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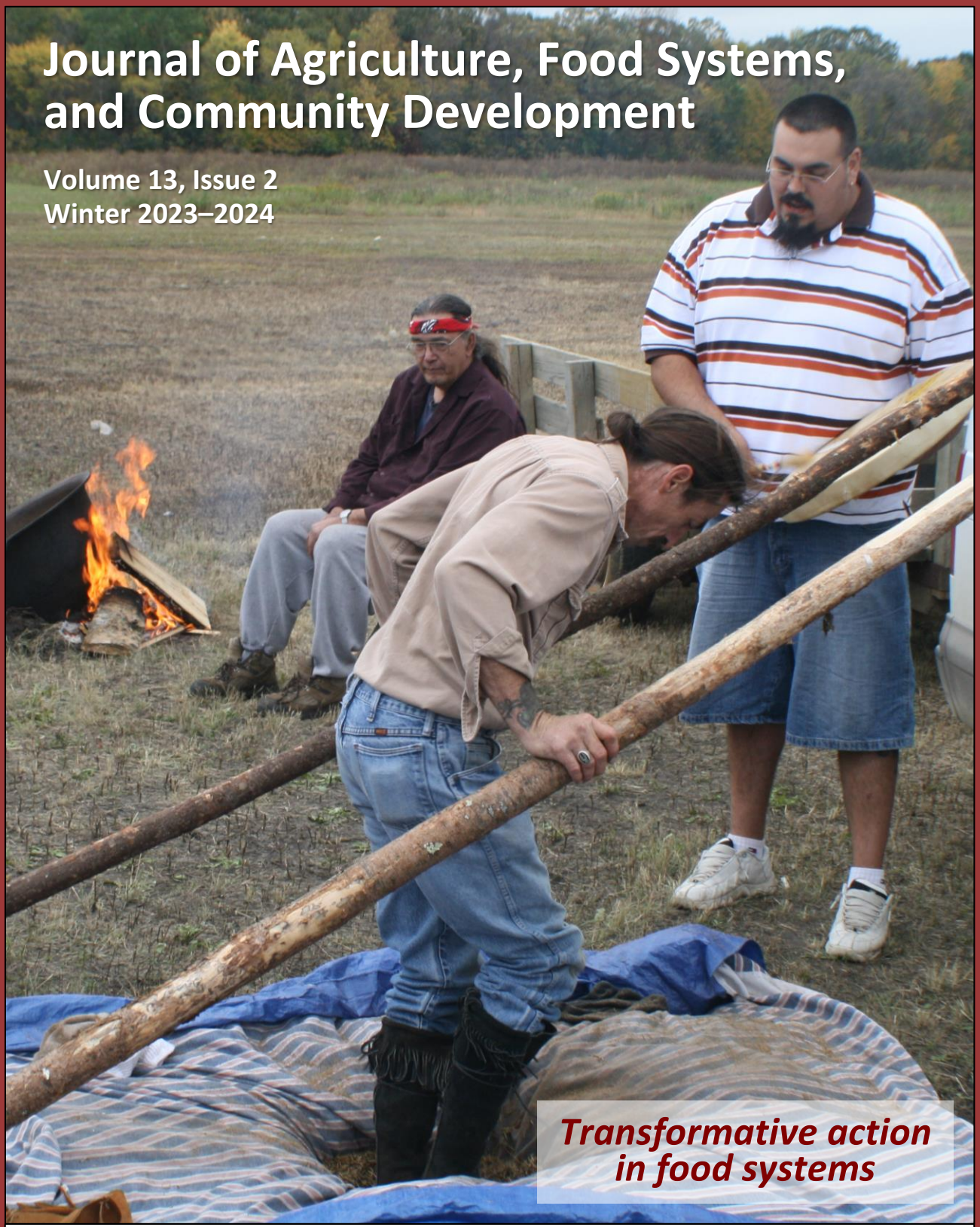

Transformative action in food systems

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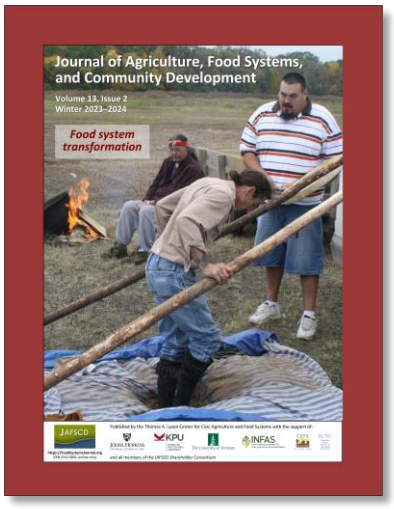

On our cover: Members of White Earth Nation (Anishinaabe) prepare freshly harvested wild rice—manoomin—for a traditional meal of ground bison and wild rice with fry bread. The rice is winnowed, danced on with chanting accompaniment, and parched in a large cast-iron pot before cooking. This ritualized process has been cherished for millennia.

Photo taken in 2007 by Duncan Hilchey

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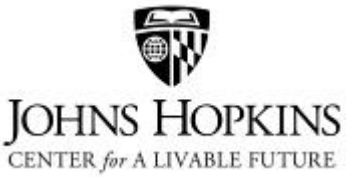
Johns Hopkins Center for a Livable Future 	**University of the District of Columbia** College of Agriculture, Urban Sustainability & Environmental Sciences 
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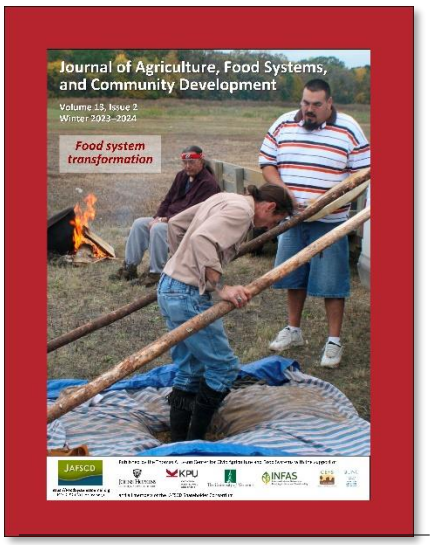
IN THIS ISSUE
DUNCAN HILCHEY

Transformative action in food systems



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On March 6, 2024, JAFSCD conducted its sixth annual general meeting of members of the JAFSCD Shareholder Consortium, which includes shareholders who support JAFSCD as an open-access journal through annual contributions. The theme of this year's meeting was how JAFSCD could become a more transformative journal—that is, a journal that effectively rallies scholars, activists, and change agents to collaboratively build bridges to a better food system, locally and globally. JAFSCD takes its cues on this critical subject from its fiscal sponsor, the Center for Transformative Action, a nonprofit affiliate of Cornell University. Its profound theory of change includes the following passage:

> *Transformative Action calls for courage to break the silence that surrounds … injustices; patience and compassion to build an inclusive movement for systemic change; imagination to stay free from "us vs. them" strategies; and inspiration to envision new solutions to common challenges.*
>
> —Center for Transformative Action (n.d., "Theory of Change," para. 3)

To that end, we asked, "how can JAFSCD become a vehicle for transformation in the food movement?" To help us answer this question, we asked Professor Christine M. Porter (University of Wyoming) to give meeting participants a brief presentation entitled "Triple-rigorous research for truth and transformation,"

On our cover: Members of White Earth Nation (Anishinaabe) prepare freshly harvested wild rice—manoomin—for a traditional meal of ground bison and wild rice with fry bread. The rice is winnowed, danced on with chanting accompaniment, and parched in a large cast-iron pot before cooking. This ritualized process has been cherished for millennia. *Photo taken in 2007 by Duncan Hilchey*

which is her argument for doing research that is epistemologically, ethically, and emotionally rigorous. Her inspiring presentation can be viewed on JAFSCD's YouTube channel.[1]

In turn, Christine's approach set the stage for breakout groups that drilled down into three specific strategies supported by our shareholders in a recent survey:

1. Increasing outreach and engagement with Historically Black Colleges and Universities (HBCUs), Hispanic-Serving Institutions, and Tribal Colleges and Universities in the U.S.
2. Offering an editorial fellowship each year to foster emerging leadership among historically excluded groups.
3. Placing more emphasis on researcher-stakeholder partnerships that lead to the co-creation of research.

The support for and feedback on these three transformative strategies we received during the meeting will help guide the journal's plan of work over 2024 and into 2025. This will be challenging, since JAFSCD has limited resources and bandwidth. But if it were easy, it probably wouldn't be transformative!

As usual, we begin this issue with The Economic Pamphleteer column, *Perspectives on the past and future of agriculture*. **John Ikerd** describes his own take on transformation over time, including the changes in the food system during his lifetime, from one of diverse scope and scale to one dominated by industrial agribusiness. Putting sentiment aside, he does not see a return to millions of farms in the United States—but he does believe we need to see a significant increase in the number of middle-scale farm operations stewarding the land. Ikerd envisions a "post-industrial" agriculture that is ecologically sound, socially responsible, economically viable. He argues that hasty "transformational change" is required, including expanding the use of existing practical preindustrial era knowledge, rigorous enforcement of antitrust laws, and establishing a thinktank that can recommend public policies that promote both farm livelihoods and environmental protection.

Ikerd's column is followed by a commentary. In *Enhancing public health through modern agronomy: Sustainable and nutrient-rich practices,* **Amanullah** and **Urooj Khan** review nine tenets of agronomy and its potential as a catalyst for transforming public health and the quality of life for individuals and communities worldwide.

Next, we continue our special collection of papers on Fostering Socially and Ecologically Resilient Food and Farm Systems Through Research Networks, co-sponsored by INFAS, eOrganic, and USDA National Institute of Food and Agriculture, including the following three papers:

Marc T. Sager, Lily Binford, and **Anthony J. Petrosino** explore the challenges faced by staff and students engaged in managing a college campus-based farm and offer recommendations for improving its operations in the commentary *Staff and student engagement on and perceptions of a college campus's urban farm.*

In *Participatory breeding in organic systems: Experiences from maize case studies in the United States*, **Christopher Mujjabi, Martin O. Bohn, Michelle M. Wander,** and **Carmen M. Ugarte** present the challenges to meaningfully engaging farmers in breeding maize to increase crop performance. They conclude there is a critical role for land-grant universities in supporting such efforts, especially at minority-serving institutions.

In his paper *Climate resilient food systems and community reconnection through radical seed diversity*, **Chris Smith** explores declining agrobiodiversity and community seed-keeping and concludes that radical seed diversity can jump-start autonomous, community-based seed-keeping efforts, increasing agrobiodiversity and, ultimately, the climate resilience of food systems.

Katherine Merritt, Jill K. Clark, and **Darcy A. Freedman** then present a systematic review of the literature to find whether and in what ways social entrepreneurship intersects with food sovereignty and food justice, and find they are not necessarily mutually exclusive, in *Social enterprise, food justice, and food sovereignty: Strange bedfellows or systemic supports?*

[1] See the video at https://youtu.be/456GZRzC5PE?si=h0Eq8Lx4y4cEdic1

Next, in *An evaluation of the federal Transition Incentives Program on land access for next-generation farmers* **Megan Horst, Julia Valliant,** and **Julia Freedgood** *e*valuate the USDA's Transition Incentives Program (which provides two years of funding incentives for renting or selling land to socially disadvantaged farmers) and find uneven geographic distribution of program benefits. They offer some insights on how the program can be improved.

In *Challenging power relations in food systems governance: A conversation about moving from inclusion to decolonization*, the **Session on Participatory Food Systems Governance at the 2021 Global Food Governance Conference**, **Renzo Guinto, Kip Holley, Sherry Pictou, Rāwiri Tinirau, Fiona Wiremu, Peter Andreé, Jill K. Clark, Charles Z. Levkoe,** and **Belinda Reeve** reflect on the key themes that emerged from their "Session on Participatory Food Systems Governance" at the 2021 Global Food Governance Conference. They conclude that more decolonization work is required to undo inequitable forms of food systems governance, including building a more effective research agenda that leads to increased BIPOC scholarship as well as planetary health.

This is followed by *Gender, sexuality, and food access: An exploration of food security with LGBTQIA2S+ university students* by **Eli G. Lumens, Mary Beckie,** and **Fay Fletcher.** Using intersectional and queer theory and qualitative evidence provided by a small group of participants, the authors examine the lived experience of the LGBTQIA2S+ community at a southern U.S. university and find that attitudes regarding sexual identity and the overall stigma associated with needing food assistance amplify their struggle to achieve food security.

