preparing meals within a particular food environment” (Trubek, Carabello, Morgan, & Lahne, 2017, p. 298). Following categorizations from psychology, food agency is a form of personal agency that incorporates social conditions over which people have no direct control (Bandura, 2000, 2004).

Past conceptions of food and behavior have largely excluded external influences on food intake (e.g., Bell & Marshall, 2003), or recognize food access as part of the equation but still rely on measuring individuals’ knowledge, skills, and behaviors (e.g., Vidgen & Gallegos, 2014). Food agency theory “goes a step further to include this broad array of actions and capacities, and emphasizes the vital role of repeated, skilled actions—assumed and unenunciated by other approaches—in developing those capacities ... [It] advances understanding in regards to such processes as a type of embodied knowledge” (Wolfson et al., 2017 p. 1148). The incorporation of socio-structural systems is one way food agency theory fills the contextual gaps of previous theories. Conceived at the intersection of psychology, anthropology, sociology, and public health scholarship, we argue that this theory allows for a more accurate interpretation of actions, and therefore of consequences, for both the individual and society (Trubek et al., 2017). This kind of transdisciplinary research—connecting theory,

cooking behavior, food access, and structural environments—can offer a better understanding of complex problems in socioecological systems, as well as possible solutions (Choi & Pak, 2006; Knierim & Callenius, 2018; Wickson, Carew, & Russell, 2006).

Contemporary food action measurements thus do not account adequately for components of food agency, such as structure and personal skill and self-efficacy. To address this problem, some members of our research team developed the Cooking Action and Food Provisioning Scale (CAFPAS). Based on the food agency framework, this scale conceptualizes cooking behaviors as sociological agency, measuring individuals’ ability to set and achieve food provisioning and cooking goals. The three main subcategories—components of the measurement—that emerged in scale development are food self-efficacy (self-perceptions of ability), food attitude (personal attitudes toward food and cooking), and structures (nonfood barriers toward provisioning). The scale has been tested and is structurally valid (Lahne, Wolfson, & Trubek, 2017). It represents a step forward in measuring the multiple facets that influence how people can source and prepare food.

This tool, designed to take into account a broader set of influences on individual action, was developed in a specific context, as part of a multi-year, multistage, mixed-methods food agency research project. Mixed-methods research is defined by leaders in the field as being diverse in form, involving both qualitative and quantitative “strands” of data, mixed or linked for greater insight than one type alone could provide (Creswell & Plano Clark, 2007). The first, qualitative phase of this research involved video ethnography and participant observation of home cooks and categories for measuring personal food agency (Carabello, 2015). The second phase involved qualitative data collection through focus groups, from which initial quantitative scale items were developed and underwent an expert review. The third phase involved quantitative testing of a beta version of the scale, administered to a sample. Subsequently, there was statistical validation of the scale to evaluate items and group them thematically (for reference, see Lahne et al., 2017). The scale was developed in a

classic approach (DeVellis, 2011) through the qualitative research, expert selection of items, large development and validation samples, and refinement to relevant items (Lahne et al., 2017). The first and second phases were pursued in Vermont with mostly white, middle-income participants. Statistical testing was conducted with a national sample of online participants of varied incomes and ethnicities, although not representative of U.S. demographics in terms of lower income, lower education, and other-than-Caucasian respondents. This article is derived from the fourth phase, a qualitative triangulation of the quantitative strand of inquiry, overlapping with the third phase in part of its timeline. Although it was developed with consultation and advising from the wider research team, the phase was designed and executed by this author. The study follows what is called an “explanatory” design in mixed-methods parlance, with qualitative methods following sequentially from quantitative to discern what the qualitative strand can explain about the quantitative strand (Creswell & Plano Clark, 2007). The explanatory question, in this case, was whether the scale captures meaningful aspects of food agency in different cultural, geographic, and economic contexts.

The objectives of this explanatory study were two-fold. First, to assess the CAFPAS through qualitative means to complement quantitative statistical tests. The study was designed to illuminate the CAFPAS’s efficacy by capturing the complexity of early qualitative research in a different setting. This expanded qualitative data is important information as people begin to use the scale to evaluate food agency. I asked, what experiences are or are not captured from a universalizing tool developed in particular circumstances? The second objective was to extend these qualitative insights into the still-developing theory of food agency. To achieve these objectives, I conducted research in Philadelphia, with participants whose life circumstances were different from those who participated in earlier phases of research. Philadelphia participants lived in an urban environment, were a mix of university students and community members from a low-income section of the city, and were majority people of color. Because the race, income, and urban life of the participant group were distinct

from Vermont participants, I hypothesized that, while established components of food agency might be the same, the supports and barriers of agency would manifest differently than those revealed in earlier qualitative work and incorporated in scale development.

Literature Review

From the literature, it would seem that low-income U.S. residents of color likely face the greatest structural barriers to food agency. Diet-related illnesses plague marginalized groups at higher rates than the general population; Black and Mexican American adults, for example, are much more likely to be obese than white adults (Ogden, Lamb, Carroll, & Flegal, 2010). Although there are racial distinctions, poor are more likely to be obese than richer people (Zhang & Wang, 2004). And while low-income Americans cook more than their wealthier counterparts (Trubek, 2017), they still suffer disproportionate health disparities from systematic differences like socioeconomic status (Braveman et al., 2011). Accessing healthy and affordable food is a widespread problem, most prominently in low-income neighborhoods of color (Bell, Mora, Hagan, Rubin, Karpyn, 2013). These social determinants of health show that people’s food lives manifest differently across demographic divides.

The intersection of structural and individual supports and barriers is where agency takes place. What happens in the kitchen is always in flux and contingent on external realities (Sutton, 2014). Personal context—the environments in which one’s life plays out—are shifting structures, with shifting influences over agency (Sobal & Bisogni, 2009). This study looks specifically at those social and environmental influences on personal experience, asking: what supports agency here? What inhibits it? What is emergent and unforeseen? Are these things captured in the scale and in our general theorizing?

To capture these questions in a relevant context, this research took place in Philadelphia. Philadelphia is a post-industrial city that saw population decline during the second half of the last century, as well as declining property values, jobs, education, and community resources. Many of its low-income neighborhoods experience substantial food

insecurity (Meenar & Hoover, 2012). Philadelphia's foodshed is a complex mix of hyper-urban and rural-adjacent, as it is within 100 miles of other major metropolitan areas, and also within reach of agricultural counties (Kremer & Schreuder, 2012). The city has a constant supply of fresh produce, much of it imported through the Port of Philadelphia, and in some parts of the city, low-income neighborhoods gain access to produce from curbside street vendors (Brinkley, Chrisinger, & Hillier, 2013). The city has majority Black residents, and Black Philadelphians experience more diet-related disease and less healthy food access than other city residents (Mui, Khojasteh, Hodgson, & Raja, 2018). Food access in Philadelphia depends on multiple factors that include food quality, variety, availability, and affordability, as well as cultural preferences (Meenar, 2017).

As Lahne et al. (2017) acknowledge about the CAFPAS, it "explicitly does *not* include actual items that might represent social structure, such as income, sex, education level, and so on...the structure [sub]scale is meant to measure an individual's perception of structure, not to measure structure 'objectively'. There are a huge variety of possible structural effects" (p. 97). This study describes those structural effects in a specific location and population through integrating multiple methods. Mixed methods research has been argued as especially relevant for studies of local food consumption, barriers to food access, and how food security connects to food culture (Mares, 2017). Although they employ a different methodology, Meenar (2017) has also used mixed methods to illuminate a "multidimensional socioeconomic problem tied to the built environment" (p. 1181). In this case, Meenar (2017) focuses on food insecurity and vulnerability in Philadelphia, and argues that mixed-method approaches provide more comprehensive assessment of food environments. In the current study, qualitative methods reveal circumstances that supported or inhibited participants from accessing and preparing food, circumstances not apparent from responses offered by the scale.

Methods

This study is the fourth phase of an ongoing, mixed-methods, multiphase study, concurrent with

the development and validation of a quantitative measure that began before this work and continued after it. I designed the research to be an in-depth qualitative exploratory study of theoretical and quantitative concepts to inform that ongoing project. A respondent's setting is often overlooked in measurements and assessments (González-Calvo, González, & Lorig, 1997), which is precisely what food agency scholarship tries to avoid. One of the ways to prevent an assumption of cultural universality and achieve a high quality "translation" of reality into measurement is pilot testing with a small sample of participants from targeted cultural or social classes (González-Calvo et al., 1997). Initial qualitative research had taken place in Vermont, a rural and overwhelmingly white state (U.S. Census Bureau, n.d.). In the scale development sample, highly educated, male, and Caucasian participants were overrepresented; in the validation sample, quotas were set to ensure more female respondents and a diversity of education and racial and ethnic backgrounds (Lahne et al. 2017).

This stage of the study took place at a healthy cooking techniques class in Philadelphia, Pennsylvania, an integrated college and community course offered to Drexel University students and residents of the Mantua neighborhood. Mantua is one of five "Promise Zones" designated by the Obama administration, which are identified by need and potential for fast-tracking of federal grants. Median household income in the area is under US\$17,000 and unemployment is 20 percent, double that of Philadelphia as a whole. More than half of Mantua residents live below the poverty line, and 90 percent are African American (Kilpatrick, 2014). As a study site, this is quite a contrast to Chittenden County, Vermont, which has fewer than 170,000 residents and is surrounded by an agricultural state. The county's median household income is nearly US\$67,000 and unemployment is only 11 percent. Residents are 90 percent Caucasian (U.S. Census Bureau, n.d.); the Vermont-based research phases included a similar ratio of white participants.

Recruiting from a cooking class allowed me to reach people who were interested in food preparation and who were actively engaged in their own food agency. The sampling strategy was to recruit as many people as possible from the healthy cook-

ing class in order to capture the widest range of responses. Recruitment¹ took place on the first week of the ten-week course. The function of this purposeful sample (Marshall, 1996) was to obtain similar qualitative data to what had informed development of the CAFPAS. I sought in-depth information from a similarly sized group of people who were also interested in food and cooking but occupying different life circumstances from focus groups in Vermont. The purpose of this was to mimic the kind of data from which the original scale items (i.e., questions) were derived. Everyone enrolled in the cooking course demonstrated interest in participating; almost all (eight community residents and five students; 13 out of 15 total students) were interviewed at the beginning of the course. Follow-up interviews and one focus group took place three months after the course ended, for longitudinal data about lasting impressions and effects. (The focus group took the place of follow-up interviews for college students, due to scheduling constraints.) The study retained seven of eight community residents and three of five students in follow-up. Participants received a US\$20 gift card after the first interview and an additional US\$50 card upon completion of the follow-up. Interview and focus group protocols were developed using themes from the scale—what supports cooking, what inhibits cooking, what are someone’s actual cooking practices—to create a semistructured format that allowed for both direct responses and unexpected information. All interviews took place at a community center near Mantua or on Drexel campus and were audio recorded and transcribed, with permission and approval of participants and my university’s Institutional Review Board.

Analysis of the data was a combination of grounded theory and thematically informed coding (Dowding, 2013), which was based on literature review of concepts related to food agency. Adapting grounded theory by using “sensitizing concepts” permitted the literature to act as a starting point for analysis while also allowing for unexpected themes to emerge (Bowen, G. A., 2006). First, I conducted a literature review to explore the

existing research on constructs from the food agency scale and on the specific research population. This included literature on the connection between health, nutrition, and cooking; barriers to individual cooking practices; cooking skill and self-efficacy; food and cooking education and literacy; and social determinants of health. (For the full literature review, see Morgan, 2016.) I then developed a qualitative codebook based on a deep reading of four of the first-round interviews (with two college students and two community residents). I developed modified codebooks for follow-up interviews (which had a different question guide), based on the original codebook and a deep reading of two of the follow-up interviews. This resulted in an extensive list of codes. I shortened the list to emergent groupings of codes, or themes. From the coded material, I developed items related to food agency—again, based on our conception, on the literature review, and on the extant scale. To integrate the interview data with the scale, I reviewed major qualitative themes, broke them down into more specific component parts, and then compared them to current scale items in order to determine whether those themes are reflected in the scale.

These two sets of items—mine and the scale’s—were arrayed side-by-side for clearer visual understanding of the connection between the two (see Table 1). One way of merging qualitative and quantitative strands of research is a joint display: a figure or table in which the two sources of data can be directly compared. This visual side-by-side comparison highlights convergent and divergent places in the two strands (Creswell & Plano Clark, 2007). Although this table is not a “quantification of qualitative data,” it does depend on presenting the qualitative data to be comparable to the results of past quantitative analysis i.e., the scale items.

This array is critical because it allows connections to emerge that might remain hidden in other forms of analysis, and it provides a direct reflection on existing quantitative data collection. While traditional mixed-methods scholars often look for confirmatory findings (Creswell & Plano Clark, 2007),

¹ Recruitment in the Vermont study was a convenience sample, recruited through flyers posted on the university campus and surrounding community as well as on email listservs, to find willing participants for exploratory research.

conflicting findings are equally useful here for emergent understandings of complicated social phenomena (Wagner et al., 2012). Here, it illuminated both similarities and discrepancies between qualitative data from Philadelphians and the scale's items.

Results

The primary result of this work is a side-by-side array of the quantitative measure (the result of qualitative and quantitative development) with the most recent qualitative data and emergent themes (see Table 1). Rather than following a typical

Table 1. Items from the CAFPAS Arrayed with Related Qualitative Data and Themes

CAFPAS Item	Related Experiences in Qualitative Data	Qualitative Theme
Before I start cooking, I usually have a mental plan of all the steps I will need to complete.	a. Inability to plan ahead b. Time management	a. Constraint (Skill) b. Strategy (Cooking)
In preparing food, I can solve most problems with enough effort.	--	--
When I shop for food, I know how I will use the ingredients I am purchasing.	a. Lack of access to desired education in nutrition or cooking b. Inability to plan ahead	a. Constraint (Income) b. Constraint (Skill)
I feel like cooking is a waste of effort.	--	--
My family responsibilities prevent me from having time to prepare meals.	--	--
I feel limited by my lack of cooking knowledge.	a. Lack of access to desired education in nutrition or cooking b. Building technique	a. Constraint (Income) b. Aspiration (Cooking proficiency)
If everything else is equal, I choose to cook rather than have food prepared by someone else.	a. Distance from family who would prepare meals b. Inability to purchase prepared food when desired	a. Constraint (Environment) b. Constraint (Income)
I find cooking a very fulfilling activity.	--	--
Compared to other activities, cooking brings me little enjoyment.	--	--
I am confident creating meals from the ingredients I have on hand.	--	--
I am inspired to cook for other people, like my family or friends.	Accounting for others' tastes	Strategy (Cooking)
I think a lot about what I will cook or eat.	--	--
I know where to find the ingredients I need to prepare a meal.	Inability to plan ahead	Constraint (Skill)
For me, cooking is just something to get through as quickly as possible.	--	--
I feel burdened by having to cook for other people, like my family or friends.	Accounting for others' tastes	Strategy (Cooking)
I know how to use the kitchen equipment I have.	Inexperience with proper technique	Constraint (Skill)
When preparing food, it is easy for me to accomplish my desired results.	Ability to cook what one envisions	Aspiration (Cooking Proficiency)
I am comfortable preparing food.	--	--
My job responsibilities prevent me from having the time to prepare meals.	Distance between home and work	Constraint (Environment)
When preparing food, I am confident that I can deal with unexpected results.	Ability to cook what one envisions	Aspiration (Cooking Proficiency)
I wish that I had more time to plan meals.	a. Limited time b. Efficiency in cooking	a. Constraint (Time) b. Aspiration (Cooking Proficiency)

Table 1 continues

Table 1 continued

CAFPAS Item	Related Experiences in Qualitative Data	Qualitative Theme
I am involved in daily meal preparation.	--	--
If I try making a new type of food and it does not come out right, I usually do not try to make it again.	--	--
When presented with two similar products to purchase, I feel confident choosing between them.	--	--
My social responsibilities prevent me from having the time to prepare meals.	--	--
I prefer to spend my time on more important things than food.	--	--
Participant Experiences Not Represented in CAFPAS		
	Lack of kitchen facilities or tools	Constraint (Environment)
	Lack of access to gardens	Constraint (Environment)
	Distance from grocery stores	Constraint (Environment)
	Insufficient budget	Constraint (Income)
	Difficult transportation	Constraint (Income)
	Insufficient amount of food	Constraint (Income)
	Inexperience with cooking terminology	Constraint (Skill)
	Lack of familiarity with dish	Constraint (Skill)
	Limited energy	Constraint (Time)
	Buying in bulk	Strategy (Provisioning)
	Deal-seeking	Strategy (Provisioning)
	Balancing price vs. quality	Strategy (Provisioning)
	Balancing price vs. satiety	Strategy (Provisioning)
	Assessing health to create meal priorities	Strategy (Provisioning)
	Gardening	Strategy (Provisioning)
	Cooking for economic efficiency	Strategy (Cooking)
	Cooking for health/nutrition	Strategy (Cooking)
	Adjusting practices based on season	Strategy (Cooking)
	Altering recipes for health	Aspiration (Health)
	Eating fresh foods	Aspiration (Health)
	Managing health issues with food	Aspiration (Health)
	Cooking from scratch	Aspiration (Cooking Proficiency)
	Cooking or trying new foods	Aspiration (Cooking Proficiency)
	Growing and preserving own food	Aspiration (Self-sufficiency)
	Cooking for and helping others	Aspiration (Self-sufficiency)

descriptive qualitative analysis, this method supports the study's objectives of comparing qualitative data directly with the quantitative measure. It provides systematic insights into additional facets

of food agency in a similar form as the scale and is equally succinct. The table visually demonstrates the themes of participants' experience of food agency that are reflected in the scale and the ones

that are not. Qualitative themes fall into three main groups: constraints on agency, strategies for provisioning and preparation of food, and aspirations related to food—the latter emerging from grounded theory coding.² Each theme is illustrated by specific examples from the qualitative data, which are compared to specific items from the scale. Experiences and themes from the qualitative data that are *not* related to any CAFPAS items are listed at the bottom of the table. One experience or theme may be reflected by multiple CAFPAS items. For an example of the scaffolding behind each, see Appendix or Morgan (2016). Where there is a “–” in the table, no Philadelphia participants indicated the item as part of their food actions.

The array shown in Table 1 is a top-level summation of more specific and complex data. For example, four primary constraints on agency emerged: physical environment, lack of time or energy to shop or cook, lack of money, and lack of cooking skill. Each of these arose from multiple pieces of specific data. This table demonstrates which of the group’s experiences would not be captured by filling out the CAFPAS. It confirms aspects of food agency in the scale as well as gaps in the scale’s ability to capture this group’s actions, shedding light on additional aspects of food agency that were not previously documented.

The table reveals some overlap in CAFPAS food agency measurement and facets of participants’ lived experiences. However, it also reveals many constraints and supports of agency that are not represented by any scale items. The biggest gaps in CAFPAS measurement of these qualitative themes are environmental barriers, income barriers, and provisioning strategies that support agency in overcoming barriers.

Constraints

The primary constraints on agency that emerged for this group were physical environment, lack of time or energy to shop or cook, lack of money, and lack of cooking skill. It is worth noting that these constraints have significant overlap. For example, many people struggled with time-efficient procure-

ment of groceries. Transportation is a struggle—an issue not only of physical environment in distance from stores, but also of time, with bus trips sometimes adding hours to the task of shopping. It can also be seen as an issue of income, since for many participants, not being able to afford a car (or taxi) limits how much they can buy per shopping trip and how frequently they must go to the store. As one participant, Annie, described, “I’m so exhausted at the end of the day . . . just the fact of getting there is time consuming. When I’m in the supermarket itself . . . I’m in there 15 minutes, I’m done, but just getting there, it takes more than an hour because I take public transportation.” Here, environment, time, and money all converge to make it difficult for Annie to access groceries, despite the fact that she has plenty of cooking skill in the kitchen.

The scale has few items that relate to these barriers. The only item connected to the effects of physical place is “I rely on someone else to prepare the majority of my meals.” This loosely links to the issue of distance to family that some participants, notably college students, cited as an issue in their lives, although if students *did* rely on parents, but could not get to them, there is no clear way to indicate this in the survey. The items relating to income ask whether a respondent prefers to cook their own food or purchase it; this framing does not allow for someone to prefer to buy prepared food but not be able to afford it. The scale does ask about skill and confidence in the kitchen, albeit in ways that do not exactly match the specific areas in which participants identify their deficits, such as not understanding terminology in cookbooks, or not knowing the proper techniques demanded by recipes. Time constraints, by contrast, are well represented in the scale. Nearly all participants mentioned time as a barrier to their cooking; interestingly, they were just as likely to frame time deficit as a lack of *energy*. That nuance is not represented in the scale. It may be important because people who are more skilled might need less energy to complete tasks.

² These categories are different than the scale subsections in order to replicate early qualitative research on the constraints and supports of food agency. By contrast, the scale’s subsections were developed from computational testing.

Supports

In terms of what supports food agency (one of this study's original questions), interviews clearly revealed that participants are very strategic about how they plan and provision around food. Their strategies allow them some freedom within economically or environmentally constrained circumstances. Most plans revolve around shopping for different types of foods at different stores in order to maximize quality or convenience while minimizing cost. Two participants named their provisioning habits as the reason they eat the way they want to, despite limited incomes. They verbally rated themselves as 10 out of 10, with totally free and unconstrained food agency. One uses coupons, buys in bulk, and seeks the lowest prices; the other grows the majority of her vegetables in a community garden plot, drastically lowering her grocery budget. Their agency arises from careful, active engagement with their best food-sourcing tactics.

Procurement strategies do not appear in the scale as a support of food agency. There is one associated question, "When I shop for food, I know how I will use the ingredients I am purchasing." An item that might more accurately reflect how Philadelphia participants bolster their agency might instead be something like "My strategies for obtaining food allow me to have what I need to cook." Such an item would allow for more flexibility around how people can procure food, beyond just purchasing. Cooking strategies are much more represented in the scale, from time management, to social relationships in cooking, to planning based on ingredient availability. But if people cannot get food, it may not matter whether they have the skills and inclination to cook it.

Aspiration: An emergent aspect

Aspiration—to eat more healthfully, cook more skillfully, and have greater self-sufficiency—emerged as a consistent theme when participants spoke of their food experiences. They hoped, through their own efforts, to attain a greater level of agency. This is not surprising in a group of people who self-selected into a course on healthy cooking techniques, but I did not predict the variety nor force of participants' food ambitions. As a facet of food agency, aspiration emerged an unex-

pectedly important way in which people related to their own food choices and actions.

Participant aspirations for healthy eating are not reflected in the food agency scale precisely because it was designed to be nonprescriptive regarding personal diets. And yet, health and cooking are two things that Philadelphia participants often conflated. Cooking from scratch, yet another aspiration, is likewise not present in the scale, as it is difficult to define and, again, potentially prescriptive. Cooking technique and planning appear in the scale, whereas trying new food and understanding cooking jargon do not. While aspiration for greater skill could easily fit into the CAFPAS category of "food attitudes," it is not represented in the scale. Where cooking-related goals are represented, they appear in present terms, not aspirational ones; there is no way for respondents to note discrepancy between their current abilities and what they wish to achieve in the future. The implications of this are discussed below.

Discussion

... while price is paramount, low-income people are neither unthinking dupes of the corporate food system motivated only by appetite, nor overly rational calculators driven only by price, but inhabitants of marginalized yet complex social worlds in which they must actively navigate a variety of barriers to obtain the foods they prefer. (Alkon et al., 2013)

This discussion blends insights into both the CAFPAS and food agency theory more broadly. Nearly all the constraints on food agency emergent in the qualitative data can be connected to issues of socioeconomic status. Constraints such as lack of appropriate cooking facilities and tools, or distance from grocery stores and difficulties with transportation, could be alleviated with greater access to resources. This finding confirms some existing literature about urban food access: what is important for this study is the particulars of *how* participants skillfully navigate around these barriers, that is, how they enact food agency. Provisioning strategies appear as means to mitigate socioeconomic struggles. Interestingly, many of the strategies are

like ones recounted by more financially comfortable participants in Vermont. Strategies like shopping at different stores for the best deals on different foodstuffs, or growing vegetables to reduce food budgets are tools for making money go as far as possible in accessing quality food. Perhaps unsurprisingly in a group of low-income participants, lack of money strongly influences needs and actions regarding food and resulting experiences of food agency. The skills used to navigate personal circumstance matter to the individuals in this study, but they also matter broadly in supporting health and wellbeing. The personal ability to organize, plan, shop, and cook increases chances of healthy cooking (Bisogni, Jastran, Seligson, & Thompson, 2012).

Although structure appears to be this group's main stumbling block to shopping and cooking, it is only a small part of the CAFPAS, representing five of 28 total items. Ability to plan and complete a cooking project are well represented by scale items, but for these participants, cooking abilities are secondary to whether they can get the ingredients they want to cook in the first place. The primary ways in which many of them enact agency is through sourcing food, despite structural impediments to doing so. Their stories echo studies done with urban residents of color, which show that low-income shoppers in food deserts do not necessarily buy groceries at the oft-referenced gas stations, but instead travel outside their own neighborhoods to get food (Rose, 2011). The cost of that travel, rather than knowledge or distance, is the primary barrier to food access (Alkon et al., 2013) and to cooking (Wolfson, Bleich, Smith, & Frattaroli, 2016). Several national nutritional programs focus on building shopping skills, such as Cooking Matters or the YMCA diabetes prevention program. These programs are designed to support personal capacity and bring recognition to the importance of personal environment. It may be worthwhile for more cooking courses to incorporate provisioning strategies and skills.

It is important to note that none of the participants have children still at home—likely part of the reason they could participate in the cooking course, this research, and perhaps also in time-intensive procurement strategies. While possibly a weakness

of this sample, it opens the door for deeper comparison to research with parents. In their consideration of working mothers, Bowen and her colleagues point out that the societal pressure to cook remains, even as time available for cooking has decreased (S. Bowen, Elliot, & Brenton, 2014). Being poor, the authors contend, “makes it nearly impossible to enact the foodie version of a home-cooked meal” (p. 23). Although this study did not reveal many experiences related to social pressures around cooking, a study with parents of small children would probably reflect many more of such CAFPAS items. Further study could explore supporting food agency through different methods and under different circumstances such as parenthood.

The CAFPAS items that do cover food provisioning and preparation do not reflect how *able* someone is to purchase the ingredients they desire, whether because of physical access, financial ability, or effective deal-seeking. For example, one might always be able “to decide what I would like to eat at any given time,” or “feel confident choosing between” two similar products, but not be able to access the ingredients to prepare what they would like to eat, or have the money to buy either of two similar products. Although the CAFPAS has several items describing feelings, including (lack of) enjoyment of cooking, these feelings did not emerge as important factors for many participants in this study. People prepared food as needed; although their skill and self-efficacy had an impact, through familiarity with technique or equipment, their own feelings seemed less relevant to whether they cooked. The exception was for feelings of low energy. This disconnect between scale items and people's reported motivations may suggest that, for people of limited means, enacting food agency is a requirement, not a luxury of choice over whether or not to cook.

For these participants, aspiration is not superseded by low socioeconomic status. Despite constraints, participants aspire to healthier choices and options, more effective action, and greater self-sufficiency. During interviews, they sometimes mined me for information: did I know how to can food? Are raw vegetables healthier than cooked ones? I heard more references to gardening for

food access than I did to services like food banks or SNAP benefits. Some cooking-related aspirations appear in the CAFPAS, although they (perhaps appropriately) are framed in present terms, not forward-thinking ones. The scale is not intended to measure the discrepancy between where people are and where they wish to be, but those insights could shed light on the ways in which low-income and structurally-constrained populations can best be supported in increasing food agency. While aspiration might not make a difference in someone's agency *in this moment*, I suspect it affects how agency develops. If the scale is to be used in pre- and post-testing of classes or other events, it might also be useful to track whether changes in agency are related to personal aspiration.

These various ways of understanding cooking and food provisioning have serious implications for policy and health initiatives. As Wolfson and others (2017) note, when the "assumptions about cooking skills are not grounded in theory, they unintentionally shape the development and evaluation of interventions designed with the intent to shift or enhance the practices of participants" (p. 1148). If we assume that the problem is that people do not know how to cook, but the real problem is that they don't have a car with which to buy groceries, then interventions relying on cooking education and home economics will not solve the problem. If we know that people would rather have access to a garden than a food bank, another food bank may not be the best service. This group, for the most part, wants to be supported by building personal capacity. They see opportunity for increasing agency by changing their own skill level, not changing the larger forces. This target makes sense; it is what they can control. But from a systems perspective, to increase agency for many, it also makes sense to work on structures. For these participants, structural supports of food agency might be making higher quality food more easily accessible in urban neighborhoods. Data from other parts of our study (see Morgan, 2016) suggest that having transparent information about food's origins, cooking education for whoever wants it,

and gardening education and community garden plots would further support the individual food agency of this group. For a full conception of food agency, if it is to be applied in community projects or policy decisions, we need to understand individuals' preferred actions and the structures that either support or inhibit them, ideally working directly with community members to develop place-based plans.

Based on their descriptions of their daily food actions and attitudes, I suspect that some participants would have relatively high food agency scores, in part *because* they are so constrained by circumstances.³ Many of them reported complex, time- and skill-intensive cooking and provisioning strategies that they acquired to negotiate between their limited means and high standards of health and nutrition. Interim statistical testing of the CAFPAS samples show that income and food agency scores generally are unpredictably related. The average score is steady across nearly all income groups, dipping slightly for people making US\$125,000 to US\$150,000 a year. Overall, food agency scores are lowest at the lowest and highest ends of the income spectrum (Lahne, 2016). This insight raises some questions about food agency theory broadly. Is someone a stronger agent because they are not only able, but required, to prepare their own food? Would food agency decrease if a capable but unwilling cook suddenly had more access to money and therefore greater ability to buy themselves out of food preparation? It seems possible that more structural constraints on agency actually result in greater self-efficacy and skill as people navigate barriers successfully. To possess food agency, one might need either ability or money; maybe it is best to have a good measure of both. Having very little money might impede agency even when skill and self-efficacy exist, whereas having a lot of money might impede the development of skill and self-efficacy to build agency beyond financial ability to pay.

While urban environment and socioeconomic themes show up consistently in this data, racial themes remain relatively obscured, except in a few instances. One participant directly linked her ethnic

³ Participants were not able to complete the CAFPAS because its items were still being tested for explanatory power.

and racial identity to her food choices, citing the inherent wisdom of poor and enslaved Black Americans' culinary choices: the healthfulness of what can be dug out of the dirt (i.e., vegetables) and the preservative power of fried meats. Another mentioned needing to choose foods based on low sodium and seemed to link this to hypertension risks for Black Americans. One woman made food choices based on her Filipina heritage and upbringing, cooking mostly Asian foods and eschewing mainstream American foods (like donuts for breakfast) that she saw as inherently poor in nutrition and quality. These and other experiences point to the kinds of foods around which participants organized their food actions, but they did not appear to influence the success or failure of those actions, with the exception of the Filipina participant struggling to source some Asian ingredients. Race may be more of an issue of food *identity* than food agency. Initial tests on the relationship on food agency scores and income were not available for food agency and race, as the development and validation samples did not have enough respondents of color for statistical significance. Future testing could illuminate more about this relationship and whether the scale is equally predictive across racial categories.

Food justice movements, socioeconomic structures, and personal agency all interact in place-based ways. One participant is able to enact a much higher level of food agency due to recent access to a community garden plot, something that was unavailable to her upon first emigrating to the U.S., which had negatively impacted her family's access to culturally appropriate foods. Her current food sourcing practices are a mixture of personal skill, cultural identity, and community resources. As mentioned earlier, her provisioning methods allow her a feeling of unconstrained agency, despite having a very limited income. As theorized previously, food agency is dependent on skill, self-efficacy, and structure alike; and it can shift substantially if one of these factors changes.

Conclusion

Without data from this community in Philadelphia, we could fail to notice the importance of food provisioning strategies, both as a stumbling block, and

as an area for negotiating personal food agency within constraints. This study was able to unpack the importance of strategic skill and aspiration in food agency development. While this personal ability and growth were important, they are not currently probed in the CAFPAS.

As a theory, food agency intends to bridge the gap between pure sociological conceptions and the more individualistic perspective of traditional nutrition study. It brings together the twin truths that people's circumstances strongly influence their lives, and they make choices of their own volition. Ideally, food agency theory will contribute to the conversation about how community and university actors can work together toward productive action research rooted in place (Porter, Woodsum, & Hargraves, 2018). Organizations focused on incremental change—as granting agencies often are—may require academics and community workers to use quantitative tools to measure progress. But if the tools themselves are flawed, perhaps because they do not fully reflect the structural influences that both the literature and this data show to be important, then the measurement of progress can become tautological. I hope this paper serves as an example of methods for developing meaningful and more democratic measurements of holistic processes, and the kinds of experiences that can remain invisible to academic inquiry unless they are intentionally sought out.

Luyt (2012) argues that the development, validation, and revision of a measurement tool is “a cyclical process best undertaken through mixed methods research, emphasizing the complementarity of qualitative and quantitative methods” and placing equal emphasis on consistent and inconsistent findings (pp. 295–296). The variety and specificity of insights about food agency that emerged from this project suggest that CAFPAS scores are perhaps best understood with accompanying, circumstantial data. Likewise, qualitative inquiry into food agency can be appropriately contextualized by connecting it to broader patterns in CAFPAS data. This study reveals aspects of food agency that deserve deeper consideration, such as provisioning strategies, and the possibility that constraints on agency might, counterintuitively, result in increased personal agency through

the acquisition of necessary skills. This work also directly counters mainstream stereotypes of low-income, urban eaters. Participants here aspire to better eating and cooking, and employ diverse, intentional strategies to acquire high-quality foods, against the odds.

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Appendix

The constraint of physical environment included participants' indication of the following, adapted from original narrative form:

1. Kitchen facilities
 - a. Lack of kitchens in dorms
 - b. House in disrepair
2. Distance from family who would otherwise cook
3. Distance between work and home (leaving less time for shopping and cooking)
4. Distance from grocery stores
 - a. No big supermarkets nearby
 - b. Difficulty of transportation getting to and from markets (traffic; multiple bus changes; long walking distance)
 - c. Distance from culturally appropriate stores (e.g. Asian markets)
5. Lack of access to gardens
 - a. Lack of gardening space
 - b. Violence in the neighborhood
6. Weather (summer too hot for cooking)

Thus, in the qualitative data, people mentioned being constrained by not having kitchens or working electricity in the home; by being far away from people whom they are used to relying on for meals; by the distance they have to travel for work; etc. From these individual specifics, it becomes clear that, as could be expected, people's physical environment affects their agency in a variety of ways, depending on individual circumstance. In Table 1, these appear alongside CAFPAS items as particular experiences (e.g. "Distance from family") and accompanying, broader theme ("Constraint (Income)"). (For in-depth detail on each of these items, see Morgan, 2016.)

Potential for leasing institutional lands in Windham County, Connecticut: Toward *A New England Food Vision*

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Abstract

The social and environmental impacts of the modern industrial food system are ample reason to explore alternative scenarios. *A New England Food Vision* calls for building a resilient food system at the regional scale, with the goal of providing 50% of New England's food from within the region by the year 2060. Land access is a substantial challenge for aspiring farmers, particularly those from socially marginalized groups. Leasing farmland is less expensive than purchasing it outright, although not without its challenges. Institutionally owned land—properties owned by government entities, nonprofit organizations, educational organizations, religious organizations, or healthcare organizations—may be especially suitable for leasing to aspiring farmers due to their secure tenure and reduced development pressure. This site suitability

analysis identifies institutionally owned lands in Windham County, Connecticut, excludes areas containing ecological or practical constraints, and assesses the new farmland acreage and food production that might be generated if these lands were converted to agricultural cultivation. Leasing the resulting lands to farmers would increase the agricultural acreage within the county by almost 19%. The majority of the land identified was owned either by state or municipal government entities, so farmer advocate organizations seeking to promote leasing arrangements should tailor their resources to this type of land ownership and audience.

Keywords

Scenarios, Alternative Landscape Futures, New England, Agriculture, Geography, New England Food Vision, Land Use

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Introduction

The Industrial Food System and the Growing Response

Agriculture in the United States has largely become an industrial endeavor, as crops and livestock are produced at massive scales and large corporations control many of the links along the chain of production. The byproducts of this system include environmental degradation, public health crises, dangerous labor conditions, increased emissions of greenhouse gases, land loss among small farmers, and countless other social justice and sustainability concerns, many of which intersect each other. For example, the widespread use of pesticides and chemical fertilizers contributes to air and water pollution while simultaneously affecting farm-worker health (Horrikan, Lawrence, & Walker, 2002), and large-scale livestock production requires vast monocultures of grain for feed and results in the use of antibiotics that may ultimately contribute to antibiotic resistance in humans (Horrikan et al., 2002). Consolidation of food production onto large mechanized farms can drive smaller producers out of business and negatively affect rural communities (Horrikan et al., 2002; Redlin & Redlin, 2003). The social costs of this system are borne disproportionately by already marginalized peoples, evidenced by the loss of Black-owned farms due to discriminatory lending and government assistance programs (Green, Green, & Kleiner, 2011), meager wages for immigrant farmworkers who produce the nation's food even as they themselves go hungry (Brown & Getz, 2011), and a lack of access to fresh produce and retailers of nutritious food in poorer urban areas (McClintock, 2011). There are many, many reasons for concern.

In response to the substantial detriments of an increasingly globalized industrial-scale agricultural system, many scholars and activists have called for a shift to more localized food systems. A single satisfactory definition of “local” may not be possible, or even desirable. There is no agreed-upon distance or characteristic, although often the presence of direct-to-consumer marketing channels like farmers markets and farm stands is a signifier (Low et al., 2015). Feagan (2007) points out that the oft-cited “binary between the local and the

global” (p. 34) is overly simplistic and contends that conceptions of local must necessarily change depending on a case's particular circumstances. Schnell (2013) likewise argues that the local food movement consists of many overlapping and place-based projects that cannot be adequately confined within a single definition of local. Within the field of geography, scale is often recognized as a socially constructed concept rather than an *a priori* truth or geographic distance (Born & Purcell, 2006; Neumann, 2009; Zimmerer & Bassett, 2003).

Further muddying the waters are the qualitative values often automatically associated with local food systems. Feagan calls attention to how frequently notions of “embeddedness” are mentioned within local food systems literature, highlighting the social and cultural relationships surrounding food transactions at a community scale (Feagan, 2007). Many advocates for local food systems, it seems, are not only hoping for a shorter chain from producer to consumer; many are invested in building values like trust, tradition, and a renewed sense of place (Feagan, 2007)—all worthy goals but harder to quantify, standardize, and implement.

Born and Purcell (2006) caution against falling into the “local trap” by assuming that locally scaled agriculture will inherently be free of social injustice and unsustainable practices, arguing that these qualities are not inherently guaranteed at any particular scale. In their eyes, re-localization efforts must consciously incorporate social justice and sustainability dimensions into their new alternative food systems or else risk perpetuating the same problems at a different scale (Born & Purcell, 2006). Agyeman (2013) likewise reminds us that “diversity and deeply unequal power relations exist within any given locality” (p. 64) and that attention must always be paid to who is empowered or disempowered by localization. By centering the achievement of justice and sustainability as the goal of alternative food movements, rather than the local scale itself, the local trap can be avoided. However, definitions of “justice” and “sustainability” are likewise subject to dispute and vary depending on one's values and what sort of future one hopes to see (Hassanein, 2003; Miller et al., 2014).

The problem is multifaceted, pervasive, and

unlikely to be neatly resolved. However, Sen (2008) suggests that a neat resolution is not a useful objective, calling attention to the “comparative question” (p. 336) of justice and arguing that it is better to focus on improvement rather than perfection. Sen also notes that the actual choices available tend to be between non-ideal alternatives, and spending time debating the ideal state will not necessarily help make choices in practice (Sen, 2012). When it comes to the current industrial food system, the social, health, and environmental costs are steep enough that an alternative framework may offer real relief, even if imperfectly defined.

Arguments for Regionalization, and A New England Food Vision

Regionalism may be one such framework. Ruhf (2015) argues that regionalism, defined as “a framework for economic, policy, and program development that responds to regional characteristics, differences, and needs and encourages regional approaches and solutions,” (p. 651) can increase the resiliency of food systems and provide a context for addressing environmental and social concerns. The familiar problem of loose definitions is encountered here as well. Ruhf is careful to note that a regional food system is not just a collection of smaller-scale local food systems, but rather includes and extends beyond the local to operate at a broader scale (Ruhf, 2015; Ruhf & Clancy, 2010); collaboration among small food producers to aggregate their products and sell to larger markets, like institutions and wholesale retailers, is one such example (Low et al., 2015). The U.S. Department of Agriculture Economic Research Service acknowledges the blurred lines between local and regional, choosing instead to refer to both together as “place-specific clusters of agricultural producers of all kinds—farmers, ranchers, fishers—along with consumers and institutions engaged in producing, processing, distributing, and selling foods” (Low et al., 2015, p. 1). Regions may be political, biophysical, or cultural/social (e.g., counties, watersheds, or “the Gold Coast” of Connecticut), and may have flexible boundaries, sometimes overlapping with other regions or containing nested subregions (Ruhf, 2015; Ruhf & Clancy, 2010). Many regions include both urban and rural

areas, and the interplay between these is particularly relevant for questions of food need, food production capacity, and transport distance, as Peters, Bills, Lembo, Wilkins, and Fick (2008) examined when they mapped potential “food-sheds” for population centers in the state of New York. A successful regional food system would be multiscalar and flexible, meeting as much of its population’s food, economic, and social needs as possible without claiming full self-sufficiency (Ruhf & Clancy, 2010). This regional framework, although inevitably nebulous, avoids the rigid local-global dichotomy and offers an option for increasing local self-reliance without shutting down connections to the wider world.

Additionally, Griffin, Conrad, Peters, Ridberg, and Tyler (2014) suggest that increasing regional self-reliance in the food system can help to decrease vulnerability to disruptions caused by climate change—in contrast to a system that concentrates food production for the nation in areas likely to experience climate impacts, like California. Coordination among local food producers across a region may also increase the economic viability of small-scale producers by presenting opportunities to reach broader markets and supply larger consumer institutions; the increasing prevalence of regional food hubs supports this claim (Berti & Mulligan, 2016; Low et al., 2015).

Ruhf (2015) argues that New England is “an ideal learning laboratory” (p. 651) for exploring regional food system possibilities. The six New England states share a strong regional identity, a history of multistate collaboration, and a set of similar strengths and challenges when it comes to food production (Ruhf, 2015). Multiple regionwide initiatives, including Food Solutions New England and the New England Farm and Food Security Initiative crafted by the New England Governors Conference, have already emerged as New Englanders attempt to steer their food system in a more regionalized direction. Additionally, farmland preservation programs, now common across the nation, were pioneered in New England, and the region currently has the most farm-to-consumer direct sales in the United States (Ruhf, 2015); both trends suggest a potential leadership role for the

region in setting an example of strong food system policies and practices.

A New England Food Vision (Donahue et al., 2014) was published by a team of scholars, experts, and activists in 2014, as part of a collaboration between Food Solutions New England and the University of New Hampshire. These authors imagine a future food system for New England guided by four central values: access to food for all, healthy diets for all, sustainable food production, and thriving communities (Donahue et al., 2014). Like Ruhf, Donahue et al. see the potential for a robust regional food system to play a critical role in achieving social and environmental well-being in New England. Together with these holistic goals, the vision calls for increasing New England's regionally produced food to 50% (up from approximately 12% currently) of its population's needs by 2060 (Donahue et al., 2014).

Agricultural Opportunities

Given the current level of geographic and corporate concentration of farmland (Griffin et al., 2014), achieving this goal in New England will require bringing some non-agricultural land into active cultivation. Donahue et al. (2014) estimate that agricultural land in New England will have to increase from approximately 2 million acres (809,000 hectares, 5% of the region's land cover) to 6 million acres (2,428,000 ha, 15% of the region's land cover) in order to meet *A New England Food Vision's* target. Advances in hydroponics and vertical farming—and financial support for these initiatives—might reduce some of the need for literal farmland, but undoubtedly the amount of actual land converted to agriculture would be considerable. The vision does not identify specific lands to be converted, nor does it prescribe specific strategies for subregions within New England, although the needed land use changes typically are decided by policy at a much narrower scale in piecemeal fashion. Anderson (2019) highlights the importance of crafting visions for a more sustainable food system future at multiple scales, which suggests the value of conducting narrower scenario visioning within the larger New England vision. To carry out this transition thoughtfully at these reduced scales, which are more conducive to

implementing on-the-ground change, it would be useful to identify beforehand the lands most suitable for new or renewed agricultural cultivation. Erickson, Lovell, and Méndez (2013) provide a useful term for these types of lands: “agricultural opportunities.”

Efforts to identify agricultural opportunities have become somewhat common in urban settings, where food insecurity and a lack of access to green spaces have helped to drive a wave of interest in creating community gardens. Colasanti and Hamm (2010) mapped publicly owned vacant land in Detroit, Michigan, and modeled potential crop yields from these lands; McClintock, Cooper, and Khandeshi (2013) followed a nearly identical approach for vacant and underutilized public land in Oakland, California. Kremer and DeLiberty (2011) analyzed high resolution aerial imagery of Philadelphia, categorizing land cover based on maximum likelihood classification, and identifying areas with grass or bare soil in residential yards that could be easily converted to agriculture. Many of these researchers worked in conjunction with local stakeholders like government officials, nonprofit organizations, and urban farmers. The emphasis of these studies tends to be the geographical inventory, or the “supply-consumption perspective” (Colasanti & Hamm, 2010), with less attention paid to who might do the proposed future farming and how they might access the land.

In urban areas where much of the land is developed, agricultural opportunities are often heavily determined by where pockets of vacant land remain, often in publicly owned parks or lots. In contrast, Erickson et al. (2013) provide an example of an analysis where agricultural opportunities are identified on privately owned lands in Chittenden County, a mostly rural county in Vermont. With more undeveloped land to choose from, Erickson et al. selected agricultural opportunities based on land cover, soil, and slope, while also considering neighborhood clusters and proximity to potential consumer markets like the city of Burlington. Finding many of these sites within residential parcels, often near existing agricultural land, Erickson et al. ultimately determined that Chittenden County had enough viable land area to produce most of its population's food

needs, including vegetables, hard wheat, and fodder for beef and pork production. Although most counties are not seeking to feed their populations from solely within county boundaries, the potential for increased local production is still promising.

The Challenge of Land Access and the Argument for Leasing Institutional Land

For farmers, identifying cultivable land is only the beginning; accessing this land is a major challenge, particularly for aspiring farmers in New England (Bowell, Coffin, & Martin, 2011; Land for Good, 2012). The American Farmland Trust lists four requirements for potential farmland: the land must be available in an adequate size, affordable for the aspiring farmer, appropriate for cultivation, and securely held (American Farmland Trust, 2015). Finding land that meets these criteria is a challenge, particularly in terms of affordability and security of tenure.

Land discrimination has a long history in the United States, leading to a series of lawsuits against the United States Department of Agriculture by Black farmers, women farmers, American Indian farmers, and Hispanic American farmers, as well as resulting disparities in agricultural land ownership that persist to this day (Carter, 2017; Green, Green, & Kleiner, 2011; Parsons et al., 2010). With no inherited family land, limited capital, and a legacy of lacking support, aspiring farmers who are low-income, young, or otherwise disadvantaged face significant financial obstacles to becoming landowners.

For those who cannot afford to purchase land outright, leasing land offers an alternative. Leasing is imperfect; the possibility of landowners changing their minds or failing to renew the arrangement—especially if the landowner is a private individual who might experience familial or financial changes—makes it risky for farmers to invest in ecological improvements to the land or long-term plans for their business (Hachmyer, 2017). However, land owned by state governments, municipalities, land trusts, churches, schools, and other nonprofit institutions may hold less risk for farmers due to the steady ownership and decreased development pressure. Additionally, institutions may be encouraged to lease land at a sliding scale or graduated

rate, particularly if their institutional missions support local agriculture, as some municipal plans of conservation and development do (Land for Good, 2012). Churches and schools may have affiliated communities that would benefit from local produce or the educational experience of gardening, providing more incentives to partner with a leasing farmer. Thus, the criteria of affordable access and secure tenure can be fulfilled while the arrangement also provides benefits to the landowner (Bowell et al., 2011). Furthermore, there is precedent for these types of leasing arrangements and existing resources to guide their creation and maintenance. The community land trust movement has demonstrated one model for nonprofit ownership of land with long-term leases to individuals, most often for the purposes of providing affordable housing options (Gray, 2008; Meehan, 2014), and organizations like American Farmland Trust and Land for Good have released handbooks for facilitating leasing arrangements with farm operations specifically (Bowell et al., 2011; Land for Good, 2012). This combination of encouraging factors and the consequent potential for future farmland on institutionally owned lands form the basis of this analysis, which utilizes a site suitability approach to identify agricultural leasing opportunities at a county scale in pursuit of the goals of *A New England Food Vision*.

Methods

Study Area

Windham County is located in the northeast corner of Connecticut and comprises 15 towns. It is known colloquially as “The Quiet Corner” for its mostly rural setting and low population density. A large portion of Windham County is also considered part of “The Last Green Valley,” a 35-town Natural Heritage Corridor designated by Congress in 1994 that runs through eastern Connecticut into south-central Massachusetts (The Last Green Valley, Inc., 2010). The county thus may be considered both a political region corresponding to recognized boundaries, and a cultural region corresponding to the Quiet Corner and Last Green Valley designations, to use Ruhf (2015)’s terminology. In 2010, according to land cover data from the University of

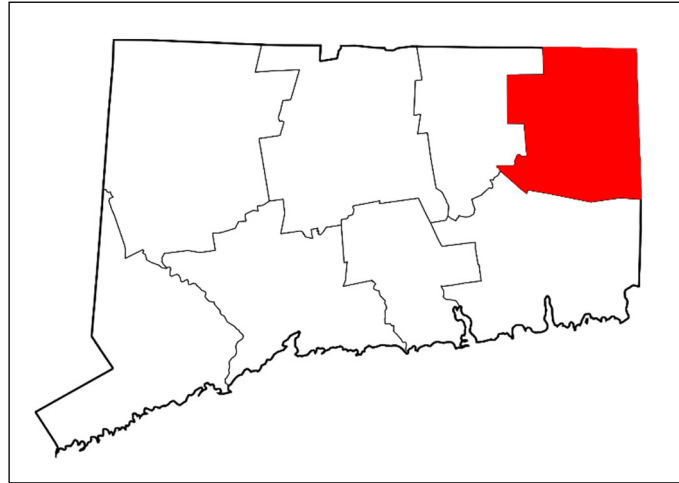
Connecticut Center for Land Use Education and Research (CLEAR), there were 34,156.05 acres (13,822.46 ha) of land in agricultural use within the county, including crop production, active pasture, and/or abandoned fields that have not yet become covered in woody vegetation (Figure 1). The per-capita income in Windham County was US\$31,106 in 2018, approximately three-fourths of the per capita income of the state of Connecticut as a whole (U.S. Census Bureau, 2018). Almost 12% of county residents live below the poverty line (U.S. Census Bureau, 2018). Windham County has the highest levels of child food insecurity in Connecticut, with 16.4% of children in the county categorized as food-insecure in 2017 (Feeding America, 2019).

Data

Parcel shapefiles for the towns in Windham County were acquired from the University of Connecticut Map and Geographic Information Center (MAGIC), the Northeastern Connecticut Council of Governments (NECCOG), and in some cases the towns themselves. Landowner information for each parcel was acquired from NECCOG or from the tax assessor offices in individual towns. Land cover data, including a data layer identifying “core forests” (contiguous forest areas more than 300 ft [91 m] from any forest/nonforest edge), were acquired from CLEAR, in raster format with a cell size of 30 m. Shapefiles indicating the locations of ecological constraint variables were acquired from the Connecticut Department of Energy and Environmental Protection (DEEP), and included inland wetlands and hydric soils, natural diversity database areas (areas identified by the state as containing species of conservation concern or significant natural communities), critical habitat areas (areas identified by the state as containing rare and specialized wildlife habitat), water bodies, and highly erodible soils.

All geospatial analysis was completed using ArcGIS 10.6.1 and the ModelBuilder interface, within the NAD_1983_StatePlane_Connecticut_FIPS_0600_Feet coordinate system.

Figure 1. Windham County in the State of Connecticut



Identifying Institutional Lands and Incorporating Constraints

The “institutional lands” considered here broaden the potential pool of agricultural opportunities beyond the “public” lands considered by Colasanti and Hamm (2010) and McClintock, Cooper, and Khandeshi (2013). Institutionally owned parcels were identified through landowner information by selecting all parcels containing any of the following keywords in the ownership attribute table: “town,” “land trust,” “church,” “parish,” “school,” “university,” “college,” “synagogue,” “fellowship,” “community,” “health,” “hospital,” “state of Conn,” “Connecticut, State of,” and “Joshuas” (the name of a well-known local land trust). The resulting selected parcels were further categorized by institution type. Parcels containing the keywords “town,” “state of Conn,” or “Connecticut, State Of” were categorized as owned by government entities. Parcels containing the keywords “land trust,” “Joshuas,” or “community” were categorized as owned by non-profit community organizations. Parcels containing the keywords “church,” “parish,” “synagogue,” or “fellowship” were categorized as owned by religious organizations. Parcels containing the keywords “school,” “university,” or “college” were categorized as owned by educational institutions. Parcels containing the keywords “health” or “hospital” were categorized as owned by healthcare institutions. Each town’s selected parcel layer was manually checked for discernible errors, such as private

landowners sharing a name with a keyword, properties with attribute information indicating they contained cemeteries or housing developments, or parcels that were visually identifiable as roads; these parcels were all removed from the selection.

A land cover data layer from CLEAR was overlaid onto the parcel selection layer to remove all areas that are already under agricultural use (as this project focuses on new farmland) as well as all areas already classified as “developed” (as the costs of restoring this land to cultivation will likely be prohibitive).

Ecological constraint variables were then overlaid with the parcel selection layer. In order to reduce the ecological impact of the proposed future farmland, all areas overlapping with inland wetlands, hydric soils, core forest areas, highly erodible soils, critical habitats, and natural diversity areas (as mapped by the Connecticut DEEP) were removed from consideration. All land within 50 ft (15 m) of a body of water was also removed, as the Connecticut *Manual of Best Management Practices for Agriculture* recommends leaving a riparian buffer zone of at least 50 ft (15 m) between agricultural land and bodies of water in order to protect water quality (Holbrook, 1996). It is worth noting that the lands excluded here for ecological reasons are delineated mostly by state-defined metrics, and so are limited by the methodology and value systems of state agencies. However, this approach has the advantage of being relatively simple to convey to public stakeholders without a scientific background and will be easier to integrate with existing state policy. Any specific parcels identified in this analysis would need to be ground-truthed prior to enacting any land use change, as shapefiles are not without error and land conditions vary over time.

After all constraints were removed, ArcMap’s “Calculate Geometry” Tool was used to calculate the acreage of the remaining selected areas in each town, which were further delineated by institutional category type.

Estimating Future Food Production and Agricultural Footprints

Crop yield per acre will naturally depend on the type of crop planted and the method of cultivation.

These decisions, in turn, depend on climate and land suitability as well as consumer demand. The type of food system possible in New England’s future, then, will be contingent upon what future New Englanders choose to eat—no amount of local farmland cultivation will suffice if every New Englander wants to dine on tropical fruit every day. *A New England Food Vision* sketches out three different possible diet scenarios for New Englanders: the Current Diet, the Omnivore’s Delight Diet, and the Regional Reliance Diet, all of which would require different agricultural production patterns (Donahue et al., 2014). The Current Diet represents an extension of New England’s present food consumption, in which approximately a quarter of calories consumed are from meat, fish, and eggs, with added fats counting for nearly 20% more, and less than 10% of calories coming from fruits, vegetables, and whole grains combined (Donahue et al., 2014). Under these current trends, the percentage of New England’s food produced within the region will remain around 12%. The Omnivore’s Delight Diet derives only 15% of calories from meat, fish, and eggs, reduces the percentage from added fats, and increases fruit, vegetable, and whole grain consumption (Donahue et al., 2014). This diet aligns with Donahue et al.’s target goal of being able to produce 50% of the region’s food within New England. The Regional Reliance Diet, which imagines a future of greater scarcity where nearly 70% of New England’s food must come from within the region, further reduces meat, fish, and eggs, removes imported warm-climate fruit completely, and increases the calories derived from protein-rich plants (Donahue et al., 2014). For each of these diet scenarios, the per capita agricultural footprint calculated by Donahue et al. was used to calculate the number of people who could be fed from the acreage identified in the site suitability analysis for Windham County.

Results

The site suitability analysis identified 6,343.27 acres (2,567.03 ha) of suitable institutionally owned agricultural land across Windham County, an increase of 18.57% from 2010 agricultural acreage (Table 1 and Figure 2). Potential acreage increases and percentage increases varied greatly by town

(Table 1 and Figure 3), with an average increase of 422.88 acres (171.13 ha) and a median increase of 476.46 acres (192.82 ha). Of the identified acres, nearly three-fourths are held in government ownership by either the state of Connecticut or individual municipalities; educational organizations own much of the remainder, followed by land trusts, religious organizations, and health care organizations (Figure 4).

According to Donahue et al.'s (2014) estimate for an extension of New England's current diet, each New Englander will have a per capita agricultural footprint of 1.10 acres (0.45 ha); under this scenario, the added institutional land would be able to supply food for 5,767 additional people. The Omnivore's Delight scenario has a per capita agricultural footprint of 0.67 acres (0.27 ha) (Donahue et al., 2014), and so the institutional land would be able to feed 9,468 additional people. The Regional Reliance scenario has a per capita agricultural footprint of 0.6 acres (0.24 ha) (Donahue et al., 2014), and so the institutional land would be enough to feed 10,572 people under this scenario. The U.S. Census population estimate for

Windham County in 2018 was 117,027 people (U.S. Census Bureau, 2018).

Discussion

Leasing land, although often more feasible for aspiring farmers than purchasing land, is not without its unique challenges. Farmers and the landowners they rent from may have differing expectations or personality conflicts, and short-term leases may disincentivize agricultural practices that require longer-term investment (Hachmyer, 2017). These challenges are particularly acute when they are reinforced by the American attachment to the principle of private property. Hachmyer (2017) cautions that focusing on expanding access to rentable land without a community-level approach may serve only to further entrench a system in which farmers (and the food system they create) are always at risk of losing the land they cultivate, a concern that echoes Donahue's (2003) earlier urging that the agrarian landscape be protected through community ownership. The focus on institutional lands in this analysis is meant to offer a geographic pathway toward the community-level

Table 1. Potential Increases in Agricultural Acreage From Converting Institutional Land in Windham County

Institutional lands are categorized by the following ownership types: government, nonprofit, religious organization, educational institution, and healthcare institution.

Town	Agricultural Acres (2010)	Potential Acres by Type of Institutional Land					Total Potential Acreage	Total % Increase
		Government	Nonprofit	Religion	Education	Health		
Woodstock	6,232.43	300.23	149.70	3.77	42.43	0.00	496.13	7.96
Thompson	2,364.59	300.46	72.47	27.02	70.74	7.30	477.99	20.21
Eastford	1,297.19	42.47	4.72	4.46	388.07	0.00	439.72	33.90
Ashford	1,754.09	335.70	52.77	52.85	286.38	0.00	727.70	41.49
Putnam	911.58	204.92	23.10	7.03	0.04	22.32	257.41	28.24
Pomfret	4,401.21	334.09	127.37	9.41	219.73	0.00	690.60	15.69
Killingly	1,339.66	212.83	0.00	29.31	0.87	1.51	244.52	18.25
Chaplin	636.30	465.67	6.65	4.14	0.00	0.00	476.46	74.88
Hampton	1,595.58	579.82	28.78	0.18	0.00	0.00	608.78	38.15
Brooklyn	2,299.20	162.42	0.15	32.35	2.58	0.00	197.50	8.59
Sterling	1,685.17	540.57	0.44	0.28	0.00	0.00	541.29	32.12
Plainfield	3,248.66	539.07	19.23	12.12	0.51	2.03	572.96	17.64
Canterbury	2,911.18	82.19	2.74	6.35	33.61	0.00	124.89	4.29
Windham	1,487.98	256.15	18.05	2.88	1.51	3.25	281.37	18.91
Scotland	1,991.22	174.94	20.29	10.72	0.00	0.00	205.95	10.34
Full County	34,156.05	4,531.54	526.46	202.87	1,046.47	36.41	6,343.27	18.57

Note: 1 acre=0.40 hectare

approach that Hachmyer and Donahue call for, under the broader scope of *A New England Food Vision's* requirement for new land to be brought into cultivation. Although this case study models this approach within Windham County, Connecticut, the methodology can be applied at other scales and in other regions if parcel ownership data and land cover data can be acquired, since, certainly, the challenge of land access for aspiring farmers is not unique to New England.

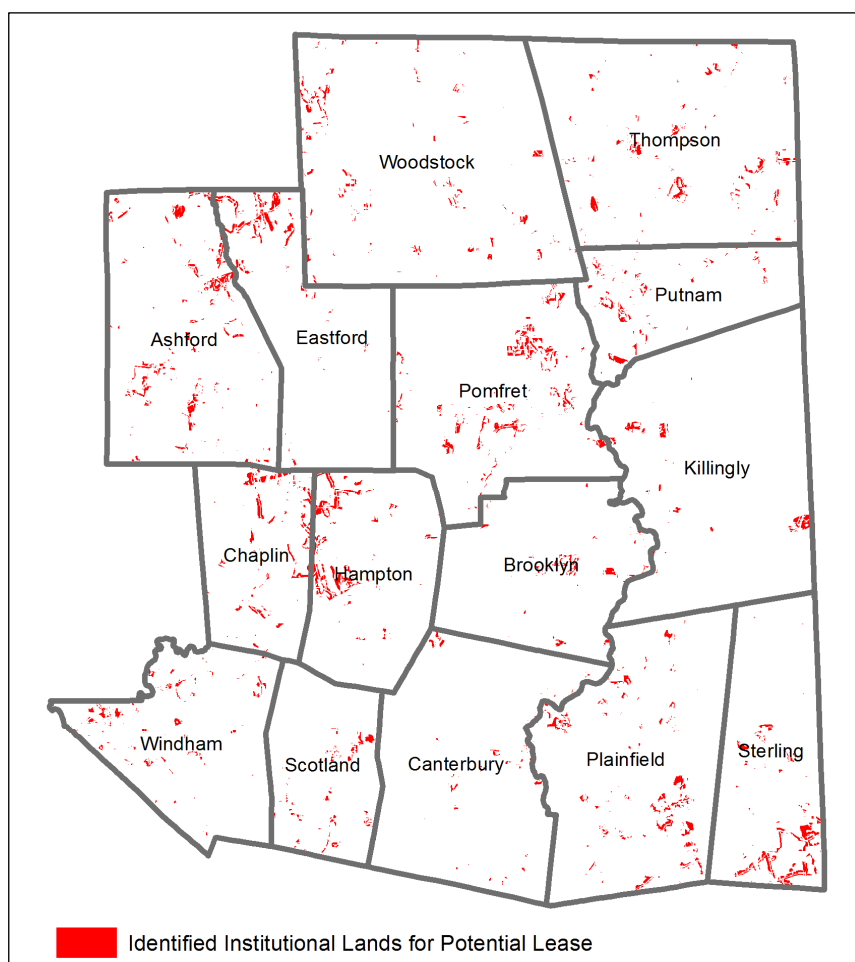
The vast majority of institutionally owned lands identified through this analysis are government-owned at either the state or municipal level; therefore, efforts to promote agricultural leasing are likely to have the greatest impact when targeted to state and local land use policymakers. There is potential for convergence between this goal and

existing government objectives. The Connecticut State Department of Agriculture coordinates the CT Grown Program for marketing food grown within the state, as well as programs for farmland conservation and restoration (CT.gov, n.d.). This state agency has set a farmland preservation goal of 130,000 acres (52,609 ha) within the state, but the watchdog Council on Environmental Quality (2015) has cautioned that farmland loss is outpacing preservation, noting that “in reality there will not be that acreage of agricultural land remaining in the state by the end of the current century if the rate of loss continues as it has for most of the past five decades” (p. 17). Converting new land to cultivation may help the state achieve this goal for total farmland acreage in Connecticut; the results of this analysis could help to inform site selection

and funding priorities, supporting the process of getting the state back on track toward its target. All towns in Connecticut must also produce a municipal plan of conservation and development every 10 years outlining community goals connected to future land use. Many towns in Windham County articulate a desire to maintain their towns' agricultural heritage and sense of place in these plans, objectives that align well with promoting municipal leasing arrangements with aspiring farmers.

These connections to state and municipal goals are especially important because of the indisputable need for financial support (through grants, loans, tax incentives, and similar mechanisms) from all levels of government if new farm operations are to be launched and sustained successfully—a reality that is not limited to Connecticut. The conversion process will

Figure 2. Institutionally Owned Lands in Windham County Identified by Site Suitability Analysis with Constraints Excluded



require investment; some of the identified land is currently turf or grasslands, but the majority is forested to some degree (edge or patch forest, as all core forest areas were excluded), which would need to be cleared and the soil potentially remediated. The Connecticut Department of Agriculture has previously funded and coordinated a Farmland Restoration Program, enacted by Public Act 11-1, which has funded efforts such as removing trees, stones, and invasive plants, installing fencing, replanting vegetation, improving access roads, and more (Connecticut Department of Agriculture, 2018). Such state support would almost certainly be needed to reduce the cost burden upon institutional landowners under this scenario.

Although the majority of identified acres across the county are owned by government entities, at a town scale several of the municipalities have pockets of suitable land owned by educational organizations and nonprofit land trusts, sometimes totaling hundreds of acres. Farmer advocate organizations in these areas would do well to connect these institutional landowners with leasing guides and tools such as those created by American Farmland Trust and Land for Good (Bowell et al., 2011; Land for Good, 2012; Land for Good, n.d.). Creating templates for leasing arrangements specifically designed to meet educational or land conservation goals would be most beneficial in the towns where these institutional lands are concentrated. Were this methodology to be applied to other study areas, the percentages of land in the different institutional categories would likely differ, as would the specific resource needs for connecting these institutions to interested potential farmers.

The inclusion of agricultural footprint data and subsequent estimates of the additional capacity to feed people from the identified acres is meant to illustrate the approximate amount of food likely to be produced under this scenario, not to imply that thousands of Windham County residents will

Figure 3. Potential Increases in Agricultural Acreages by Town in Windham County, Based on Institutionally Owned Parcels after Site Suitability Analysis

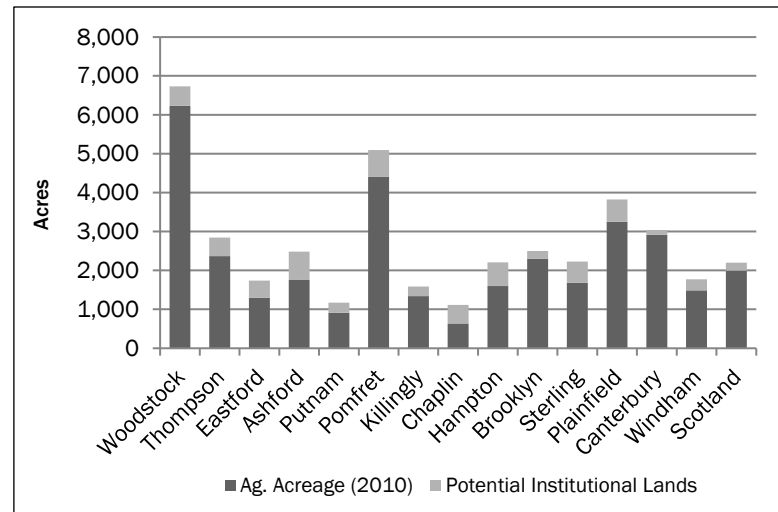
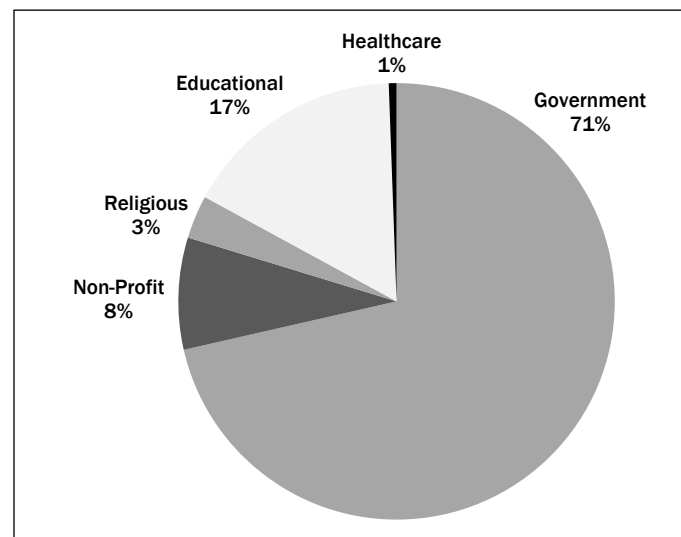


Figure 4. Ownership Category Percentages for Potential Agricultural Acreage, Based on Institutionally Owned Parcels after Site Suitability Analysis




henceforth obtain all of their calories from food produced within the region. *A New England Food Vision* calls for additional self-reliance, not complete self-sufficiency and isolation from the wider world, and no one is suggesting that New Englanders never again consume bananas, or cinnamon, or chocolate, nor should the rest of the country have to swear off New England maple syrup for good. Returning to Sen (2008) and the question of com-

parative justice, improvement is a worthy goal even if perfection remains unattainable.

Conclusion

In the “home rule” state of Connecticut where towns hold considerable regulatory power, a perfectly unified countywide approach is unlikely. The choices of individual towns, however, can have large cumulative effects across a region, particularly if multiple complementary strategies are enacted; the same is true of the individual states that make up New England, and indeed the United States. Institutional lands—with their secure tenure, reduced development pressure, and often mission-linked ownership—may be the “low-hanging fruit” on the pathway to reaching the agricultural acreage called for by *A New England Food Vision*, while beginning to move toward a community-level approach to sharing land access. It will not be enough, but it may be a start.

Changes in land use alone will not lead to a just and sustainable food system. Social and economic support for farmers at the federal, state, and

municipal levels, expanded market opportunities, additional regional processing and distribution centers to allow the creation, packaging, and sale of value-added products, and increased public awareness of and commitment to seasonal, regional food choices will all be necessary in order to reach the goals articulated by *A New England Food Vision*. However, without a secure and abundant agricultural land base, these other elements cannot succeed. This research project endeavors to explore options for assembling this land base in Windham County and demonstrating an adaptable model for other regions—one that marries the methodology of site suitability analyses with the value-driven goals of community land access—in the hopes that the food system of the future might avoid some of the mistakes of the past. 