In *Disparities in COVID-19 vaccine uptake, attitudes, and experiences between food system and non–food system essential workers*, **Brianna L. Smarsh, David Yankey, Mei-Chuan Hung, Heidi M. Blanck, Jennifer L. Kriss, Michael Flynn, Peng-Jun Lu, Sherri McGarry, Adrienne C. Eastlake, Alfonso Rodriguez Lainz, James A. Singleton,** and **Jennifer M. Lincoln** conducted a large national study and find that food system workers tended to not get vaccinated as much as other workers, highlighting a potential vulnerability in the food system.

In their innovative project, **Sarah A. Stotz, Hollyanne Fricke, Carmen Byker Shanks, Megan Reynolds, Tessa Laswell, Laurel Sanville, Rachel Hoh,** and **Courtney A. Parks** studied the funding applications of organizations that are focused on increasing fruit and vegetable consumption among low-income residents to shed light on their common program needs in *Strengthening nutrition incentive and produce prescription projects: An examination of a capacity building and innovation fund.*

Next, in their reflective essay, *First you need the farmers: The microfarm system as a critical intervention in the alternative food movement*, **Kent Curtis** and **Grace Cornell** detail the challenges of implementing a holistic seed-to-table local food system development project in the U.S. state of Ohio.

This is followed by **Anna M. Roodhof,** who explores and characterizes community-based food forests and finds a wide range of diversity in practices, along with homogeneity in stakeholder demographics, in *Understanding the emerging phenomenon of food forestry in the Netherlands*.

Simone Ubertino, Romain Dureau, Marie-Ève Gaboury-Bonhomme, and **Laure Saulais** then explore the strengths and challenges of building trust and having meaningful impact in *Democratizing food systems: A scoping review of deliberative mini-publics in the context of food policy*.

In our final paper, *Public assistance, living environments, and food insecurity: A comparative community case study*, **Mesfin Bezuneh** and **Zelealem Yiheyis** *e*xplore food insecurity in traditional and mixed-income public housing communities and find that government assistance in terms of reducing food insecurity is wanting. They suggest that perhaps increased assistance levels are needed to have a measurable impact.

We wrap up with several book reviews. **Mallory Cerkleski** reviews *Distress in the Fields: Indian Agriculture after Economic Liberalization*, edited by R. Ramakumar, along with *Agrarian Reform and Farmer Resistance in Punjab: Mobilization and Resilience*, by Shinder Singh Thandi. **Natasha Bernstein Bunzl** reviews *Feeding New Orleans: Celebrity Chefs and Reimagining Food Justice*, by Jeanne K. Firth. **Bob Perry** reviews *At the Table: The Chef's Guide to Advocacy,* by Katherine Miller; and **Max Sano** reviews *Gardening at the Margins: Convivial Labor, Community, and Resistance*, by Gabriel R. Valle.

Though it was not formally by design, a clear theme of transformative action emerged in this issue. In the above papers we see the development of public policies and community development strategies that are in some cases resulting in measurable impacts and in others coming up short. Naturally, there will always be setbacks and failed attempts. But my cup-is-half-full takeaway from this applied research is that with holistic and concerted effort across all fronts, we will see, in the long run (should we not run out of time), breakthroughs that lead to equity and resilience in food systems. The trick, of course, is slowing the pace, if not reversing, climate change, land loss, and human population growth so that we have a chance for innovative policies and practices to benefit people and the planet in the future.

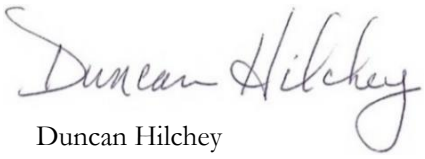
While John Ikerd calls for haste in this effort on the policy and practice front, Christine Porter gives us a glimpse at how activist scholars can contribute through their approach to practitioner engagement in research. In 2018, Christine submitted to JAFSCD and we published a paper entitled: *Triple-rigorous storytelling: A PI's reflections on devising case study methods with five community-based food justice organizations*.[2]

This was a stunningly candid self-reflection on her experience shepherding a multiyear, US$5 million, USDA-funded action-research project called Food Dignity. In the Food Dignity project, Porter worked with and learned from leaders of five community-based food justice organizations. What an earful and eyeful she got in that experience. She bared it all with us in this must-read essay. We are the beneficiaries of her fearlessness.

In wrapping up this editorial, I share with great sorrow that Christine has been living with Stage 4 breast cancer for some time. Her fearlessness extends to how she has openly and gracefully shared her cancer journey and treatment over the years. As she moves closer to the end of that journey, some of her colleagues and mentees are collaborating with us to host a *Festschrift* in her honor. A Festschrift (or "celebratory writing") is a traditional way for colleagues at scholarly institutions and organizations to celebrate the contributions of a valued colleague. JAFSCD has published two Festschrifts in the past.[3]

In Christine's case, we celebrate her and the advances in the food systems and community-based participatory action research that she has led and supported so far in her career. It will also serve as an opportunity for Christine to share more of her thoughts on triple-rigorous research, on Food Dignity and its successor, Growing Resilience, and in engaging practitioners in the co-creation of applied research on food systems. An announcement of the Festschrift is forthcoming later in 2024.

Yours for transformative action in food systems and publishing,



Duncan Hilchey
Publisher and editor-in-chief

Reference

Center for Transfomative Action. (n..d.). *About us*. Retrieved March 26, 2024, from https://www.centerfortransformativeaction.org/about-us

[2] Read the full article at https://doi.org/10.5304/jafscd.2018.08A.008

[3] See the Festschrift for urban agriculture advocate Jac Smit at https://doi.org/10.5304/jafscd.2010.012.009 and for Syracuse University Professor Evan Weissman at https://doi.org/10.5304/jafscd.2021.104.032

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The Economic Pamphleteer
John Ikerd

A new series of Economic Pamphleteer columns:
Perspectives on Agriculture, Food Systems, and Communities

Perspectives on the past and future of agriculture

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John Ikerd has contributed "Economic Pamphleteer" columns to the *Journal of Agriculture, Food Systems, and Community Development* since its inaugural issue in 2010. His columns have provided economic perspectives on a wide variety of agricultural, food systems, and community development issues. He provides a perspective that comes from someone who has lived through the transition from small, independent family farms, local food systems, and vibrant rural and urban communities to a corporately controlled agriculture, a global food system, and economic and socially desolate rural and urban communities.

His perspectives are also informed by spending the first half of his 30-year academic career as an advocate for the extractive, exploitative system of economic development that brought about these changes and in the years since as one of its most outspoken critics. He has been a relentless advocate for sustainable family farms, community-based food systems, and an economic and social renaissance of rural and urban communities. The next several columns will focus on John's unique perspectives on changes in farms, foods, and communities over the past 70 years and why understanding the past is relevant in planning and preparing for the future.

The Harvard Business School defines transformational changes as "changes that are typically much grander in scope than incremental, adaptive changes. Very often, transformational change refers to a dramatic evolution of some basic structure of the business itself—its strategy, culture, organization, physical structure, supply chain, or processes" (Harvard Business School Online, 2020, "Transformational Change," para. 1). I have lived and worked through a period of

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 https://ikerdj.mufaculty.umsystem.edu and http://johnikerd.com.

*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 available at https://bit.ly/ikerd-collection*

transformational change in American agriculture.

I was born in 1939 and raised on a small family farm in southwest Missouri. The only farm machinery in our community during the early 1940s was a steam engine that powered a threshing machine that moved from farm to farm at harvest time. Everything on the farm was done with horsepower or human power. We milked cows by hand, picked corn by hand, and plowed fields and cultivated crops with horse-drawn equipment. Like most farmers in the U.S. at the time, most farmers in our community milked a few cows, raised a few hogs and chickens, and grew at least enough feed grains and forages for their livestock. They used crop rotations and livestock manure to manage pests and maintain soil fertility. Neighboring farmers shared their horse power and human power at harvest times—as a matter of necessity. I recall silo-filling crews of up to 40 farmers. Our community may have been a few years behind some other areas, but this was pretty much the state of agriculture in the U.S. in the late 1940s.

Within 50 years, by the late 1990s, farming in the U.S. had been transformed in ways that were unimaginable when I was growing up in the 1940s. Agriculture as a way of life and a way to make a living had been transformed into an agribusiness. Between the early 1950s and late 1990s, the number of farms in the U.S. dropped by more than half, from over five million to under two million, while the average farm size more than doubled, from around 200 acres to 500 acres (Johns Hopkins Center for a Livable Future, n.d.). The number of commodities produced on an average farm dropped down to one to two from four to five (Dimitri et al., 2005). Farmers could tend more land in a couple of hours than a 1940s farmer could tend in a week. Large livestock and poultry operations were more like factories than farms. By the 1990s, large, specialized farming operations, with gross farm incomes of a million dollars or more, dominated the farm economy—agricultural production, farm income, land ownership ... (MacDonald et al., 2018).

Agriculture as a way of life and a way to make a living had been transformed into an agribusiness.

From my perspective, two factors are largely responsible for this transformation in American agriculture. The first was the new agricultural technologies that emerged following World War II. Tractors had begun to replace horses in some areas in the 1930s, but didn't do so in many areas until factories started turning out affordable farm tractors rather than the Jeeps and tanks needed during the war. The number of tractors on farms in the U.S. tripled between 1940 and 1960, and the number of workhorses and mules dropped from 15 million to fewer than 5 million. Farmers specialized and expanded their operations to justify their investments in tractors and specialized farm equipment. Affordable commercial fertilizers and pesticides, also byproducts of World War II, allowed farmers to abandon the crop rotations or integrated crop and livestock systems they had relied on to manage pests and maintain productivity.

The new mechanical and chemical technologies not only allowed each farmer to produce more but also allowed farmers in total to produce more. The resulting surpluses in agricultural production depressed commodity prices to unprofitable levels, forcing reluctant farmers to adopt new cost-cutting technologies to survive. Farmers needed their own hay bailers, grain combine harvesters, or field forage choppers to remain competitive. They also needed more land to justify these added investments. Agricultural economists called this the technology treadmill ("Technology treadmill," 2020). Farmers no longer needed their neighbors to help them farm, but they needed their neighbor's farm. The farmers who didn't get big enough fast enough didn't survive. They sold out or were forced out of farming—they fell off the treadmill. Many farmers in our community either fell off or never got on the technology treadmill; they moved elsewhere.

The second cause of the agricultural transformation was a fundamental change in U.S. farm policy. Rather than addressing the outmigration of farmers as a problem, the policymakers saw it as an opportunity to transform agriculture. In 1962, the Committee for Economic Development (CED), a

prestigious business/academic think tank, assembled a subcommittee to address "the problem of agriculture" (CED, 1962). The resulting report noted the rapid outmigration of farmers beginning in the 1930s, but concluded, "Nevertheless, the movement of people from agriculture has not been fast enough to take full advantage of the opportunities that improving farm technologies and increasing capital create for raising the living standards for the American people, including of course, farmers" (CED, 1962, p. 7).

U.S. farm policies during the 1940s and 1950s had continued the commitments of the Agricultural Adjustment Act of 1938—the first farm bill. The act was meant to provide economic security, or parity incomes, for family farmers for the purpose of "preserving, maintaining, and rebuilding the farm and ranch land resources in the national public interest" (Agricultural Adjustment Act of 1938, p. 31). The CED saw economic security for farmers as an impediment to the efficient use of resources. They proposed an "adaptive approach" that "utilizes positive government action to facilitate and promote movement of labor and capital where they will be most productive and will earn the most income" (CED, 1962, p. 8).

Every farm bill since the 1970s has continued to incentivize and support the specialization, mechanization, and consolidation of farming into large industrial agricultural operations.

The CED report provided a blueprint for transformational changes in agricultural policies during the Nixon Administration during the 1970s with Earl Butz as secretary of agriculture. The new policies forced farmers to either "get big or get out" (Carlson, 2008, para. 6). Every farm bill since then has continued to incentivize and support the specialization, mechanization, and consolidation of farming into large industrial agricultural operations.[1] By the time I received my Ph.D. in agricultural economics in 1970, I had been thoroughly indoctrinated into this new vision for the future of farming. The mission of the land-grant university system was really *industrial* technology development and transfer. While the universities claimed the technologies they promoted could benefit all farmers, this was true only if farmers were willing to specialize, mechanize, and expand their farming operations. As agricultural economists, our research and extension programs were designed to help farmers turn their farms into agribusinesses.