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“Don’t just come for yourself”: Understanding leadership approaches and volunteer engagement in community gardens

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Abstract

Community gardening initiatives are popular interventions for health promotion and the development of socially inclusive local agricultural models. The leadership of such gardens is critical for their long-term success and sustainability. This study describes the leadership styles of garden managers, as well as how managers recruited and interacted

with volunteers. Thirteen community garden managers were interviewed, and 48 community garden volunteers participated in six focus groups. Transcripts were coded with Dedoose software using a conventional content analysis, which led to the development of thematic clusters in consultation with a qualitative data expert. During the analytic process, codes were refined and added, and three themes were identified: managers struggled to recruit and retain volunteers capable of maintaining gardens; garden managers’ leadership styles were either collaborative or directive; and garden participants emphasized managers’ organization and openness to ideas. Leadership styles varied among managers, and participants acknowledged and appreciated elements of both leadership styles.

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More research is needed on the impact of leadership styles on other measures of garden success.

Keywords

Community Gardens, Leadership, Volunteer Engagement, Qualitative Research

Introduction

Participating in community gardens has been associated with several health-related benefits, including increased access to, and consumption of, fresh fruits and vegetables (McCormack, Laska, Larson, & Story, 2010; Patel, 1991), as well as reduced risk of chronic disease (Boeing et al., 2012). Participating in community gardens is typically defined as volunteering in garden planting, maintenance, or operations (Booth, Chapman, Ohmer, & Wei, 2018). Beyond fruit and vegetable consumption, research on community gardens has explored how gardens build community capacity and cohesion, bridging communities of diverse races, ethnicities, and ages (Glover, Parry, & Shinew, 2005; Teig, Amulya, Bardwell, Buchenau, Marshall, & Litt, 2009). Such interventions may prove especially helpful in ensuring that food systems are socially inclusive and foster equity, social integration, and the “generous creation of natural human capital” (Macias, 2008).

Gardening initiatives are one of several policy, systems, and environment (PSE) strategies supported by SNAP-Ed, an evidence-based nutrition education program that complements the Supplemental Nutrition Assistance Program (SNAP) (U.S. Department of Agriculture Food and Nutrition Service [USDA FNS], n.d.). Conventional nutrition education programs typically engage a limited number of individuals per session and are often hampered by recruitment and attendance challenges, lowering their potential reach (Haynes-Maslow, Osborne, & Pitts, 2018). PSE interventions, on the other hand, are designed to “make the healthy choice the easy choice,” and influence the broader community (Leung et al., 2013). In a 2018 study of SNAP-Ed implementing agencies, garden-based interventions were the most frequently cited PSE education strategy in rural communities (Haynes-Maslow et al., 2018).

Previous literature has explored the processes

in community gardens that contribute to social cohesion and increased community capacity, but this research has not explicitly addressed the influence of individuals in positions of power on community garden goals and systems (Alaimo, Reischl, & Allen, 2010; Egli, Oliver, & Tautolo, 2016; Hartwig & Mason, 2016; Lanier, Schumacher, & Calvert, 2015). It is well understood that leadership is critical to the success of any community-based project (Ceptureanu, Ceptureanu, Luchian, & Luchian, 2018). Far less understood—given the paucity of relevant results in a literature review—is how different qualities of leadership styles can lead to vastly different experiences by program participants (Patton, 2009), even in a relatively simple program. When ‘leadership’ is discussed in relation to community garden initiatives, the discussion focuses on the benefits the community garden setting provides in the development of leadership characteristics among members, not on how leadership quality influences garden style and measures of success.

However, the quality of leadership in community garden settings is surely an important factor in encouraging and sustaining broad participation by community garden members, members who in turn can reap the myriad benefits of community garden participation. The SNAP-Ed Toolkit identifies ‘Champions’—“...people who provide sustained and often charismatic leadership...”—as one of its core indicators in measuring program success and sustainability (SNAP-Ed Toolkit, n.d.).

These leaders fill a more challenging and nuanced role than generally conceived: they possess deep knowledge of the community, tap into local resources, and unify direction in the interest of shared ownership (Aoun, Shahid, Le, & Packer, 2013). The unique perspectives that leaders bring are especially important because garden projects tend to be specific to their communities. For example, a garden located in a faith community might function quite differently and attract different participants than one based at a school, making it difficult to generalize lessons learned.

This paper aims to understand who leads community garden efforts, as well as *how* they lead these efforts in order to broaden the understanding of some of the ways that community gardens func-

tion. By utilizing qualitative methods, the researchers explore the conditions and processes that are unique to each community's organization. Understanding attributes of garden management is critical to better documenting different approaches that could facilitate the sustainability of these programs.

Methods

The University of North Carolina Center for Health Promotion and Disease Prevention (HPDP) is an implementing agency for SNAP-Ed that supports SNAP-Ed initiatives in six North Carolina counties. Part of supporting these initiatives includes providing training and technical assistance for 18 community garden projects. Of the 18, three were targeted at engaging youth, three were situated in senior centers, three were situated with faith-based institutions, and nine were for general use in a park or common community area. While SNAP-Ed constrains some operational and financial decisions, HPDP strives to involve and empower participants by using community-engaged research principles. Recognizing that each of the gardens is unique, HPDP allows the community to shape the garden's mission and goals, as well as its organizational processes. At each garden, a community member serves as a manager who recruits and organizes garden volunteers, coordinates logistics, and facilitates data collection on participation and harvest totals. This community garden manager is always a person who had prior experience working with the organization or group the garden is formed around and is often the leader of that organization or group. At some gardens, the role of community garden manager changes hands at irregular intervals. For their efforts, garden managers receive a small stipend.

Because the community garden manager is the one person at each garden who has regular contact with the project manager at HPDP and the one person who is paid to help the garden run, he or she wields a great deal of power in shaping some pieces of the garden project. To encourage more equitable distribution of power, the project manager at HPDP participates in meetings with each community garden group so as to hear from others and try to facilitate group decision-making on fundamental decisions determining how the garden

will function. However, those occasions are intermittent, and the majority of the time the garden manager sets direction with as much or as little input from the community as his or her management style dictates. This power structure—which may not be dissimilar to the majority of community gardens—makes understanding leadership styles very important.

Between August and October 2017, trained researchers from HPDP (including authors CC, BS, and MDM) conducted semi-structured interviews with garden managers ($n=13$) and focus groups with garden participants (48 individuals in six focus groups). Interviews and focus groups lasted between 60-90 minutes. Semi-structured interviews were held with garden managers due to the smaller number of garden managers (only one or occasionally two managers per garden compared to an average of 15 or more garden participants per garden). Each of the community gardens was represented either through garden manager interviews or through gardener participation in focus groups. Focus groups were conducted throughout the project implementation region to allow for participants from different counties to participate. Table 1 shows demographic characteristics of participants from the interviews.

Interviews and focus groups were mostly conducted in English. One garden had a majority of Spanish speaking participants, so the manager interview and focus group were conducted in Spanish by one of the study co-authors (CC) who is fluent in Spanish. Interviews and focus groups were audio recorded with participant permission, then transcribed and de-identified. Spanish language transcripts were translated into English for analysis. Researchers asked managers specifically about garden operations and organizational structure. Because garden managers were tasked throughout the season with collecting quantitative data on garden participation and garden yield, these interviews were an opportunity for managers to describe the successes and shortcomings of their gardens in ways that were not captured by these measures. During the focus groups, on the other hand, researchers encouraged garden participants to speak freely about challenges and frustrations in the garden, as well as successes, without the garden

manager in attendance. A sample of key focus group and interview questions is available in Table 2. Participants received US\$25 for their time.

Prior to conducting this secondary analysis, the first author had limited contact with these data; he had no role in data collection, whereas the other

authors took part in developing the interview guides and collecting data. Upon receiving the transcribed data, JG read each transcript twice, utilizing a conventional content analysis approach with the aim of understanding the data and identifying potential research questions (Hsieh & Shannon,

Table 1. Participant Demographic Characteristics

Characteristic	All (n=61)	Focus Group (n=48)	Garden Manager (n=13)
Gender, n (%)			
Male	12 (19.7)	8 (16.67)	4 (30.8)
Female	49 (80.3)	40 (83.33)	9 (69.2)
Race, n (%)			
American Indian or Alaska Native	5 (8.9)	4 (8.89)	1 (9.1)
Asian	2 (3.6)	2 (4.44)	0 (0)
Black or African American	38 (67.9)	31 (68.89)	7 (63.6)
White	9 (16.1)	8 (17.78)	1 (9.1)
Mixed Race	2 (3.6)	0 (0)	2 (18.2)
Ethnicity, n (%)			
Hispanic/Latinx	6 (10.2)	4 (8.33)	2 (18.2)
Not Hispanic/Latinx	53 (89.8)	44 (91.67)	9 (81.8)
Age, mean (SD)			
	53.1 (16.1)	52.9 (17.5)	53.6 (9.3)

Note: Demographics were collected by self-report in a short survey prior to interviews and focus groups. Missing values are due to participants leaving demographic characteristics blank. 5 values were missing on race, 2 on ethnicity, and 3 on age.

Table 2. Key Interview and Focus Group Guide Questions^a

Interview Guide	Focus Group
What does a successful community garden look like? ^b	What did you think volunteering at the community garden would be like? How similar/different is this from what your volunteering experiences have been like?
In what ways has the community garden you work with been successful? ^b	Do you feel like you have a say in how the garden works?
How do you feel about your experience with the garden?	Do you feel like you can make suggestions about what is happening in the garden?
What are your existing needs at the garden? Were there needs, throughout the season that weren't met? These needs could be monetary, equipment for the garden, or any other type of assistance.	
Based on your answer just now (reference above answer), how, if at all, did these unmet needs affect the garden?	
How do you recruit volunteers for the garden? Do you feel you have enough volunteers to maintain the upkeep of the garden?	
What is your relationship with the volunteers of the garden? How, if at all, has that changed over time?	

^a These questions do not constitute the full interview guide, but rather a selection of key questions. Probes were included with the guides but are not presented here for brevity.

^b Question also asked during focus group.

2005). With no predefined research questions, this inductive approach enabled JG to propose thematic clusters that would structure the codebook. Such a methodology aligns with HPDP's research approach by allowing the perspectives and knowledge of the participants, rather than the preconceived theoretical perspectives of the researchers, to drive analysis. JG developed a set of descriptive codes, including codes categorizing the tasks of garden managers, barriers to garden success, and managers' characterization of participants. JG conducted analysis using Dedoose qualitative software (version 4.7, SocioCultural Research Consultants, Los Angeles, CA). Analysis was iterative; after coding several transcripts JG added codes on explicit and implicit leadership styles to the codebook, which would later inform the final analysis. At this point, the final research questions guiding this secondary analysis were clarified (see Table 3).

Following the coding process, data were organized into a matrix to compare several key descriptive and interpretive themes without disaggregating

quotes from their speaker and context (Maxwell & Miller, 2008). An iterative process of writing, revising, and revisiting the data followed to further explore and connect those passages deemed most pertinent to the research questions.

Results

In the interviews with garden managers, we identified important themes about volunteer recruitment and retention, as well as managers' leadership styles. While we present our results in an organized manner, which could suggest that participant perspectives can be cleanly separated into distinct categories, the data demonstrate a spectrum of experiences. We utilized pseudonyms for garden managers so that individual perspectives and ideas can be traced throughout the manuscript. The reader should not attempt to develop any singular notion of how a garden might best operate from these perspectives. Because the individual voices of the managers are important to understanding this paper, Table 4 gives a brief overview of the inter-

Table 3. Final Research Questions

Who participates in the community garden?
In what ways do garden managers ascribe meaning to volunteers based on their age?
In what ways do different garden managers' leadership styles inform their ability to attract and retain volunteers?
How do managers' leadership styles shape their interactions and relationships with other gardeners?

Table 4. Garden Manager Pseudonyms and Garden Characteristics

Garden Manager (Pseudonym)	Organization Type	Garden Style and Size	Average number of garden participants per month, 2017
Jasmine	Senior center	Approx. ½ acre in rows + three garden boxes	4.33
Shawn	Faith-based	Approx. ⅓ acre in rows	8
Natalie	Senior center	3 large garden boxes	7.5
Jane	Faith-based	4 garden boxes	7.67
Kayla	Public housing	Approx. ¼ acre in rows	6.17
Zasha and Maya	Housing community	8 large garden boxes	32.5
John	Faith-based	3 garden boxes	5
Corey	Community development corporation (CDC)	3 large garden boxes	5.67
Tasha	Public housing	8 garden boxes	12.33
Jeanette	Senior center	4 large garden boxes	6.17
Ryan	Community garden nonprofit	16 garden boxes + fruit trees	12.33
Jerry	Community development organization	Approx. 1 acre in rows	10.33

view participants whose words are used. An overview of the themes that emerged follows.

Managers Struggled to Recruit and Retain Volunteers Capable of Maintaining Gardens

When asked at the beginning of their interview to describe their community garden, managers either discussed the physical characteristics of the garden—the size of beds, the crops growing—or, more frequently, discussed who volunteered in the garden’s upkeep and maintenance. By centering their description of the garden on these volunteers, the managers emphasized the pivotal role that labor plays in day-to-day operations. Managers rely heavily on community involvement and volunteerism, and the individuals that showed up consistently shaped their experience of the garden.

Managers discussed both volunteers and garden yield even though they were not explicitly prompted to do so. However, these are the two quantitative measures that their role requires them to monitor. Qualitative interview questions, including “What does a successful community garden look like?” and “In what ways has the community garden you work with been successful?” were constructed to allow managers to provide a richer sense of how managers’ conceptions of their garden’s objectives can differ from established community goals.

Most managers reported that they had difficulties recruiting enough volunteers, and that this was an impediment to their garden’s productivity. It should be noted, though, that their commentary suggests that simply keeping track of the average *number* of volunteers was an insufficient metric to describe if volunteer efforts were helpful. ‘Kayla’ was a manager of a garden that partners with the local church. Unlike most managers, Kayla was typically able to recruit volunteers, but conceded that the *distribution* of labor between participants and over the course of the growing season was often inconsistent:

Nine times out of 10 you get a couple of volunteers who do the hardest work and then you, you know. They’re kinda like worn out and in the end of season you really have nobody but you.

Garden managers’ perceptions of their *volunteers’ age and physical abilities* often reflected how much importance they ascribed to garden yield (versus other less quantifiable outcomes.) Several of the gardens affiliated with senior centers or churches are maintained by older volunteers. In these settings, garden managers expressed different values related to how the age of their volunteers contributed to work ethic and work culture. ‘Jasmine,’ the manager of a garden located at a senior center, attributed the seniors’ enthusiasm for helping in the garden to generational norms around farming and gardening:

They’re old schoolers, this is what they know, this is how they grew up, so they seem more eager to be involved and participating.

Enthusiasm alone, however, was often viewed as insufficient for garden success. Managers admitted that a large number of older volunteers might not be optimal for garden upkeep. Several mentioned that participants’ age was often a constraint on their ability to participate, but that these volunteers could still contribute meaningfully to the garden operations: “you know, some of them would just come out and I was like, just hold the hose.” The seniors in the community may love and appreciate the garden, but as ‘John,’ a manager at a faith-based garden, glibly puts it, “they just ... they’re too old to come out and work it.”

According to the managers, seniors often had gardening knowledge and experience that made them invaluable even if they provided limited physical labor. ‘Shawn’ is one of the managers who shared this perspective. He noted that:

I’m learning every day from different ones, that there’s a guy, um older man that comes down there. He don’t work in the garden but he just comes down there, and he give me pointers.

While some managers noted the positive contributions of their older volunteers, nearly all the managers and participants admitted that having more young people involved would be a boon to their garden, as their physical strength and mobility

would allow them to contribute more significantly than older participants. Managers described how they depend on the younger volunteers to perform more laborious tasks, and that they were more comfortable in hot weather. Age, however, was not always viewed as a proxy for the ability to execute garden tasks. ‘Corey,’ who manages a garden with participants who are veterans, mentioned she has a young assistant who is instrumental in helping with planning and logistical coordination. She notes that those who collect SNAP benefits, but especially young people, “need to have some seeds. They need to have soil. They need to be involved in the community garden project.” Corey repeatedly emphasized the educational benefits that youth gain from the garden and that the garden benefits from the intellectual contributions of these young volunteers and not just their physicality.

While positive perceptions of youth participants were widely held amongst managers, two garden managers described young garden volunteers negatively, claiming that they were lazy or irresponsible. John provided brief responses during his interview, often replying only in a few words and declining to elaborate when pressed further. In his limited responses, he frequently returned to his belief that young people did not want to work:

...you know, young people, young men don’t wanna work for some reason [laughter]. I don’t know why, but, uh, they just refuse to work.

This characterization, though contrary to that shared by other managers, might be a reflection on recruitment challenges. John noted that it is tough to engage young people who are working in paid positions full-time, and who may not want to volunteer without the promise of compensation.

Certain gardens have an intentional focus on youth development or youth empowerment, and managers of these gardens were keenly interested in ensuring that young people actively participated. One such manager, ‘Jerry,’ explained that the potential for financial opportunity that gardening provides is an impetus for teens to get involved. He reported that he hopes to empower the youth in his program so that they are motivated to become agricultural entrepreneurs.

Garden Managers’ Leadership Styles Were Either Collaborative or Directive

Garden managers described their leadership style in a way that was consistent with either collaborative or directive approaches. Those who took a *collaborative* approach emphasized their attention to community members’ needs and desires. These leaders tended to be flexible and incorporate volunteer suggestions, allowing those opinions to shape how the garden was operated throughout the growing season. Those managers who tended to lead in a *directive* way, on the other hand, utilized language that centered their own vision for the garden.

Directive leaders tended to describe garden volunteers in terms of how much they contributed to or hindered the realization of their vision. This distinction was at least partially predicated on gender: the three male managers were best categorized as *directive* leaders, while nine of the ten female managers were *collaborative*.

These interpretive categories should be viewed as frameworks for unpacking intra-group distinctions, rather than monolithic or exclusive typographies. These categories were constructed following descriptive coding rounds incorporating parent codes like “Motivation for Gardening” and “Garden Manager Tasks.” The terms *collaborative* and *directive* might best be viewed as shorthand for the relationship between how a manager viewed their garden and what they felt they did during daily management. For example, those whose motivation for gardening was coded as “obligation to help others” tended to overlap with the task of “mediating conflict,”—a *collaborative* style—whereas a motivation of “economic opportunity” or “transactional give and take” might overlap with “telling people what to do”—a *directive* style. Not all managers fell neatly into one or the other leadership style; a few managers offered anecdotes illustrating that they embodied both styles. Below is a summary of how garden managers described their position in the garden, relative to their volunteers both young and old.

Collaborative Leaders

A common way in which managers acted as *collaborators* was through allocating produce after harvest. When individuals—seniors and/or those with disa-

bilities, in particular—were unable to help maintain the garden, collaborative managers called attention to how they still shared produce from the garden with those individuals. ‘Jeanette’ notes that the garden she managed would allow anyone to come to the garden and take food, even if they did not participate.

You know I do have people come in and, um, and just wanna come pick something, and um, and I’ve had people walk in, and I don’t really know them, that’s all they came for. They’ll ask, “Do you have anything in the garden that I can pick and have?” And I let them out there.

This sharing of garden produce was presented as a wholly charitable act, with several managers expressing this altruistic sense of giving back to others as a significant, satisfying reason why they chose to manage the garden in the first place.

A few managers, such as Jasmine, recalled how they sought to empower younger people to take garden produce home to older relatives, thereby enhancing the impact of the garden while allowing the young people to position themselves as helpers and providers:

So, what I always tell them you always have someone younger working, someone in your house that’s younger than you...I always say when you come to the garden, **don’t just come for yourself**. When you come out here, first of all I want you to go by the senior citizens, put your name down, whatever you come to get it I want you to take half back out there, and then once it gets out there it’ll get distributed.

Like Jeanette, Jasmine’s insistence that young people “don’t just come for yourself” suggests an embedded sense of altruism and a collective effort in her leadership style. Under her guidance, those who volunteer, especially those who are young and capable, should be seeking more than their own satiation. Beyond the tangible (re)distribution of fruits and vegetables, Jeanette’s instructions serve to bring generations together to share in the benefits of the garden.

Several of the managers viewed their role as more than just coordinating the logistics of the garden. These managers emphasized that their position empowered them to build trust and bring garden volunteers together, building social cohesion and connection. ‘Tasha’ saw her role as a connector, and shared that while she felt the garden’s output of produce was important, it was also significant that she could build relationships between people:

I’ve thought about the statement, ‘You have an uncanny ability to attract people.’ I don’t think it’s my ability to attract people. I think it’s my ability to want to identify folk. I have a sense that I know who has similarities, and I can connect people...And then that person is connected. And I have this through connection, I can connect. I like the connection. And... and showing people their own strength.

Unlike many of the other garden managers, Tasha expressed fewer issues attracting and retaining volunteers. Her words suggest that it is incumbent on a leader to not simply coordinate participants as a requirement, but to actively *want* to encourage volunteers and to show them “their own strength.”

‘Jane’ is another collaborator who, as both the pastor of a church and the manager of the congregation’s on-site garden, expressed that she felt the garden served a much larger purpose than its agricultural yield. She claimed that the garden had “given us a foundation from which we can now identify other needs in the community and see ourselves as agents.” Unlike several managers who viewed recruiting youth as a means to accomplish more garden work, Jane saw the role of youth as central to their own empowerment, remarking that,

as the young people move away and...pursue other things it’s a skill set they’ll take with them. An experience that they’ll take with them that they could potentially utilize wherever they are in the future.

Throughout her interview, Jane discussed how her personal vision for the garden had not been

wholly fulfilled—that the garden was not as productive and aesthetically attractive as she would like. Yet, while she recognized a difference between her personal expectations for the garden and its reality, she frequently returned to its benefits for the youth who participate. In providing a physical space at the church, she felt that she had facilitated a sense of community that extended beyond the congregation. That Jane was able to separate *her* goal from these other favorable outcomes is a hallmark of a collaborative leadership style.

Directive Leaders

A few managers mentioned that their role sometimes required them to be stern or strict when participants did not subscribe to assumed group norms, or when overzealous volunteers imposed their own ideas about how the garden should operate. While some imposition of collective rules may be expected for all managers, a key attribute of *directive* leaders was this lack of flexibility when garden participants suggested changes throughout the season. The managers who presented stories of scolding participants tended to believe that their personal investment in the garden granted them the power to unilaterally approve or deny such suggestions. ‘Shawn’ remarked, “We have some that come out there trying to take over, but I just tell ‘em, you know, this is my pride, this is my joy. So, if you wanna help? Get in line.” He recognized, however, that the role of a volunteer coordinator comes with a set of challenges. Shawn noted that because participants are not paid, there are limits to how much clout his word holds:

So, if you don’t wanna do it you don’t have to!
You’re not getting paid to do this! You don’t
have to listen to me, but you not gonna come
out here and tell me what I’m doing wrong!
Let me find out for myself what I’m doing
wrong. So, if it’s wrong, it’s wrong!

Throughout his interview, Shawn returned to his own education, how the individuals around him—specifically those older than him—had taught *him*. His words frequently centered on what he has gained from the garden, rather than what the participants had gained. Because he views the

garden as his “pride” and “joy,” those who resisted his vision of the garden were seen as unwelcome.

Shawn was not the only manager whose self-interest and engagement in the garden directly affected his management style. When asked if she had enough volunteers, another manager, ‘Anna’ replied:

I do, cause one I like to be down there by myself. Which is probably selfish, but I like it that way... I’m real selfish when it comes to that garden, overprotective of it. So, yeah. We can use more, yes.

Anna, then, held two conflicting opinions: she wanted to have direct control of the garden, but also knew that the garden could use more support. This is made manifest in her approach to leadership:

...you don’t wanna put yourself too far out there but it works out pretty well once you give them how you want the place to be, once you get them the information about what to do, what not to do then sit back. But I don’t like to sit back, I like to help, so I stand side by side.

While her words initially suggest a sentiment of collaboration and egalitarianism, a closer reading reveals that her leadership style was predicated on her desire to be closely involved in the aspects of the garden she found most compelling. Anna admitted that it was “probably selfish” to center her own approach to the garden, but also recognized that it “works out pretty well” to marry this active engagement in garden operations with a directive leadership style.

The garden that Jerry manages is one of several projects operated through his youth empowerment nonprofit. Jerry’s garden functions quite differently from the others, and he did not express having difficulties recruiting participants. Jerry, however, was also very strict in how he runs and operates his garden:

Guidelines, I follow the guidelines, on the program. And through the guidelines, then there’s a, I got older people, younger people

out there. So, there's only one way, there's one way to do this thing and that's, that's the program dictates the program. The program, not me! But the program does, but I developed and designed the program, okay...I'm in, I'm in charge, that's why I'm sitting why talking to you. So, at the end of the day, if you attend my garden, I'm a give you your instructions for the day.

Jerry clearly defined the goals of his garden, with a vision that was decisively focused on the economic opportunity that gardening and small-scale farming offers. Emphasizing that he is "in charge" and that "there's only one way to do this thing," Jerry's reliance on the "guidelines" aligns with his rather narrow vision of success. He has made a priori assumptions about how the garden will operate and is less willing to change during the season, or even over the course of one day. With tens of thousands of dollars of grant funding and robust agricultural yield, the garden that Jerry manages has been undoubtedly successful, complicating any singular notion of how gardens *should* be operated.

Tasha, who emphasized her role as a connector and unifier, also occasionally had to deal with conflict. In her interview, she shared an anecdote of how she responded to older women who were possessive of the garden operations:

There's about four older women, elderly women, that was very possessive when the garden first started. And I think they thought, every year 'this is mine.' And uh, (I told them) 'You have to share. It's not yours.' They became very, oh gosh, they were... They had such ownership. They [said], 'Well, I'm just not gonna participate' ...I feel bad because I want them to be able to share and it's... Everybody should have an opportunity. You know? You know, I every year, I go knock on their doors, 'Please come back.' But what I do is, I give them vegetables still out of the garden.

In her story, Tasha was firm in her words but, consistent with her self-description as one who likes connection, she was firm in the spirit of unify-

ing the garden. She recognized that the women had a strong sense of ownership of the garden's operations but wanted to extend this feeling of belonging and ownership to everyone. Tasha explained that she gave out produce as a peace offering so that the older women could benefit from the garden's output, but she also strove to express unity by helping the older women feel a shared sense of contribution. It might be most useful, then, to view this example as showing how a manager demonstrating a *collaborative* leadership style does not indicate that the manager is passive in the face of conflict.

Garden Participants Emphasized a Need for Managers' Organization and Openness to Ideas

In focus group discussions, garden volunteers cited the benefits of having a leader who was organized and "on top of things". Many acknowledged that they would defer to the manager when it came to day-to-day operations if they felt as though the leader was inclusive of others' opinions and contributions. For example, one volunteer expressed that an effective leader would recruit individuals even if they may not be physically capable of gardening:

I think that that they need to come up with different ideas that the person is heading it that you can give to them and then that way we can go out and kinda press it out throughout the community and find out what would make people want to come... You may can't bend over, you may can't weed, you may can't do certain things but it to me it would be more fulfilling if I know my contribution may be small but the benefits at the end are worth it.

This perspective aligns closely with the perspective revealed in the manager interviews, demonstrating that participants do not necessarily see garden yield as the sole marker of a successful garden. These volunteers believe that the garden manager should "find out what would make people want to come," to the garden, suggesting that community opinions should hold a great amount of clout from the beginning. Participants were inspired by leaders who cared for the overall well-being of the community: "I was mostly impressed

by the [manager] and her community spirit and...her desire to just try to do something that's gonna benefit everybody."

One participant suggested that the mere presence of a community-oriented space enabled individuals from different backgrounds to join together:

There's a lot of times that adults and teenagers or children don't get together to learn certain things, certain things that elders can teach younger children. Yes, it is about growing vegetables that is healthier for us that don't have pesticides and things like that, but I feel like it can also be an effort to learn different things.

The speaker recognized that individuals are often limited in their contact with those of other generations, and that the garden is a site of knowledge transfer and more importantly a site of possible intergenerational friendship.

Several participants described how their garden's manager solicited opinions and feedback, but they had little confidence that these were truly taken into consideration. When asked if she felt that she had "a say in the way that the garden works?" one participant remarked "Oh, yeah, I mean, I can say anything I want, not that it'll happen." A volunteer in another garden was unsure if she had a platform in any form.

Zasha [garden manager] is always fighting, and I know that perhaps she is the voice right now. And perhaps, if she says 'I am going to do that we will be with her. We will say "yes, Zasha," because she will explain [it], she will give [us] the information, and we will be there...but I can't say for sure that I have a voice or that I don't have a voice.

Of note, both of these participants worked alongside managers who had described their leadership style as *collaborative*, indicating a disconnect.

Some participants expressed frustration regarding their leader being disorganized or felt the vision of the garden was "piecemeal." In one garden where there was very little yield, a participant claimed there was a need for an explicit "hierar-

chy," suggesting that there is a role for directive leadership in some community gardens. A long-time gardener expressed that a lack of communication and centralized decision-making impeded her ability to contribute meaningfully or share her knowledge with others. Other unsuccessful gardens were led by leaders who did not involve community members in the planning process, or who waited until it was too late in the growing season to try to recruit participants.

I think that's one of the things that we have to really come to who's doing the planning. I don't know how some of the people have their gardens but we were just approached kinda like okay it's time to plan in May we were approached to do a garden in April so we didn't have time to do a lot of planning.

To this end, participants wanted their opinions to be incorporated early and often and grew frustrated when they perceived calls for collaboration as empty rhetoric.

These participants were critical of their leaders when they felt like their contributions were not valued or when they felt like their leaders did not find ways to incorporate all volunteers.

Discussion

Community gardens are an effective intervention that can influence a broad range of factors related to participant health and well-being, such as the adoption of healthy behaviors including fruit and vegetable consumption (Boeing et al., 2012; McCormack et al., 2010; Patel, 1991; Quested, Thogersen-Ntoumani, Uren, Hardcastle, & Ryan, 2018). Community gardens can also have a positive impact on upstream determinants of health, such as community cohesion (Bateman et al., 2017; Firth, Maye, & Pearson, 2011), mental health (Adevi & Lieberg, 2012; Whatley, Fortune, & Williams, 2015), social capital, and civic engagement (Glover et al., 2005; Teig et al., 2009).

While community gardens are effective interventions for health promotion, they can be difficult to sustain, and the factors influencing long-term success have received little attention in published studies. Examining the influence of leadership

characteristics of garden managers on how a community garden is experienced by participants has the potential to help elucidate one important factor in community garden sustainability.

The results of this qualitative analysis offer insights into how garden managers' goals and the perspectives of their volunteer base may shape garden operations. In the interviews, directive managers frequently described age as a qualifying attribute of volunteers and often viewed garden harvest yield as a primary, if not exclusive goal. Volunteers who were older or who had disabilities were often perceived by managers as the recipients of produce, with younger more able-bodied participants viewed as the primary source of labor. Collaborative managers who held a more expansive view of their role as leaders—vocalizing benefits of community cohesion and connectedness—tended to see intergenerational collaboration as an important goal in and of itself and emphasized the value of older volunteers' horticultural knowledge. To these managers, young people were viewed as more than just able-bodied workers. They were also seen as foundational assets to form connections within the garden and as a bridge to the surrounding community.

Leadership styles fell roughly along gender lines, which is in line with previous research on gender roles within gardens. Parry, Glover, and Shinenew (2006) have demonstrated that women are usually more comfortable thinking of themselves as co-leaders with others, seeking cooperative, team-oriented approaches to management. Their study was limited to interviews with female gardeners, and noted the perception that men were more work-oriented, and “harder to work with as far as flexibility.” Interviews with male managers during the present study are consistent with those findings; respondents like Jerry and John offered garden visions predicated on the production of a large amount of produce, and a volunteer base that works hard. In general, these male managers emphasized an authoritative approach to leadership and expressed less emphasis on relationship-building than their female counterparts.

Short (2012) also explored community gardens operated by universities, though these community gardens were on or near universities, unlike in our

study. Short identified a “shared leadership” approach as a characteristic of successful community gardens, which is similar to the “collaborative leader” approach we identified. Our research builds on Short's work by expanding beyond university settings, as most of the gardens in this study were in rural areas. Since gardens in rural settings may not benefit from a consistent supply of volunteer labor from students and faculty as described by Short, leadership styles may hold a more important role in the sustainability of gardens and the maintenance of adequate “staffing” by volunteers.

Given that community gardens provide a diverse set of potential benefits to participants, it is necessary to consider how leaders can be best supported, both internally and by external partners, to ensure the sustainability and long-term success of garden projects. One method is for universities to support garden initiatives during implementation by providing funding and technical support, facilitating meetings, or encouraging leaders to network with other advisory groups, community-based organizations, or food policy councils (Firth et al., 2011; Haynes-Maslow et al., 2018). When external stakeholders provide support, they must recognize the autonomy of partner organizations to determine their own goals and structures, and not impose any singular model of best practices.

Our findings might also inform future studies on conflict mediation or intergenerational communication; community gardens are an important place to bring together diverse people from a community, but this convergence also means managing different opinions and perspectives. There is a widely stated need for more volunteer labor, especially in gardens in senior living communities, and implementing agencies should consider how to facilitate connections between different volunteer sources. Some garden managers can benefit from skills training to help augment their natural leadership skills and styles, but trainings should be conducted in a way that supports the community's goals rather than impeding upon members' self-determinism.

Limitations

This study has limitations. Participants were aware that staff members from HPDP were conducting


the interviews, and as such, there may have been social desirability bias; participants may have over-emphasized the successes of the garden or shared more of what they thought the interviewers wanted to hear. Interview and focus group participants may have been reluctant to share anecdotes of personality clashes, and thus this would not be captured in our analysis. Managers may have felt hesitant to report challenges in their gardens because they knew that the interviewers were from the institution where they receive their funding. Research staff tried to address this issue up front by emphasizing anonymity in responses and the desire for critical feedback. Although the HPDP staff member who manages the community garden project and regularly interfaces with garden participants did not participate in data collection, managers may still have restrained their answers. Participants did, however, share several concerns and criticisms about the garden, suggesting that they felt comfortable being honest with research staff.

As an outsider to HPDP, as well as to the individual gardens and the communities in which they were situated, the position of JG presented both challenges and opportunities. The distance from the data prevented JG from contextualizing the attributes and perspectives of interviewees outside of what exists in their transcribed speech. The goal and structure of data collection was within a community-driven research framework; however, this particular analysis was unable to follow those methodological principles as closely given the fact that the analyses were performed by an outside researcher without room for community feedback and input. This separation, however, also affords an ability to critically assess the university's role in facilitating and supporting communities. JG collaborated with co-authors who provided relevant history and current status of HPDP's work with the community gardens, which further grounded him in this analysis.

Conclusion

This qualitative study explored the perspectives of community-based managers of SNAP-Ed-funded

community garden projects regarding volunteer engagement and leadership style. This study identified two main leadership styles, collaborative and directive leadership, which were often elastic and could be exhibited by the same manager at different times. The central themes explored in this paper—age and leadership—were identified during an iterative process of memoing, coding, and writing, but were not included in the initial research aims or interview guides prior to data collection. Future studies might consider how these themes, as well as other findings from the data surrounding community cohesion and feelings of ownership in the planning process, could be explicitly incorporated into evaluation planning for garden programs to better expand upon these preliminary findings. Furthermore, future research should examine how leadership styles impact traditional measures of garden success such as nutrition behaviors, garden yield, and volunteer engagement.

Haynes-Maslow et al. (2018) suggest that a best practice for ensuring long-term sustainability of SNAP-Ed PSE interventions is to frequently communicate “short-term wins” with the community. By visually demonstrating the influence of such interventions on behavioral and systems change, technical assistance agencies help to generate community buy-in so that benefits do not exist in a silo, solely benefiting those who choose to participate regularly in the garden. Rather than only measuring success by pounds of food grown, garden managers should be advised to frequently report the “short-term wins” of community cohesion and unity that they can achieve through collaborating with their volunteers in the garden. 

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A systems analysis and conceptual system dynamics model of the livestock-derived food system in South Africa: A tool for policy guidance

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Abstract

Global food production systems are currently under scrutiny, in particular the health, nutrition, and environmental impacts of livestock-derived food (LDF). Despite South Africa's recent socio-economic transformation and increased per-capita LDF consumption, the triple burden of malnutri-

tion persists. Policy responses to such complex problems often fail because of linear thinking with short-term goals. However, a systems approach helps identify root causes, feedback mechanisms, potential unintended consequences, and opportunities for integrated, durable solutions. Participation in the systems-thinking process improves

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stakeholder understanding and buy-in. Our participatory workshop facilitated the development of a systems map for South African LDF, identifying key system elements, linkages, and nexus points. The latter included climate change, land access and management, livestock management and productivity, farming systems, food safety, policy articulation, agricultural knowledge, and income. Based on these findings, and an overview of related literature, we produced a conceptual system dynamics model of the LDF system. We identified key variables and causal relationships, vicious and virtuous loops, system archetypes, conceptual stock and flows, and links to Sustainable Development Goals. The LDF system is complex and dynamic, with a dominance of commercial enterprises across agriculture and food retail, presenting barriers for small and medium-scale individuals. Other key elements relate to population growth and urbanization, land access, deregulation of international trade, climate change vulnerability, feed production limitations, and food safety. Our work provides a unique reference for policymakers, identifying the need for deep structural change, highlighting the possible unintended consequences, and thereby mitigating the risk of system destabilization.

Keywords

Food Systems, Systems Thinking, System Dynamics, Livestock-Derived Food, Animal Source Food, South Africa

Note on Implications of COVID-19

This research was conducted prior to the COVID-19 pandemic, which has further highlighted inequalities in agriculture and food systems, both globally and nationally.¹

Introduction

Food systems are increasingly disconnected from delivering healthy and nutritious food in a sustainable manner for all (Alders, Ratanawongprasat, Schönfeldt, & Stellmach, 2018). The provision of nutritious food is challenged by a rising population and the planetary boundaries for sustainable production (Conijn, Bindraban, Schröder, &

Jongschaap, 2018). However, current global food production is considered sufficient to feed even the predicted population of 2050, but it falls short due to poverty, distribution, and waste (Berners-Lee, Kennelly, Watson, & Hewitt, 2018; FAO, 2018a; Holt-Giménez, Shattuck, Altieri, Herren, & Gliessman, 2012). As a result, global food production has failed to address the triple burden of malnutrition and diet-related noncommunicable diseases (NCD) (Gómez et al., 2013; Swinburn et al., 2019; Willett et al., 2019). In addition, the current global burden of food-borne diseases (FBD) is comparable with the major infectious diseases of HIV/AIDS, malaria, and tuberculosis and is linked closely with poverty (Havelaar et al., 2015).

Livestock-derived food (LDF) is a major contributor to climate change, habitat destruction, and biodiversity loss (Godfray et al., 2018; IPCC, 2019). The predicted trends of increased global LDF consumption are considered environmentally unsustainable (IPCC, 2019; Tilman & Clark, 2014). Livestock keeping, however, provides rural communities with multiple benefits and plays an important cultural role (Eisler et al., 2014; FAO, 2009, 2018b). Carefully managed livestock can be used to positively manage ecosystems and their services (Diaz et al., 2012; Feliciano, Ledo, Hillier, & Nayak, 2018; Huruba, Mlambo, Mundy, Sebata, & MacFadyen, 2018). Livestock-derived food is rich in energy, protein, and essential amino acids and micronutrients, and it plays an important role in the nutrition of children and pregnant women in low and middle-income countries (LMICs) (Grace et al., 2018; Neumann et al., 2003). However, excessive consumption, of especially red and processed meat, increases the risk for some cancers, obesity, and related NCDs (Godfray et al., 2018; Willett et al., 2019). Changes in food systems, and the associated growth of LDF consumption, are most noted in countries undergoing rapid economic transition (Ritchie & Roser, 2018; Schneider et al., 2011). Demand for LDF in LMICs often increases at a pace that outstrips the development of effective food safety governance (Grace, 2015).

South Africa has undergone significant change

¹ See <https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19>

since the end of apartheid in 1994, including a 40% population growth and improving socioeconomic status, which are key drivers for increased consumption of LDF (Schneider et al., 2011; STATS SA, 2018a). Poultry meat has shown the greatest rise of LDF consumption over the past 20 years (Directorate Statistics and Economic Analysis [DSEA], 2018). Gaps in food safety surveillance were highlighted by the 2017–2018 outbreak of listeriosis, which was linked to a low-cost, processed LDF product containing poultry meat (Salama, Embarek, Bagaria, & Fall, 2018). South Africa's plant-based food production capacity is limited by the relatively small proportion (13.5%) of agricultural land suitable for cropping, its dependency on rainfall, and the associated vulnerability to climate change (Conway et al., 2015; DSEA, 2016). Despite socioeconomic change and advances in ensuring national food security, South Africa remains one of the most unequal countries in the world (World Bank, 2011). Inequality is embedded in land access, agriculture, and food retail, and this is also reflected in the triple burden of malnutrition (National Department of Health [NDoH], Statistics South Africa [STATS SA], South African Medical Research Council [SAMRC], & ICF, 2019). While adult obesity rates are rising to over 30%, stunting in under five-year-olds (27%) remains unresolved, and micronutrient deficiencies are especially high in vulnerable groups (Kolahdooz, Spearing, & Sharma, 2013; NDoH et al., 2019; World Bank, 2011).

The Wellcome Trust funded Sustainable and Healthy Food Systems (SHEFS) program aims to provide policymakers with novel, interdisciplinary evidence to define future food system policies that deliver nutritious and healthy foods, in an environmentally sustainable, and socially equitable manner. Holistic systems thinking is advocated to better understand such complex, wicked food system challenges (Alders et al., 2018; Zhang et al., 2018). Narrowly focused agricultural and food security interventions fail to recognize unintended consequences and opportunities for synergies that are often highlighted by more integrated approaches (Ruegg et al., 2018; Ruel & Alderman, 2013). Systems thinking and system dynamics modeling identifies key elements and archetypes (and their

interconnections and feedbacks) within a system, and are useful tools in food system analysis, especially when looking for trade-offs and synergies within the “eco-agri-food system” (Zhang et al., 2018). When used in a truly transdisciplinary and participatory manner, a system dynamics model (SDM) provides stakeholders and policymakers with a more comprehensive understanding of the broader food system, builds their confidence and acceptance of the model, and allows for forecasting the outcomes of policy scenarios (Turner, Menendez, Gates, Tedeschi, & Atzori, 2016; Zhang et al., 2018). Examples include those published by Lie, Rich, & Burkart (2017) (dairy value chains), Stave (2002) (transport and air pollution), and Allender et al. (2015) (obesity).

Given its triple burden of malnutrition, ongoing socioeconomic and dietary transition, and vulnerability to climate change, South Africa is one of three countries selected by SHEFS (Govender, Pillay, Siwela, Modi, & Mabhaudhi, 2016; Ziervogel et al., 2014). This paper aims to provide a broad overview of recent dynamics within the South African LDF system and demonstrate the complexity of the system, using a systems map based on stakeholder participation. Furthermore, through a conceptual SDM, we aim to provide a tool for decision-makers, when considering food system recommendations, associated with nutrition and health, environmentally sustainable food production, food security, and equitable access.

Methods

We drew on methods described in several publications, within a broad range of disciplines, where groups of key stakeholders or community members participated in developing system maps and SDMs (Allender et al., 2015; Lie et al., 2017; Maani, 2002; Stave, 2002; Vennix, Akkermans, & Rouwette, 1996). A broad literature review was conducted for our own understanding of the South African LDF. We held a participatory workshop to map the overall system and to identify key nexus points, which were used to structure a more focused literature review. Thereafter, we created a conceptual system dynamics model based on the analysis of the results from the previous steps.

The participatory workshop, held at the Uni-

versity of KwaZulu-Natal (UKZN) in March 2018, aimed to understand better the broad structure and key elements of the South African LDF system. Twenty-nine participants (13 female, 16 male) represented various stakeholders and key informants within the LDF system. These included individuals from the national Department of Agriculture, Forestry and Fisheries (DAFF), and the Department of Agriculture and Rural Development and local municipalities within KwaZulu-Natal (KZN) province. Nongovernmental organizations (NGOs) and not-for-profit organizations, including the Institute of Natural Resources (Agricultural and Rural Livelihoods), Wise Waze Water Care, and the World Wildlife Fund (Sustainable Agriculture), represented the local farming communities in which they work. Academic staff were included from various disciplines and research centers within UKZN, including Animal Science (Livestock Production), Crop Science, Grassland Science, Conservation, Public Health, Indigenous Knowledge, and Transformative Agriculture and Food Systems. They were joined by academic research staff from the University of London's Royal Veterinary College (RVC) (Veterinary Epidemiology, Economics and Public Health) and School of Oriental and African Studies (SOAS) (School of Interdisciplinary Studies, Centre for Development, Environment and Policy).

Leading researchers within the SHEFS program opened the workshop with an introduction to SHEFS, and the concept of systems mapping. Thereafter, as a warm-up exercise and to encourage broad systems thinking, four predetermined breakout groups, representing an approximately equally diverse mix of backgrounds conducted a strengths, weakness, opportunities, and threats (SWOT) analysis of the South African livestock sector, and shared their findings for discussion and feedback during a plenary.

Then, after briefing participants on the purpose of a holistic approach to systems mapping using examples from previous research, each group was tasked with creating a systems map of the LDF system, identifying nexus points and indicating interrelational or causal loops between them. Participants were also asked to consider cross-cutting issues, such as food choice, nutritional

status, environment, biodiversity, and socioeconomic variables. A facilitator (NS) experienced in systems mapping engaged with groups, questioning clarity on interrelationships and causalities, maintaining system boundaries, and made notes on overlaps and common elements in the maps. Each map was presented during a plenary, for feedback and discussion.

After the workshop, the four maps were analyzed by a panel, which included the authors and other participants with relevant expertise within UKZN. The systems mapping facilitator then created a single, merged system map that was shared electronically with workshop participants for comment and verification. Participants were also asked (via SurveyMonkey) to identify (with motivations) their top five nexus points from the map. Responses were collated and analyzed to give a weighted ranking to each nexus point.

Using themes based on these main nexus points, a more focused literature review was conducted to provide evidence for the system elements and their interrelationships when constructing the conceptual SDM, as described later. The review covered academic journal articles and grey literature, including government reports and statistical releases, farmers associations' and NGOs' reports, and websites of local and international press agencies, United Nations agencies (including FAOSTAT), and the World Bank. These were accessed through Google searches, using multiple disaggregated terms based on the nexus point themes. Further resources were identified through snowballing from primary results, using related references and citations. Results from this review were also used to identify the main livestock species used to produce the most consumed LDF. The dynamics of each species' production system and outputs were researched, as were the import and export dynamics for the associated LDF product. The most recent data from FAOSTAT, national statistics reports, and review articles were collated and presented in tables, graphs, and/or maps. Quantec EasyData (www.quantec.co.za), a data resource for South African economic data, supplied import and export data on request, which the authors analyzed and presented in graphs. During this review, several terms were identified in

the literature that were used (often inconsistently) to describe the different types of livestock farmers and farms. An overview of these terms and description was therefore included in our review, for clarification (Box 1).

Using logical reasoning and professional judgment, the authors created a conceptual SDM of the South African LDF system, based on a thorough, iterative, and collaborative systemic analysis of the workshop results and literature review. We identified interrelationships, feedback loops, balancing and reinforcing causal loops,²

conceptual stocks and flows, underlying structural issues, including system archetypes,³ and links to the Sustainable Development Goals (SDGs) (United Nations, 2015). Finally, key gaps and challenges pertaining to the sustainability of the South African LDF system, and its nutritional and related health outcomes, were identified.

Ethics approval for the study was gained from the UKZN Human and Social Sciences Research Ethics Committee (HSS/0235/018D) and the RVC Social Science Ethical Review Board (URN SR2018-1624).

Box 1. South African Livestock Farmer Typology

Before 1994 and within the early post-apartheid transformation period, two terms are commonly used.

- **Commercial:** Business-orientated farms of large, medium or small scale, privately owned by White farmers, often practicing a high level of formal market engagement (Kirsten & van Zyl, 1998).
- **Communal:** Black subsistence or smallholder farmers residing in “homelands” (separate development territories), mostly engaged in local informal markets, if any (Meissner, Scholtz, & Palmer, 2014). “Communal” traditionally refers to a system of livestock management and land tenure in which privately owned livestock graze together with other herds on communally owned land.

In more recent literature, several additional terms are used (with some overlap):

- **Subsistence farmers or household producers:** Those with the lowest productivity, producing food primarily to support their household consumption needs (Tihanyi & Robinson, 2011).
- **Smallholders:** Farmers of higher productivity than subsistence, but still primarily for their own consumption, using more labor-intensive traditional methods, and perhaps marketing any excess production (Pienaar & Traub, 2015).
- **Small-scale farmers:** This term refers to *both subsistence and smallholders* and replaces the term communal, above (Aliber & Hall, 2012). Communal is still sometimes used, when referring to the communal management practice of small-scale livestock farmers (Mahlobo, 2016).
- **Commercial smallholders or market-orientated smallholders:** Smallholder farmers who produce for both home consumption and more regular income (Aliber & Hall, 2012; von Loeper, Musango, Brent, & Drimie, 2016).
- **Small-scale commercial (emerging) farmers:** Farmers who are transitioning from commercial smallholders to medium and large-scale commercial farming (Aliber & Hall, 2012; von Loeper et al., 2016).
- **Commercial farmers:** Both **medium-scale** (annual turnover US\$360,000 to US\$1.44 million)¹ and **large-scale** (annual turnover greater than US\$1.44 million)¹ (DAFF, 2018b), privately owned farms (no longer exclusively White-owned as in commercial, above), business-orientated farms, often with high inputs and investment, practicing a high level of formal market engagement (Tihanyi & Robinson, 2011).
- **Noncommercial:** Refers to all others except medium and large-scale commercial farmers (DAFF, 2017a; RMRD, 2016).

¹ Conversion rate 1 ZAR=US\$0.072 on November 27, 2018, per <https://www.xe.com>

² A reinforcing loop is one where an increase in a variable, when traced around the loop, leads to a further increase in itself, while a balancing loop is one where an increase in a variable leads to a counterbalancing decrease in itself.

³ System archetypes classify generic patterns of behavior over time (in particular counterintuitive behaviors), and demonstrate intended and unintended reactions and delayed reactions, and are a powerful tool to understand and communicate the underlying system's dynamic behaviour.

Results

1. System Mapping and Nexus Point Ranking

The workshop's merged systems map is presented in Figure 1. The participants' post-workshop analysis of the merged map, to identify and rank key nexus points, yielded the following results. In a highest-to-lowest, weighted-ranking analysis, the first 10 points were: (i) land access and (i) climate change (joint first place); (iii) small-scale vs. commercial farming; (iv) livestock management; (v) livestock productivity; (vi) food preservation/safety; (vii) policy articulation; (viii) agricultural education; and (ix) income, and (ix) land management (joint ninth place).

2. Literature Review

The review focussed on the following six themes developed from the workshop participants' nexus point ranking.

2.1. Human population statistics

In July 2018, South Africa's population was estimated at 57.5 million, a rise of 17% over the previous 10 years (STATS SA, 2018a). Approximately 30% of the national population is aged 15 years or less, while 8.5% are 60 or older. Life expectancy is 61 years for men and 67 years for women, while the infant mortality rate is 3.6%. Overall HIV prevalence estimates are 13.1% of the total population and 19% of the 15-49-year-old category (STATS SA, 2018a).

Despite government-funded social grants and Black Economic Empowerment (BEE) policies, South Africa is one of the most unequal countries in the world: 10% of the population holds 70% of the wealth, while 60% hold only 6% of the wealth (World Bank, 2018). The Black middle class has reportedly grown from 1.7 to 6 million since 1995, yet half the population lives in poverty and unemployment is approximately 28% (City Press, 2018a; Labadarios et al., 2011; World Bank, 2018).

2.2 Consumption dynamics of LDF

Actual LDF consumption data are not readily available, but various proxies are used, including household expenditure, and national production figures per capita. Due to extreme wealth polarity, national average consumption estimates do not represent the extremes, which are likely to mirror the tenfold difference between low-income and high-income countries (Meissner et al., 2014; Ritchie & Roser, 2018). A review of South African dietary surveys reported that red meat was unaffordable for most low-income households (McHiza et al., 2015).

The percentage of national expenditure on LDF has increased from approximately 40% in 2005 to 48% in 2015, with 5% attributed to meat and 3% to milk, milk products, and eggs (DAFF, 2018a; DSEA, 2016) (Table 1).

Average consumption per capita estimates (Table 2) show that red and white (poultry) meat

Table 1. Private Expenditure on Food by Main Food Categories, 2005, 2010, 2015, and 2017/18

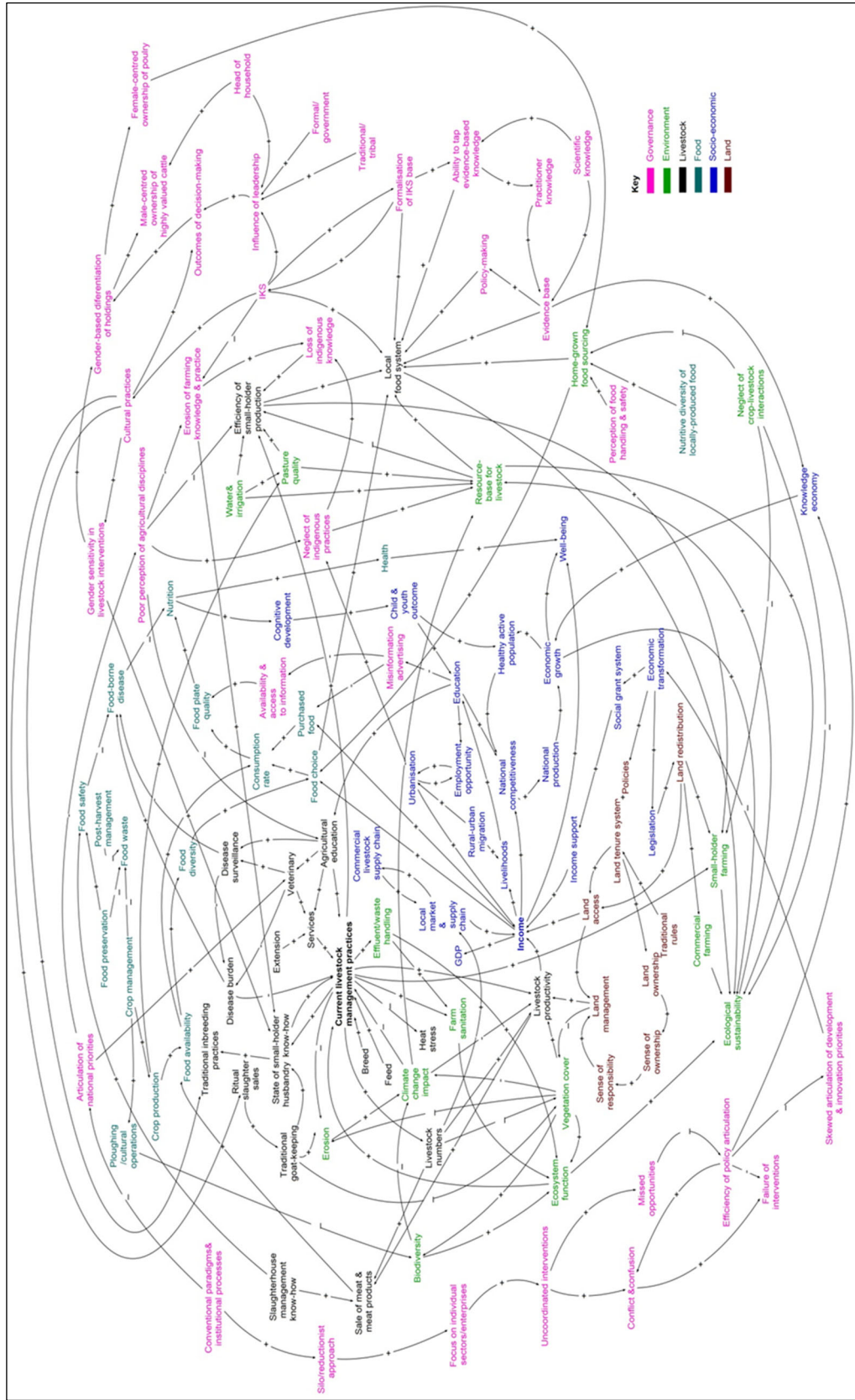
Main food categories ^a	Expenditure on food consumption in billion South African rand (% of total food)			
	2005 ^b	2010 ^b	2015 ^b	12 months prior to June 30, 2018 ^c
Meat (red and white)	56.4 (30%)	121.6 (34%)	186 (35%)	225 (35%)
Milk, milk products, eggs	19.6 (10%)	42.2 (12%)	68.3 (13%)	83 (13%)
Bread and grains	54.5 (28%)	92.9 (26%)	128.9 (24%)	152 (24%)
Sugar	3.8 (2%)	5.5 (2%)	6.4 (1%)	7.9 (1%)
Fruit and vegetables (including potatoes)	28.0 (15%)	50.5 (14%)	71.1 (13%)	87 (14%)
Oils and fats	4.5 (2%)	7.3 (2%)	12.0 (2%)	12.8 (2%)
All Foods	189.3	362.8	536.0	644

^a Categories as per Directorate of Statistics and Economic Analysis (DSEA) reports.

^b Data source: DSEA, 2016.

^c Latest available figures from Department of Agriculture, Forestry and Fisheries (DAFF), 2018a.

Interrelational connections between elements are shown as causal loops. The elements are categorized and color-coded as relating to governance, environment, livestock, food, socioeconomic, and land.



consumption increased by 39% between 1985 and 2015, most occurring in the last 20 years (DSEA, 2016). Beef consumption dropped from 48.5 lb (22 kg) in 1985 to 33.5 lbs (15.2 kg) in 1995, but has subsequently risen to 42 lbs (19 kg) in 2015. By contrast, poultry has seen a 250% increase from 34.6 lbs (15.7 kg) in 1985 to 87.3 lbs (39.6 kg) in 2015 (DSEA, 2016). Consumption of fresh cow's milk in 2015 was 83.7 lbs (38 kg), with little change since 1985. Pork consumption, although relatively low, has increased by 40% from 1985 to 10 lbs (4.6 kg) in 2015. Similarly, mutton consumption is low, but over the same period (1985–2015) has increased by 40% to 8 lbs (3.6 kg) in 2015 (DSEA, 2016). From 1985 to 2015, consumption of hen eggs increased by 83% to 19.4 lbs (8.8 kg).

Diets are strongly affected by the local food environment (Claasen, van der Hoeven, & Covic, 2016). During apartheid, supermarkets became established in urban locations, focussing on higher-income White consumers, but with time they extended their reach into rural areas (Stroebe & van Schalkwyk, 2012). Four main supermarket groups (Shoprite/Checkers, Pick 'n Pay, Spar, and Woolworths), with close links to commercial farmers, control over 75% of food retailed (Heijden & Vink, 2013; Tihanyi & Robinson, 2011). The informal food retail sector consists of independent small-scale enterprises, such as cafes, street vendors, hawkers and “spaza shops” (small, home-managed shop attached to a home or on street

frontage), with most procuring their merchandise from larger wholesalers or supermarkets (Stroebe & van Schalkwyk, 2012). South Africans, as individuals, are buying more and producing less of the food they consume (Pereira, 2014).

2.3 Agriculture and the Livestock Sector

South Africa has a diverse range of climate, soils, and ecosystems. The total land surface area is 302.2 million acres (122.3 million hectares), of which 247 million acres (100 million ha) are considered agricultural (arable and grazing) (Red Meat Research and Development [RMRD], 2016). Of the total agricultural land, 84.4% is suitable for grazing only, 13.5% for cropping, and 1.2% for commercial forestry (DEA, 2016; DSEA, 2016). Agriculture contributed 2.5% to the country's annual gross domestic product (GDP) (DSEA, 2016). Within agriculture, the single largest contributor by value is poultry (16.5%), followed by cattle and calves (13.5%) and maize (9.2%) (DAFF, 2018a). Of the national export value, agriculture contributes approximately 8% (DSEA, 2016).

In the literature, several terms are used for different types of livestock farmers and farms, and they vary depending on the source and time period of publication. There are little consistency and no formally agreed-upon definitions, even in government reports. Refer to Box 1 for a brief overview of terms and explanation.

South Africa's agricultural sector is still under-

Table 2. South African per Capita Consumption Dynamics for Livestock-Derived Food Groups, Showing Five-Year Interval Trends

	Per capita consumption in kg/year (5-year intervals)						
	1985	1990	1995	2000	2005	2010	2015
Beef	21.6	19.3	15.2	15.6	15.5	17.8	19.0
Mutton (includes lamb and goat)	7.3	5.3	3.1	3.8	3.6	3.5	3.6
Pork	3.3	3.6	3.2	3.0	3.9	4.4	4.6
Red meat subtotal	32.3	28.2	21.5	22.4	23.0	25.7	27.2
White meat (poultry)	15.7	17.5	17.1	21.5	31.2	38.4	39.6
Red and white meat total	48	45.7	38.6	43.9	54.2	64.1	66.8
Eggs	4.8	5.9	6.9	7.1	7.6	8.6	8.8
Butter	0.5	0.5	0.4	0.2	0.3	-	-
Cheese	0.9	1.2	1.0	0.9	0.8	-	-
Fresh milk	38.6	31.9	35.4	29.4	39.1	37.4	38.6

Data source: DSEA, 2016.

going post-apartheid transformation. Before 1994, agricultural and related land policies supported White commercial farmers, estimated to number 60,000 and owning 86% of agricultural land (Boudreaux, 2010). By contrast, an estimated 3.4 to 4.8 million Black communal farmers resided in homelands (designated areas for Black settlement and land ownership) (Feynes & Meyer, 2003). Homelands contained less fertile and marginal land, were overcrowded, and lacked infrastructure (Tihanyi & Robinson, 2011). Landholdings were generally inadequate to support a household's needs, and communal lands were shared, under allocation from traditional leadership, for grazing individually owned livestock (Feynes & Meyer, 2003).

Despite the post-1994 government's vision for "a united and transformed" agricultural sector (DAFF, 2015, p. 2), the sector remains racially polarised and dualistic. Most Black farmers have limited access to predominantly state-owned or tribally controlled lands (Hornby, Nel, Chademana, & Khanyile, 2018). Commercial farming is characterized by large-scale systems, is strongly connected to global markets, and requires capital, sophisticated knowledge, equipment, standards, and practices (Hall, 2004). Between 1993 and 2007, commercial farm unit numbers dropped by 31% (DSEA, 2016), mostly through the aggregation of smaller cattle farms that was driven by declining profitability and environmental factors such as drought (Goldblatt, 2015).

Estimates of noncommercial farmer numbers, from around 1998/2000, vary from 2 to 3 million household farmers and approximately 240,000 commercially oriented smallholders (Aliber & Hart, 2009). The 2016 national household survey stated that less than one-fifth of households was involved in agricultural production; 93% were limited to "backyard" production (STATS SA, 2017). Reasons for production were for diet supplementation (77%), main food source (8%), additional income (6%), and main income (2%) (STATS SA, 2017). Because of historical commercial farming dominance, government policies have focused on the transition of commercially orientated smallholders into "emerging" commercial farmers (Meissner et al., 2014; Tihanyi & Robinson, 2011). However,

progress has been limited by dwindling agricultural investment, incoherent rural development, persistent poverty, and delayed land reforms (Adey, Kotze, & Rijkenberg, 2004). Moving from subsistence to commercial production requires a major change in mindset and comes with greater risk, which may diminish its attraction (Poole, Chitundu, & Msoni, 2013). Aliber and Hall (2012) argue against the supporting of a few emerging farmers, and rather for investing in developing a commercial orientation of small-scale farmers, and improving their access to inputs and services, and the knowledge and skills required to access the formal value chains and high-end markets (Aliber & Hall, 2012; Binswanger-Mkhize, 2014).

Implementation of the government's land reform in 1997 (to redistribute approximately 62 million acres (25 million ha) of land to those forcibly removed or discriminated against under apartheid, on the principle of "willing buyer, willing seller") has been inadequate and inefficient (Binswanger-Mkhize, 2014). In 2018, President Ramaphosa announced a "re-prioritisation" of funding in agriculture and rural areas to support Black commercial farmers' contribution to the food system (City Press, 2018b). The ruling party in government also aims to change the constitution to allow "land expropriation without compensation" to speed up land reform, while ensuring economic stability and national food security (Reuters, 2018).

Agriculture plays a key role in a wider socio-economic-ecological context. Many district towns developed off the back of local commercial farming enterprises (Meissner et al., 2014). In resource-poor households, livestock plays an important role as social and financial capital (Mahlobo, 2016; Randolph et al., 2007). Rural communities typically have strong spiritual and cultural ties to nature, embedding the environment in their social and economic societal structures (Hamann, Biggs, & Reyers, 2015). Livestock farmers are key to managing and preserving South Africa's natural rangelands (Meissner et al., 2014).

2.4 Livestock production systems and outputs

Livestock production systems in South Africa mirror the dualistic nature of the agricultural sec-

tor, with highly productive, high-input commercial production systems, often part of increasingly vertically integrated supply chains, contrasted against low-input, low-productivity small-scale production systems. This is most obvious in the poultry, dairy, and beef systems, which produce the highest quantities of LDF.

Poultry: The commercial poultry industry is comparable with global intensive systems, having high levels of supply-chain integration and productivity throughout (Louw, Davids, & Scheltema, 2017). Broiler meat production represents the highest tonnage of meat produced (1.8 million tonnes in 2016) and shows the strongest growth, with an increase in production of 89% between 2007 and 2016 (FAOSTAT, 2018). Three major vertically integrated producers (controlling their breeding, feed manufacture, slaughter, meat processing, and distribution), are responsible for 53% of total production (DAFF, 2017b). Small-scale producers mainly sell live birds, and most households keep backyard chickens (Louw et al., 2017; Malatji, Tsotetsi, van Marle-Koster, & Muchadeyi, 2016). The commercial layer industry is similar, dominated by three vertically integrated companies producing 51% of the total eggs. Given the intensive nature of both industries, they are sensitive to rising feed costs (as a result of drought and variable exchange rates) and disease outbreaks (avian influenza and salmonella) (SAPA, 2016).

Dairy: The commercial dairy industry has seen a 60% reduction in the number of farmers from 2007-2016, although national herd levels have remained stable, with increased productivity and efficiency (MilkSA, 2017). Two main feed-based production systems exist, namely irrigated pastures with winter silage supplement and daily concentrate, or a partial or total mixed ration system (Lassen, 2012). Fresh milk production was approximately 3.5 million tons in 2016, an increase of 18% over the previous decade (FAOSTAT, 2018). It is estimated that 38% of milk produced in 2016 was processed into concentrated products (cheese, butter, whey powder, and condensed milk) (MilkSA, 2017).

Beef: On both commercial and small-scale farms, beef cattle are primarily grazed extensively on natural grasslands, although 75% of formal abattoir-slaughtered cattle are finished for approximately 110 days in feedlots on cereal-based feeds (Scholtz, Van Ryssen, Meissner, & Laker, 2013). Commercial farmers own approximately 57% of the national beef herd (Meissner et al., 2014) and feed into vertically integrated supply chains (DAFF, 2017a). Noncommercial herd productivity is low due to higher mortality and lower reproductive rates (RMRD, 2016). Beef production was approximately 1.1 million tonnes in 2016, showing an increase of 34% over the previous decade (FAOSTAT, 2018).

Sheep, Goats, and Pigs: Commercial sheep farmers hold 87% of the total stock, and production relies primarily on extensive grazing in the drier and semi-arid areas (Cloete, Olivier, Sandenbergh, & Snyman, 2014). Noncommercial farmers keep sheep within mixed farming systems, with low inputs and low productivity (Mthi, Skenjana, & Fayemi, 2017). Total sheep meat production was approximately 0.18 million tonnes in 2016, showing an increase of 6% over the previous decade (FAOSTAT, 2018).

Noncommercial farmers keep the majority of goats, which play an important role in traditional rituals and customs; less than 1% enter the formal market, and most are sold informally as live animals for ritual slaughter (DAFF, 2017d; Meissner et al., 2014). Commercial farmers primarily keep meat breeds, or Angoras for mohair, or exotics for milk (DAFF, 2017d). Goat meat production was approximately 0.01 million tonnes in 2016, showing no change over the previous decade (FAOSTAT, 2018).

Commercial pig producers hold 95% of the pig population, typically in closed intensive systems with 300 or more sows (BFAP, 2014). Noncommercial producers housed pigs with varying degrees of intensification, either for home consumption (63%) or to sell to formal abattoirs (10%) (Gcumisa, Oguttu, & Masafu, 2016). Pig meat production was approximately 0.24 million tonnes in 2016, showing an increase of 31% over the previous decade (FAOSTAT, 2018).

Trends in production outputs of the main LDF products in South Africa are presented in Figure 2.

2.5 Imports and exports of LDF

Two key issues affecting international trade of LDF are: (a) the deregulation of several previously subsidized industries and the dismantling of tariff barriers (Hall, 2004), and (b) the fluctuating value of the South African rand (ZAR) against the U.S. dollar (US\$), which has peaked at US\$0.15/ZAR and troughed at US\$0.06/ZAR in the past decade. Trade liberalization has opened internal markets in both directions; however, South African farmers struggle to compete internationally since many

exporting country producers receive government subsidies (Meissner et al., 2014).