The changes in farm policy were necessary to continue the process of industrializing American agriculture. Large, specialized farming operations may be economically efficient, but they are also risky and vulnerable to economic collapse—as evidenced during the farm financial crisis of the 1980s and the COVID-19 crisis that started in 2020. The farm policies of the 1980s were an experiment to see if large, specialized farms could survive without government assistance. They couldn't. Government price supports, deficiency payments, subsidized crop and crop revenue insurance, guaranteed loans, and disaster payments are all means by which taxpayers have absorbed the risks of industrial agriculture. Without these government programs, the industrialization of agriculture likely would have slowed, and possibly reversed, during the 1970s and 1980s.

Changes in American agriculture since the 1990s have been more about control than farm size or numbers. U.S. Justice Department essentially quit trying to maintain the competitiveness of markets during the 1980s. The justification was that consumers would benefit from lower prices and technological innovations if corporations were allowed to expand to scales of maximum economic efficiency. However, without large numbers of competitors, there can be no assurance that consumers will receive the benefits of lower production costs or that consumers have access to products that might better meet their needs (Ikerd, 2023). This is a basic economic principle, the "invisible hand" of free markets, that any econom-

[1] For a detailed discussion of the transformation in U.S. farm policy, see Ikerd, 2022.

ics student should be expected to understand. As we saw with price gouging during the COVID years, once a few large corporations gain control of an industry, they collectively set prices to benefit corporate managers and investors at the expense of consumers.

Since the 1980s, the consolidation of agri-food corporations has eliminated the competitive markets used by independent family farmers. Vertical integration has given large corporate processors and retailers control of agricultural production as well as processing and distribution. The U.S. Department of Agriculture (USDA) estimates that about one-third of agricultural production is covered by corporate contracts (USDA Economic Research Service, 2022). This percentage does not reflect the ability corporate buyers have to dictate production practices or the patents corporations hold on genetically modified seeds. Except for small part-time hobby or lifestyle farmers and the growing numbers of smaller, diversified farms in the organic, local, and sustainable agriculture movements, independent family farms are largely a thing of the past.

But what about the future of farming? The industrial approach to farming is not sustainable over the long run, no matter how economically efficient or productive it may be in the short run. There is no way of knowing how long taxpayers will continue propping it up through government programs. However, there is increasing public awareness of the large and growing ecological and social costs of industrial agri-food systems (Reynolds, 2023). If industrial farming operations were forced to eliminate or pay these external costs, it's doubtful that industrial agriculture could survive more than a decade. Regardless, there will be growing opportunities for farmers to provide knowledgeable and thoughtful consumers with non-industrial alternatives.

Farming sustainably does not mean going back to farming in the 1940s. From my perspective, the early years of transformation in U.S. agriculture were mostly positive for farm families and rural communities. Many farmers simply didn't know any other way to make a living. To them, farming was drudgery, period. When the post-war economic boom created new employment opportunities, they willingly sold their farms and moved out. Also, I don't think the U.S. will need to return to five million farmers, but we may need two or three times as many farmers as today who make a good living farming. Most importantly, total agricultural production will need to be more evenly distributed among family-sized, management-intensive farms rather than concentrated in a few large, capital-intensive farming operations.

We may need two or three times as many farmers as today who make a good living farming.

I will close this perspectives on agriculture column with what I feel are the keys to hastening another transformational change in American agriculture—from industrial to sustainable. First, the previous transformation was completed essentially in 50 years—between the early 1950s and the late 1990s. Few if anyone involved with agriculture in the 1950s could have imagined the large-scale, specialized, mechanized, corporately controlled farming operations of the 1990s. The changes before and after this period were incremental, rather than transformational. Agriculture by 2075 could be dramatically different from anything that seems remotely possible today.

Second, our understanding and knowledge of sustainable alternatives to industrial agriculture today are far more advanced than our knowledge of industrial agriculture in the 1950s. Many of the environmental and social costs of industrial agriculture were a result of people doing things without knowing the consequences of what they were doing. Farmers today have access to research on soil health, cover crops, crop rotations, and integrated crop and livestock systems of the pre-industrial era as well as the formal and experiential research of academics and organic and sustainable farmers over the past 50 years and even earlier.

Third, with the technical knowledge in place, a transformational change in farm policies could trigger a transformation in agriculture similar to that of the 1970s. Perhaps what is needed is

another prestigious think tank, like the CED, that understands the need for policies to support a post-industrial agriculture—an ecologically sound, socially responsible, economically viable agriculture. This think tank could make the ecological and social case that we have too few farmers, rather than too many, and propose farm policies that support more farmers who are committed to taking care of the land for the long-run benefit of society as well as themselves.

Finally, a return to vigorous enforcement of antitrust laws could transform the balance of economic and political power, including the power to transform farm policy. The U.S. was faced with a similar situation of concentrated economic and political power in the early 1900s. Monopolies of the time, such as Andrew Carnegie's U.S. Steel Company, John D. Rockefeller's Standard Oil Company, and the American Tobacco Company, were powerful politically and well economically (Investopedia, 2023). Five U.S. beef-packing companies controlled up to 75% of the market (Mathews et al., 1999, p. 9). The trend toward corporate control of markets was reversed by a progressive populist movement that demanded fundamental change. It can and must happen again. My perspectives on this and other aspects of the agri-food system will be the focus of my next column. Ultimately, agri-food sustainability is not an option; it is a necessity.

The trend toward corporate control of markets was reversed by a progressive populist movement that demanded fundamental change. It can and must happen again.

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COMMENTARY

Enhancing public health through modern agronomy: Sustainable and nutrient-rich practices

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Introduction

This commentary explores modern agronomy concepts aimed at enhancing public health through sustainable and nutrient-rich agricultural practices. We explore various innovative approaches, including precision agriculture, sustainable farming, efficient nutrient management, crop diversity, biofortification, climate-resilient farming, vertical farming and urban agriculture, digital agriculture, and agroecology (see Figure 1). Our commentary delves into each of these modern agronomy practices, unveiling their intricate web and profound implications for public health. We aim to demonstrate the potential of modern agronomy as a catalyst for improving public health and the quality of life for individuals and communities worldwide. These concepts collectively strive to elevate public health by improving food quality, enhancing nutrition, and safeguarding the well-being of individuals and communities. By harnessing these cutting-edge agronomic concepts, we aspire to transform agriculture into a powerful force for improving public health and enhancing overall quality of life.

Discussion

In a world facing complex health challenges and pressing environmental issues, the intersection of agriculture and public health emerges as a critical domain for transformative change. Agriculture exerts a profound impact on both the nutritional quality of our diets and the health of our ecosystems. Within this intricate landscape, we embark on a journey to explore how modern agronomy acts as a catalyst for enhancing public health through the promotion of sustainable and nutrient-rich practices. This exploration converges innovative strategies and scientific insights, aiming to redefine the relationship between agriculture and community well-being in an ever-changing world.

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Figure 1. Innovative Approaches to Enhancing Public Health through Modern Agronomy Practices

Precision Agriculture

Precision agriculture is a transformative approach to farming that leverages cutting-edge technologies and data analytics to optimize resource utilization (Amanullah, 2024). This, in turn, ensures efficient crop production, minimizes environmental impact, and fosters the growth of healthier, more nutrient-dense crops, ultimately improving the quality of our diets. This section will delve into precision agriculture, its components, benefits, and provide citations to support the discussion.

Significance of Precision Agriculture in Relation to Public Health:

- **Increased Productivity**: Precision agriculture allows for optimal resource allocation, ensuring that crops receive the right amount of water, nutrients, and care. This results in higher crop yields.
- **Resource Efficiency**: By applying inputs where and when they are needed, precision agriculture minimizes resource wastage. This includes reduced water usage, lower fertilizer and pesticide application, and decreased fuel consumption due to optimized machinery routes.
- **Environmental Sustainability**: Precision agriculture promotes sustainable farming practices by minimizing the environmental impact of agriculture. Reduced chemical usage and soil erosion contribute to improved ecosystem health.

- **Nutrient-Dense Crops**: Through the precise management of soil nutrients, precision agriculture can enhance the nutrient content of crops. This is particularly important in addressing nutrient deficiencies in staple foods.

Precision agriculture, a groundbreaking approach that leverages technology and data to revolutionize farming practices, offers substantial benefits in the face of a changing climate (Khanna & Kaur, 2019). By fine-tuning resource allocation and agricultural processes, it enhances crop yields, bolstering global food security. Furthermore, this precision-driven approach extends its impact to public health by producing nutrient-dense crops. As climate change disrupts traditional agricultural patterns, the adaptability made possible through precision agriculture becomes invaluable. By aligning with the objective of improving diets worldwide, it addresses food-security challenges and promotes public health through a consistent supply of essential nutrients (Myers et al., 2017). Precision agriculture emerges as an indispensable tool for strengthening our resilience against climate change and global health concerns.

Sustainable Farming Practices

The promotion of sustainable farming practices, which include crop rotation, organic farming methods, and reduced pesticide usage, plays a pivotal role in enhancing soil health, reducing chemical contamination, and simultaneously benefiting the environment and public health (Amanullah, 2018).

Significance of Sustainable Farming Practices in Relation to Public Health:

- **Enhanced Soil Health**: Crop rotation and organic farming practices enrich the soil with organic matter, improve soil structure, and increase microbial diversity. Healthy soils are better at retaining moisture and nutrients, resulting in increased crop yields.
- **Chemical Contamination Mitigation**: Reduced pesticide usage minimizes the risk of the chemical contamination of soil and water. This not only safeguards the environment but also reduces the presence of pesticide residues in food, benefiting public health.
- **Biodiversity Conservation**: Sustainable farming methods often support greater biodiversity on and around farms. This includes the proliferation of beneficial insects, pollinators, and other wildlife. Biodiversity is critical for ecosystem resilience and long-term food security.
- **Reduced Environmental Impact**: By reducing the use of synthetic fertilizers and pesticides, sustainable farming practices lower the environmental footprint of agriculture. This includes reduced greenhouse gas emissions and minimized pollution of bodies of water.

Sustainable farming practices promise to nurture healthier soils while acting as a shield against chemical contamination. In the face of a changing climate, these practices are even more critical. Through sustainable farming, we can boost crop yields while mitigating the risks associated with chemical contamination, ensuring a stable and nutritious food supply (Roberts & Mattoo, 2019). As we confront the challenges of climate change, sustainable farming practices are indispensable for safeguarding our agricultural systems. Moreover, the far-reaching impact of sustainable farming extends to public health. By reducing the presence of harmful chemicals in our food and environment, these practices contribute to the well-being of ecosystems and human populations (Garcia et al., 2020). They align with the objectives of enhancing agricultural sustainability and ensuring the health of our planet and its inhabitants. In a changing climate, sustainable farming emerges as a beacon of hope, offering solutions that simultaneously enhance yield, food security, and public health (Lipper et al., 2014).

Nutrient Management

Nutrient management, in the context of agriculture and environmental sustainability, refers to the strategic and responsible handling of essential nutrients (primarily nitrogen, phosphorus, and potassium [NPK]), as well as secondary and micronutrients. The goal is to optimize nutrient use efficiency while minimizing adverse environmental impacts (Amanullah et al., 2023).

Significance of Nutrient Management in Relation to Public Health:

- **Improved Crop Productivity**: Proper nutrient management ensures that crops receive the right amount of nutrients they need for healthy growth and optimal yields.
- **Environmental Protection**: Nutrient runoff from excessive fertilizer use can lead to water pollution, algal blooms, and ecosystem damage. Effective nutrient management helps prevent these environmental issues.
- **Resource Efficiency**: Nutrient management enhances the efficient use of fertilizers, reducing production costs for farmers and conserving nonrenewable resources, such as phosphorus.
- **Climate Mitigation**: The application of nitrogen-based fertilizers can release nitrous oxide (N_2O), a potent greenhouse gas. Nutrient management practices that minimize nitrogen losses can contribute to climate change mitigation.
- **Regulatory Compliance**: In many regions, regulations govern nutrient management to protect water quality. Farmers who practice responsible nutrient management are more likely to comply with these regulations.

Effective nutrient management lies at the core of optimizing crop nutrition, and consequently it plays a pivotal role in elevating the nutritional content of our food (Krasilnikov et al., 2022). By meticulously providing crops with the precise nutrients they require, we not only increase agricultural yields but also bolster the overall nutritional quality of our harvests. This synergy between nutrient management and crop health results in a higher concentration of essential vitamins, minerals, and other vital nutrients in the produce we cultivate. In a world grappling with issues of food security and the need for more nourishing diets, this approach holds immense promise. As we continue to refine our understanding and application of nutrient management practices, we are poised to make significant strides in enhancing both crop productivity and the nutritional value of the food we grow, contributing to a healthier and more food-secure future (Amanullah, 2020).

Crop Diversity

Crop diversity refers to the practice of cultivating a wide range of plant species and varieties within agricultural systems. This diversity is vital for human nutrition as it ensures a rich and varied supply of essential nutrients, contributing to improved dietary quality and overall health (Food and Agriculture Organization of the United Nations [FAO], 2017).

Significance of Crop Diversity in Relation to Public Health:

- **Enhancing Dietary Diversity through Crop Diversity**: Crop diversity promotes dietary diversity by providing a wider array of foods with distinct nutritional profiles.
- **Nutrient-Rich Crops and Micronutrient Deficiency Mitigation**: Crop diversity allows for the cultivation of nutrient-dense crops, which play a crucial role in mitigating micronutrient deficiencies, such as vitamin A deficiency.
- **Enhancing Human Health and Resilience**: Crop diversity contributes to resilient food systems by safeguarding against crop failures and ensuring a consistent supply of diverse nutrients.

Crop diversity is a linchpin for fostering a nutritious diet and enhancing food system resilience. It bolsters dietary variety, providing access to a wider range of essential nutrients and addressing micronutrient deficiencies (Amanullah, 2024). Additionally, diverse crops help us adapt to climate change and reduce the risk of crop failure. This multifaceted significance extends to cultural preservation, where crop diversity supports traditional farming practices and local food systems. Beyond diversifying our plates, crop variety combats malnutrition, upholds cultural heritage, and enhances the well-being of individuals and communities. It is a vital component of sustainable agriculture and public health.

Biofortification

Biofortification is a process that aims to enhance the nutritional content of crops by increasing the concentration of essential nutrients such as vita-

mins and minerals in the edible parts of plants (Amanullah et al., 2020). This agricultural approach holds great promise for improving human health, particularly in regions where nutrient deficiencies are prevalent.

Significance of Biofortification in Relation to Public Health:

- **Addressing Micronutrient Deficiencies**: Biofortification directly addresses micronutrient deficiencies, which can have severe health implications. The biofortified crops can combat deficiencies in essential micronutrients like iron, zinc, and vitamin A.
- **Improved Nutrient Intake**: Biofortified crops provide an effective means of improving nutrient intake, especially among vulnerable populations.
- **Enhancing Overall Health**: Consumption of biofortified foods can lead to improved overall health and well-being. For example, biofortified rice plays a large role in reducing anemia and improving cognitive function among children.

The deliberate cultivation and consumption of biofortified crops hold the potential to significantly boost nutrient intake, resulting in enhanced overall health and a noteworthy reduction in the prevalence of nutrition-related health problems, particularly in regions grappling with severe malnutrition. This approach not only addresses immediate dietary needs but also offers a sustainable solution to the long-term challenge of improving public health through improved nutrition (Avnee et al., 2023). By harnessing the power of biofortification, we can help build stronger, healthier communities and contribute to a brighter and more food-secure future.

Climate-Resilient Farming

Climate-resilient farming refers to agricultural practices and strategies designed to withstand and adapt to the challenges posed by climate change (Amanullah, 2024). These practices not only contribute to food security but also have significant implications for public health.

Significance of Climate-Resilient Farming in Relation to Public Health:

- **Stable Food Supply and Reduced Hunger**: Climate-resilient farming focuses on maintaining stable food production even in the face of climate variability. By ensuring a consistent food supply, these practices contribute to reduced hunger and malnutrition, which are fundamental public health concerns.
- **Diverse Diets and Improved Nutrition**: Climate-resilient farming often involves diversifying crop varieties and species to adapt to changing climate conditions. This diversification supports more balanced and diverse diets, ultimately improving nutrition and reducing the risk of nutrient deficiencies.
- **Mitigation of Climate-Related Health Risks**: Climate-resilient farming practices help mitigate health risks associated with climate change, such as heat stress and waterborne and vector-borne diseases. Sustainable farming systems can reduce exposure to extreme weather events and promote safe water and sanitation practices.

Climate-resilient farming practices are instrumental in bolstering public health on several fronts. Through the assurance of consistent food supplies, the promotion of diversified and nutritious diets, and the mitigation of climate-induced health hazards, these practices significantly enhance the overall well-being of individuals and communities (Amanullah, 2020). They serve as a multifaceted and proactive approach that not only addresses the pressing issues of food security but also the broader spectrum of public health challenges in the context of a dynamic and changing climate. In doing so, climate-resilient farming practices represent a cornerstone for fostering healthier and more resilient communities while simultaneously contributing to global efforts for a sustainable and secure future (Wheeler & von Braun, 2013).

Vertical Farming and Urban Agriculture

Vertical farming and urban agriculture are innovative approaches to food production that have the potential to significantly impact public health and environmental sustainability. These practices aim to

cultivate crops and raise livestock in urban areas, often in vertically stacked layers or controlled environments.

Significance of Vertical Farming and Urban Agriculture in Relation to Public Health:

- **Improved Access to Fresh Produce**: Vertical farming and urban agriculture bring food production closer to urban populations. This proximity improves access to fresh, locally grown produce, which is essential for promoting healthier diets and reducing consumption of processed foods.
- **Reduced Environmental Impact**: By utilizing vertical space and controlled environments, these practices can reduce the environmental impact of traditional agriculture. They often require fewer pesticides, herbicides, and water, contributing to lower pollution levels and healthier ecosystems.
- **Community Engagement and Education**: Vertical farming and urban agriculture often involve the community in food production. These practices provide opportunities for education about nutrition, sustainable agriculture, and environmental stewardship, which can lead to improved public health awareness.

Vertical farming and urban agriculture emerge as innovative solutions to tackle the complex challenges of public health and sustainability in urban environments (Chatterjee et al., 2020). These practices substantially enhance access to fresh, locally cultivated food, effectively reducing the environmental footprint associated with conventional food production and distribution. Additionally, they play an important role in fostering community engagement and education, promoting a deeper understanding of food systems and sustainability among urban dwellers. By amalgamating these benefits, vertical farming and urban agriculture contribute to the creation of healthier, more sustainable urban ecosystems, thereby addressing crucial public health concerns and paving the way for a greener and more vibrant urban future (Van Gerrewey et al., 2022).

Digital Agriculture

Digital agriculture is a transformative approach that leverages technology and data-driven solutions to optimize farming practices and enhance agricultural sustainability (Gumbi et al., 2023). It has significant implications for public health and the development of more sustainable food systems.

Significance of Digital Agriculture in Relation to Public Health:

- **Precision Farming and Reduced Environmental Impact**: Digital agriculture emphasizes precision farming practices, where data-driven decision-making leads to the precise application of resources such as water, fertilizers, and pesticides. This targeted approach reduces the environmental impact of agriculture by minimizing resource waste and chemical runoff, contributing to cleaner water and healthier ecosystems.
- **Enhanced Food Safety and Traceability**: Digital agriculture enables real-time monitoring of food production and supply chains. This transparency enhances food safety by quickly identifying and addressing potential contamination issues. Consumers benefit from access to safer and healthier food products.
- **Nutrient Optimization and Improved Nutrition**: Digital agriculture technologies, including precision nutrient management, enable farmers to optimize nutrient levels in crops. This leads to improved crop quality and enhanced nutritional content. In turn, consumers have access to more nutritious food, contributing to better public health.

Digital agriculture serves as a potent instrument for advancing both public health and sustainability in the realm of agriculture (Zhang & Zheng, 2023). Its capacity to curtail environmental impacts, elevate food safety standards, and fine-tune nutrient content closely aligns with the overarching objectives of promoting the health of individuals and fostering more sustainable food systems. This digital revolution in agriculture not only amplifies agricultural efficiency but also contributes to the creation of a healthier and more ecologically sound future for all.

Agroecology

Agroecology is a holistic approach to farming that integrates ecological principles into agricultural practices. It emphasizes sustainable, regenerative, and environmentally friendly farming methods (Amanullah, 2024). Agroecological practices have profound implications for public health, contributing to healthier ecosystems and safer food systems.

Significance of Agroecology in Relation to Public Health:

- **Healthier Ecosystems and Reduced Environmental Hazards**: Agroecology prioritizes natural processes and minimizes the use of synthetic chemicals. This reduces the environmental hazards associated with conventional agriculture, such as pesticide exposure and soil degradation. As a result, ecosystems become healthier, with benefits for both the environment and human health.
- **Improved Nutrition and Food Quality**: Agroecological practices often focus on diverse cropping systems and nutrient-rich soil. This leads to improved crop quality and nutritional content, ultimately benefiting consumers' health by providing access to more nutritious food.
- **Enhanced Resilience and Food Security**: Agroecology emphasizes resilience in agricultural systems, making them better equipped to withstand climate-related challenges. This resilience contributes to food security by ensuring a stable food supply, reducing the risk of hunger and malnutrition.

Agroecology paves the way toward healthier ecosystems, elevated food quality, and fortified food security—vital constituents of public health and sustainability. Through the embrace of agroecological principles, we forge pathways that foster more symbiotic relationships between agriculture and the environment. In this pursuit, we not only protect the integrity of our ecosystems but also ensure the health and security of individuals and communities. Agroecology represents a holistic and visionary approach to harmonizing our agricultural systems with the well-being of our planet and its inhabitants, offering a promising framework for a healthier and more sustainable future (Deaconu et al., 2021).

Conclusions

In this comprehensive exploration of modern agronomy concepts and their impact on public health, we have examined nine key parameters: precision agriculture, sustainable farming, nutrient management, crop diversity, biofortification, climate-resilient farming, vertical farming and urban agriculture, digital agriculture, and agroecology. The cumulative effect of these modern agronomy concepts on public health is substantial and diverse. By promoting sustainable farming practices, enhancing nutritional quality, mitigating environmental contamination, and ensuring consistent food supplies, these concepts provide a comprehensive framework for advancing public health. They effectively address nutrient deficiencies, reduce the risk of foodborne illnesses, mitigate climate-related health threats, and empower communities by providing access to healthier, locally sourced food choices. In essence, these modern agronomy concepts are central to fostering more resilient, sustainable, and healthier food systems, aligning with the overarching goal of enhancing the well-being and health of individuals and communities worldwide.

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Special Section:
Fostering Socially and Ecologically Resilient Food and Farm Systems Through Research Networks

SPECIAL SECTION SPONSORED BY:

COMMENTARY

Staff and student engagement on and perceptions of a college campus's urban farm

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Abstract

In this commentary, we provide a snapshot into the experiences and perspectives of college students and staff engaged in an on-campus urban farm run by a college. By delving into the challenges faced by staff members and student workers, we seek to identify nuanced areas for improvement in the management, communication, and promotion of the on-campus farm's work. This commentary emphasizes the imperative to bridge the gap between students and staff, address negative perceptions, and amplify the educational and career value of on-campus farming experiences.

Keywords

college campus, food justice, student engagement, urban farming, campus farm

Introduction

On-campus urban farms stand as vital hubs for fostering agricultural education and community

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Conflict of Interest Statement

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engagement (Berman, 2020; Bradley & Galt, 2014; Parr & Trexler, 2011; Sager & Sherard, 2022). This commentary unpacks the intricate dynamics within the on-campus farming environment by examining the experiences of two groups: staff members and student workers. Understanding their perspectives is crucial for cultivating an environment that maximizes the potential of college campus farming initiatives (Evans & Roggio, 2023; Walter, 2013).