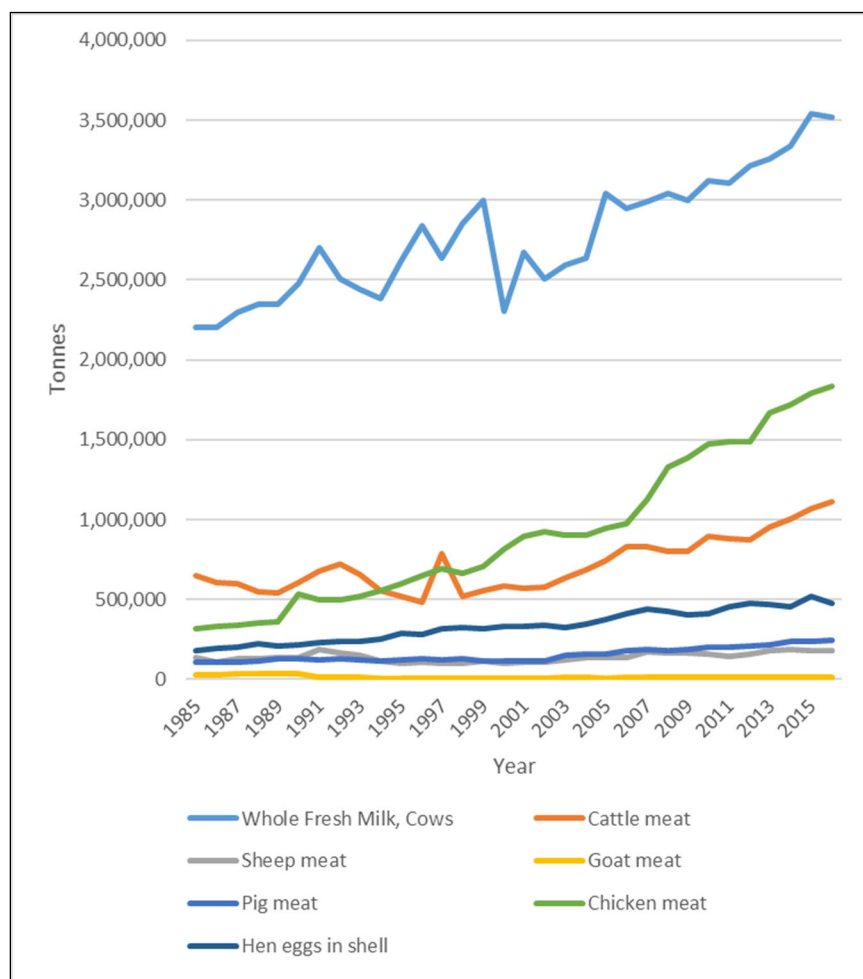
The agricultural export value for 2017 was an estimated US\$10.2 billion, and the import value was US\$6.9 billion (DSEA, 2018). Poultry meat was the only LDF listed in the top five agricultural imports by value during 2012–2017 (DSEA, 2018). Import and export data for individual LDF for 2008–2017 are presented in Figure 3.

Poultry: Poultry meat has shown a sustained rise in imports over the past decade. In 2017, 555,730 tonnes of poultry meat were imported, compared to 220,278 in 2008, which represents 30% of the total consumed (GAIN, 2017). Approximately 94%

of the poultry meat was chicken, of which 99.8% was broiler meat, and 38.6% of this was mechanically deboned meat (MDM) (SAPA, 2018). The biggest suppliers in 2017 were Brazil (62%), the U.S. (16%), and Argentina (6%) (SAPA, 2018). Apart from South Africa's avian influenza outbreak, which reduced exports by 20% to 62,222 tonnes in 2017, there has been little export variation over the past seven years, with 66% exported to Mozambique, Namibia, and Lesotho collectively (GAIN, 2017).

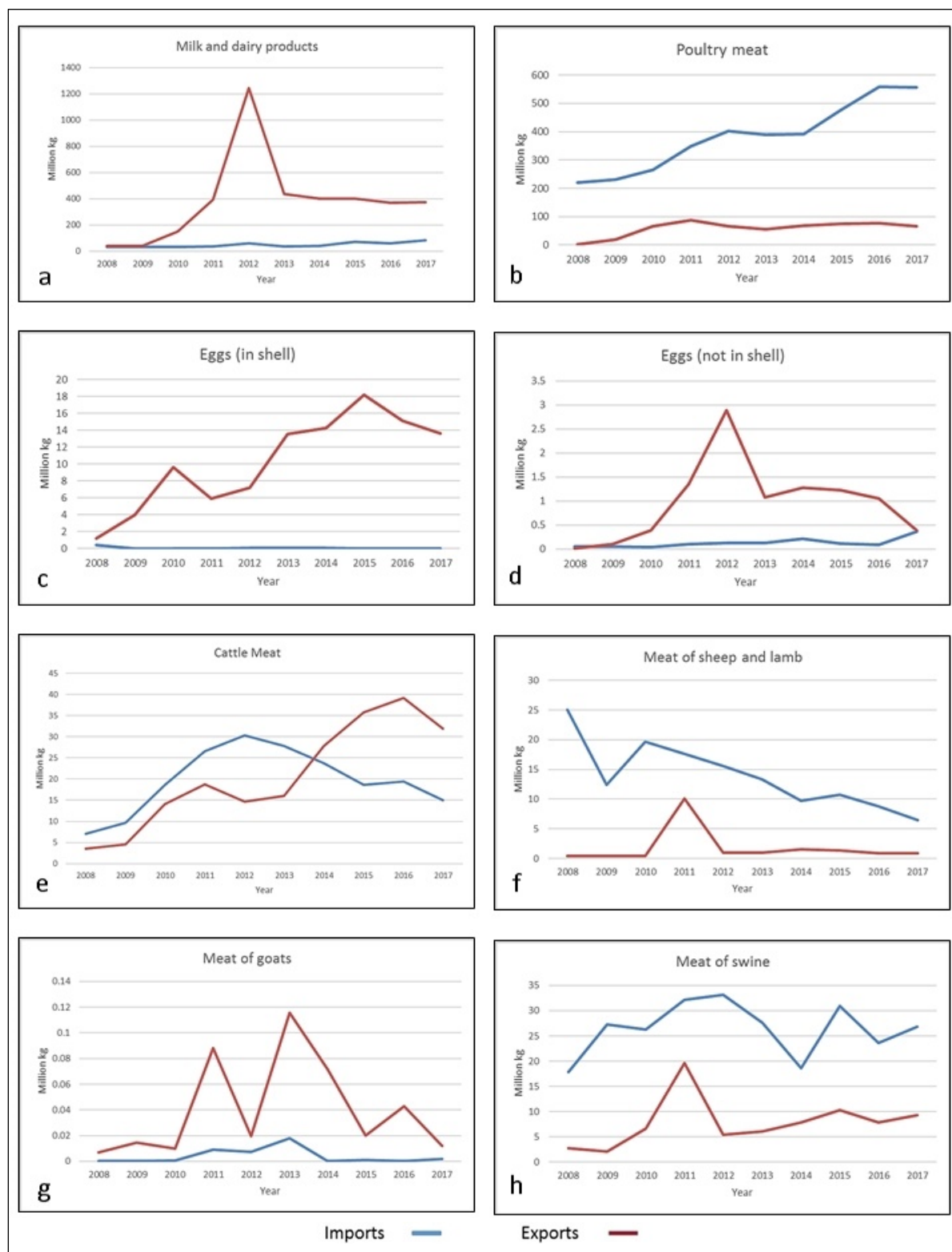
Exports of eggs in-shell in 2017 were 13,646 tonnes (includes 3,669 tonnes for hatching) compared to 1,175 tonnes in 2008, with the bulk to Mozambique (78%) while imports are negligible (SAPA, 2017b). In 2017, total exports for not in-shell eggs totaled 386,980 tonnes, while imports were similar at 361,476 tonnes, which was almost entirely in the form of dried

Figure 2. Production in Tonnes of Livestock-Derived Food Products, 1985–2015



Data source: FAOSTAT, 2018.

Figure 3. Import and Export Quantities of LDF in Million Kgs, 2008–2017



Data source: Quantec Easydata (<https://www.quantec.co.za/easydata/>).

eggs, the bulk of which were from Italy (44%), France (33%), and Denmark (20%) (SAPA, 2017b).

Dairy: The dairy industry in South Africa has remained stable in terms of production and domestic demand. It is one of the most deregulated dairy industries globally, and it struggles to compete with countries where governments subsidize production (DAFF, 2017c; MilkSA, 2017). Despite some lower-priced imports, South Africa is still a net exporter of milk and dairy products. Almost all exports go to Southern African Development Community (SADC) members (41% to Botswana in 2016); imports in 2016 were primarily from the European Union (France and Poland), in addition to New Zealand and Uruguay (DAFF, 2017c).

Beef: Exports of beef peaked at 39,132 tonnes in 2016, primarily due to South Africa regaining its status of being free of foot and mouth disease (DAFF, 2017a), and a high off-take rate due to drought-related poor grazing and high feed costs in 2015/2016 (GAIN, 2018). Exports are primarily to SADC members (predominantly Mozambique 11%), but in 2015–2016, exports to Vietnam reached 13%, and those to the United Arab Emirates, Kuwait, and Jordan collectively reached 32% (DAFF, 2017a). Imported beef in 2016 was primarily from neighboring Botswana (49%) and Namibia (33%) (DAFF, 2017a).

Mutton, Goat Meat, and Pork: Mutton imports recently declined from 25,027 tonnes in 2008 to 6,499 tonnes in 2017, due to rising international prices (DAFF, 2017e). Imports originate predominantly from Namibia (50%), Australia (37%), and New Zealand (13%), while a small export market exists with local neighbors, with 45% going to Mozambique in 2016 (DAFF, 2017e).

Although the export market for goat meat (chevron) is very small, South Africa was a net exporter, varying from 115,719 tonnes in 2013 to 11,777 tonnes in 2017. In 2016, exports were almost entirely destined for Lesotho (85%), with the remainder to the Seychelles (10%) and Zambia (5%); imports were negligible (DAFF, 2017d).

Pork imports varied between 17,795 tonnes in 2008 to 33,180 tonnes in 2012. In 2016, 63% of

total imported pork was in the form of frozen ribs and originated from Spain (37%) and Germany (31%), with the rest, in almost equal share, from Brazil, the UK, France, Belgium, and Canada (DAFF, 2017f).

2.6 Food-borne disease burden and LDF

The South African National Institute for Communicable Diseases (NICD) is responsible for public health surveillance of communicable diseases and outbreak response advice. The Centre for Enteric Diseases (CED) is a part of NICD and focuses on diarrhea and enteric fevers, including food-borne and waterborne diseases.

Although South Africa commonly experiences food-borne diseases (FBD) outbreaks, official estimates underrepresent the burden, due to poor reporting and a lack of definitive diagnosis for broad presenting symptoms, such as diarrhea (Smith, Gouws, Hoyland, Sooka, & Keddy, 2007). Statistical reports do not disaggregate data beyond, for example, “intestinal infectious diseases” (STATS SA, 2018b). An NICD review of reported FBD outbreaks during a five-year period prior to December 2017 listed an average of 65 outbreaks a year, with an average of 2,230 affected individuals and 10 deaths per year (Shonhiwa, Ntshoe, Essel, Thomas, & McCarthy, 2018). The most common enteric pathogens were *Salmonella* spp., *Clostridium perfringens*, *Bacillus cereus*, *Shigella* species, *Listeria monocytogenes*, and *Escherichia coli*.

Listeriosis is an FBD caused by *Listeria monocytogenes*, a bacterium commonly found in soil, vegetation, and water (Manganye, Desai, Daka, & Bismilla, 2018). Between January 2017 and May 2018, the largest reported listeriosis outbreak worldwide to date occurred, affecting all South African provinces, with 1,034 human cases and a 28.6% case-fatality rate (DoH, 2018; Salama et al., 2018). The source was traced to polony (a low-cost, processed meat product containing broiler MDM) that was contaminated in a processing factory and was only identified in March 2018 (Salama et al., 2018). The size and duration of this outbreak reflect the underinvestment in national food safety systems and the need for robust food safety regulations and standards and their implementation (Salama et al., 2018).

3. Conceptual Model of the South African Livestock-Derived Food System

The conceptual model (Figure 4) contains the LDF system's key variables and causal relationships, reinforcing (Rn) (either vicious/destructive or virtuous/healthy) and balancing (Bn) causal loops, feedbacks, conceptual stocks and flows, and underlying archetypes. Variables relating to nine SDGs are highlighted, namely, SDG 1: No poverty, 2: Zero hunger, 3: Good health and well-being, 8: Decent work and economic growth, 10: Reduced inequality, 11: Sustainable cities and communities, 12: Responsible consumption and production, 13: Climate action, and 15: Life on land.

Since 1994, South Africa's democratically elected government has worked toward an economic transformation for all by creating policy frameworks, including the 2013 National Development Plan 2030 (NDP, 2013). These frameworks intend to address the persistent inequalities in society (theoretically a balancing loop B1).⁴ However, a more long-term and multifaceted solution to inequalities is achievable by aligning the NDP more closely to the SDGs (Fourie, 2018), albeit with a time delay (B2). Due to gaps in governance, the creation and implementation of policies remain fragmented and aimed at short-term successes, in many cases compounding the inequalities due to unintended trade-offs (reinforcing loop R1). Furthermore, as an unintended consequence, the current fragmented policies are eroding the potential to achieving the SDGs and ultimate long-term solutions, characterized by "shifting the burden" archetype as described by Meadows (2009).

The policies relating to the analysis of the LDF system with the SHEFS aims of sustainability, health, and equitable access are categorized as Health and nutrition, Economic, Land, Agriculture, and Trade.

A fundamental outcome of transformative economic policies is the systemic structure behind the country's widening inequality in wealth, which underpins many of South Africa's problems. This can be characterized by the "success to the successful" archetype described by Meadows (2009). In these connected reinforcing loops (vicious

cycles) (R2, R3), the majority share of the economy is held by the minority, that is, middle- and high-income societal groups, which in turn favors their ability to gather a greater share. In the process, the low-income group has access to an ever-decreasing share, which, in turn, restricts its members' ability to access opportunities for more.

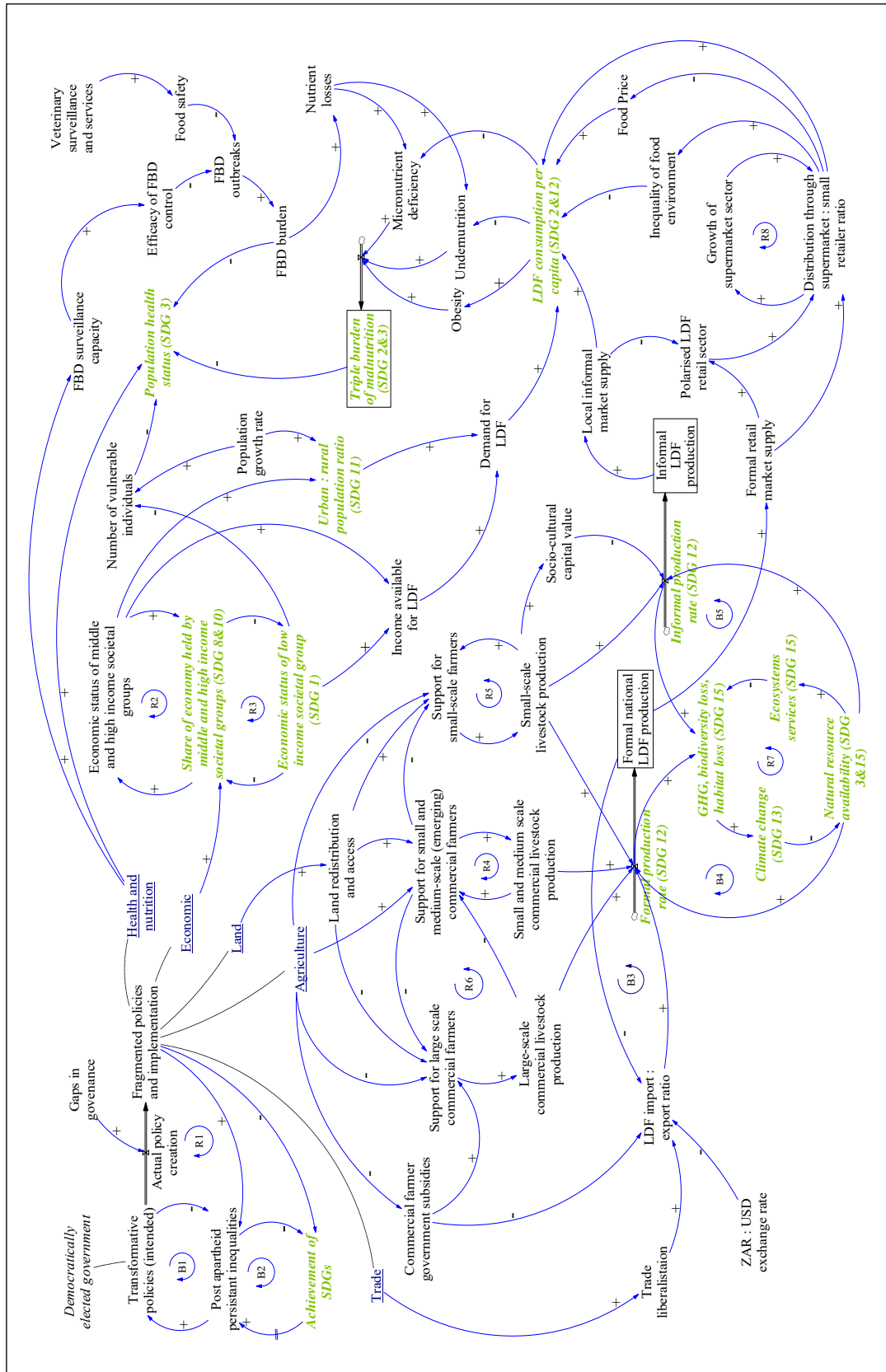
The agricultural sector is highly polarized, with a small number of large-scale and highly commercialized farmers, and a large number of small-scale (subsistence and smallholder) farmers, with some small and medium-scale commercial (emerging) farmers. Agricultural policies have focused on developing new commercial farmers while withdrawing subsidies from existing large-scale commercial farmers and giving little attention to small-scale farmers. Investment in developing small- and medium-scale commercial farmers improves their production, reinforcing their support (a potentially virtuous cycle) (R4). A lack of investment in small-scale farmers further reduces their productivity, reinforcing the idea that they are a lost cause in contributing to food production (vicious cycle) (R5). A lack of investment in large-scale commercial farmers, including the withdrawal of subsidies (and deregulation of trade), has reduced their profitability and potentially the overall production outputs from the sector. This may provide a stimulus for further support of small and medium-scale commercial farmers to fill the production deficit (R6). Through supporting a small number of commercial farmers and neglecting a large number of small-scale farmers, these policies maintain a polarized agricultural sector.

Interwoven in this are policies on land redistribution, which promise to be more proactive in the future. While this would support the development of new commercial farmers and small-scale farmers, the discussions around "land expropriation without compensation" may negatively affect established commercial farmers, reducing their ongoing business investment and their contribution to commercial production.

Commercial production contributes the most to formal LDF production, with a lesser contribution from the small-scale farmers, and is balanced

⁴ Hereafter such references pertain to labels in Figure 4.

Figure 4. Conceptual Model of the South African Livestock-Derived Food System
Dotted lines draw out five categories of policies (relevant to the LDF system and SHEFS, underlined in blue font). Variables, which relate to the Sustainable Development Goals (SDGs) are denoted in bold italic green font (see text).



by the import-export ratio (B3). The liberalization of South African trade laws and the loss of government subsidies have decreased the competitiveness of exports, increasing the import-export ratio. When the value of local currency weakens against the U.S. dollar, it reduces the affordability of imports, lowering the ratio.

Both the informal and formal production of LDF rely on natural resources, either directly as grazing or indirectly through supporting feed production. However, increased LDF production leads to increased greenhouse gas (GHG) emissions, biodiversity loss and habitat destruction, increased climate change, loss of natural resources, and reduction in ecosystem services, in a reinforcing feedback loop (R7). This, in turn, has a balancing effect of reducing the production potential of LDF (B4, B5).

The formal and informal LDF production systems each supply a formal and informal retail market, respectively. The dominance of the formal retail sector increases the distribution of food via supermarkets, rather than smaller retailers, and this, in turn, further polarizes the retail sector. The greater the proportion of food retailed through supermarkets, the greater their growth and dominance (vicious cycle) (R8). Increasing supermarket distribution may increase access and consumption, while also reducing prices due to economies of scale, but may also add to the inequality of the food environment.

Per capita LDF consumption estimates are rising due to increasing demands, driven by a growing and increasingly urbanized population, and the level of income available to spend on LDF, which is related to economic status.

The consumption of LDF directly affects obesity, stunting, and micronutrient deficiencies, all of which contribute to the triple burden of malnutrition. The latter impacts on the overall population health status, as does the burden of FBD, both directly, and indirectly through adding to the burden of malnutrition through links to stunting and micronutrient deficiencies, caused by nutrient losses. The overall health status of the population is dependent on health policies and budget and is affected by many additional factors, including the proportion of vulnerable individuals (children,

pregnant women, the elderly, and individuals with HIV/AIDS or tuberculosis [TB]), which is influenced by population growth and economic status.

Health policies are directly related to FBD surveillance capacity, and, consequently, the efficacy of FBD outbreak control, which would reduce the outbreaks and the FBD burden and, indirectly, the triple burden of malnutrition. Veterinary surveillance and food safety-related services will reduce a proportion of FBD cases by reducing the hazards at the preprocessing stage of LDF production.

Discussion

We used a participatory and systems approach to investigate the South African LDF system. A wide range of local stakeholders and key informants took part in a workshop and follow-up survey in which they demonstrated the system's complexity by populating a systems map and identifying and ranking main nexus points. The detail and dynamics of key structural elements around these nexus points were unpacked through a focused literature review, and their causal relationships, unintended consequences, and feedback loops were analyzed and presented in a conceptual system dynamics model.

Involving a broad spectrum of participants adds to a better understanding of the problem and of the scope of the associated system (Bérard, 2010). Furthermore, it encourages double-loop learning, where a person's underlying beliefs and assumptions are challenged and operating norms are questioned, thereby improving an individual participant's mental model, which in turn can feed back into organizational learning (Bérard, 2010; Ruegg et al., 2018).

Similar participatory research methods have been used elsewhere. Lie et al. (2017) and Rich, Rich, and Hamza (2015) used an LDF value chain as the system, and thereby identified the key stakeholders for group model-building. Von Loeper et al. (2016) used a thematic literature review with ethnographic, participatory research to develop an SDM, analyzing market-access challenges for South African smallholders. Our work adds to these examples, demonstrating the value of a participatory and systems approach to food systems. It also

provides a methodology for studying similarly dynamic food systems elsewhere. A limitation was a lack of representation of nutrition specialists in the workshop, and hence nutrition and related health issues were not identified as key nexus points by participants. We also recognize our work would have been strengthened by a follow-up workshop to critique, discuss, and validate the conceptual model. Nevertheless, our participatory process facilitated ongoing contact between researchers and participants, enriched social capital, and snowballed introductions to further stakeholders and key informants within the LDF system and subsystems.

South Africa's post-apartheid transition toward a more equal society is far from complete (World Bank, 2018). Government policies attempting to address inequality have been unsuccessful and, to some degree, reinforcing. In our conceptual model, we presented nine SDGs linked to the LDF system, as well as vicious cycles and archetypes that maintain inequality in the agricultural and food retail systems. With "No poverty" arguably the root of all SDGs, a better alignment of future LDF system policies with the SDGs is crucial to move South Africa closer toward the 2030 Agenda for Sustainable Development (United Nations, 2015).

Historic land-access inequalities underpin commercial livestock farmer dominance, with the bulk of production arising from integrated companies (most notably in broiler production), using capital-intensive, sophisticated systems, maximizing efficiencies, while maintaining market-based quality and safety standards and still remaining profitable. This presents a significant barrier for small and even medium-scale producers to enter this predominantly high-end value chain. Similar to elsewhere in sub-Saharan Africa, livestock-keeping among smallholders and subsistence farmers is primarily for financial and social capital, as well as for cultural purposes (Mahlobo, 2016; Malatji et al., 2016). With an overall trend, particularly in sub-Saharan Africa, toward urbanization, with aspirations of a "modern lifestyle," livestock ownership and the agricultural life become the less attractive and realistic livelihood choice. The current and potential contribution of small-scale farmers to LDF production is unquantified and needs further

research. Support and investment aimed at small-scale farmers in the form of better access to finance and inputs, together with extension services to improve knowledge and skills, is required to improve access to existing value chains (Aliber & Hall, 2012; Binswanger-Mkhize, 2014).

Commercial producers have close links to supermarkets that demand reliable supply chains and high standards in quality, safety, packaging, and labeling. Supermarkets dominate food retail and extend widely into rural areas, changing rural food environments and leading to greater consumption of purchased rather than self-produced food. Both supermarkets and fast-food companies employ typically aggressive, price focused, and aspirational-lifestyle marketing. This, together with urbanization and improving socioeconomic status, has driven LDF consumption. The impact of increased levels of LDF consumption on the health and nutrition of consumers, and the links to the intractable triple burden of malnutrition, requires further research. While playing an important role in providing essential nutrients to the undernourished and vulnerable, LDF's role in obesity, which affects both the wealthy and the poor, is less clear. More research on consumers' choice and their food environment is needed to understand what drives the choice of LDF purchased, how LDF products are prepared in the home, and which pre-prepared and food consumed away from home products are favored.

Land access, climate change, and livestock feed costs all affect LDF production. Intensive commercial livestock production, especially broiler production, relies heavily on cereals (DAFF, 2017b; SAPA, 2017a). The sustainability of this trend requires further investigation for the following reasons. South Africa has limited arable land area, most of which is rainfall dependent and vulnerable to climate change (Conway et al., 2015). The increasing consumption of LDF (especially broiler meat) creates greater pressure on land and other natural resources, competing with cereal production for human consumption. The international demand for cereal-based feed is likely to become increasingly competitive, given the global rise in consumption of pork and broiler meat. Higher costs of imported raw material for feed may

push local broiler producers out of business or be passed on to consumers. Since price plays an important role in broiler meat preference, retail price increases will affect affordability for the poor (McHiza et al., 2015). Alternatively, relying on cheaper, imported broiler meat and products to meet increasing demand risks destabilizing the local industry, which remains internationally uncompetitive without local government support (through import tariffs and subsidies).


Food safety is a major consideration with LDF, as it may involve zoonotic pathogens, contaminants, parasites, toxins, and/or chemicals, including antibiotic residues. These affect human health directly through FBD, and indirectly through malnutrition, affecting nutrient absorption in the short and long term. In addition, the risk of FBD in South Africa may have greater significance than elsewhere, given the proportion of the population suffering from poverty, malnutrition, and HIV/AIDS. The listeriosis outbreak was blamed on a processed broiler meat product, which for many poorer consumers was the only affordable animal protein option. Consumers' pathways and barriers to accessing affordable LDF products of high nutritional value and hygiene standards need to be explored further. In addition, qualitative research is needed to explore consumers' understanding of food safety, their risk-mitigation behavior, and the role this plays in their choice and consumption of LDF. The delay in controlling the listeriosis outbreak raises questions around the capacity of FBD surveillance, risks associated with increased LDF consumption, choice and affordability of LDF products for the poor, and the enforcing of regulations and standards on small-scale producers and informal markets.

Our research, while working toward the policy aims of SHEFS, delivers a reference for stakeholders and policymakers to better understand the complexity and depths of the linkages between the LDF system's elements and its archetypes, when considering recommendations associated with nutrition and health, equitable access, sustainable production, and food security. In addition, we have

identified several key research gaps. Identifying options to improve smallholder and subsistence farmers' access to and participation in existing LDF value chains is crucial, given the uncertainties facing commercial producers, such as land redistribution and imports. The dynamic relationship between increasing local broiler production and local feed production, importing cereals for feed and cheap broiler meat, and the impacts on availability and affordability of broiler meat for the poor requires further investigation before developing policy recommendations.

Conclusions

The South African LDF system is unique within sub-Saharan Africa, and while it is undergoing significant development and transformation, it remains challenged by deep historic roots. Transdisciplinary research is needed to provide evidence for decision-makers and stakeholders to consider leverage points for change. Our systemic analysis demonstrates the importance of a wider contextual analysis when considering the debate around food security, nutrition, health, and sustainable agriculture, and presents an alternative methodology for investigating complex LDF food systems in a state of dynamic transition.

Furthermore, this research provides a unique reference for policy-makers. Creating policy recommendations for the sustainable production of safe, healthy, and nutritious LDF, with equitable access, will need to consider profound structural changes in the system. Our work presents a deeper understanding of the LDF system's complexity and linkages between key elements. It therefore has the potential to guide policy toward more integrated and durable solutions, highlighting possible unintended consequences, and mitigating the risk of system destabilization that may accompany the deep structural change required. 

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Virtual farmers markets: A reflective essay on a rural Ohio project

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Abstract

This reflective essay discusses the development, structure, operation, and transitioning of an online virtual farmers market in rural Ohio. In this model, customers order online and then pick up their fresh, local produce at a specified time and location. Through a combination of practitioner experience in the market's development and informal discussions with people associated with the market's development and management, the authors analyze the positive and negative aspects of the online market structure and implementation, as well as suggest critical steps that may be necessary

to export this model to other communities. They also consider potential structural and process improvements that could increase viability and success. A last-minute addendum briefly discusses the potential for this model to become a meaningful response to the COVID-19 issue as well.

Disclosure

The first author of this reflective essay was directly involved in the conception, planning, fundraising, and implementation of this project, as part of his role as an Extension educator serving the area in which it was conducted. We hope this association will provide helpful insight as others study or consider conducting similar projects. Note: We have used the USDA's spelling of "farmers market," which does not include possessive case punctuation.

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Keywords

Farmers Market, Virtual Farmers Market, Food Council, Local Food, Online Farmers Market, COVID-19

COVID-19 Addendum

This manuscript went to peer review at the same time the COVID-19 pandemic emerged. We have given much contemplation to the now prescribed “social distancing” (physical distancing) as we have moved our academic classes and Extension programming online. In addition, we have paid close attention to conversations among food systems researchers, educators, and practitioners who, in real time, have been tackling the crisis in earnest. They have asked if and how farmers markets can survive. In April and May, many states had mandatory “stay at home” orders; unessential gathering places were mandated closed just when traditional in-person farmers markets should have been opening for the season. Many states began re-opening in June and July. But COVID cases spiked in some areas, and more restrictions were enforced.

The structure of this online virtual farmers market inherently provides physical distancing and consumer safety, which have been necessitated during this pandemic. The farmer/producer controls food safety within their field, packing, and transportation circles. The customer singularly selects and orders their food online. Limited interaction does occur with farmer drop-off at the aggregation point and with customer pick up, but as with grocery store precautions, those exposures can be mitigated.

In brief, we believe a digital platform such as the one outlined in this reflective essay may help to mitigate pandemic effects on proximate food systems. We are watching and hope to see increased use of these virtual interfaces not only for benefits outlined herein but as a meaningful response to the COVID-19 issue as well.

Introduction

Though U.S. farmers markets have long held the aesthetic of an in-person, communal, and even friendship opportunity among growers and consumers, there has been a considerable decline in the number of farms that sell directly to consumers

and wholesalers in recent years (O'Hara & Benson, 2019). The interest and growth in online shopping have made some speculate that farmers markets have peaked and may, in fact, now face a decline (Low et al., 2015). However, farmers, along with other geographically based local-scale food entrepreneurs seeking to tap into the growing demand for online retail, may face difficult issues of scale and delivery costs. For example, through Facebook or other social media platforms, a customer could place an order with a local farmer in largely the same way they might order a bathmat through Amazon. However, the delivery of (for example) US\$10 worth of leafy greens to that same doorstep could potentially cost a local farmer a similar amount in labor and travel costs, effectively making such a distribution system untenable. The farmer's problem lies not with connecting with customers through the Internet, but with the economies of scale required to deliver produce to customers' doorsteps (Lutz, Smetschka, & Grima, 2017). In food-related sales, Kroger, Walmart, and other traditional grocery stores offer “click-lists” in which customers shop online, then drive through to pick up their food or goods at a scheduled time. News reports indicate that these have increased dramatically since the third week of March 2020, with the onset of the COVID-19 pandemic. The convenience factor of this system seems to make even the nominal fee, charged by some, of little consequence (Anesbury, Nenycz-Thiel, Dawes, & Kennedy, 2016).

Convenience has shown up as a major factor that consumers cite for their online food purchasing. Morganosky and Cude (2000), who studied reasons for buying food online over 20 years ago, found convenience and time savings as the main motivators. They also found that mothers with small children and people with disabilities highly valued online grocery shopping. Long et al. (2013) found that convenience was a key to a consumer's decisions for making local food purchases (e.g., due to the limited hours of farmers markets). Yeo, Goh, and Rezaei (2017) also noted that specific convenience factors (reducing time and energy consumers expend) were important for consumers who used online food delivery services. Along with practical goals such as quality, taste, and nutrition, a

study by Brekken, Parks, and Lundgren (2017) noted that *convenience* was considered “important” or “somewhat important” by 79.5% of respondents to the question of interests in obtaining local fresh produce.

Debra Tropp (2019) recently reflected that the growing popularity of hybrid business models “that transcend traditional local food system silos” (p. 28) makes it imperative that we understand coming shifts and synergies in market practice, for example, with Millennials and Generation Z members. The hybrid models, in this case, refer to direct-to-consumer and intermediated sales of locally grown and produced foods. Tropp (2019) notes that they “will exert even greater influence on local food demand” (p. 28) and lists *convenience* as a key component of how they may develop their local food purchasing habits and store format choices.

So is convenience enough of a factor to make a new online virtual farmers market successful and sustainable? If so, what characteristics (e.g., structural, financial, marketing, infrastructure) would be necessary for a group of farmers and other local food entrepreneurs to leverage the power of the Internet to create the economies of scale necessary to make digitalization profitable. In other words, would an online order and local pick-up system work for farmers market shoppers? Would convenience outweigh the in-person experience? Or, could there be an entirely new classification of a local food shopper perhaps not yet identified by the mainstream purveyors at farmers markets? That is, one who wants to know where their food is grown, who wants to support the local economy, but who does not have time to go to an in-person farmers market?

This article reflects on the development and the initial management of the Miami County Virtual Farmers Market, a digital interface through which several dozen local food growers and producers market their goods, harvest only what has been purchased, and deliver it to a central location for weekly pick-up by the online customers. The market is operated located in a largely rural county in western Ohio. Although the market was still in operation as of May 2020, this article provides a snapshot in time of the market’s development and

operation from 2015 to 2018. One of this article’s authors was personally involved in the market’s development during this period. While the market did not accomplish all the goals initially envisioned by its founders, reflections on its development process may inform other groups seeking to establish similar online markets, especially in less dense or rural regions.

Online Virtual Farmers Markets: History and Background

The concept of an online virtual farmers market for locally produced foods appears to be a very recent innovation. Based on our Internet research, we have seen it emerging only in the last 10 to 15 years, and mostly in more urban locations with larger populations. At its core, an online virtual farmers market allows multiple farmers to sell produce to multiple customers using the Internet while using a centralized distribution point(s) in the physical world to arrange for both drop-off and pick-up of that produce. Multiple farmers, all delivering to the same centralized location, create a critical mass that allows, through fees to the market, the maintenance of refrigeration and other storage devices at the distribution site.

Despite the concept’s recent evolution, numerous examples of online markets at which consumers can shop at their convenience and later pick up or have their foods delivered to their doorstep already exist. In Brooklyn, New York, San Francisco, California, New Orleans, Louisiana, and Los Angeles, California, the Good Eggs virtual market has been satisfying customers for several years and continues to grow (Wortham, 2013). Wortham (2013) notes that New York also has Urban Organic and Next Door Organics, along with companies like Quinciple that specialize in artisanal food delivery. It appears that most of the distribution points for these examples exist in established urban areas, suggesting that densely populated areas offer the necessary critical mass for a viable market. That said, Local Food Marketplace (established in Eugene, Oregon, in 2009) offers online connections for farms, food hubs, and marketplace selling; however, according to examples on their website, their platforms appear workable in both urban and rural areas.