Context

The farm is located on a college campus in an urban setting in the southwestern United States. The college boasts a work program model, where students receive Federal Work-Study awards. Approximately 10 years ago, the college converted one of its sports fields into a four-acre urban farm, which continues to be used to grow seasonal vegetables. The farm was started to combat the college's food desert status and take an asset-based approach (Mathie & Cunningham, 2003) to food justice, such as by leveraging existing activities, resources, and investments within the community (Alkon & Agyeman, 2011; Bradley & Herrera, 2016). The farm's mission states:

> To transform the health and well-being of under-resourced communities in [the] southern [part of the city] by providing fresh, healthy, affordable food options and educating and empowering future generations to take better care of themselves, their environments, and their communities. ([Farm website], n.d.[1])

Interviewees for our research ranged in age from 20 to 55, and were made up of six Black individuals, one Latina women, and one white women. Staff members (Nancy, Dan, and Kelley[2]) played instrumental roles in the farm's day-to-day operations, oversight of student workers and navigating the multifaceted challenges of college campus farming. Current student workers (Michael, Jane, and Audrey) provided their perspectives based on their varied roles within the college and at the college's farm. The student workers undergo an interview process to determine which work placement best aligns with their interests, schedule, or the campus's needs. The students are expected to work 15 hours each week to receive their Federal Work-Study tuition benefits, as well as a cash stipend.

Staff Perspectives

The staff members, especially those directly involved in college campus farming, managed day-to-day operations, oversaw student workers, and established connections with consumers and community members. The diverse responsibilities highlighted the intricate balance required for successful on-campus farming initiatives. Kelley, a passionate advocate for agricultural education, expressed her commitment to teaching students and the community about different cultivation methods: "You can grow in the ground, you can grow in your pot. You can grow in some water." Despite this enthusiasm, challenges were highlighted by other staff members. Dan, reflecting on a lack of clear leadership in the organization, discussed the demotivation that arises when new ideas get overlooked: "[There are] so many leaders that it's hard to know which one you should present to, for it to have any kind of impact, and historically it hasn't really gone anywhere when I've tried." Nancy, shedding light on the negative positioning of college campus farming, articulated how it is perceived as a form of punishment for student workers: "You're going out there, you're working in the field, it's grunt work, it's drudgery."

Student Perspectives

Michael's narrative brought attention to a perceived communication gap between students and staff, emphasizing a lack of acknowledgment for students' concerns and input: "The gap is when the older folks will tell them: 'Oh yeah, y'all go out there, y'all do this, y'all do that.' However, the students are like, 'But what about this and what about that.' We don't have a rebuttal for the staff because after we hear them, they just forget about the students, and that's why the students leave, because it's like a cliff-hanger." Audrey and Jane added

[1] For confidentiality and anonymity, the reference has been anonymized.
[2] All names used are pseudonyms.

insights about negative perceptions of on-campus farming as a low-status position contributing to high turnover rates: "Some people just don't like being outside; some people maybe hate bugs and getting their hands dirty."

While the physical demands and initial challenges were acknowledged, the students' experiences also revealed a lack of appreciation for the educational and career value of on-campus farming. Michael noted that his peers often struggle with the demands of outdoor work and suggested that a lack of interest in farming and the perception of the farm as a "bottom-of-the-barrel position" contribute to negative perceptions across campus.

Challenges and Opportunities

Unraveling these perspectives provides a foundation for understanding both the challenges and opportunities in on-campus farming. The dichotomy between staff and student perceptions and experiences calls for targeted interventions to bridge this communication and expectation gap. One key aspect is the need for clear and effective leadership organization to ensure that students' ideas and concerns are not overlooked. This would foster a more inclusive and responsive college campus farming environment.

Beyond communication challenges, the negative perception of an on-campus farm as low-status work demands attention. Understanding that some students may not be initially prepared for the physical demands of farm work is crucial. It requires an integrated approach, combining dedication to the work with foundational farming education to overcome any initial challenges.

Potential Solutions

In an effort to address these multifaceted challenges, participants proposed various solutions. Dan, emphasizing the need for a structured approach, proposed tying farm work to an agriculture degree, promoting the development of 21st-century skills, and fostering critical-thinking abilities: "Work ethic, time management, problem-solving, being able to help students." Current student workers emphasized the importance of dedication and foundational farming education to overcome initial challenges: "Being dedicated to [the farm]" and "teaching students the basics [of farming], then putting them in the field, to make them feel more comfortable."

Addressing the disconnect between the educational and career value of on-campus farming and students' negative perceptions is pivotal. This requires a concerted effort from both staff and students to recognize the broader benefits of on-campus farming experiences. Furthermore, integrating college-level farming initiatives with academic programs can enhance the perceived value of the work, fostering a sense of purpose and alignment with students' career goals. At the current time, the college does not offer any classes or programs relating to agriculture or food systems.

Our interviews with students and staff underscore the significance of addressing communication gaps, negative perceptions, and organizational challenges in an urban farm on a college campus. By implementing the suggested solutions, such as integrating farm work with academic programs and highlighting the educational and career benefits, colleges can enhance the overall experience for both staff and student workers (Berman, 2020; Walter, 2013).

We encourage any college with an on-campus farm to evaluate the narrative around its farm, promoting it as an educational and rewarding endeavor that contributes to personal growth and community welfare (Alkon & Agyeman, 2011; Hoey et al., 2018). Further research and practical interventions are warranted to solidify the transformative potential of on-campus farming experiences (Layman & Civita, 2022; Sager et al., 2022a, 2022b). Recognizing the diverse perspectives and experiences of participants can lead to a comprehensive understanding of the challenges and opportunities in on-campus farming, guiding future initiatives toward a more inclusive and effective model (Emery & Flora, 2006; Mathie & Cunningham, 2003; Sweeney et al., 2015).

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Special Section:
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Participatory breeding in organic systems: Experiences from maize case studies in the United States

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Abstract

Participatory breeding and crop selection can satisfy the needs of underserved groups of farmers (e.g., organic producers, farmers producing specialty grain for niche markets) neglected by the modern global seed industry. Participatory research methods that value local knowledge and facilitate the active involvement of producers, researchers, and other actors involved in the agri-food system are tactics that can help us achieve sustainable agriculture. Interest in the use of participatory methods to increase the value of U.S. land-grant universities to society has grown rapidly during the last decade.

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Interest includes re-engagement in the development of maize hybrids that perform well in a diverse range of heterogeneous growing environments and that are better suited for sustainability-minded producers, buyers, and consumers. Systems-based breeding aimed at protecting the environment and providing food, fiber, and energy while considering equity issues, has been proposed as a way to overcome the shortcomings of privatized approaches. In this article, we consider recent projects that use collaborative methods for hybrid maize breeding, cultivar testing, and genetic research to develop, identify, and deliver traits associated with crop performance, quality, and sustainability. Three case studies consider the efforts focused on developing non-GMO varieties for organic and specialty markets. We find that, unlike many successful efforts focused on the improvement of other crops, there are few promising models for participatory breeding of hybrid maize. Even though many projects have sought to involve stakeholders with a variety of methods, all have struggled to meaningfully engage farmers in maize hybrid improvement. Still, our reflection of case studies calls for systems-based breeding and suggests a path forward. This route would seek to address the needs, perspectives, and values of a broader range of actors participating in the food system by leveraging technologies and infrastructure in service of the public. Land-grant universities are well positioned to play a crucial role in coordinating efforts, facilitating partnerships, and supporting breeding programs that satisfy societal wants that include health, equity, and care.

Keywords
participatory research methods, hybrid maize, participatory breeding, organic systems, land-grant universities

Introduction

Participatory plant breeding (PPB) is an inclusive and decentralized approach to cultivar development in which farmers, breeders, and other stakeholders in the value chain collaborate to advance sustainable agriculture and promote the adoption of technology by underserved groups (Colley et al., 2022). This approach assumes that the likelihood of generating useful outcomes is increased when all participants in the value chain play an active role in decision-making (Swanson et al., 1998). Participatory efforts focused on crop breeding emerged in the 1980s as a response to the limitations of centralized research programs that developed following the Green Revolution and that failed to address the needs of resource-poor farmers in countries of the Global South (Ashby, 2009). The concentration of breeding efforts within a few private companies might result in the neglect of small markets and farmers who employ alternative production methods that are suited to their growing environments, resource availability, and philosophies of management (Endres et al., 2022). Centralized breeding models develop and evaluate germplasm using controlled experiments at research stations where breeders select materials that excel under conditions favorable for high-yielding cultivars. In the later stages of a breeding program, promising varieties are tested in numerous locations in the targeted growing environments. To accurately identify elite varieties and subsequently maximize genetic gain, breeders strive to create on-station conditions that closely resemble the target environment (Dawson et al., 2008). Accordingly, the centralized breeding model is most effective in industrialized production systems that are managed in regions with optimal fertility inputs, and that use seed and herbicide treatments to reduce disease and weed pressure (Murphy et al., 2007). This approach is less successful in organic farms where management practices and on-farm environments typically vary more widely (Seufert & Ramankutty, 2017).

The objectives of PPB include developing crop varieties that meet farmers' needs (e.g., possess desirable food or feed grain characteristics, compatible with their management practices and farming conditions) while promoting crop genetic diversity by developing germplasm suitable for different micro-environments and empowering farmers to understand and participate actively in the breeding process (Thro & Spillane, 2000). The PPB model is assumed to be most effective for enhancing crops intended for small, localized niche markets. The production for these markets often features highly variable, sometimes marginal soil environments that can amplify genotype-by-environ-

ment interactions (Morris & Bellon, 2004). Plant breeders commonly use participatory methods in countries where farming systems are typically managed with low inputs, the growing environments are heterogeneous, crop and soil management are less mechanized and more diverse, and the adoption of modern crop varieties may be low to negligible (Walker, 2006). Involving farmers in the direct selection of varieties well adapted to these diverse and often marginal target environments might also reveal the crop traits that are important to participants. This approach to breeding should also be well suited to alternative agriculture systems in the Global North, where diversity and complexity of management practices are considered to be the main challenges for crop improvement (Bhargava & Srivastava, 2019; Dawson et al., 2008). This approach may work well for organic corn grain production operations in the U.S. Midwest, where farmers use a wider range of agronomic management practices than their counterparts who use conventional practices (Ugarte et al., 2018).

At present, the majority of the organic maize acreage in the U.S. is planted with certified organic seeds and less than one-third with conventionally produced untreated non-GMO seeds (Endres et al., 2022). The U.S. Department of Agriculture's National Organic Program allows the use of untreated non-GMO seeds when comparable organically produced are unavailable. Both sources of hybrid seed rely primarily on parental inbred lines developed and tested in fields using conventional management practices (e.g., high inorganic nitrogen [N], herbicides, seed treatments) that are not representative of organic farming systems. Furthermore, the privatization and concentration of the conventional maize seed industry, the associated capture of elite genetics by this industry (IPES-Food, 2017), and the relatively high labor needs leading to the greater costs of organic seed production are thought to be major barriers to hybrid improvement and seed production for the organic maize sector (Endres et al., 2022). Loss of maize genetic diversity grown in farmer fields is most prominent in markets like the U.S., where hybrids replaced maize landraces and open-pollinated varieties (OPVs) by 1950. Seed collections like the USDA Agricultural Research Service (USDA ARS) North Central Regional Plant Introduction Station in Ames, Iowa, retain a significant portion of these genetic materials for public use, whereas commercial hybrids and their inbred line components are developed and owned by the private sector by utilizing federal plant variety protection and patent laws. The hybrid breeding and seed production pipeline has matured into a formalized seed system that is now global and promotes the use of modern technologies, including genetically modified maize cultivars, the application of genome editing and doubled haploids to speed up the breeding process, as well as inputs that are easier to produce and control (Brush, 2004, p. 277; Khoury et al., 2022; Robinson, 2018). This continued consolidation of the seed sector, in which the top ten breeding companies and seed suppliers hold 65.4% of the global market share (Howard, 2009), restricts the selection of genetically diverse corn hybrids. This limited choice may hinder the success of organic and other alternative farmers who require a more diverse catalogue of hybrids that can perform well across a wider spectrum of environmental conditions and management practices.

Collaborative networks that re-engage public-sector scientists with independent breeders and other participants in the agri-food system might accelerate the development of regionally adapted cultivars. This approach would not only contribute to genetic diversity and crop performance but also help involve farmers from diverse backgrounds and with varied philosophies of management (Adam, 2005; Luby et al., 2018). Ashby (2009) identified five levels of participation (conventional, consultative, collaborative, collegial interactions, and farmer experimentation) used by collaborative networks based on how decision-making is shared and whether new knowledge is co-produced by breeders and farmers. The conventional participation category suggests there is no organized communication between breeders and farmers regarding the establishment of breeding objectives or selection of suitable germplasm. Researchers using consultative participation do solicit farmers' opinions and preferences via one-way communication, but these views may or may not influence decision-making or objective-setting. Collaborative participation refers to the implementation of structured

methods that encourage mutual communication between breeders and farmers, ensuring joint authority in decision-making. Collegial participation arises when a group of farmers, in structured communication with breeders, makes breeding decisions autonomously, not always considering the breeders' input. Finally, in farmer experimentation, breeding decisions are collectively made by farmers without any structured input from breeders (Ashby, 2009). While other nomenclatures could be used and adapted, versions of all of these classes exist in participatory research; however, a detailed review is beyond the scope of this article.

Most efforts identified as PPB (or participatory variety selection or testing) vary based on the degree and timing of farmers' participation in the breeding work, that is, creating genetically diverse breeding populations, as well as selecting and testing new cultivars (Ashby, 2009; Walker, 2006). In PPB programs, local knowledge is recognized, and farmers' engagement is high as they actively select parental germplasm based on their traits of preference, make crosses to generate segregating breeding populations, and select genotypes with desirable traits from a range of materials to test in farmers' fields and under a particular range of growing conditions (Joshi & Witcombe, 1998; Walker, 2006). The extent of farmer participation in this breeding process varies based on the desired cultivar type (e.g., line cultivars, open-pollinated varieties, or hybrids). Breeding inbred varieties of wheat, barley, oats, and soybean, or the more genetically diverse open-pollinated varieties in maize, is less complex and requires fewer inputs than the process to develop hybrid cultivars. Other projects outside the U.S. that pertain to PPB for maize typically apply mass selection protocols (Mendes-Moreira et al., 2017). These are technically less demanding than the breeding methods used in hybrid cultivar development. However, selection response from mass selection (i.e., selecting ears from an open-pollinated variety post-harvest) is slow in outcrossing species like maize, aimed at improving key quantitative traits such as grain yield, nutritional grain composition, and tolerance to abiotic and biotic stresses. Progeny testing approaches using recurrent selection methods improve the selection response, but they require more time, resources, and training. In general, the improvement is incremental from one selection cycle to the next. Developing hybrid cultivars necessitates maintaining and enhancing different heterotic groups simultaneously and using a reciprocal recurrent selection approach for the targeted exploitation of heterosis. This usually falls beyond farmers' areas of interest or expertise, which probably prevents networks working with hybrid maize from succeeding beyond niche markets. Coordinating networks for the organic sector or other communities neglected by the commercial seed industry poses a significant challenge for conventional breeding programs focused on developing hybrids that succeed in multiple environments (Ceccarelli & Grando, 2020). Re-entry of the public sector into maize breeding may provide a way to offset the greater costs and complexity of hybrid development, as proposed by Gerpacio (2003).

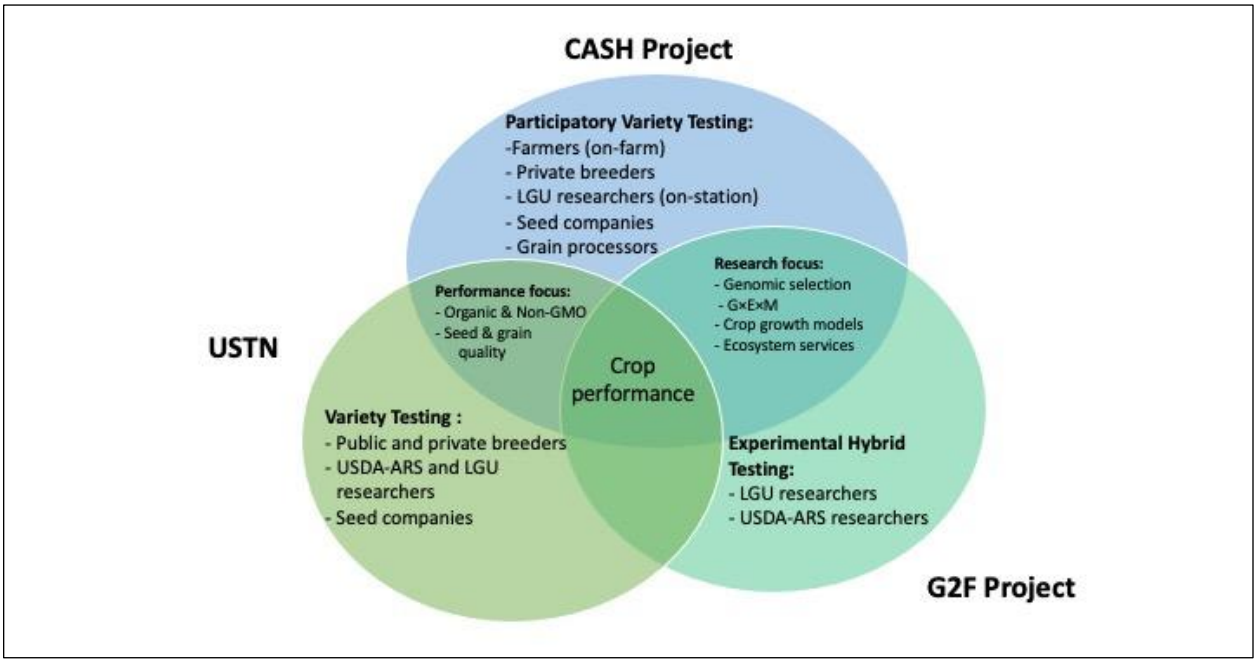
Prior to the 1960s, plant breeding in the U.S. was managed largely by public breeders at 1862 land-grant universities (1862 LGUs) that have traditionally received a greater proportion of resources compared to non-1862 institutions. As the demand for maize produced in more environmentally friendly and equitable agroecosystems grows, recognizing and integrating the needs identified by researchers serving across all LGUs, minority-serving institutions, and federal institutions (such as the USDA ARS and USDA Economic Research Service [USDA ERS]) become crucial (Brzozowski et al., 2022). Ganning et al. (2012) highlighted the potential of LGUs to serve as "regional resources for a new era of agricultural development" (p. 493) particularly through community-university partnerships that emphasize inclusive and sustainable agricultural practices. The recent trends toward the development of a more resilient food system that use sustainable production practices has brought renewed focus to the leadership that can be generated from within LGUs (Brzozowski et al., 2022; Lyon et al., 2021; Shelton & Tracy, 2016). We recognize that disparities among LGUs exist, but the adoption of inclusive approaches can rejuvenate public research and development, begin to address historic structural inequities (Partridge, 2023) and be integral in shaping resilient, equitable, and sustainable food systems.

Despite our optimism about publicly supported research networks, we note that few scholarly inquiries have considered when and why project outcomes from participatory efforts focused on knowledge co-creation and system change often fall short of goals (Turnhout et al., 2020). A recent systematic review identified the recognition of contextual diversity of participants, preemptive and intentional engagement of knowledge-holders, formation of shared understanding of project goals, and empowerment of actors, as the core components of collaborative research networks (Zurba et al., 2022). The recent review by Colley et al. (2021) of participatory plant breeding methods in the U.S. reported only one example of maize breeding using participatory methods. That effort did include researchers at an LGU (the University of Wisconsin) and was focused on sweet corn. While the number of participants was limited, the project was motivated by farmer interest. Despite this, the sustained engagement of farmers in the breeding process was challenging due to the long-term commitment required for recurrent selection and reliance on winter nurseries. While sweet corn seed production and sales might be less centralized and serve a broader spectrum of markets, these barriers to participation are equally or even more pertinent to farmers interested in enhancing field maize seed. In this reflective essay, we introduce three case-study projects that use collaborative networks for hybrid maize breeding and cultivar development in the U.S. with the goal of identifying strategies for systems-based breeding that meet the broad organic goals of health, wellness, and care, and contribute to sustainability by protecting the environment and providing food, fiber, and energy (Chable et al., 2020; Lammerts van Bueren et al., 2018).

Projects Using Participatory Methods in the U.S.

In this work, we considered case studies (Figure 1) that were started within the last 10 years in the U.S. to address the needs of farmers neglected by the dominant hybrid model for commercial maize cultivar development and seed production. To our knowledge, these are the only collaborative projects in the grain sector dedicated to field maize. The projects are arranged in descending order based on the level of farmer involvement and their potential to satisfy the systems-based breeding objectives listed in Table 1. Reflection and analysis were based on reports available in the literature, presen-

Figure 1. Key Characteristics, Goals, and Outputs of Three Projects Working to Develop Maize Seed that Satisfy the Needs of Organic or Non-GMO Markets



tations at relevant conferences (including the Organic Seed Growers Conference and the American Seed Trade Association), and project reports available online. Our team was actively involved in the Corn and Soil Health (CASH) project; therefore, more information is available for this specific case study.

The Corn and Soil Health Project (CASH)

The CASH effort evaluated experimental maize hybrids using a participatory selection model for organic systems. Beginning in 2018, a group of researchers at the University of Illinois worked with a diverse group of stakeholders in the food industry to foster transdisciplinary research that evaluated maize hybrids for their agronomic potential and prospects to make contributions to a broader range of ecosystem services. Efforts included a participatory on-farm testing network and a participatory educational network. The goal of the on-farm testing network was to gather information regarding the various strategies that culti-

Table 1. Projects Using Participatory Variety Testing Methods for Grain Maize in the United States

	Corn and Soil Health (CASH)	United States Testing Network (USTN)	Genome to Field Project (G2F)
Project duration	2017–2022	2009–2019	2013–present
Levels of participation	Collaborative with a participatory variety testing model	Consultative with farmers and with a variety testing model	Collaborative between scientists and using a variety testing model
Participating actors	Farmers, seed retailers, food processors, public and private breeders, soil scientists, agricultural economists	Public and private plant breeders, nonprofit project managers	Crop scientists, engineers, and computational scientists
Lead institutions	University of Illinois	Practical Farmers of Iowa	University of Wisconsin
Testing sites	All certified organic fields. 43 field plots across three states in organically managed land (WI, IL, and IN)	Mostly conventional management and a few certified organic fields. 53 field plots (10 certified organic) across 6 states (NE, IA, WI, OH, NY, MD)	180,000 field plots at LGUs/USDA-ARS managed experimental stations using conventional production practices and across 16 states (CO, NE, TX, MN, IA, MO, WI, IL, IN, MI, OH, GA, NY, DE, NC, SC)
Weather and management information	Weather data collected from regional weather stations, rotation details including crop sequence, rate and type of fertility amendments, frequency and intensity of tillage	None collected (or shared publicly)	Weather data collected from stations installed at each field plot, previous crop, pre-plant tillage and in-season tillage methods, irrigation information
Agronomic traits	Stand count, plant height, ear height, test weight, kernel weight, moisture content, grain yield	Stand count, root lodge, stalk lodge, green snap, plant height, ear height, pollen date, silk date, test weight, moisture content, grain yield	Stand count, root lodging, stalk lodging, days to silking/anthesis, plant height, grain moisture, test weight, grain yield
Ecosystem services traits	Organic seed; soil traits related to soil fertility; soil biological activity; nutrient cycling, and soil organic carbon; plant beneficial microbes, functional genomics of rhizosphere microbiome	Non-GMO traits may serve as proxy of ecosystem services	Soil traits related to soil fertility; genomic sequencing for all inbreds
Grain quality traits	Grain protein, starch, and oil content, aminoacid content, antioxidant content	N/A	N/A

vars use to cope with diverse environments and how crop cultivars respond to specific farming practices as well as biotic (e.g., pests, diseases, competition against weeds) and abiotic (e.g., cold, hot, dry, wet growing conditions, nutrient deficiency) stresses (Table 1). Between 2018 and 2021, the researchers worked with 24 farmer collaborators to assess maize hybrids in 15 fields in Illinois, 10 in Indiana, and 18 in Wisconsin. Gaining a deeper understanding of the cultivars' potential to respond to inputs and stresses is the first step to efficiently improving crop productivity in complex organic farming systems. For this, researchers maintained regular communication with the participating farmers and developed, with farmer input, a detailed manual that identified goals and methods for on-farm phenotypic evaluation of hybrids. Student researchers collected supplementary data to assess additional project objectives. The team of researchers met with participating farmers each year to adapt a standard planting plan to accommodate farmers' equipment and interests, as well as to identify a field that fit the rotation characteristics and that would be planted into maize. The winter before planting, researchers shared information on a selected set of hybrids available for testing based on known agronomic traits. Farmers generally selected cultivars based on their market outlets, with farmers in Wisconsin choosing maize with greater lysine and methionine contents suited for the dairy and poultry feed industry, and collaborators in Illinois and Indiana favoring food-grade cultivars with high carbohydrate contents suited for cereal and bread-making.