White (2011) notes that there are conveniences for both consumers and farmers when buying and selling through an online virtual farmers market. Customers do not have to arrive at the farmers market first thing in the morning to get the best produce. Additionally, customers do not have to accept random items as they would in a community supported agriculture (CSA) share. For farmers, instead of guessing the amount of produce they might sell at the in-person market, they are able to harvest only what has been ordered, eliminating any wasted product. Farmers also get the convenience of knowing exactly what produce they must harvest and what amounts. They also have the additional benefit of selling remaining produce at a traditional farmers market or another venue. But for any of this to transpire, software that allows for the digital connection between producers and customers is required.

Perhaps the earliest example of such software and its associated market dates back roughly to roughly 2002, when Eric Wagoner of Athens, Georgia, launched <http://locallygrown.net/>. A University of Tennessee Extension study profiled the primary features of Locallygrown.net, and provided limited case studies of its use (Grigsby & Bruch Leffew, 2016). According to the profile, service charges for markets are 3% if all customers pay in cash and roughly 7% (a combination of software costs, security fees, and transaction fees) if customers are allowed to pay online, and there are no upfront costs for markets who join. According to a 2011 *Mother Earth News* article, Wagner said his Athens market had combined weekly sales of US\$8,000 to US\$12,000, depending on the season (White, 2011). It also described how he copied the platform to create a template that any entrepreneurial farmer or farm market manager could use. According to Wagoner's website, 300 online markets are currently operating nationally, and 140 are in development (Locally Grown, 2018).

Over time, other online platforms have emerged. In 2009, Farmigo built a software system that would allow any local farm to offer online ordering. They have grown to service over 300 farms in more than 20 states (Wortham, 2013). In Africa, the Virtual Farmers' Market (VFM) app helps farmers advertise and sell surplus crops

(World Food Programme, 2018). The VFM app launched in May 2017. Developers targeted 2,500 Zambian farmers intending to connect them with 70 national and international buyers and become sustainable after three to five years. The app allows farmers to negotiate fair prices and make deals transparently. Additionally, the farmers also gain bargaining power and a potential for higher profits through the real-time pricing information provided by the app.

One possible critique of the idea of online virtual farmers markets is the potential for the so-called "digital divide" between more affluent and less affluent customers. The former possess smart phones and are accustomed to purchasing goods online, but the less affluent customers are often less financially and culturally able to purchase goods online. Given the recent evolution of farmers markets, research on this conflict is limited. Freedman et al. (2016) indicated that traditionally, markets can create targeted marketing, especially in targeted languages, and provide tours to local residents to increase customer diversity. The mostly digital nature of a market using this model may restrict the ability of well-intentioned market managers to reach out to these potential customers. However, Skizim et al.'s (2017) analysis of social marketing for farmers markets in a low-income region of Louisiana suggests that Internet and social media access is not a significant barrier for low-income individuals to access information about farmers markets.

The Case of Rural Western Ohio

The examples of online virtual farmers markets that we discovered seem to exist mostly in densely populated, urban areas. However, Miami County, Ohio, is a predominately rural county in western Ohio. As of the 2010 Census, 102,503 people lived in county, with a population density of 252 people per square mile (U.S. Census Bureau, 2010). The city of Troy is the county seat, which as of the 2010 Census had a population of 25,179 (U.S. Census Bureau, 2010). Commodity monoculture (e.g., feed corn and soybean) dominates the agricultural production of the county. The county's three largest cities are all located along the Interstate 75 corridor that links the Dayton and Cincinnati metro-

politan regions to the south with northern Ohio and Michigan. The manufacture of automobile parts once played a major role in the economies of each of these urban areas. However, post-industrial forces have reduced (but not completely eliminated) this sector of the local economy. In the last two decades, sprawl from the Dayton metropolitan region has expanded into southern Miami County.

Although some coordination efforts around local food system projects do exist, Jones (2018) indicated that a lack of regional aggregation prevents many urban farmers in the nearby greater Dayton region from expanding their growing operations. We did find, however, that at least two CSA farmers in the area changed to home delivery models in the middle 2010s (Jones, 2018). Cuy Castellanos, Jones, Christaldi, and Liutkus (2017) noted a disconnect between local government officials and agents of civil society interested in local food system development and noted that local entrepreneurs might limit cooperation at a regional scale. Within this context, a citizen-grower group was formed in Miami County with guidance from the local Ohio State University (OSU) Extension office (led by this article's lead author) to investigate the possibility of creating more support for selling locally grown and produced foods.

Development and History of the Miami County Virtual Farmers Market

In the summer of 2013, we invited a diverse group of 22 people—representing local farmers, growers, businesses, farm-related organizations, public health, government, and citizens—to meet at the local OSU Extension office in Troy, Ohio. We discussed how we might place local food and agricultural economic development on the agendas of public policy-makers, private business leaders, not-for-profit institutions, and citizens. From that initial 2013 meeting, the Miami County Local Food Council was formed. We discussed projects that could help Miami County growers expand their markets and connect with new or potential consumers beyond the existing local traditional farmers markets. We outlined the ultimate goal as expanding opportunities for working together, creating jobs, doing business, and expanding the agricultural and local foods economy in their area (Raison,

2013). We then created a mission statement to guide actions: *“To develop, support, and promote local food farmers and producers”* (Raison, 2015). As we continued meeting, we again partnered with OSU Extension and undertook a modified strategic planning process that resulted in the formation of additional working groups (both short-term and ongoing teams) that would tackle specific tasks and activities. One of these teams began exploring the possibilities of starting an online virtual farmers market.

In November of 2015, with OSU Extension as the lead partner, we received a US\$45,000 USDA Local Food Promotion Program (LFPP) grant to fund the salary of a market manager and launch a new online market in early 2016. The mission was to connect local consumers with local foods through simple technology. The vision: *“The Miami County Virtual Farmers Market provides an easy way for consumers and producers to buy and sell local goods, supporting the local economy and encouraging healthy eating while building positive community relationships.”* After a few weeks of research into various online selling platforms, we chose Wagner's locallygrown.net online venue due to its low cost and ease of website setup and navigation. The council hired a market manager at 20 hours per week and began setting up the market.

Market Prep and Manager Work

In the late summer of 2016, as we entered the preparation period just prior to the market opening, our newly hired manager, with board assistance, constructed an outline of activities that would be necessary to undertake:

- Generate farm/grower list. Invite and hold vendor information meetings.
- Write press releases and distribute them to local news media outlets, including online social media channels.
- Interview early vendor businesses/farms. Compile vendor features to spotlight a new vendor each week on the market site and blog, including pictures.
- Read and become familiar with cottage food and retail food restrictions, labeling requirements, and plan review requirements.

- Meet with county health officials and managers of the market pickup location to finish plans, review application, and ready the space for market use.
- Create a Facebook account with updates, links to the website, new products, vendor features, product pictures, etc.
- E-mail potential customers, detailing the structure of the market, the advantages of participating, and how to join our community.
- Verify the county health department and Ohio Department of Agriculture requirements to ensure all vendors are properly licensed and prepared for a retail market.
- Design, print, and distribute publicity posters and postcards among area businesses and potential customers.
- Research commercial refrigerators and freezers (health department-compliant models) that will work with our retail food license.
- Learn the licensed website's computer coding necessary to change anything needed in the default settings.
- Research other Locally Grown sites to see what products they offer, how they structure their market and website, what their requirements and restrictions are, etc. Send vendors helpful hints and suggestions to assist their entrance in the market and their continued participation.
- Create action lists and team-building exercises for the food council volunteers and board members who will rotate helping out at drop-off, to help transform them from occasional participants to vested members of the community we are creating.

Here is an overview of how the online market ordering process works:

- **Market Process Flow:**
Each week, our farmers, artisans, and producers list all the products they currently have to offer on the website under their farm's name and branding. They have individual log-in pages that allow them to

specify exactly how much of any given item might be available each week (e.g., "We'll have only 10 dozen eggs this week."). They may also add photos.

- **Product Line Variety:**
Products vary weekly, depending on the time of year. But from the beginning, we worked to offer a wide variety of products, including vegetables, fruits, meats, eggs, baked goods, desserts, dairy products, fresh flowers, live plants, jams, jellies, fruit butters, dried herbs and mixes, teas, sugar alternatives such as maple syrup, honey and sorghum, soaps, body care products, and artisan crafts for the kitchen and home.
- **Customer Ordering:**
Every Tuesday at 9 pm, a list of available products is e-mailed to everyone with a free Miami County Locally Grown Virtual Market account. Customers may place their order for the week any time between Tuesday at 9 pm and Sunday at 8 pm. Orders are only placed via this website, and payment are not made until pickup.
- **Vendor Harvest Order:**
Vendors receive a customized list of what has been ordered by e-mail each Sunday night after the market closes for the week. They then harvest only what customers have ordered (on Monday or Tuesday) and deliver it to the market before 4 pm on Tuesday.
- **Customer Pickup:**
Customers receive an e-mail reminder to pick up their order from 5 pm to 7 pm on Tuesday.

Sales and Details

Our Miami County Locally Grown Virtual Farmers Market opened August 2, 2016, with 160 registered customers who were recruited while we were setting up the online operation. We had also simultaneously recruited 13 farmers and producers to participate during this period (and began training

them on posting products, interfacing with the back end of the website, and even helping with some marketing ideas). By year-end, we had just under 400 customers and 20 vendors.

The first 10 weeks of operations saw 148 total orders, for an average of 15 orders per week. The lowest week had only 11 orders; the highest had 22. The total sales over the first 10 week were US\$5,033 or about US\$500 per week. Although the grant covered our market manager's salary, we began calculating what sales volume might be required (via a 10% market hold-back fee from the vendors/farmers) to sustain the position for the long term. Through Thanksgiving of our first year (19 total weeks of sales), we had 301 total orders or an average of 17.7 per week. Sales totaled US\$11,820 for an average of US\$622 per week.

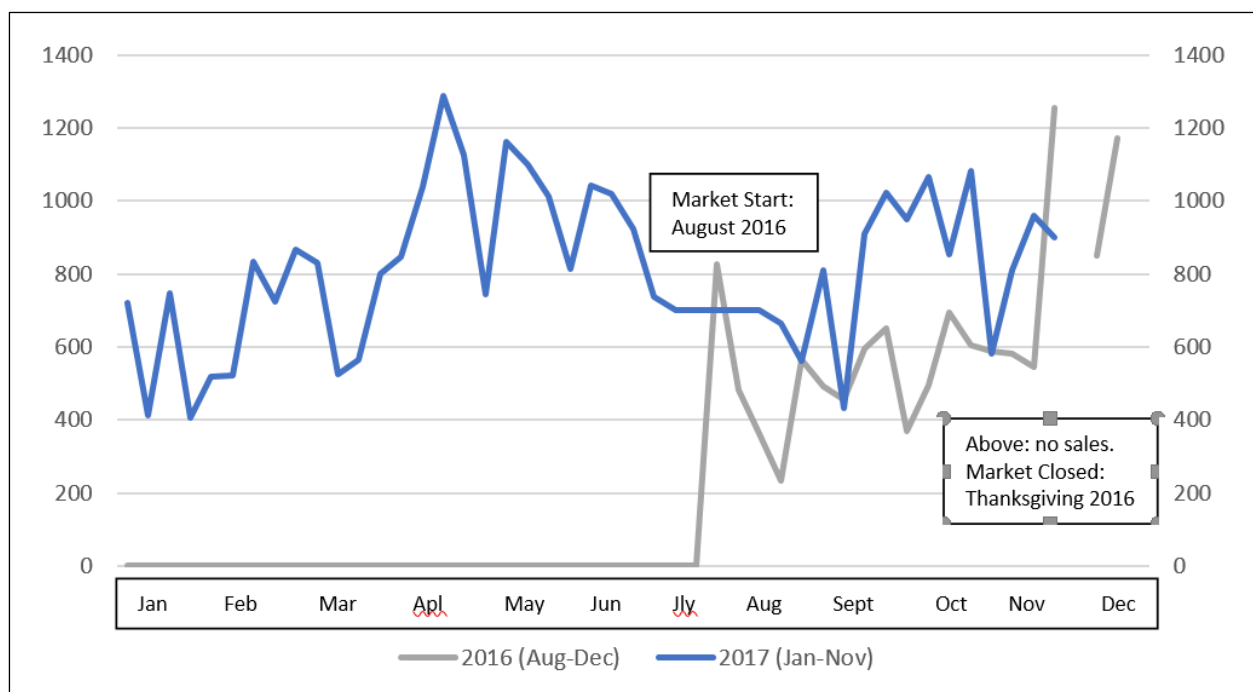
During the winter months of early 2017, sales slowed somewhat. But during the first 10 weeks of spring (weeks 34–43, or April 4–July 3), we had 308 orders, or nearly 31 orders per week on average. These 10 weeks saw total sales of US\$10,341 or just over US\$1,000 per week. This increase in sales made sense to us, as customers enthusiastically talked about their excitement of having fresh produce again after the winter months.

In summary, the 64 weeks of sales covered in the scope of this review grossed just over US\$48,240, with 35 participating farmer/producers and over 560 registered customers. The weekly sales graph (Figure 1) provides a weekly sales trend line for the 64 weeks covered in this project's timeframe. Please see the Appendix for a table of weekly sales.

Market Transition Away from Food Council Control

At the conclusion of the LFPP grant, we investigated ways to restructure the financials so that market fees could fully cover the manager's part-time salary (which had been funded at 20 hours per week for two years under the grant). But that formula would have required gross sales to nearly double to achieve the desired salary recovery from market fees. So the food council's involvement with the market ended formally on January 30, 2018. However, the manager was willing to attempt to keep the market going by incorporating it as a for-profit business, and, with few assets and the grant ended, the council agreed to give up the Miami County Locally Grown name, website domain, and customer list of the market in the

Figure 1. Weekly Sales (US\$)



hope that it could continue (Miami County Local Food Council [MCLFC], 2018). The Miami County Local Food Council had several other projects (apart from the online market) related to promoting local food sales and consumption. It has continued and expanded these efforts around local foods. And the virtual online market continues operations today. As a private entity, we do not know sales volumes nor revenues, but hope they are growing and will continue.

Reflection

By investing time in going back, interviewing participants, and reflecting on the history of this project, we were able to learn quite a bit over the course of this three-year project. The council's online market idea, in theory, aimed to help resolve challenges that many smaller and microscale farmers face in being both farmer and salesperson. On the theoretical level, an online virtual farmers market may help, as it provides an economically viable means for smaller and microscale farmers to connect with consumers in a way that allows farmers to focus more on farming and less on the mechanics of selling their produce.

We also learned that this new, virtual platform might not fit into existing local public health categories pursuant to the aggregation and storage of produce, along with other products, *from multiple growers*. Our market manager indicated that local-level public health officials helped our new venture ensure compliance, and we received approval as a "retail food establishment" under Ohio food safety laws. And though we implemented good handling practices (GHP), food selling and safety laws and their enforcement may vary dramatically across individual states and the nation. Thus, *any attempt to replicate this model elsewhere should begin with a conversation with local public health officials early in the development process*. This will aid in understanding how this model will interact with the letter of the law and enforcement of food safety regulations in a particular location.

Lastly, we speculated that if we expanded the concept, markets using it could see growth in sales to individual and family-scale consumers as well as small-scale commercial consumers (e.g., restaurants), because the market's infrastructure and

administrative capacity would be increased. Further, markets using this model could include the products of micro- and cottage-scale value-added producers, again increasing capacity by using technology.

The model we used could have value in other communities. Members of the Miami County Local Food Council suggested that while the model has been only moderately successful in the Miami County market, they believed that the region's small potential market was a significant negative factor limiting the model's success. They believed that the use of a similar model in a community with a much larger market share has a greater likelihood of being successful. But food system professionals know that larger communities often have more options for localized produce sales, both online and with varying pick-up and delivery options (e.g., more farmers markets, CSAs, and grocery stores selling locally grown products), and so the online service may require more marketing dollars or start-up investment to reach that larger market, establish a visible footprint, and find success.

Potential for Adoption or Adaptation

Other groups seeking to adapt this model for use in their community should consider several process improvements over our approach. First, our experience showed us that the role of the market manager is vital to the overall function of an online market. This person must understand and follow local food safety regulations; understand the local agricultural industry and economy; possess basic accounting and project management knowledge; understand the management of feeding program redemption (e.g., SNAP and WIC); and know social media marketing techniques. Our project depended on these. We also noted that reliable Internet service is important at both the market manager's home and the pick-up location, to allow for greater responsiveness to customers given the 24-hour reality of online retail (the latter of which was not present in this case).

Along with structural support, a successful virtual market project needs a physical location that can provide adequate space and infrastructure for three main functions: the receipt and pickup of

food; the storage of food in refrigerators; and office space for the market manager to complete administrative tasks. In this case study, the Troy market used a multipurpose room in a local church building. However, it did not have adequate office space, which became a challenge for our operations.


One additional consideration for the development of an online market may center on issues of the digital divide (e.g., access and proficiency with the Internet, as well as the ability to make online financial transactions). During our test, we accepted cash or check payments at pickup. Although we wanted to accept online payments at the time of ordering, we did not possess the expertise to get that set up in conjunction with our website host, who did not, at the time, offer this service. With increased options today (e.g., PayPal, Venmo, etc.), we believe this is necessary for customer service, and likely an expectation.

As noted above, access to and expertise with the Internet and social media marketing are critical to effective outreach. Providing a digital access point (e.g., a dedicated tablet or computer) for customers to complete orders at the market's distribution point can help breach the digital divide. In addition, the deliberate selection of the location of a market's physical distribution point at a visible and accessible location may assist with outreach and access as well.

Recommendations and Conclusions

In summary, developing an order and delivery

system by way of an online farmers market may increase the number of customers and expand the volume of sales for local foods by offering an alternate mechanism for purchase and pick-up. While there is a cost to starting a virtual market, ours had a relatively low start-up investment, consisting mostly of the manager's salary and refrigeration equipment to satisfy food safety requirements.

Based on the convenience factors we have outlined (saving time for the consumer and limiting the farmer's loss by harvesting only what has been ordered), we believe launching a new online market can be an attractive option for both farmers and consumers. We also believe it can capture a potentially untapped share of the local food dollar from those customers who do not have time or who do not wish to go to a farmers market physically, but who still want to purchase locally grown products and support the local economy. The Troy, Ohio, online market experiment continues today, nearly four years later. However, at the time the market became a private business, sales had remained consistently below what we hoped for, and below the level to create a desirable part-time salary for a market manager. Again, this points us to think there is greater potential in a more populated, urban area where increased sales volume could generate the desired cash flow for operations. As we found extremely limited writings or research on this model, we strongly encourage further research, case studies, and exploration of the concept. 

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Appendix

Table A. Weekly Sales Data (all in US\$)

Week # (2016)	Total \$ sales	Week # (2017)	Total \$ sales
(August 2–8) 1	\$827.57	(January 3–8) 20	\$721.22
2	481.06	21	412.67
3	363.80	22	748.67
4	234.72	23	407.09
5	566.09	24	517.5
6	491.95	25	523.11
7	456.22	26	834.38
8	593.79	27	724.32
9	649.93	28	864.79
10	368.02	29	829.78
11	496.64	30	525.29
12	694.10	31	565.15
13	605.74	32	801.75
14	587.84	33	848.21
15	581.40	34	1,039.71
16	546.14	35	1,286.28
17	1,253.17	36	1,126.39
(Closed Thanksgiving week)	0	37	743.17
(Dec. pre-holidays) 18	849.22	38	1,160.37
(Dec. pre-holidays) 19	1,172.91	39	1,098.34
(Closed through 12/31)	0	40	1,013.37
TOTAL for 2016	\$11,820.31	41	812.14
		42	1043.54
		43	1,017.73
		44	923.19
		45	735.80
		46	700.00
		47	700.00
		48	700.00
		49	700.00
		50	700.00
		51	663.63
		52	561.86
		53	809.07
		54	433.27
		55	911.05
		56	1022.12
		57	950.51
		58	1066.07
		59	852.98
		60	1081.93

		61	580.91
		62	811.2
		63	957.84
		64	900.10
		TOTAL sales (January– November 2017)	\$36,426.50
		Grand Total for 64 weeks:	\$48,246.81

From online cart to plate: What Amazon's retail domination means for the future of food

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Abstract

Amazon's 2017 purchase of Whole Foods Market seemed to suddenly make this commercial giant a notable player in food retail. However, as we demonstrate below, this development was neither sudden nor surprising. Amazon's business strategy has paved the way both for this acquisition, and for the other surreptitious ways in which it is chipping its way into food retail. We argue that these developments are motivated by Amazon's goal of becoming a one-stop-shop for all consumer goods for as many customers as possible, which would in turn allow Amazon to expand as the key global

broker for consumer data. Although Amazon's tactics have little to do with food itself, the implications to food retail and more generally to food systems around the globe could be momentous.

Keywords

Amazon, Big Data, Market Concentration, Whole Foods Market, Datafication, Food Retail

Introduction

When Amazon purchased Whole Foods Market (WFM) in 2017, its entry into the fresh food sector and the addition of physical locations received much media attention. *Forbes* magazine pointed to Amazon's wealth of data as the key tool for industry disruption, noting "Amazon is using Data

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Note on COVID-19

This research was conducted before the 2020 pandemic. The implications of our findings are nevertheless still relevant, and perhaps even more significant now that more consumers appear to be using online platforms to shop for food.

to reverse-engineer retail” (Aziza, 2017, para. 3). The visibility of this purchase made it seem like Amazon was shifting gears, but a closer look at the company strategy over the years reveals that this purchase was rather unsurprising. In this paper we explore Amazon’s foray into food retail to ask: What drove Amazon to move into food retail and what steps has Amazon taken to enter and expand into this market? What is enabling it to succeed in monopolizing purchasing habits, and what are the potential implications if the power of the world’s largest internet company is not checked? We argue that the complex interplay of technology, data capabilities, and lax regulatory regimes are both driving and enabling Amazon to vie for consolidated control of food retail. We observe, however, that this control is not born of Amazon’s desire to dominate food retail. Instead, food retail is merely collateral damage in Amazon’s larger strategy of stealth.

We describe the context of digital retail and digital economies of scale, and then trace Amazon’s growth and foray into food retail. We argue that Amazon’s overall strategy was already well-suited to the risky business of online groceries. We suggest that this strategy, combined with the current regulatory environment, is allowing Amazon to become the sole retailer a customer would need for all their consumer goods. Next, we discuss potential implications of Amazon’s strategy for food retail, and more broadly for food systems. We conclude that Amazon’s development is troubling, as the consequences in this sector may be much more far-reaching than in other retail sectors.

Background and Literature Review

Political economists have been fascinated by Amazon as the embodiment of market concentration and datafication of the consumer (Culpepper & Thelen, 2019; Mosco, 2017; Srnicek, 2017). Political economy is “the study of the social relations, particularly the power relations, that mutually constitute the production, distribution, and consumption of resources, including communication resources” (Mosco, 2009, p. 2). Political economists ask, “how are power and wealth related and how are these in turn connected to cultural and social life?” (Mosco, 2009, p. 4). We approach our

analysis from the political economy perspective and draw on this tradition’s key concepts of concentration and economies of scale.

Concentration

Concentration refers to “the composition of a given market and especially its potential impacts on competition” (Howard, 2016, p. 3). Concentration is a spectrum. At one end are freely competitive, fragmented or unconcentrated markets that function on the basis of supply and demand, curbing any one company’s ability to raise prices; at the other end are monopolies and oligopolies, in which a single firm or handful of firms dominate, leaving consumers at the behest of the few corporations that have the power to set and control prices (Howard, 2016).

Regardless of industry, political economists agree that shifting away from competitive markets towards consolidation has political and economic implications. Concentrated power means fewer people are involved in decision-making, particularly around “what is produced, how it is produced, and who has access to these products” (Howard, 2016, p. 5). With larger firms emerging out of mergers and acquisitions, other firms struggle to enter the market; if they do enter the market, prices are still set by larger firms that then obtain greater percentages of the profits (Howard, 2016). As becomes apparent below, Amazon’s size and scope call for an analysis through the lens of concentration, casting doubt on e-commerce’s ability to facilitate free market competition.

Studies of power in the agri-food sector offer ample critique of concentration, and readers of this journal will be familiar with at least some of them. Phil Howard has examined concentration extensively (see Howard, 2014, 2015, 2016, 2018, 2019). Various authors have discussed the “hourglass” system, where multiple producers and consumers are connected through a handful of retail companies and agricultural suppliers who control food economy and governance. This results in barriers-to-entry for small- and medium-sized businesses, and significant economic and cultural threats to both consumers and producers around the globe (Kneen, 1993; Lang & Heasman, 2003; Patel, 2007).

Economies of Scale and Digital Economies of Scale

Political economists dispute mainstream economy's stance that concentration enables firms to take advantage of economies of scale. While "consumers are often claimed to benefit from synergies and lower transaction costs that are expected to result from mergers and acquisitions" (Farrell & Shapiro, 2001, cited in Howard, 2016, p. 8), there was traditionally little evidence that increasingly large and complex organizations experience an increase in efficiency (Howard, 2016). The web-commerce boom of the 1990s and 2000s added the question of whether the original tenets of economics and political economy would hold true in the digital age. Vincent Mosco asked: "are the forces of new communication and technology so revolutionary that they are bringing about a radical restructuring and that will lead to the transformation or even the dissolution of capitalism?" (Mosco, 2009, p. 3). Early e-commerce scholars viewed e-commerce as a "paradigm shift": a "disruptive innovation . . . radically changing the traditional way of doing business," and saw it as operating "under totally different principles and work rules in the digital economy" (Lee, 2001, p. 349).

Robert McChesney (2013) argued to the contrary—that internet giants were, ultimately, like other traditional commercial entities and that the internet would hardly usher in a new economic frontier. Indeed, the internet seems to solidify top-heavy corporate concentration that works systemically to create an anticompetitive environment (Winseck, 2016).

Echoing McChesney, Hindman argues that firms like Amazon take advantage of digital economies of scale that enable them to concentrate traffic (2018). The internet "provides economies of scale in 'stickiness'"—a term Hindman uses to refer to the tactics internet firms utilize to "attract and keep audiences" (p. 16). Sites, as they grow, become progressively cheaper per user: more visitors allow for expansion, attracting even more visitors, and building visitor loyalty over time. Amazon's survival relies on stickiness to ensure that users come back to the site for all of their purchasing needs. Hindman focuses on media firms and draws attention to six aspects of digital economies of scale, including network effects,

architectural advantages, design advantages, advertising and branding, user learning, and path dependence and the dynamics of lock-in, arguing that each of these factors "tilt the playing field" towards already powerful internet firms. Ultimately, he argues that "large media firms still dominate, for reasons economists will find both novel and familiar" (p. 5). As our analysis shows, these dynamics prove useful in understanding Amazon's business strategy.

Food Retail and E-Commerce

Food retail largely evaded the e-commerce takeover that transformed myriad industries in the 1990s. While electronics, books and other products transitioned to the "new" economy of electronic and "frictionless" transactions that minimized costs and promised a "better way of doing business for both retailers and consumers" (Morganosky & Cude, 2002, p. 451), the grocery sector resisted this trend. The logistics of delivering fresh produce are substantially more complex, as the challenge of long-distance delivery of low profit-margin products is further complicated by the need for physical infrastructure such as warehousing, refrigeration and distribution centers, and strict quality and safety regulations (de Koster, 2002; de Koster & Neuteboom, 2001). E-grocers need to deliver from sites close to consumers, and sparsely populated areas pose problems for all retailers (Williams, 2017). Combined with the challenge of "consumer trust in the context of online purchasing," (Morganosky & Cude, 2002, p. 452) and a preference for brick-and-mortar grocery stores, food retail became the stubborn last frontier (Williams, 2017) and "the toughest nut in ecommerce" (Jones, 2018, para. 1).

In 2018, 30 percent of Americans purchased groceries online (Nielsen, 2018a, para. 1), up from 13 percent in 2015 (FMI), and of all online purchases made by Americans between 2017–2018, food and beverage sales made up 13 percent (Nielsen, 2018a, para. 4). In the U.S. alone, "fresh and perishable foods generated brick-and-mortar sales of more than US\$177 billion in 2017-18" (Nielsen, 2018a, para. 5). Across the "fast-moving" brick-and-mortar retail landscape of quickly-sold, low-cost consumer goods, "fresh categories have

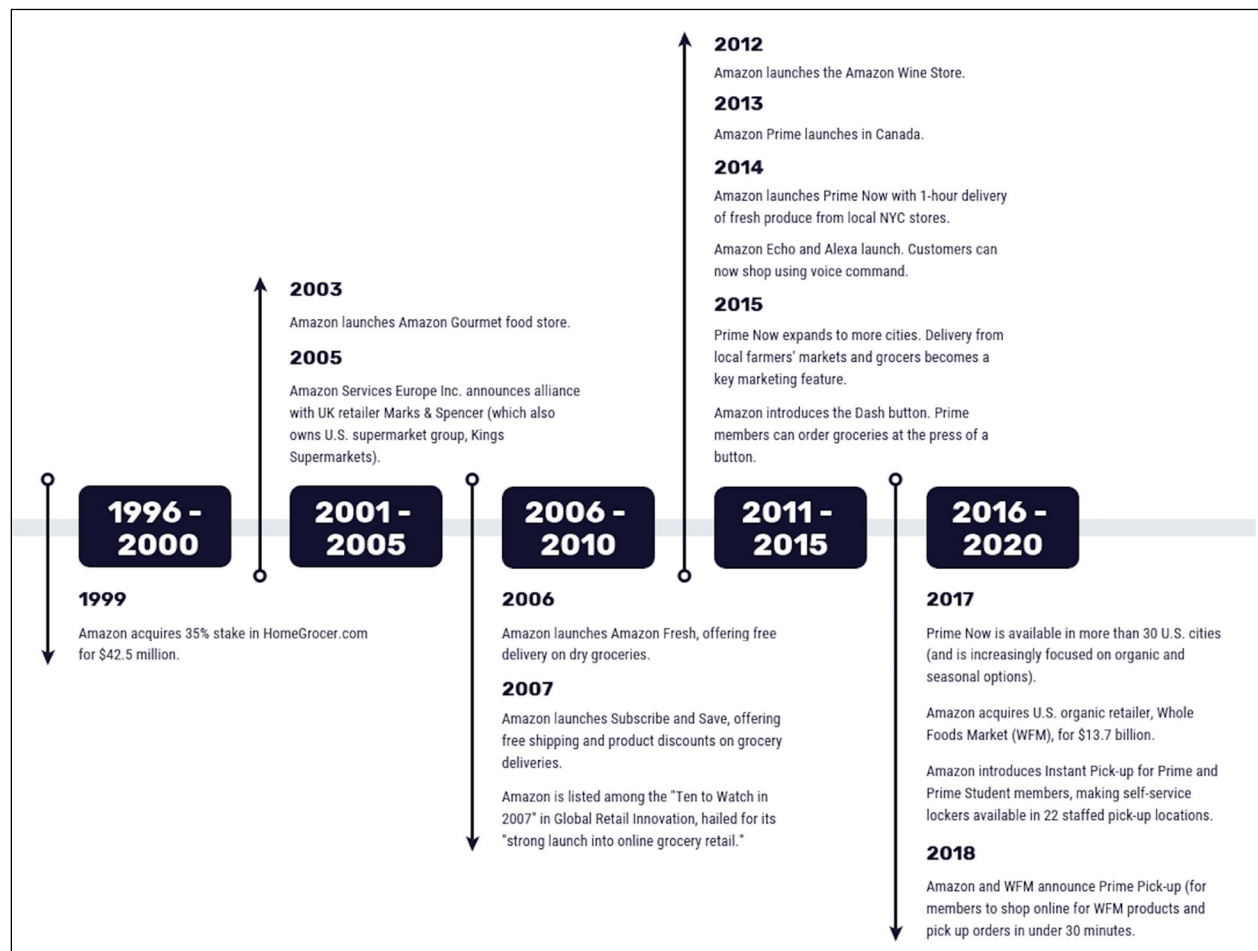
driven nearly 49% of the dollar growth” (Nielsen, 2018a, para. 5). The percentage of Americans purchasing their groceries online is expected to grow to 70 percent in the next decade (“Why E-Commerce Shouldn’t,” 2018, para. 1). Amazon is in the lead with 18 percent of the U.S. online grocery sales “marking the largest share of any single retailer and doubling that of its closest competitor, Walmart Inc” (One Click Retail, 2017 cited in Taylor, 2018, para. 2). Globally, the most significant e-commerce activity growth includes packaged and fresh groceries (Nielsen, 2018b). With online grocery sales set to reach US\$100 billion by 2025 (Danziger, 2018), it is a race to innovate and capture consumer purchasing power.

Amazon’s Transition into the Food Market

In 2017, Amazon was the first search for 44

percent of all global e-retail purchases (Khan, 2016). It is unclear how this translates specifically to online food purchases, but Amazon is working quickly and quietly to replace traditional grocery chains and supermarkets. The largest global internet company began eyeing food retail in 1999 (Figure 1), entering this sector in earnest in 2013, promising to upend food retail with e-commerce (Barr, 2013). In 1999, Amazon paid US\$42.5 million to acquire a 35 percent stake in HomeGrocer.com, the first fully integrated internet grocery shopping and home delivery service (Amazon, 1999). Amazon Gourmet Food Store launched in 2003, offering Amazon shoppers “gourmet” food, limited to dry goods and non-perishables (Amazon, 2003). In 2005, Amazon Services Europe Inc. announced an “alliance” with Marks & Spencer, the UK’s leading retailer of clothes, food, and

Figure 1. Amazon’s Transition into Food Retail, 1996–2020



home products, which also owns the U.S. super-market group, Kings Supermarkets (Amazon, 2005). While not an acquisition, the alliance stipulated that Amazon would host and provide the technology behind the Marks & Spencer-branded website. In 2006 the launch of Amazon Fresh offered consumers free delivery on dry groceries including Kraft and Kellogg products, and natural and organic brands like Annie's Homegrown (Amazon, n.d.-a; Leighton, 2019). The following year Amazon launched Subscribe & Save, offering customers free shipping and product discounts on grocery deliveries (Amazon, n.d.-e). In 2007 Amazon's Grocery store was hailed for its "strong launch into online grocery retail" by international food and grocery experts IGD (as cited in Amazon, 2007, para. 4), and it was listed among the "Ten to Watch in 2007" in Global Retail Innovation (Amazon, 2007).

Between 2008 and 2014, Amazon was relatively quiet in the food space, announcing little besides the launch of the Amazon Wine Store in 2012 and the expansion of Amazon Grocery to Canada and Australia. Then, in 2014 it launched Prime Now, a one-hour delivery of items (including fresh produce, prepared meals and baked goods) from local stores in New York City. Throughout 2015 and 2016, Prime Now expanded to other cities where delivery from local farmers' markets and grocers became a key marketing feature.

In 2015, Amazon introduced the Dash Button, an electronic device enabling Prime members to replenish frequently ordered goods with the (literal) press of a button. Food options were gradually added and there are now Dash buttons for Clif Bars, Nature Valley, and hundreds of other brands. By late 2017, Prime Now was available in more than 30 U.S. cities, with an increasing focus on the provision of organic and seasonal options. Amazon announced the launch of Prime Now in Seattle stating, "Prime members will find organic produce and meats from the region's best producers, made-from-scratch foods, freshly baked organic, non-GMO breads...from New Seasons Market" (Amazon 2017, para. 1). Following the 2014 launch of the Amazon Echo and Alexa (wireless speaker and voice command devices) shoppers could shop using their voice.

In June 2017, Amazon announced the acquisition of WFM, the largest U.S. organic retailer, for US\$13.7 billion. Jeff Bezos, Amazon's CEO, announced its strategy for WFM, citing a four-pronged approach that would include lower prices; making Amazon Prime the new customer rewards program; making WFM private label products available through Amazon.com, AmazonFresh, Prime Pantry, and Prime Now; and, making Amazon lockers available in select WFM stores, for local pick-up and item returns.

In August 2017 Amazon introduced Instant Pickup, a free service offering Prime and Prime Student members a "curated selection of daily essentials" (Better, 2017, para. 2), made available in self-service lockers in 22 staffed pick-up locations on or near a college campus in the U.S. In late 2018, Amazon and WFM announced the introduction of Prime Pick-Up, an option for members in select cities to shop online for WFM products and pick up their order in as little as thirty minutes, without leaving their car. While this section by no means covers all of the moves and innovations Amazon has made in food retail, it does suggest that Amazon's transition into food retail has been methodical and strategic, and therefore its acquisition of WFM was anything but sudden or unprecedented. This case study demonstrates a gradual but consistent series of moves, dating as far back as 1999 and continuing to the present day, to disrupt food retail and replace traditional grocery chains and supermarkets.

Applied Research Methods

Situating our work in the political economy tradition, we set out to explore Amazon's tactics and strategy in-depth. We relied on an iterative environmental scan. We cast our net wide and surveyed academic and grey literature, as well as media reports, that provide insights into Amazon's business strategy, the tactics deployed over the company's two-and-a-half-decade-long existence, and the reservations that other analysts have voiced regarding Amazon's commercial successes. The resulting synthesis is equally descriptive and analytical, as we attempt to reveal the "big picture" story of Amazon and its surreptitious entry into the food retail space.

Analysis

Amazon's expansion from its already dominant position in global e-commerce into fresh food retail, a highly regulated sector with typically slim profit margins, is a product of multiple motivations, enablers and tactics. The key aspect of this development is Amazon's overall business strategy, which was already well-suited to the risky business of online groceries. While food retail is strictly regulated, the e-commerce regulatory environment is lax and caters almost solely to consumer welfare. In concert, strategy and regulation allow Amazon to use groceries as the gateway into a world in which customers can purchase all goods from them, becoming what Bezos considers "Earth's most consumer-centric company" (Amazon, 2018, p. 7).

Amazon's Business Strategy is Conducive to Risky, Low-Profit Online Grocery Business

Jeff Bezos' first letter to shareholders in 1997 laid out his vision for the future of Amazon. Its long-term investment philosophy would center around extending and solidifying Amazon's market leadership position, and the metrics of success would be "customer and revenue growth" and "the degree to which...customers continue to purchase from [Amazon] on a repeat basis" (Bezos, 1997, p. 2). A balance would be struck between growth, long-term profitability, and capital management; critically, Amazon would "choose to prioritize growth," believing that "scale is central to achieving the potential of [its] business model" (Bezos, 1997, p. 8).

Bezos recognized that becoming consumers' one-stop-shop would require investing aggressively and spending billions to expand capacity (Khan, 2016). Bezos was playing the long game. Amazon's prioritization of growth at the expense of short-term returns also hinged on a second, related strategy: to "sustain losses" while "integrat[ing] across multiple business lines" (Khan, 2016, pp. 746-747). These strategies enable Amazon "...to leverage advantages gained in one sector to boost its business in another" (p. 747). A customer-first approach underpins the strategies of growth-over-profit and integration across business lines. Bringing new value to customers through e-commerce

and merchandizing, while solidifying and extending Amazon's brand and customer base were explicit goals for 1998 (Bezos, 1997). This required "... sustained investment in systems and infrastructure to support outstanding customer convenience, selection, and service while we grow" (Bezos, 1997, p. 4).

Additionally, Amazon's place in data and data-service markets has given it tremendous commercial stature. The systems and infrastructure requiring investment cannot be disentangled from the big data platform that enabled Amazon's development and that now helps keep and grow Amazon's customer base. While retail is Amazon's "core" business, what gives Amazon the freedom to take risks in chancy, regulated, low-profit-margin industries are its nonprimary business offerings that are much more profitable: Amazon Web Services (AWS), Amazon Prime, and Marketplace with Amazon's accompanying ad business.

Following that 1997 letter, Amazon spent two decades taking risks, incurring losses, and investing heavily in systems and infrastructure to develop what it now refers to as its "three pillars" or "life partners." AWS, Amazon's "secure cloud services platform, offering compute power, database storage, content delivery and other functionality to help businesses scale and grow" (Amazon, n.d.-g, para. 1), is now the world's biggest cloud computing business (Dastin, 2017). In 2018, AWS accounted for US\$7.8 billion in operating income (Condon, 2019). Marketplace, a platform that charges a fee to retailers to sell their wares alongside Amazon products, gives sellers "access to the world's largest e-commerce platform and customer base" (Galloway, 2017, p. 25), allowing Amazon to vastly expand its offerings without the expense of carrying additional inventory. Sellers can pay to have their wares appear as top search results, generating additional advertising revenue for Amazon. Most critical to the push into food retail is Amazon Prime. While "originally designed as an all-you-can-eat free and fast shipping program" (Bezos, 2014, p. 2), Prime has become a "physical-digital hybrid that members love" (Bezos, 2014, p. 2), offering "free two-day and same-day shipping on eligible orders and other benefits" (Amazon, n.d.-b, para. 1).

Amazon made massive investments in these three pillars, which now have a staggering degree of architectural flexibility and scalability, making Amazon the “world’s most valuable public company” in 2019 (Oreskovic, 2019, para. 1). These pillars enable Amazon to integrate across business lines. Whereas Amazon’s acquisition of WFM is what made food systems analysts take note, it is these pillars that have allowed for Amazon’s much subtler but pervasive penetration across the agri-food value chain. We next take a closer look at two services that have infiltrated the agri-food sector through a process of stealth: AWS and Amazon Prime.

AWS in the Food System

AWS provides cloud-based services to large-scale agribusiness, U.S. federal regulators, and retailers. Bayer Crop Science, one of the world’s largest agricultural companies (Amazon, n.d.-i, para. 1), relies on AWS Internet of Things (IoT) devices to enable real-time data collection “to get seed data to analysts in just a few minutes instead of a few days” (Amazon, n.d.-i, para. 3). The U.S. Department of Agriculture (USDA) Food and Nutrition Service, which administers nutrition assistance programs, also relies on AWS to host its web application SNAP Retailer Locator, to direct the nearly 47 million nutrition benefits recipients to the nearest authorized store (Amazon, 2014a). The U.S. Food and Drug Administration, whose mandate includes ensuring the safety of the U.S. food supply (“What We Do,” 2018), relies on AWS to, among other things, make its “data entry process more efficient and reduce costs” (Amazon, 2014b, para. 1).

At the time of Amazon’s acquisition, WFM was relying on Microsoft for software as a service (SaaS) (Novet, 2017, para. 1) in place of applications developed in-house (Microsoft, 2016). AWS and WFM have thus far refused to comment on whether WFM would adopt AWS and move away from Microsoft (Novet, 2017, para. 6).

As more actors rely on the AWS cloud-services architecture, the architectural advantages of large sites set the conditions for a digital economy of scale, wherein large firms become more efficient as they scale up (Hindman, 2018, p. 20). The develop-

ment of networking infrastructure, hardware, and software has resulted in cheaper (per computer) data centers, allowing Amazon to “deploy more computing power, and bandwidth per dollar than smaller firms” (Hindman, 2018, pp. 22–23).

The flexibility of AWS’s vast computing possibilities is critical to its success. As Hindman (2018) states, “while web-scale data centers are an enormous upfront cost, they can be adapted to do many different tasks” (p. 23). Amazon has gleaned immense benefit from integrating its web-scale technologies and applications (Hindman, 2018), users of which include conglomerates like Kellogg’s and Unilever (Amazon, n.d.-c), and local and national governments that now use AWS’s Gov-Cloud to meet their growing cloud-computing needs (Amazon, n.d.-d). AWS has positioned itself as an underlying data architecture that works across business lines. The result is what Bezos enthusiastically refers to as a “dreamy business offering,” that is “market-size unconstrained,” whose opportunity encompasses “. . . global spend on servers, networking, datacenters, infrastructure, software, databases, data warehouses and more” (Bezos, 2014, p. 4). Bezos recognizes the “stickiness” with AWS, stating that as more customers (individuals, businesses, and governments) become comfortable and proficient with AWS tools, it will be only rational that they stay with what they know (Bezos, 2014, p. 4). As Amazon conducts more business across the food system, making governments, regulators, agribusiness, and retailers increasingly reliant on their services, these developments should raise serious questions about the company’s control and power and who is (or is not) going to check its power.

Amazon Prime: Supply Chain Innovation

If AWS is the infrastructure that makes companies and governments increasingly reliant on Amazon, then Prime is the ever-adaptable flywheel that keeps customers coming back. Prime, described in 2015 as a money-pit (Mangalindan, 2015, para. 7), more recently as an innovator in supply-chain management (Leblanc, 2019), and now as the world’s most ingenious customer loyalty program (Bruce Consulting, 2017), emerged out of Amazon’s early goal to grow customer loyalty.

With fast and free shipping, Bezos sought to make Prime so valuable that “you’d be irresponsible not to be a member” (Bezos, 2015, p. 2).

Prime required massive investments and years of profit losses. It launched publicly in 2005 with an annual membership fee of US\$99. Members received guaranteed two-day shipping on hundreds of thousands of products (Amazon, n.d.-b). Bezos admitted these were “bold bets” (Bezos, 2015, p. 1) to develop quick and efficient supply-chain management. First, Amazon outsourced inventory management and insourced logistics (Leblanc, 2019). By outsourcing inventory management to third-party sellers (which account for nearly 82 percent of Amazon’s sales) but relying on its own delivery logistics to deliver, Amazon would be able to use its own delivery vehicles and systems to ensure shorter delivery timelines (Leblanc, 2019). Second, Amazon began to rely on “different warehouses for different kinds of products and customer preferences for delivery options” (Leblanc, 2019, para. 6) that range from one-day delivery, free super-saver delivery, and now 1 to 2 hour delivery. Third, Amazon enabled a push/pull strategy, wherein “Amazon’s own warehouses are strategically placed, moving closer and closer to main metropolitan areas and city centers,” which acts as a “push strategy for the products it stores in its warehouses” (Leblanc, 2019, para. 7). The pull strategy is alternatively employed when Amazon sells products from third-party sellers, who store their own goods but rely on Amazon to pick up and deliver the products (Leblanc, 2019).

The fourth strategy pertains to the location, size, and number of warehouses critical to Amazon’s successful supply chain (Leblanc, 2019); Amazon now has “75 fulfillment centers and more than 125,000 full-time employees” in North America alone” (About Amazon Staff, n.d., para. 1), strategically “positioning warehouses in proximity to local urban markets” (Leblanc, 2019, para. 8). The fifth strategy involves automation. In 2012, Amazon acquired Kiva Systems, a “provider of automated and robotic warehouse solutions” (Leblanc, 2019, para. 9). Cutting-edge technology and robotics were introduced into Amazon’s fulfillment center (About Amazon Staff, n.d.), where robots “pick and pack without . . . human

assistance” (Leblanc, 2019, para. 9).

The rate of Amazon’s innovations in supply-chain management makes it difficult for other companies to compete (Leblanc, 2019). Amazon is “forcing its major competitors to invest more in supply-chain automation, lessen the overall product delivery time, [and] increase the number of warehouses . . .” (Leblanc, 2019, para. 20), and it has contributed to shifting customer demand. Bezos wrote in his 2016 letter to shareholders: “no customer ever asked Amazon to create the Prime membership program, but it sure turns out they wanted it . . .” (Bezos, 2016, p. 1). As consumers learned that they could expect quicker delivery at no added cost, retailers faced intense pressure to adapt (Leblanc, 2019). Prime helped Amazon grow into the large company it is today, “. . . and there are certain things that only large companies can do” (Bezos, 2015, p. 1).

Amazon Prime in the Food System

Amazon’s early prioritization of efficient supply-chain management and, significantly, its focus on automation and technological innovation both have contributed to an architectural advantage required to offer Prime members increasingly fast delivery. But research on the failure of e-grocers shows that improved supply-chain operations are “not enough to reach a significant market share in the grocery market” (Kämäräinen & Punakivi, 2010, p. 292), as “a range of new value-added services is also needed” (p. 292). Herein lies the impetus for the seemingly never-ending assortment of what Amazon Prime refers to as “other benefits” (Amazon, n.d.-b) intended to attract and maintain audiences (Hindman, 2018, p. 23), or in this case customers.

With more than 100 million Prime members, Amazon has been boosting the benefits linked to its grocery services, “enticing consumers to spend more via a growing number of discounts linked to Prime membership” (Brick Meets Click, 2018, p. 3). This makes sense, given that members, on average, spend twice as much per year compared to non-members (Floship, 2017, para. 15). Prime is the gateway through which to attract more members and encourage existing members to spend more. “Convenience [is] the true source of loyalty,”

and no business offering does it better than Prime (Baille, 2018, para. 16).

Prime and Amazon's Food Business: Integration Over Time

Amazon has been integrating Prime into multiple aspects of its food business since Prime's launch in 2005. From offering customers free shipping on dry grocery products in 2006, to one-hour delivery service from local farmers' markets and grocers in 2015 via Prime Now, Prime's perks have evolved. But the power of Prime has also grown to such an extent that it actually drives Amazon to integrate across any number of business lines. In food retail, Prime can no longer be separated from in-store logistics, check-out, and delivery. The clearest example of this process of integration is Amazon's acquisition of WFM.

In a press release following the closing of the acquisition on August 28, 2017, Amazon and WFM announced their intent to make "high-quality, natural and organic food available for everyone" (WFM, 2017, para. 1). On the Monday following the acquisition, WFM's prices of typically high-cost groceries such as organic brown eggs, responsibly farmed salmon, and avocados were slashed, in what the WFM press release called a "down-payment" on their joint vision to make organic affordable without jeopardizing the high standards expected by WFM shoppers (WFM, 2017). Central to the acquisition was, however, Prime. Press releases from both Amazon and WFM publicized their plans to integrate Prime into the WFM point-of-sale system, promising special savings and in-store benefits for Prime members and, in time, inventions surrounding merchandizing and logistics that would ultimately result in lower prices for WFM customers (WFM, 2017).

A second round of price cuts came a few months later to coincide with the launch of Prime member exclusive promotions (which broke the WFM all-time record for turkeys sold during the Thanksgiving season) (WFM, 2018b). Free two-hour delivery on orders over US\$35 for Prime members was introduced in select cities (Amazon, n.d.-f) and benefits of the Amazon Prime Rewards Visa Card were expanded to give Prime members five percent back when shopping at WFM (WFM,

2018a). WFM private-label products were quickly integrated into Amazon's online platform so that customers could order online and have their WFM groceries delivered (for free with Prime). Further, lockers were integrated into the physical WFM stores to allow Amazon customers to pick up and/or return Amazon packages (not only grocery orders, but any Amazon product offering) (Gebel, 2019). Amazon devices (Echo, Dash buttons, and Alexa Home Systems) were integrated into the physical WFM stores for purchase and Amazon began "the technical work needed to recognize Prime members at the point of sale" (Hu, 2018, para. 5).

Today, all of Amazon's promises have been implemented. Cashierless grocery stores, "Amazon Go," that require Prime members to be recognized at point of sale so that they may take items off store shelves and be automatically charged for the items upon exiting, have rolled out in nine locations. At this point, Amazon Go locations are replacements for convenience stores, and while Amazon is testing cashierless technology in larger spaces with layouts similar to grocery stores, Amazon has not yet commented on the potential roll-out of these systems to WFM locations (Detrick, 2018).

Acquiring WFM gave Amazon 460 physical, brick-and-mortar stores in urban centers, close to a more affluent consumer base with an existing relationship to WFM products (Galloway, 2017). Amazon's greatest expense is and has always been shipping, and despite its success in obtaining greater market share in groceries, it has struggled to overcome multiple challenges (like other e-commerce retailers), including consumers' lingering preference to shop offline for their groceries (particularly meat and fresh produce) (Galloway, 2017). What this adds up to is "stickiness"—using online and offline economies of scale to keep customers coming back and maintaining Prime's ability to stay flexible and adopt innovations and new business ventures to reinforce customer loyalty.

Discussion: Implications for the Food System and Beyond

If Amazon's trajectory to grocery domination persists as anticipated, the consequences of this con-

centration will arguably be more severe than in most retail sectors, with implications that reach beyond food retail. As an internet company, Amazon is able to leverage its existing technological dominance and big data platform to innovate, implement, adapt, and grow at a pace that grocery stores, supermarkets, and other traditional food retailers have never had the capacity to do (nor were ever in the business of doing). Amazon spent years investing in high-cost, high-risk logistics systems and an extensive e-retail platform (Oja Jay, 2018). Now positioned as one of the world's largest data managers (Mooney, 2018), Amazon can "amass and analyse incredible quantities of data to extract commercially-relevant information" like never before (Oja Jay, 2018, p. 3). Generally speaking, those with massive platform capabilities are disruptive because of their ability to "[shift] the commercial advantage to the companies that have the most data and are most able to manipulate it" (Oja Jay, 2018, p. 3).

In July 2018, Microsoft announced a 5-year strategic partnership with Walmart to "accelerate Walmart's digital transformation in retail, empower its associates worldwide and make shopping faster and easier for millions of customers around the world" (Microsoft, 2018, para 1). In the vague media release, Microsoft indicated that the pair would embark on a "broad set of cloud innovation projects that leverage Machine Learning, Artificial Intelligence, and data platform solutions for a wide range of external customer-facing services and internal business applications" ("Walmart Establishes," 2018, para. 4). Around the same time, Reuters and others announced that Microsoft, like Amazon, was working on the development of cashierless technologies (Dastin & Nellis, 2018). In 2019, Walmart proudly announced a series of innovations being piloted or integrated into stores, from automated shelf scanners that "identify where in-stock levels are low, prices are wrong or labels are missing" (Walmart, 2019, para. 10), to the 'alphabot,' which uses autonomous mobile carts to deliver items from storage to store associates who prepare and deliver orders to customer vehicles (Walmart, 2019, para. 9).

In January 2019, grocery giant Kroger announced a partnership with Microsoft to

"redefine the customer experience and introduce digital solutions for the retail industry" (Kroger, 2019, para. 1). They started by piloting two stores with an integrated smart technology system "powered by Microsoft Azure and connected by IoT sensors" to market new a Retail-as-a-Service (RaaS) product to the industry (Kroger, 2019). Like AWS, RaaS is a commercial product marketed to the rest of the grocery retail sector that "offers a suite of capabilities to support [key performance indicators] and merchandising plans, collect consumer insights, enhance employee productivity, improve out-of-stocks, better the customer experience, and allow for hyper-personalization using proprietary technology" (Kroger, 2019, para. 7).

Kroger and Walmart are just two examples of traditionally dominant retailers jumping feet first into the grocery data competition. Other partnerships have been emerging, including Microsoft's recent pairing with Albertsons (Liptak, 2019), which is the second largest grocery chain in the U.S., (having acquired Safeway in 2014; see iPES-Food, 2016), and Google's partnership with French grocery chain Carrefour for online food delivery (Shoot, 2018). Costco, too, has joined the ranks offering same-day delivery after establishing a partnership with online grocery delivery service Instacart (Bloomberg, 2019).

The consequences of this rapid race to datafication remain to be seen, but it seems likely that these changes will facilitate even greater market concentration in food retail. Food retail markets are highly concentrated regionally due in large part to food products being "purchased by individuals in the direct vicinity of their home, meaning that the concentration of retailers in a given region is what matters in terms of shaping food systems and food choices" (iPES-Food, 2016, pp. 43–44). Purchasing regionally traditionally has required that grocers have a brick-and-mortar store everywhere, which has been difficult for even the biggest food retailers and has kept them "small" (Oja Jay, 2018, p. 15). Amazon's use of its big data platform and the lax enforcement (and perhaps insufficient nature) of antitrust regulation, however, is paving the way for a restructuring in the food system that will create players bigger than the food retail space has ever seen before. Big data does, after all,

demand concentration; as ETC Group notes, “...no company at any point in the [food] chain can risk allowing others to gain control of more information” (Mooney, 2018, p. 10). This restructuring is playing out with dominant firms expanding in multiple directions (Howard, 2016). Vertical integration, or the act of “firms buying upstream suppliers or downstream retailers,” both nationally and globally in order to become “more directly involved in other stages of the food system” (Howard, 2016, p. 24), is becoming increasingly common (Howard, 2016).

While Amazon prepares to control the food retail ecosystem, Walmart is acquiring logistics and fulfillment companies across the globe, such as Parcel, a “technology based, same-day and last-mile” (Walmart Staff, 2017, para. 1) food delivery company in New York City, and Cornershop, a food delivery service in Latin America, to help escalate its online grocery business in Mexico and Chile (Solomon, 2018). Costco is vertically integrating into meat production (with plans to launch in-house poultry production, see Devenyns, 2018) in a move to “better manage supply and costs” (Gerlock, 2018, para. 5). This move comes at a time when the highly concentrated poultry-production sector is “trending away from raising chickens to be sold whole” (Gerlock, 2018, para. 5); Costco sells approximately 60 million rotisserie chickens per year.

Traditionally dominant supermarkets like Walmart, Costco, and Kroger are recognizing that survival hinges on bridging the offline/online divide. Amazon is neither the inventor nor the agitator of concentration in the food value chain, but it appears to be laying a new framework for success, ploughing through traditional food retail barriers to enact standalone supply chains that afford them a level of control unprecedented in food retail. Likewise, the world’s largest tech companies have recognized that the fight for control of the grocery market is one well worth jumping into. But, while the largest retailers have the money and scale to invest in costly digital acquisitions and partnerships, food retailers that are local or regional and/or independently owned, and that operate at small and medium scales, will be left to navigate a different landscape entirely, and space

for new entrants into this sector will shrink even further.

Faced with the ‘adapt-or-die’ ultimatum of offering both online and offline services, smaller players in food retail that lack the logistics and fulfillment systems and online platforms may be increasingly forced to “choose” Amazon. Food processors, too, are facing increasing pressures felt across the manufacturing sector to sell through Amazon if they want to succeed or even survive (Del Rey, 2019). Whether it is Instacart (online grocery delivery platform) or Eataly (a provider of Italian food and beverages) (“Retail Case Studies,” n.d.) using AWS for its online service offerings, or one of the many food processors and grocery stores using Amazon’s Marketplace, competitors are now Amazon’s customers; those customers are increasingly at the whim of Amazon as the setter of terms.

The more “customers” Amazon has, the more data-grabbing it can execute and monetize. Alistair Fraser defines data-grabbing as “. . . firms (and government agencies) . . . gathering as much data as possible from customers (and from those with whom customers interact online) . . . to inform innovations and direct strategic investment” (Fraser, 2019, p. 895). As Amazon grabs more data “add[ing] value (by aggregating or packaging),” algorithms use those data to “target consumers with ads and services, thereby shaping subjectivities” and increasing their competitive advantage (Fraser, 2019, p. 895). As Alexa’s capabilities expand, for example, it will be increasingly able to proactively recommend specific grocery items. Additionally, because of the edge Amazon has over traditional food retailers in its ability to monetize data, it has a permanent advantage to “use a price point unsustainable or flat out unachievable for other retailers” (Clinton, 2018, para. 21). In making competing food retailers into customers, Amazon gains the ability not only to set terms around what products are made visible and available, and the cost of those products, but also what should be surveilled of consumers, how market data can and should be used, who controls it, and what enforcement mechanisms are enacted (or not) to make Amazon the default grocery provider.

Retailers that avoid Amazon, for whatever

reason (cost, scale, philosophy), may not be much better off. Patrick Clinton sums it up well; “sure, a regional, family-owned grocery chain can use loyalty cards to collect data about what its customers buy and what price points they’re sensitive to . . . but Amazon can use what it learns in one realm to make predictions about entirely other realms” (2018, para. 21). As ETC Group notes, people “‘use’ food every day—and buy it every other day” (Oja Jay, 2018, p. 15). Smaller food retailers in the past have benefited from their ability to be consistent, physical providers that consumers preferred. That advantage is slipping away, as “food doesn’t even need to make companies like Amazon money if customers fill their carts with other ‘stuff’” (Oja Jay, 2018, p. 15).

How can small, independent retailers compete in a new environment, where the company consumers rely on for a basic necessity like food are actually not even truly “in the business” (Clinton, 2018, para. 20) of food? Tech companies are playing an entirely different retail game, and traditional grocery giants are scrambling to follow suit. The smaller players, however, will struggle to make supply and price decisions based on limited information, while Amazon and others mine massive amounts of data for a detailed understanding of consumer food habits and preferences. As Hindman (2018) reminds us, sites like Amazon render digital economies of scale inaccessible to small retailers, where “only the biggest sites can personalize ads and content efficiently” (p. 163).

Beyond Retail

Whereas implications of these developments are the most obvious in retail, they are also far reaching elsewhere in the food system. Retail concentration has significant impact along the entire value chain and has been shown to present significant challenges to producers and processors (Hendrickson, Howard, & Constance, 2017; Lang, 2004), as well as other distribution actors (Friedmann, 2007). If Amazon is successful in becoming one of two or three global food retailers, as is predicted to occur in the next ten years, it may likely have the power to negotiate with the other retail giants to “determine what food will be harvested from the fields and oceans and what will be brewed and baked by

robots” (Mooney, 2018, p. 35).

Prominent groups have in recent years called for a move away from the concentrated, industrial food system (FAO, iPES Food) and diversification of food systems around the globe. This diversification refers as much to size and scale as it does to biodiversity in production (iPES-Food, 2016, p. 69). In the industrialized world, there is a movement afoot to rebuild community food systems and in recent years there has been growth in local food businesses, community gardens and kitchens, local food hubs, farmers’ markets, food-related social enterprises, and other types of community food initiatives (Winnie, 2010). But this growth is leveling off. For instance, between 2007 and 2012, direct-to-consumer farm sales in the U.S. grew by eight percent to reach US\$1.3 billion (USDA, 2014, p. 1). Three years later, the sales more than doubled to surpass US\$3 billion (USDA, 2016, p. 2). But the 2017 U.S. agricultural census shows a drop in direct-to-consumer farm sales for the first time in years, down to US\$2.8 billion (White & King, 2019, para. 4). Recent analysis of this data by O’Hara and Benson (2019) points to online sales as likely one of key factors in this decline. Whereas online platforms have opened up opportunities for direct-to-consumer sales for small producers and processors, many of which are trying to sell locally (Carolan, 2017), the trends described above indicate that such platforms have yielded more opportunities for the large players. As O’Hara and Benson point out, even direct-to-consumer online sales by small enterprises “conceivably can occur across any distance” (2019, p.33), which would suggest that in addition to revealing the decline in sales, the census numbers may also be obscuring other developments that could undermine community food systems.

Agri-food conglomerates are already adding data and related technologies to their portfolios, allowing for even greater integration across sectors. This integration comes with troubling consequences such as consolidation of power, tougher competition for small players, and increased barriers to entry for new enterprises (Bronson & Knezevic, 2016; Fraser, 2019; Mooney, 2018). Amazon is moving from the other direction—rather than being an agri-food company entering

data markets, it is a data company entering the food sector. The implications, however, are similar, and the above noted relationship with Bayer Crop Science suggests that rather than these being discreet market dynamics in the food-data mix, they are a sign of cross-sectoral convergence.

Conclusion

Amazon challenges the notion that contemporary commerce is preoccupied with short-term profit. We have demonstrated that Amazon's business strategy, combined with an inadequate regulatory regime, enabled it to enter into the risky and complex business of food retail through stealth. Amazon's willingness to forego short-term profit in the name of long-term growth led to the development of flexible, scalable, and profitable business pillars (Pappageorge, 2017). These pillars, which required aggressive and costly investments in the early years, became the tools that contributed to Amazon's integration across any number of business lines. Amazon acquires companies up and down the supply chain in any and every sector, in an effort to streamline services, under the guise of creating a frictionless experience for customers.

In a regulatory environment that is always behind the big-tech developments, Amazon thrives. Active or would-be competitors are eliminated by acquisition; those that become customers are mined for data and business knowledge, leading to cloning of products or services (Wu, 2018, p. 125) and then Amazon's marginalization of those same companies by, for example, privileging their own products online. Individuals are not exempt; their data too, is mined and monetized. In the context of modern-day tech trusts, data implications for privacy and data control are critical. Yet, as iPES-Food notes, these implications are a blind spot in antitrust regulation (2017, p. 80). Viewed in the context of food retail, then, is the realization that Amazon's acquisition of WFM in 2017 was not a new play for the tech company, nor were its previous forays (Amazon Fresh, etc.) or subsequent moves (Amazon Go, etc.) out of character. Instead, food retail is merely collateral damage in what is a stealthy, larger quest to become "Earth's Biggest Store." We see this as particularly dangerous for food retail and food systems in general.

In light of the new business models employed by big-tech and a regulatory system that is perpetually playing catch-up, we add our voices to the movement of scholars and governments calling for a reassessment of antitrust laws. This call for an end to self-regulation by big-tech companies is gaining momentum, particularly with U.S. regulators seeking to investigate antitrust activities and the implications of data collection and analysis on privacy and democratic processes more broadly. The case of Amazon is one of many contributing to this movement (United States Senator Elizabeth Warren has called for the uncoupling of anticompetitive mergers like Amazon's acquisition of Whole Foods). The particularly dangerous ramifications of unchecked, concentrated power in food retail for all links in the food chain necessitate that those working in the development of food systems policy add their voices and expertise to this movement.


Beyond regulation, the advancement of food policy that guides and drives local food systems is arguably necessary now more than ever. Ensuring food systems are participatory, resilient, and serve to improve the health and well-being of people, the environment, and the economy can be advanced in part by policies that promote and incentivize local food infrastructure and take a coordinated, people-centric approach to food policy and governance. The inclusion of a funding line for a Canadian national food policy in the 2019 federal budget is one example of a promising step forward in the establishment of a coordinated food systems approach, but it will require continued advocacy and political will in order to come to fruition as an operational food policy.

This case study also has implications for the future of food systems research. Our observations may not surprise scholars in critical data studies and communication studies where Amazon and its impact on other sectors have been watched with interest for years. But food systems scholars have not given much attention to Amazon and other tech giants. Whereas some scholarship is emerging on the impact of data technologies and the associated power in relation to agriculture (Bronson & Knezevic, 2016; Carolan, 2017; Fraser, 2019), we now require similar attention paid to the retail end

of the food chain where implications are no less critical. Additionally, while communication, digital media studies, and other domains traditionally focusing on the impacts of big-tech and data on retail markets have often grouped food retail together with any number of other businesses (from personal-care to books and furniture), future scholarship should take into account the unique complexities and ramifications of big-tech and data on food retail and food systems more broadly. We stress the need for an integrated, interdisciplinary, system-wide approach that includes communication, media, and critical data studies with food retail and food systems domains; our ability to understand, prevent, and respond to potentially dangerous trends and shifts in tech and food retail depends on all of this expertise being at the table.

This same call to attention applies to food systems practitioners. Community organizations, food activists, and regional officials (from public health to planning departments) invested in rebuilding community food systems are typically not well-versed in the trends that characterize the big-tech sector. Given that software-designers are

similarly not versed in food systems, the gap between big-tech and community food systems goals is likely to widen. This can only be remedied by deliberate efforts to engage tech developers into conversations about the future of tech in food systems.

Ultimately, the world may be able to afford, or at least adapt to, a reality in which Amazon dominates the book industry. But eaters, producers, food processors, retailers, and community food systems cannot afford domination by the world's biggest tech companies. In the words of ETC Group, "it is not what happens to Amazon or Walmart that matters – it's what happens to food security" (Oja Jay, 2018, p. 15). 

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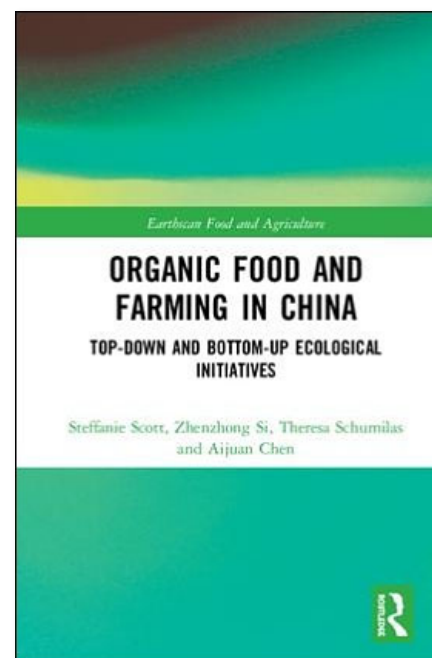
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Transforming industrial food systems to prevent future disruptions

Review by Laxmi Prasad Pant, Natural Resources Institute, University of Greenwich*

Review of *Organic Food and Farming in China: Top-down and Bottom-up Ecological Initiatives*, by Steffanie Scott, Zhenzhong Si, Theresa Schumilas, and Aijuan Chen. (2018). Routledge. Available as ebook, hardcover, and paperback; 236 pages. Publisher's website: <https://www.taylorfrancis.com/books/e/9780203701706>



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I cannot emphasize enough the relevance of the work reported in this book, most notably how Chinese consumers procure food, including so-called wet markets that are often blamed for infectious disease outbreaks (e.g., SARS-CoV in 2002 and SARS-CoV-2 in 2019). For this reason, JAFSCD has allowed me to review this book although it was ably reviewed by Anthony Fuller in the previous issue of JAFSCD (Fuller, 2020). This book provides theoretical as well as empirical analysis of food systems in China, a country with

the largest human population. It also details the long-established history of how traditional wet markets have become culturally important for food, nutrition, health, livelihoods, and wellbeing of Chinese residents. The book is divided into 10 self-contained chapters. Chapter 1 introduces the topic with a compelling story of how the authors' journey to write this book began after they attended the BioFach China trade fair in Shanghai, the biggest annual organic food trade fair in the country (<http://www.biofachchina.com/en/>). This chapter also outlines the research objectives and methods for data collection and analysis. Chapter 2 provides further context surrounding China's changing food systems after the economic liberalization in the late 1970s, following the death of

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Mao Zedong, former chairman of the People's Republic of China. It was the time when industrial agriculture gained momentum in the country. Together with crop monoculture that eroded agricultural biodiversity and polluted air, water, and soil, industrial livestock production led to the concentration of animal wastes and excessive use of antibiotics and growth hormones.

Subsequently, chapters 3 and 4 provide empirical evidence on the state-led promotion of food systems that offer alternatives to industrial food systems, and chapter 5 discusses bottom-up grassroots initiatives. Farmers markets, often labeled as organic markets in China, provide alternative market spaces for emerging middle-class customers who can pay a premium price for the perceived quality and safety of agricultural products sold in these markets. Food prices are lower in China's supermarkets and traditional wet markets than in farmers markets. Chapter 7 presents a case study of the Beijing Organic Farmers' Market to illustrate how such markets serve as contested spaces. The remaining chapters (chapters 6, 8, and 9) cover the cross-cutting issues of agricultural and rural development in China, and the final chapter (chapter 10) concludes the book with a reflection on the development of alternative food systems and agrarian movements in China.