During in-person interviews and subsequent discussions, farmers provided details about their organic farming practices used at least three years before the testing period to satisfy the requirements for organic certification. A summury of documented management practices is in Table 1. The range of management used by participating farmers was representative of the diverse practices used in organic grain production systems in the region. For the purposes of our work, each field location was treated as a single replicate. Detailed site and soils information was collected and used to prepare yearly, personalized reports that were shared with farmers during one-on-one and group meetings. Their feedback informed activities in subsequent years. Reports included information about the yield performance of each tested hybrid in comparison with the average of all testing sites, as well as information about soil quality and related soil health contributions to ecosystem services like nutrient cycling and climate mitigation achieved by increasing soil organic matter reserves. This two-way exchange let farmers and researchers from the University of Illinois share their opinions about the hybrids and details about on-farm realities like stand establishment and management that might have influenced results. Overall, this effort evaluated germplasm developed by three breeding programs under a wide range of selective pressures introduced by an even wider range of management practices and environmental conditions.

While participating farmers were eager to share their views, time constraints limited their ability and interest in participating in plot maintenance or phenotypic evaluations. Similar experiences have been observed in participatory breeding efforts in the Global South (van Etten et al., 2019) and echo findings of Colley et al. (2021) suggesting that farmers may not want to participate directly in the breeding process. After two years of testing, we reduced our expectations for field engagement and asked farmers only to help plant, cultivate for weed control, and, in a few cases, harvest the trial when equipment was available. The shift in responsibilities transformed the network from collaborative to consultative, heightening the researchers' workload and control over data. This kind of modification of roles is common during the implementation phase of participatory research projects as members seek to build capacity (Cargo & Mercer, 2008). This change added logistical hurdles for a small team of students and research assistants that needed to visit farm fields distributed throughout the region at specific crop growth stages. Additionally, turnover in network facilitation personnel added to the challenges faced by students scheduling these visits, but also added value by increasing their interactions with and understanding of farmer cooperators. Farmers who were in the testing network also engaged through an educational network that linked them and other interested farmers with food processors and grain buyers (including restaurant

owners), as well as crop breeders and agronomists to explore opportunities for producing maize with value-added traits. Some members of the participatory educational network were farmers who hoped to have greater control over their seed or market aspirations that were incompatible with the hybrids we offered for testing. Farmers who produce for niche markets generally save their seed and prefer to use OPVs. This group may be much more willing to regain the skills, e.g., conducting on-farm selection and seed processing, needed to translate phenotypic characteristics into meaningful indicators of yield, quality, insect resistance, and aesthetics. Other participants included farmers who normally produce white maize for the food industry and were worried about cross pollination with yellow dent maize from our trials. These are cases when farmers chose to opt out of the on-farm testing network but remained involved and interested in project results.

As the project team refined and clarified its goals, it acknowledged pluralism in wants and disparities in power that affect the efficacy of participatory efforts (Turnhout et al., 2020). We conducted a participatory maize-based case study by coupling educational efforts with on-farm comparisons of maize varieties using an iterative process that included a series of focus groups, workshops, and consultations to understand the perceptions of seed quality and to better tailor the activities of the network to suit their needs. Some farmers expressed doubts about the value of participatory data collection and sharing and expressed concerns about the amount of time it would take to identify locally adapted varieties. And while there was a consensus that widening breeding objectives to improve societal well-being was needed, farmers did not see themselves as central actors in this venture (Endres et al., 2022). Most farmers interested in modern hybrids expressed little interest in regaining the breeding and selection skills that were required in the 1930s, when farmers in the Midwest actively partnered with LGUs to improve corn varieties (Fitzgerald, 1993). We envision that instead of 'de-skilling' farmers and making them reliant on experts to understand grain performance, as suggested by Fitzgerald (1993), participatory breeding could empower them while liberating them from the painstaking work of breeding. Farmers and breeders engaged in the network identified privatized testing networks as a tactic that could lower transaction costs enough to provide real value.

U.S. Testing Network (USTN)

Between 2009 and 2020, the USTN served as a prime example of a privatized network. It rigorously tested maize seed for organic and non-GMO markets in the U.S. This effort facilitated exchanges among public and private breeders, farmers, and independent seed companies (Carlson, 2012).The members of the USTN were breeding companies, public breeders at the USDA ARS and LGUs, farmers, and seed producers (Figure 1). The effort was consultative and was coordinated by the Practical Farmers of Iowa, a nonprofit organization founded in 1985 to facilitate effective cooperation between farmers, extension services, and university researchers. Based on participants' interests collected during annual meetings, the USTN efforts broadened to test hybrids chosen for specific maize quality traits. These traits encompassed characteristics such as high lysine and methionine content; both amino acids are sought after by the poultry feed industry. Other traits included specialty grain colors required by the food industry. By 2018, the USTN provided an infrastructure of 53 testing sites, 12 of which were organically managed and distributed across 10 states (Table 1).

This network allowed for simultaneous testing across a wide range of growing environments that encompassed early, medium, and late relative maturity zones. The USTN gathered more agronomic trait data than the CASH project and shared averaged hybrid performance results across experimental sites publicly via the USTN Practical Farmers of Iowa website. Information about the experimental design and management practices used at the various testing sites were only available to USTN members (Table 1; Goldstein et al., 2012). This fact, and the absence of individual plot, site, or environmental data, as well as the methods used to engage farmers in data collection, prevent any comprehensive analysis of site-specific interactions between crop genetics, environments, and farm management. Despite their focus on value-added

maize varieties, no data related to environmental outcomes or other ecosystem services were gathered. Reduced demand for the services provided by the USTN has been attributed to the relatively small number of maize breeders who devote their efforts to breeding for organic and non-GMO markets. This, and reduced levels of funding available for maintaining this type of infrastructure, ultimately contributed to the USTN's closure (Wilbeck & Carlson, 2018). Despite USTN's perceived compatibility with goals for hybrid development for stewardship-minded markets, and the fact it was organized in partnership with the farmers themselves, it failed to grow into the kind of diffuse seed system made up by small companies that Ceccarelli and Grando (2020) argue is needed for PPB to thrive. Failure to meaningfully engage farmers or other key stakeholders in the USTN network may explain why it was discontinued despite its compatibility with many breeders' preferences that seek farmer engagement through variety testing during the latter stages of the breeding process and across a wide range of environmental conditions (Ceccarelli & Grando, 2020). Although this approach of participatory variety selection or testing is considered easier to organize, requires fewer resources, and more rapidly identifies mature varieties suitable for seed production and distribution to farmers (Joshi & Witcombe, 1998), it is less participatory than PPB. Farmers have restricted ownership and influence over the materials they assess, and often lack the resources, both in terms of time and labor, to actively participate.

The Genome to Fields (G2F) Initiative

The third case study considers the Genome to Fields (G2F) collaborative network. Even though it does not currently include farmers' direct input into the effort., it does involve other important stakeholders, including plant breeders, geneticists, agronomists, and the regional and national maize growers associations that represent farmers across the U.S. Corn Belt. The research objectives of the G2F are more fundamental than those of CASH or USTN. The G2F aims to understand the functions of all genes in the maize genome across a broader range of environments, ultimately benefiting growers, consumers, and society (G2F Initiatives, 2017). It may provide a way for society to derive added value from the public funds used to sequence the maize genome. Initiated in 2013 with support from the Iowa Corn Growers Association (IowaCorn), the G2F represents collaborations in diverse environments and a wide variety of conventional management practices. Since 2014, more than 30 collaborators from academia and federal organizations across 15 states, from Texas to New York and Minnesota to Georgia, have planted thousands of yield trial plots, phenotyped hundreds of experimental hybrids based on agronomic traits, logged weather data for all fields, and provided soil and management data summarized in Table 1 (AlKhalifah et al., 2018). All these data, including the genetic information from all tested maize cultivars, is publicly available (G2F Initiative, 2017). This public-private collaboration supports initiatives funded by research-driven grants. The research projects under the ubrella of the G2F aim to deepen our understanding of plant-soil interactions, plant-soil-microbiome dynamics, and disease resistance. Additionally, they focus on pioneering engineering approaches to phenotyping, including the use of unmanned aerial vehicles (drones) and nitrogen sensors. All collaborators, stakeholders, and interested groups meet annually to report results, discuss research agendas, and consider new phenotyping (G2F Initiative, n.d.).

The addition of intentional mechanisms for including the participation of underserved and aspirational growers into the G2F could help reforge ties that were lost during the past half century. At present the advisory board of the G2F consists of academics from LGUs and the USDA ARS and a representative from the Iowa Corn Growers Association. While grower participation may not provide a formal tie to research, it certainly can and does influence the public research agenda. The G2F's current structure echoes the 1960s, when plant breeding was largely under the purview of public breeders at 1862 LGUs and USDA ARS. By strengthening partnerships among G2F members, including geneticists, agronomists, plant pathologists, food scientists, and statisticians, and bridging collaborations with LGUs, federal entities like USDA ARS and USDA ERS, and pro-

ducers, the network is poised to cater to diverse stakeholder needs, from processors to consumers to citizens. This synergy holds the promise of pinpointing and promoting innovative maize hybrid traits. The greatest impact might result from the true regionalization and engagement of smaller and more distributed seed-producing efforts that meet the needs of regional markets and that contribute to harnessing genetic diversity. This vision is in line with recent proposals for more equitable public breeding programs led by LGUs and that amplify the needs and values of an ever-growing group of diverse stakeholders (Brzozowski et al., 2022). The growing demand for sustainable food systems has garnered significant attention from crop breeding programs at 1862 LGUs, as highlighted by Shelton and Tracy (2016). Looking ahead, we anticipate and advocate for these efforts to increasingly attract and integrate minority-serving institutions, enhancing the diversity and impact of these initiatives.

To improve the value of the G2F to farmers and markets interested in value-added traits that do more than signal intent, the range of farming systems and traits measured must be expanded. While only the CASH project sought to measure traits associated with social and environmental outcomes, the USTN relied on market-associated traits, such as non-GMO seed and high amino acid content, that might be useful proxies for desired environmental or health outcomes (Endres et al., 2022). The vast array of genetic data gathered by the G2F initiative can help the public and others to achieve social goals. This is equally relevant to breeders and others, whether they are interested in using classical or advanced breeding methods or developing a product for organic, non-GMO, regenerative, or standard markets. Projects and partnerships interested in pursuing opportunities can readily leverage G2F resources and protocols while working on securing competitive grants.

Synthesis and Conclusions

Given the limited amount of funds available to support publicly funded research and the significantly greater investment realized through the private sector, how do we serve farmers who want to have greater control over their seed and to use varieties with broad adaptation that could ensure yield stability even under extreme weather conditions? How do we overcome barriers to farmer participation in active breeding and selection during the growing season? According to Montenegro de Wit and Iles (2016), breeding strategies and technologies used to cultivate seeds that promote entrepreneurial approaches and business models gain credibility due to active involvement of the public and agroecologists in general.

While all three efforts described in this work focused on crop performance, which served as the primary objective, only the CASH project included active stakeholder participation. Both the G2F and USTN projects allowed testing of varieties and experimental hybrids across a wide geographical area. Different project priorities resulted in key differences in organizational structures and methods for stakeholder engagement. The CASH project's participatory variety testing model needed to better consider farmers' time and availability to ensure that demands for this effort did not represent a conflict with other farm operations during the growing season, as noted in other projects (such as Healy & Dawson, 2019). Only the CASH efforts asked farmers to evaluate the work undertaken by breeders and researchers and provide feedback. Farmers who remained engaged in the participatory educational network presumably found enough value to share their time and opinions. Determining how to sustain ongoing engagement that does not overburden participants is essential, as is providing them with a legitimate voice in decision-making.