The remainder of this review focuses on the three types of food markets in China: modern supermarkets, traditional wet markets, and farmers markets. It further discusses the implications of these markets on building resilience and transforming food systems to avoid future disruptions from sudden shocks as well as gradual stresses.

Modern Supermarket

The term "supermarketization" is used five times in the book, primarily to discuss how the global trend of bigger, faster, cheaper, and standardized food products co-exist with China's traditional food systems, often with tensions and contestations based on beliefs and values of either system. A recent study by some of the same authors (Si, Scott, & McCordic, 2019) documents that supermarkets in Nanjing, the capital of China's eastern Jiangsu province, normally sell rice, dairy, eggs, pasta, noodles, cooking oil, sugar, white bread,

brown bread, tea, snacks, coffee, sweets, chocolate, potato chips, French fries, canned vegetables, frozen pork, canned fruit, frozen beef, frozen lamb, cooked lamb, frozen shellfish, and canned meat. This mode of marketing is based on the principle of a "just enough, just in time" food supply that depends on standardized and homogeneous products sourced from the monoculture of crops, livestock, poultry, and aquatic species.

Traditional Wet Market


The book reveals that despite the expansion of supermarkets, most Chinese consumers continue to purchase foods in traditional wet markets. Food items more commonly acquired in these markets are fresh fruits and vegetables; raw pork, chicken, fish, beef, lamb, shellfish and offal; frozen fish and chicken; cooked pork, chicken, beef and shellfish; and steamed bread and patty, sowbow, pies, and samosas (Si, Scott, & McCordic, 2019). The name "wet market" appears five times in the book to illustrate why traditional markets still exist. Wet markets are diverse in form, contrary to international media portrayals of these markets as homogenous spaces with food safety, quality, and animal welfare concerns (T. Zhong, Si, Crush, Scott, & Huang, 2019). Furthermore, a study in southern China, specifically Sanya in Hainan province and Guangzhou in Guangdong province, concludes that the cultural construction of freshness creates a niche for small-scale traders in traditional wet markets (S. Zhong, Crang, & Zeng, 2020). The proportion of households with food and nutrition security is 79% in Nanjing, which is attributed to access to traditional wet markets (Zhong et al., 2019). The industrial modernization of agriculture has pushed regionally oriented traditional food markets to the margins, partly because of the perceived food safety issues and adoption of the modern, fast lifestyle. Until the 1980s, most wet markets were informal street food vending operations, but starting in the 1990s, local governments regulated these markets by building closed, usually in indoor, spaces (T. Zhong & Scott, 2020). Farmers markets are sometimes considered as a viable alternative that would continue the gambit of traditional markets while addressing the perceived food safety issues.

Alternative Farmers Market

The book further notes that in contrast to traditional wet markets, where petty traders also bring products from large wholesale markets for resale, at farmers markets producers themselves participate, although there are many exceptions. Farmers market vendors also are not necessarily primary producers and traditional growers whose lives and livelihoods are dependent on agriculture. In this type of direct marketing, producers and consumers interact, often inviting the latter to visit farms. By way of comparison of farmers markets in industrialized countries, this book explains that Chinese farmers markets exclude customers who cannot pay a premium price for the perceived quality and safety of the produce being offered.

This book serves as an excellent resource for those who are interested in food systems resilience, robustness, and sustainability. However, it is missing an examination of problems with current animal protein sources, including industrial food animal production, live animal transport and sale, and illegal wild animal trade (Greger, 2007). As such, over 65 billion broiler chickens are slaughtered per year worldwide; the combined mass of these birds exceeds all other birds on Earth, and they are

unable to survive and reproduce without human intervention (Bennett et al., 2018). The current pandemic exposed the fault lines of the industrial food system, including the unfortunate burying alive of millions of young broiler chickens, plowing under of vegetables, and dumping of milk, all due to disruptions in the supply chain (Clapp, 2020).

The pandemic provides an opportunity to transform the industrial food system in China and around the world. It could be a mistake to push regionally oriented traditional food systems to the margins or, worse, to shut them down. Such an attempt to modernize food systems can severely affect millions of lives and livelihoods. Although it may appear counterintuitive, government bodies in China, in their efforts to adapt to the postpandemic food environment, temporarily relaxed street food vending regulations to achieve the twin goals of creating employment for low-income households in the informal sector while promoting food security (T. Zhong & Scott, 2020). The regulation and standardization of traditional food systems out of concern for quality and safety should differentiate wet meat markets and fresh fruit and vegetable markets, specifically in deciding the fate of Chinese wet markets in a postpandemic world. 

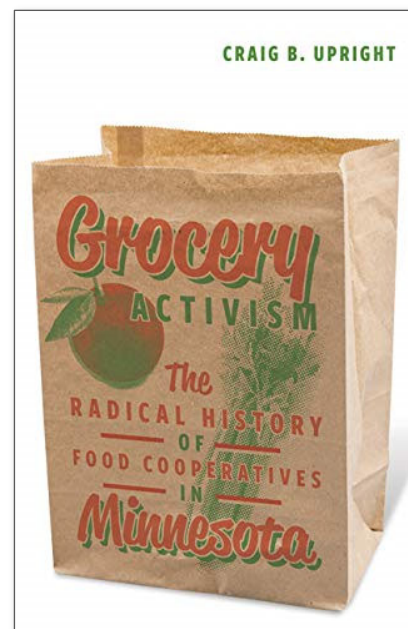
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Equity, environmentalism, and conscious consumerism: A review of *Grocery Activism*

Review by Leah Halliday, University of Louisville*

Review of *Grocery Activism: The Radical History of Food Cooperatives in Minnesota*, by Craig B. Upright. (2020). University of Minnesota Press. Available as paperback; 264 pages. Publisher's website: <https://www.upress.umn.edu/book-division/books/grocery-activism>



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Two crises pervading the current consciousness of society—the COVID-19 health crisis and the ongoing crisis of police brutality against Black Americans as evident in the recent murder of George Floyd in Minneapolis—make Craig B. Upright's *Grocery Activism: The Radical History of Food Cooperatives in Minnesota* particularly timely and relevant, though neither is the direct topic of the book. Upright outlines how grocery co-ops were able to find, sustain, and promote a niche in the market through a symbiotic relationship with the

natural and organic foods movement. Readers encounter a variety of voices from Minnesota's rich history of food co-ops, and while some voices are notably missing, the book provides a foothold into exploring the broad environmental, social, and economic implications of the aphorism Upright notes in the text: "Food is power."

Some tout the COVID-19 health crisis as a foreshadowing of the as yet unimagined manifestations of industrialized societies' failed stewardship of the earth. Upright's exploration of the connected development of the organic farming and grocery cooperative movements provides a thoughtful perspective on the power of food-based activism to influence values and foster a sense of conscious consumerism. One method for the latter

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is through the power of what Upright refers to as the “boycott,” a low-risk way to engage and sustain a sense of involvement with a movement through purposeful spending. Upright transports readers accustomed to organic choices even in mainstream stores to a time when these items were not only not available, but when the language and meaning of the terms had not been developed. He outlines pushback against the industrialization of agriculture through appeals to environment and personal health. His arguments focus on the organic food movement but touch on labor and land ownership by presenting the commodification of agriculture as a social and environmental harm. Upright examines the impact of retail co-ops in raising awareness and serving as stewards of information on sustainable agricultural practices. Indeed, Upright’s research would contribute to any conversation on green development and challenging the industrialized agricultural practices and infrastructures on which our society relies.

In creating a context for the co-op history, in addition to the exploration of the organic food movement, Upright establishes the Twin Cities as a prime, progressive locale for the development and sustenance of new wave cooperative groceries in the 1970s and beyond. This image of the area is difficult to reconcile with the revelations of the racial and economic inequities in Minneapolis that have captured the world’s attention in recent weeks. A part of this narrative that is largely missing, the stories of the Black co-ops, would help provide a fuller picture of Minnesota’s co-op story. While Upright rarely focuses on individual co-ops, focusing instead on a larger picture of the movement, his representation of minimalistic 1970s co-ops that kept the keys to the storefront at the police station for members to pick up as needed after hours does not address who would be excluded by this sort of arrangement. Further, while Upright includes a variety of historic photographs, including some of the Credjafawn Co-op Store (a successful African-American cooperative from the early first wave of cooperatives in the state), his mention of the store’s destruction when the freeway “was plotted through the center of the neighborhood” barely hints at the added complexity of the position of Black co-op organizers in this

social-economic experiment in cooperation (p. 63).

Perhaps the most exciting part of Upright’s history emerges in chapter 4, where he delves into the drama that emerged in Minneapolis from 1975 to 1976. During this year, the politically focused, Marxist-leaning Cooperative Organization (CO) clashed violently with the more natural-foods—focused contingent, forcefully occupying the area co-ops’ primary distribution center, the People’s Warehouse. Upright reasons that anti-war sentiment had brought many to the cooperative movement with a genuine but somewhat vague passion for change that was able to jumpstart an impressive surge of retail co-ops and a distribution infrastructure. He describes the co-op wars as a fire that forced the cooperatives to clarify the direction of their passions moving forward, allowing for more purposeful cooperation between co-ops. Those that survived were those that opted to focus on natural and organic foods. The co-op wars, Upright argues, actually strengthened the commitment and connections of the co-ops that survived; he highlights Hayagreeva Rao’s concept of “hot causes” and “cool mobilization” in this convincing analysis. Still, while Upright suggests that the CO leaders’ anti-imperialist stance may have been less than genuine, additional stories could help bear that conclusion out. The Bryant-Central co-op, for instance, the site of which was very near the now rapidly gentrifying area where George Floyd was killed, was a Black co-op in an area of the city where Black families were long compelled—by redlining and racial covenants in leases—to live. It is included in Upright’s comprehensive catalog of area co-ops but not elsewhere in the book. The stories of the city’s Black co-ops could help illuminate the complexity of the concept of cooperation between co-ops through which Upright understands the co-op wars.

The final chapter and conclusion look at the present and future. Considering the success of co-ops at making organic food so desirable and widely accessible an option, Upright acknowledges, one might expect co-ops to become obsolete. However, they are still driven by more than a financial bottom line. As arbiters of causes and conscious consumerism, co-ops will likely continue to define and develop their own relevance, just as they devel-

oped their business practices. Co-ops are poised to pivot toward new causes, allowing members and shoppers to continue to live their values at minimal risk. Upright points to the developing focus on local foods as a possible next direction.

Ultimately, with *Grocery Activism* Upright provides a wealth of food for thought. He offers a bird's eye view of the intersections of the organic

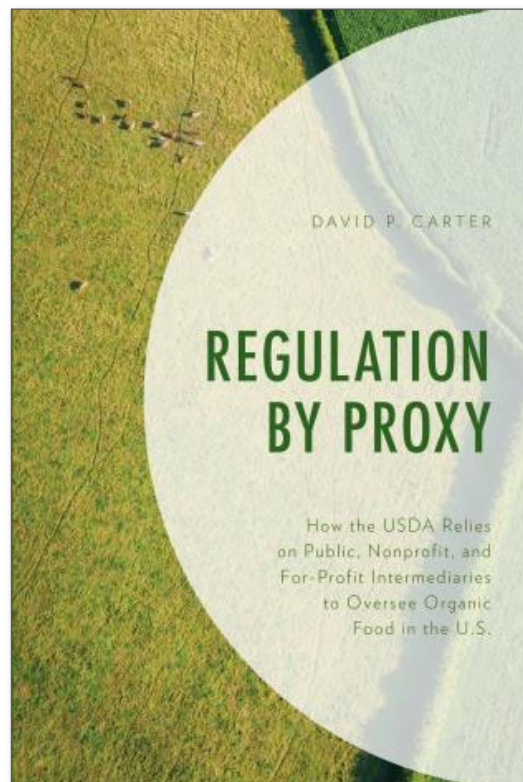
food movement and the dramatic history of grocery cooperatives, focused on a place where many co-ops still thrive today. While his work hits the current social landscape at just a time and in just a place that may draw readers' attention to the voices that are omitted, the text is rich in detail and insight and may serve as a springboard into further research and discussion.



The regulator, the target, and the intermediary: A comprehensive look at the regulation of organic food in the United States

Review by Sarah J. Morath, Wake Forest University School of Law*

Review of *Regulation by Proxy: How the USDA Relies on Public, Nonprofit, and For-Profit Intermediaries to Oversee Organic Food in the U.S.*, by David P. Carter. (2019). Rowman & Littlefield/Lexington Books. Available as hardcover and eBook; 262 pages. Publisher's website: <https://rowman.com/ISBN/9781498574198/>



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In *Regulation by Proxy: How the USDA Relies on Public, Nonprofit, and For-Profit Intermediaries to Oversee Organic Food in the U.S.*, Dr. David P. Carter,

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assistant professor of political science at the University of Utah, provides a comprehensive analysis of organic food regulation in the United States. The regulation of organic food is complex, and, as the book title suggests, organic regulation involves many actors with various roles. Although the federal government, through the U.S. Department of Agriculture (USDA), plays a role in organic certification, “the regulatory arrangement is not as simple as a regulator . . . regulating an industry activity . . .” (p. 7). Instead, The National Organic Program (NOP), a regulatory entity housed under the USDA’s Agricultural Marketing Service, relies

on “an assortment of ‘regulatory intermediaries’” (p. 7) independent from the NOP to develop and enforce uniform national standards for organically produced agricultural products sold in the United States. As a result, the regulation of the USDA organic standard is “decentralized” such that organic food is regulated by proxy.

Regulation by Proxy describes the various actors, or “proxies,” involved in organic regulation, examines their relationships with each other, and considers the incentives and constraints they face. The book also analyzes how this complex regulatory scheme affects the consistency and integrity of organic certification in the U.S. Throughout, Carter identifies the strengths and weaknesses of the USDA’s decentralized regulatory system for organic food—something he calls “an illustrative example of the complexity found across many regulatory settings” (p. 5). Carter uses the regulation of U.S. organic food “to examine the theoretical implications of a decentralized regulatory system that depends on public, nonprofit, and private action” (p. 6). As such, *Regulation by Proxy* would be of interest to organic food advocates as well as academics interested in regulation, public policy, and public administration more generally.

Relying on both primary and secondary data, Carter’s research is extremely thorough and balanced. The primary data comes mostly from his work with the Organic Regulation Research Project (a three-year research project carried out by a research team spanning multiple universities). This data includes both quantitative data from surveys and qualitative data from interviews with the various actors involved in organic regulation. The secondary data comes from publicly available reports and databases published by federal and state agencies. Carter also draws heavily from and acknowledges the scholarship of others, particularly as it relates to the evolution of organic food governance in the U.S.

Chapter 1 explains what Carter means by the phrase “regulation by proxy” and places it in the context of U.S. organic certification. Chapter 2, “A Framework for Examining Decentralized Regulation,” offers a framework for his analysis. Carter explains the regulator-intermediary-target model of USDA organic certification, with the NOP as the

“regulator” and the organic farmer as the “target” (p. 18). The intermediaries are entities that act “on behalf of a regulatory authority, or in conjunction with it, to achieve regulatory goals” (p. 13). Important to Carter’s analysis are four dimensions through which the outcomes and processes of decentralized regulation can be analyzed: regulatory fidelity, regulatory integrity, program feedback, and policy durability (p. 24). This framework guides Carter’s subsequent analysis of the various actors involved in organic certification.

Chapter 3, “Institutional Emergence and Evolution: The History of Organic Food and Governance in the U.S.,” describes the roots of organic agriculture and its evolution from self-regulation to third-party certification (or regulation by proxy). This chapter also includes a summary of the Organic Food Production Act of 1990 and the NOP regulations that followed. This chapter illustrates how the USDA organic certification’s decentralized regulatory design is a direct result of “the institutional legacy” of the organic movement (p. 43).

Chapter 4, “Systems-Based Regulations and Rulemaking Counsel: The USDA National Organic Standards and the NOSB,” discusses both the content of the USDA Organic standards and the development of those standards through the National Organic Standards Board (NOSB). This chapter acknowledges the growing discontent with both the development and content of organic standards and points to the recent emergence of supplemental certifications or “add-ons” as evidence of this disapproval.

“The Regulator: The National Organic Program” is the subject of Chapter 5. This chapter describes the structure and evolution of the NOP. In addition to this history, Chapter 5 offers a detailed description of the process through which the NOP accredits independent organic certifiers and monitors them for compliance with national organic standards. Carter notes the lack of data available to analyze this actor. Specifically, “no database exists by which audit findings can be readily aggregated and analyzed” (p. 80) and “no effort” has been made to “systemically assemble or assess all of the enforcement actions that organic certifiers take on [the NOP’s] behalf” (p. 82).

Consequently, while Carter concludes that the NOP has been “active in its accreditation oversight role,” he cannot state “the extent to which National Organic Program accreditation oversight ensures fidelity and integrity in the administration of USDA organic standards” (p. 87).

Chapters 6 through 9 discuss distinct intermediaries involved in organic regulation and their interactions with the regulator, target, and each other. These intermediaries include accredited certifying agents, organic inspectors, the California State Organic Program, professional associations like the Accredited Certifiers Association (ACA) and the International Organic Inspectors Association (IOIA), and materials review organizations like the Organic Materials Review Institute (OMRI). Each intermediary has a different responsibility: administrator, inspector, state-level enforcer, coordinator, and informer. These chapters make important points related to regulatory fidelity and integrity. For example, the chapter on accredited certifying agents (chapter 6) concludes that certifiers vary in decision-making, which could raise some regulatory fidelity concerns, “but there is no evidence . . . to indicate that certifiers respond to competitive certification environments in a manner that threatens the integrity of the USDA organic label” (p. 112). Inspector surveys analyzed in Chapter 7 reveal that “certifiers appear to demand ethical behavior from the inspectors they hire and are willing to issue penalties if they deviate from it” (p. 132).

The regulated target, certified organic producers, is the focus of Chapter 10. This chapter provides data on organic production over time and information on the motivations and perceptions certified organic producers have about practicing organic agriculture and maintaining compliance with the NOP standards. Carter concludes that regulatory integrity is a strong motivator of producers and that “willful violations of the National Organic Program regulations occur among a relatively small producer subset” (p. 184).

Chapter 11 provides a summary of findings from earlier chapters and offers ways in which Carter’s analysis could be extended. While Carter acknowledges that his “analysis raises as many questions as it answers” (p. 200), he offers several avenues for future inquiry, including the “‘black box’ of NOP rulemaking to determine how the USDA officials weigh NOSB recommendations against other forms of stakeholder input” (p. 200).

The book concludes with Chapter 12, which offers final reflections on the theoretical implications of regulation by proxy. Earlier scholarship has shown unease with the idea of “intermediaries assuming important regulatory responsibilities” (p. 207). Accountability and intermediary capture are common concerns. Carter’s findings “substantiate some of these concerns while tempering others” (p. 207). While reliance on third-party administrators may lead to lack of uniformity with enforcing standards, systemic intermediary capture does not seem to be a problem, at least when it comes to the NOP (pp. 207–208). In fact, it would be a “gross oversimplification to conclude that the decentralized administration of regulatory standards invites nothing but program liabilities” (p. 209).

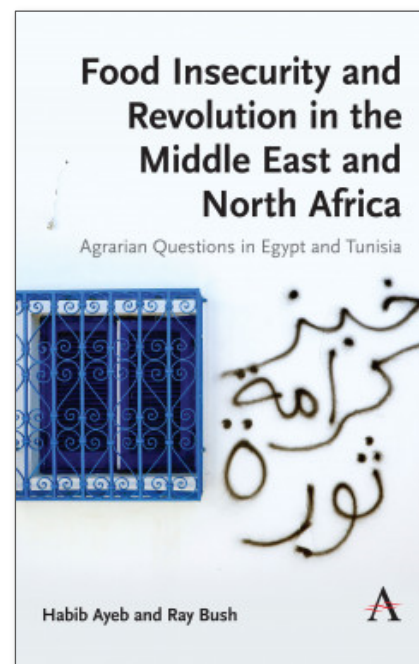
Regulation by Proxy is both empirical and theoretical, making it useful to those interested in the regulatory process and regulatory theory. It makes important contributions to both the narrower topic of organic regulation and the broader discussions of regulatory policy. In a time when many are questioning the legitimacy of the organic food label, the book offers measured reassurance. Perhaps the focus on the occasional producer is misplaced. Instead, perhaps it is the regulator that deserves greater attention. Toward the end of the book, Carter states that he set out “to conduct the most thorough analysis possible of the complex regulatory architecture by which organic food is governed in the U.S.” (p. 199). On all counts, he has succeeded.



Toward a model of food sovereignty in Egypt and Tunisia

Review by Jennifer R. Shutek, New York University *

Review of *Food Insecurity and Revolution in the Middle East and North Africa: Agrarian Questions in Egypt and Tunisia*, by Habib Ayeb and Ray Bush. (2019). Published by Anthem Press. Available as hardcover, paperback and eBook; 216 pages. Publisher's website: <https://www.anthempress.com/food-insecurity-and-revolution-in-the-middle-east-and-north-africa-hb>



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“Food sovereignty,” write Habib Ayeb and Ray Bush, “is a framework and set of policy praxis that prioritises the principle and policies to deliver food as a human right rather than as just another commodity exchanged for cash or kind. People’s survival depends on growing and distributing food, which can only be provided in a sustainable way if

it is made part of national and public sovereignty” (2019, p. 150). This insight lands with particular poignancy in the context of the 2020 COVID-19 pandemic, when urban and rural communities across the globe face issues of food access and agricultural laborers are constantly exposed to COVID threats in order to continue supplying consumers with produce (Wozniacka, 2020). Ayeb and Bush’s monograph thus centers around food sovereignty, a concept which advocates for not only access to food, but the ability of producers and consumers to participate in decisions around what is produced and how it is produced and consumed (La Via Campesina, 2003).

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In *Food Insecurity and Revolution in the Middle East and North Africa*, Habib Ayeb and Ray Bush undertake the ambitious project of surveying and analyzing data on agrarian systems in Egypt and Tunisia from the 1800s to the present moment. They argue that policies on farming and agriculture, both in the Middle East and North Africa (MENA) and internationally, often occlude farmers' voices, and that Egypt and Tunisia have been incorporated into the world economy in ways that have negatively affected small-scale farmers. A focus on export-driven economies, cash and monocropping, nationalization and collectivization of agricultural land, and adjustment programs driven by international financial institutions, especially the World Bank and USAID, undermine family farms and peasant livelihoods in Egypt and Tunisia.

Ayeb and Bush draw their data predominantly from secondary data sets to gain a macrocosmic perspective on the conditions of peasants and agricultural laborers in Egypt and Tunisia, grounding the quantitative data in historical descriptions of decolonization, agrarian reforms, regime changes, and the involvement of global organizations like the World Bank. Their chapters are organized thematically and chronologically.

The first chapters provide the historical contexts for contemporary protest movements in Egypt and Tunisia. Chapter two focuses on conflict, economic and agrarian reform, and environmental issues that have led to food and agricultural "underdevelopment" in Egypt and Tunisia. With impressive attention to historic political events throughout the twentieth century, the authors suggest that the MENA is structured by wars, neoliberal reform, and environmental crises (p. 43). Chapter three looks at the agrarian origins of regime change, with a detailed discussion of the self-immolation of Tunisian fruit vendor Mohamed Bouazizi, widely regarded as a catalytic event for the Tunisian Revolution and, indirectly, for the "Arab Spring" movements throughout the MENA. This chapter argues that peasants and the "near landless" played significant roles in the protests that led to the ousting from power of Ben Ali in Tunisia (in January 2011) and Hosni Mubarak in Egypt (in February 2011) (p. 49). Following this, Ayeb and Bush explore

narratives of food security (chapter four) before carrying out extensive analyses of the agrarian roots of social unrest in Egypt and Tunisia (chapters five and six). They conclude with a critique of food security-focused analysis and suggest that, instead, food sovereignty should be the main concern for politicians, activists, farmers, and scholars interested in issues of social justice and food access.

The distinction between food security and food sovereignty lies at the heart of Ayeb and Bush's analyses. Food security focuses on providing enough food for populations, often from a strictly quantitative perspective; as a result, neoliberal food security-oriented approaches to hunger can involve import-oriented solutions and large-scale industrialization of food production, which can, paradoxically, destabilize people's access to sufficient and culturally appropriate food. Food sovereignty, on the other hand, argues that individuals and communities must have agency over which foods are produced, how they are produced, and how they are distributed and consumed (Wittman, 2011).

While Ayeb and Bush cover a wide range of themes, their macrolevel approach, at times, can obscure essential topics that require a more granular approach. For example, the topic of gender could be more fully theorized and closely examined. Ayeb and Bush do note, importantly, that "we are therefore not witnessing a feminisation of agricultural work, but rather its increased visibility. Women have always undertaken activities that are crucial to the functioning of the farm, and household" (p. 115). The discussion of gendered labor is important and merits more than the two pages it receives in the chapter on Tunisian agriculture and the one paragraph in the chapter on Egyptian agriculture.

The authors' aim of critiquing existing modes of development in Egypt and Tunisia by applying a Marxist analysis to peasant alienation from the land, and arguing that alternative methods of development are possible, is laudatory. However, one of the most persistent issues arises when the authors refer to the necessity for "alternative models of development" in Egypt in Tunisia. As they acknowledge, they do not discuss tangible


viable alternatives (p.13). Given the authors' experience and expertise, they are well situated to make insightful contributions to imagining what these alternative systems could look like, in concrete detail.

Ayeb and Bush might have also examined literature from the field of food studies, where there is ample literature that critically discusses how food production in the Global South is adversely affected by capitalist structures (see, for example, work by James C. Scott, Raj Patel, Barry Estabrook, Seth Holmes, and Margaret Gray). Including literature from the field of food studies in their work would have added nuance to their analyses and strengthened their theoretical engagements with foodways.

The most powerful chapter is perhaps the final chapter on food sovereignty, in which the authors discuss the work of La Via Campesina, an international organization of farmers, peasants, and rural workers established in the 1990s. This organization formulated the concept of food sovereignty as a way to discuss their vision of returning autonomy over food production and consumption from governments and corporations to people and communities (Wittman, 2011). Ayeb and Bush suggest that food sovereignty is a model for potential reform to social justice and food sovereignty movements in Egypt and Tunisia. In this chapter, they most clearly articulate their perspectives on narratives of food security, which focus on the industrialization of food production as ultimately harmful to sustainable, healthy, and culturally appropriate agricultural policies. Ayeb and Bush argue that food sovereignty—which, like the Slow Food movement, calls for supporting small-scale agriculture and supporting biodiversity—returns decision-making about agriculture to those who work the land. In this way, the histori-

cal trajectory of agricultural policies in Egypt and Tunisia that have disenfranchised farmers and rural workers and led to decreased food security among local populations could be changed. Their reference to a Tunisian group, Million Rural Women, affiliated with La Via Campesina, would have made a fascinating case study; this suggests the necessity of grounded ethnographic work to better understand the operations of organizations mobilizing for food sovereignty.

Food Insecurity and Revolution in the Middle East will be particularly useful for students and scholars in Middle Eastern area studies, history, or political science who want to incorporate food and agricultural systems into their understandings of the MENA. This book would be an appropriate core text in an undergraduate survey course on political economy in the MENA. It could also provide important supplements to undergraduate and graduate food studies courses, which often focus on the United States, Mexico, and western Europe, by introducing topics of food insecurity, food sovereignty, and agricultural policies in the MENA.

Since the 1980s, scholars from diverse fields, notably Roger Owens in *The Middle East and the World Economy, 1800–1914* (1981), Sidney Mintz in *Sweetness and Power: The Place of Sugar in Modern History* (1986), and Raj Patel in *Stuffed and Starved: The Hidden Battle for the World Food System* (2008) have demonstrated how the globalization of trade and economics have adversely impacted food security and food sovereignty among rural and urban populations. Ayeb and Bush contribute to this growing chorus of voices within and outside of the academy arguing that food insecurity is not reducible to environmental factors alone; rather, food insecurity is often a state created by policy and exacerbated by socio-economic inequalities. 

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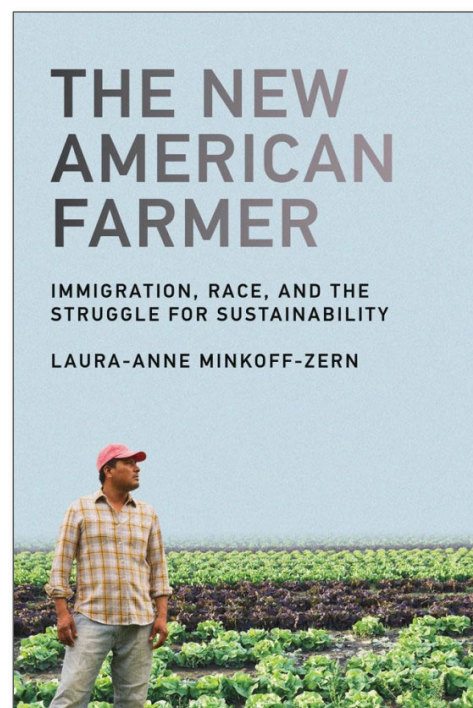
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Growing food, growing a movement: How structural racism affects immigrant farmers

Review by Claire Hutkins Seda, Migrant Clinicians
Network *

Review of *The New American Farmer: Immigration, Race, and the Struggle for Sustainability*, by Laura-Anne Minkoff-Zern. (2019). MIT Press. Available as paperback and eBook; 216 pages. Publisher's website:
<https://mitpress.mit.edu/books/new-american-farmer>



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Most U.S. farmers and farm owners are white, while most farmworkers are Latinx immigrants. This timely book uncoils the history, institutions, and politics that racialize farming in America and the growing number of immigrant farmers—primarily small-scale and Mexican—who have climbed the agricultural ladder despite the

crushing barriers they face. Author Laura-Anne Minkoff-Zern deftly spells out the social, political, and cultural influences that built racism and anti-immigrant practices directly into the structure of American agriculture. She then enriches the picture with the stories of 70 interviewed immigrant farmers who operate within this structure; excerpts from her interviews are spotlighted throughout the book. Additional interviews with agricultural support and outreach programs emphasize how immigrant farmers are often excluded from start-up capital, land access, and farmers market access. The storytelling element, paired with Minkoff-Zern's first-person perspectives and reactions, enliven

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each chapter and extricate the book from a purely scholarly work into an engaging read on immigration, race, and agriculture.

The book starts off with a snapshot of immigrant farmers in America, followed by a short preface on how Minkoff-Zern found the farmers she interviewed, from California's Central Coast, the Northern Neck of Virginia, the "black dirt" region of New York's Hudson Valley, northwestern and central Washington State, and southeastern Minnesota. The second chapter, "Sharecroppers, Braceros, and 'Illegals': Racializing the Agricultural Ladder," explores the links in the chain from the unfulfilled promise of "40 acres and mule" after emancipation, to the Bracero program, "Operation Wetback" and deportation, and their legacies evident in "the structural conditions encouraging low-paid immigrant labor and criminalizing the people who perform it" (p. 43). She then shows how structural racism perpetuates itself through poor census counts, as many immigrant farmers, perhaps due to low literacy and English proficiency or fear of exposing immigration status, decline to complete the census form, which in turn affects policy priorities and funding.

Institutions designed to support farmers routinely ignore Latinx immigrant farmers, as reported in the third chapter. For example, the U.S. Department of Agriculture (USDA) was sued in the 2000s for structurally discriminating against farmers of color, and it continues to lack consistent methods for interaction with and outreach to immigrant farmers. Minkoff-Zern found that farmer support networks and groups like the Farm Service Agency often did not have staff that spoke Spanish. Latinx immigrant farmers, for their part, had few records of their farming practices—which is critical to applying for various programs and services. English language proficiency and literacy rates varied among farmers, erecting another potential barrier to them working with support organizations and completing paperwork.

Finally, many of the support programs, including from the USDA, are built with large-scale farmers' needs in mind. The mismatch in support mechanisms continues when farm products are ready for sale. Minkoff-Zern argues that small-scale immigrant farmers are "de-prioritized" in the grow-

ing farmers market movement, shutting them out of much-needed market mechanisms like direct-to-consumer sales (p. 86).

In the fifth chapter, "Food, Identity, and Agricultural Practice: Re-creating Home through the Family Farm," the farmers' stories at last dominate the conversation instead of augmenting it, as Minkoff-Zern explores why, in the face of extreme racial exclusions, farmers push forward. The stories of farmers wishing to create a *recuerdo*, or memory, of their former agricultural lifestyles in Mexico—providing healthy food for their families and communities, and reclaiming a sense of self and place after migration—enriched the picture of small-scale immigrant farming in America today. However, Minkoff-Zern notes that not all the farmers she interviewed fit the tidy and idyllic small-scale, diversified, low-chemical-input family farm label; some of the farmers she interviewed, mostly orchardists in Washington state, operated large industrial operations. In the sixth chapter, entitled "Shifting the Means of Production," she also notes that those who needed to hire workers outside the family struggled with the same financial restraints that larger farms do, and even family labor "does not imply an inherently better or more equitable labor system, and by no means ensures labor justice on the farm" (p. 152).

It is in the sixth chapter that Minkoff-Zern finally approaches the legacy of colonialism, international development, food policy, and globalism that forced many of these farmers off their home farms and induced them to migrate to the U.S. in the first place. This is important context that felt missing from the first half of the book. She goes on to frame a conversation about generations-long Mexican small-scale farmers' resistance to dispossession, farmers' love of farming, and their value of independence over profit.

The seventh and final chapter of the book encourages better literacy around the social and political factors that underpin agriculture in order to address the structural racism that confronts immigrant farmers, noting that "Only by looking closely at the differences in lived experiences between racialized groups of food producers, and appreciating both their race- and citizenship-based obstacles as well as their unique offerings and

skills, can we begin to form a new theory of agrarian change” (p. 168). The farmer profiles provide a useful blueprint for agriculture institutions to pinpoint and begin to dismantle racial disparities.

At times, this book felt like a companion reader to the news. In the spring of 2020, COVID-19 pummeled rural America, with massive outbreaks at farms and meatpacking houses that primarily employ low-wage immigrant Latinx workers. Contradictorily, farmworkers were designated as “essential” workers, providing services that America cannot go without, while toiling in an exploitative system that cannot or will not provide the health and safety measures necessary to keep them safe on the job.

Simultaneously, beginning in May 2020, Black Lives Matter protests erupted in cities and towns across the U.S. in response to the killing of George Floyd by police in Minneapolis. The killing and the protests in response held up a mirror up for Americans, exposing the deep-seated racism embedded within our most basic systems. This book provides a useful backdrop for these headlines, for aca-

demics and agriculture advocates alike, describing how our agricultural systems came to be and how such basic structures rigidly maintain hierarchies of class, race, and citizenship.

The book also exposes the barriers that immigrant farmworkers (not just farmers) face, including fear of exposing immigration status, deep poverty, and cultural and linguistic barriers. These help explain why, amid the coronavirus pandemic, farmworker health needs are not being met by regulatory systems, and how their ability to advocate for their health is stifled. The farmers profiled in this book illustrate that, contrary to the dominant story of agriculture and in spite of numerous barriers, some immigrant farmers are disrupting the agricultural norm, challenging its racist and classist underpinnings. Their vivid stories unleash a vision of America where racist structures are superseded, and where Latinx farmers’ hard work paves the way for a new, more equitable and sustainable agricultural system, which—as evidenced from current events—is much needed.