The involvement of all institutions in the U.S. LGU system is essential to revitalizing public and private collaborations. LGUs have the capacity to direct the efficient use of resources like genomic sequence information generated in the G2F project while adopting some of the methodologies laid out in CASH to cater to the needs of diverse production systems. For instance, LGUs can coordinate the use of molecular methods compatible with the regulations in the National Organic Program and PPB methodologies to accelerate the entire breeding process (Ceccarelli et al., 2007). Efforts to integrate and build capacity and infrastructure at minority-serving institutions are crucial. These can steer major breeding efforts to address the needs

and values of historically underserved producers. This can be further amplified if LGUs coordinate public-private partnerships in support of diverse and equitable breeding programs through grant funding. While funds obtained through competitive programs are typically available for durations shorter than regular breeding cycles, LGUs can provide leadership to ensure the continuity of funding. Models that establish partnerships for germplasm improvement and dissemination can engage and support small seed companies that produce seeds tailored to specific environments (López Noriega et al., 2013; USDA, 2022).

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Climate resilient food systems and community reconnection through radical seed diversity

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Abstract

Diversity is essential to climate resilience in food and farming. Traditionally, agrobiodiversity has been cultivated and sustained through communities' relationships with seeds. A fluid process of saving, preserving, and exchanging seeds allows for regional adaptation and transformation. This process results in seed diversity at the crop, variety, and genetic level. Over the last century, agrobiodiversity has declined at an alarming rate, and simultaneously there has been an erosion of community seed-keeping practices. A reaction to these interrelated crises has been an increased push to preserve biodiversity through institutional seed preservation efforts (also called ex situ preservation), which focus on genetic preservation of seeds in controlled environments. The seeds are genetic resources that are made available to plant breeders, who solve agronomic problems by creating improved cultivars for farmers. This is very different from community seed-keeping (also called in situ preservation), which values seed-people relationships and fosters natural agrobiodiversity and regional adaptation. Seeds are seen in direct connection to food, and saved for immediate and practical reasons like yield, flavor, and resistance to biotic stressors. In traditional communities, seeds are often perceived as kin, as ancestors or living beings with both histories and futures. For institutional seed preservation, collecting and maintaining seed diversity is an imperative insurance policy against future challenges. Ironically, this model erodes

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community-based seed-keeping efforts and increases dependence on institutional seed preservation to maintain genetic diversity. In this paper, we explore declining agrobiodiversity and community seed-keeping and share our experiences working with a diverse range of varieties from The Heirloom Collard Project (HCP). We propose that radical seed diversity can jump-start autonomous, community-based seed-keeping efforts, increasing agrobiodiversity and, ultimately, the climate resilience of food systems.

Keywords
agrobiodiversity, climate resilience, relational seed-keeping, regional adaptation, seed preservation, collards, landrace, ultracross, plant breeding, community seed-saving, food systems, heirloom

Introduction

The Encyclopedia of Biodiversity defines agrobiodiversity as "variety and variability of living organisms that contribute to food and agriculture in the broadest sense, and that are associated with cultivating crops and rearing animals within ecological complexes. It is further expanded in some contexts to include all the organisms present in an agricultural landscape" (Jackson et al., 2013, p. 31). Increased agrobiodiversity has multiple documented benefits: farm resilience to extreme weather events and other system shocks (McFall et al., 2015), increased speed and capacity of a crop's climate adaptiveness (Ceccarelli & Grando, 2020), superior ecologically based pest and disease management (Altieri et al., 2014), and broader availability of nutritious and culturally appropriate foods (Fransiska et al., 2015). However, there is a clear lack of agrobiodiversity in food and farming.

The 2017 Census of Agriculture reported that 95% of U.S. farm producers are white (U.S. Department of Agriculture National Agricultural Statistics Service [USDA NASS], 2017), and farming is generally taught and understood through a colonial lens (Layman & Civita, 2022). Practices such as regenerative agriculture promote systems that can heal the land, but still often exclude Indigenous voices from which those practices are derived (Mangan, 2021); peasant[1] and Indigenous farming wisdom often promotes a more harmonious relationship with the land and its workers (Penniman, 2018). In terms of natural resource management, the white-dominant mindset still embraces an extractive relationship. Within white-dominated systems, the range of commercially grown crops is severely limited. According to a Food and Agriculture Organization of the United Nations (FAO) report on agricultural biodiversity, there are 20,000 edible plant species, only 6,000 of which have historically been used for food. In 2019, fewer than 200 made a major contribution to food production, and just nine crops are used for two-thirds of all food production (FAO, 2019).

Within the limited range of crops there has been significant erosion of genetic diversity over the last century, with 75% crop genetic loss (FAO, 2019). Much of this loss has occurred in loss of landrace varieties (domesticated but diverse, regionally adapted seed varieties), although modern cultivars and replacement landraces have created stable diversity in some areas; for example, diversity in pearl millet landraces in villages in Niger has remained stable despite the landraces themselves shifting significantly due to recurrent drought (Khoury et al., 2021). Genetic diversity of the varieties grown has also generally become limited, from homogeneity due to inbreeding multiple generations of heirlooms (Lofthouse, 2021) or from the dominance of commercial modern crop cultivars (Khoury et al., 2021). Just as heirlooms are precious objects passed from generation to generation, heirloom seed varieties have been around and inbred for a long time (strict definitions vary, but there is a general consensus that heirlooms are open-pollinated varieties that predate World War II).

Additional narrowing of agrobiodiversity can be seen in declining insect populations (Seibold et al., 2019), degraded soil biodiversity (Kraamwinkel et al., 2021), and homogenous farming landscapes and land management (Carmona et al., 2022). A recent collaborative project provides a succinct summary:

[1] I use the term "peasant" farmer to refer to a person of the land, who has a direct and special relationship with the land. For a fuller exploration of the term peasant, I recommend *Unpacking the Word Peasant* (A Growing Culture, 2023).

> The evidence is mounting that agricultural biodiversity ("agrobiodiversity") is vital for supporting human food sovereignty, food security, and nutrition. Biodiversity-rich agriculture has proven able to provide a stable, diversified, and nutrient-rich supply of food for farmers and their communities while supporting ecological functions important for resilient and sustainable food production and the sustenance of complex ecosystems. However, agrobiodiversity has declined dramatically in the last decades, with diverse impacts for human and more-than-human communities. Multiple studies point to the links between homogenization of the global food supply and the persistence of hunger and malnutrition among consumers, both rural and urban. (Limeberry et al., n.d., para. 1)

When the food system is reduced to a linear series of inputs and outputs—the industrialization of food and farming—costs such as societal health and environmental harm can be externalized and ignored. Reduction of agrobiodiversity can be justified as an improvement in efficiency because capitalism incentivizes profit-maximizing behavior by producers. In this paper, we prefer the term *relational foodways* as an alternative to *food systems* (Valeriote, 2021). Relational foodways speaks directly to the interconnected complexities of food system relationships, and opens the conversation to food as a way of life rather than a system of inputs and outputs. We propose the parallel term *relational seed-keeping* to depict the complexities of living alongside seeds in community. Much of our agricultural history has relied on our relationship with seed, and the coevolution of people and plants has allowed for tremendous human advancements. It is only in our very recent past that seeds have been separated from people and reduced to "genetic resources."

The Utopian Seed Project (TUSP) is a nonprofit based in Western North Carolina that encourages food and farming to embrace greater agrobiodiversity, encouraging relational seed-keeping by engaging a broad swath of stakeholders. These stakeholders are defined in the TUSP vision statement as "An engaged community of growers, gardeners, farmers, foodies, cooks and chefs (actually, everyone) who embrace diversity because they understand and believe in resilient, delicious and equitable food and farming" (TUSP, 2020, para. 3). Growers are considered to be not only food but seed growers as well, based on the core concept that a healthy and thriving seed system is a fundamental pillar of a healthy and thriving food system. TUSP is part of The Heirloom Collard Project (HCP), which defines itself as "a collaboration of collard-loving people and organizations—a crock pot of sorts, where the ingredients are each respected, but the true magic is in the pot likker" (HCP, 2021, para. 2). This collaboration is an example of high impact and effective change through community engagement. The HCP includes and empowers people and communities to interact with collards in a way that is deeply meaningful, often food and culture focused, and therefore long lasting. These relationships are critical because agrobiodiversity is not an object that can be stored and saved, but rather a process that needs to be embraced and applied. By working with diverse stakeholders, from farmers and gardeners to consumers, chefs and food businesses, TUSP aims to create deep connection with food and an appreciation of the important role of seeds in our foodways.

At least in part, TUSP asks the question, How do we re-infuse agrobiodiversity and seed connection into relational foodways? In 2020 TUSP planted 21 varieties of heirloom collard varieties as part of a national trial organized by The HCP and Seed Savers Exchange. The trial included a beautiful mix of diverse varieties, such as William Moore, Fulton Stroud, Tabitha Dykes, Fuzzy's Cabbage Collard, E.B. Paul, Jernigan Yellow Cabbage Collard, Yellow Cabbage Collard, Georgia, White Cabbage Collard, Willis Collard Greens, Ole Timey Blue, Georgia Blue Stem, North Carolina Yellow, McCormack's Green Glaze, White Mountain Cabbage Collard, Green Glaze, Miss Annie Pearl Counselman, Brickhouse Old Collard, Lottie Collard, Vates, and Georgia Southern (HCP, n.d.). At the TUSP experimental farm in Leicester, NC, we planted 10 plants of each variety in a randomized block design with a single replication (a total of 20 plants of each variety). The aims of the project

were fairly standard: to collect agronomic data on the plants as well as document the diversity of the varieties. We worked with chefs to do tastings and explore various food applications.

There was significant diversity within the varieties as well as between the varieties. The collards were allowed to grow into the winter season, during which we experienced a sudden low of 8°F, when some plants completely perished and others still thrived. Plants of the same variety performed differently, suggesting a strong genetic predisposition for cold tolerance. The cold snap caused about 30–40% plant loss, but the surviving population, which included plants from all varieties, continued to grow into spring when they flowered and produced a seed crop.

Given the use of randomized block design and the strong outcrossing habit of collards, the seed mix certainly contained a high level of intervarietal cross-pollination. The plants that produced seeds were simply the winter survivors, and initiated a seed mix that was beautifully diverse, delicious, and extremely cold-tolerant. An HCP collaborator, Melony Edwards, described this exciting new seed mix as Ultracross Collards, which we will explore in detail later. We will also compare institutional seed preservation (ex situ preservation) and community seed-keeping (in situ preservation), as well as the differences between commercial heirlooms and community-saved seeds. From that foundation, we will discuss reasons for declining seed diversity and the challenges of reintroducing it into communities. Our work with collard varieties from The HCP will serve as an example of both the loss and the importance of relational seed-keeping. We will then fully explore the potential of radical seed diversity (e.g., Ultracross) as a tool to create climate resilient foodways and community reconnection.

Institutional Seed Preservation vs. Community Seed-Keeping

Institutional seed preservation is a common response to declining biodiversity. It includes both the search for wild crop relatives as well as the collection and storage of peasant and Indigenous seeds, which are often described as landraces. The USDA has sponsored plant-collecting trips around the world for over a century and stores seed specimens in the National Plant Germplasm System. The seeds, and sometimes plant material, are made available as a public resource for research and education through the Germplasm Resources Information Network (GRIN), whose tagline is "Empowering and enabling crop diversity" (Germplasm Resources Information Network, n.d.). Globally coordinated efforts to preserve seed diversity were ramped up in the 1970s (Frankel & Bennett, 1970), with the International Board for Plant Genetic Resources (IBPGR) established in 1974. Perhaps the most famous institutional seed preservation effort is the Svalbard Global Seed Vault: over 1.2 million seed varieties and wild crops are stored in a vault designed to survive a range of global catastrophes (Angel, 2023). The prevailing narrative is of the threatened extinction of crop varieties, which establishes a moral imperative to preserve and protect them.

Sadly, access to the germplasm resource collections is often restricted to academic and corporate plant breeders for creating improved varieties (Gewin, 2017), which are often released as proprietary hybrids or patented genetics, further consolidating the seeds within the power of corporations and institutions (Greenaway, 2017). In a positive feedback loop, the work of preservation leads to the consolidation of seed genetics through the introduction of "improved cultivars," which further undermines in situ maintenance and availability of agrobiodiversity and therefore fuels the urgent (and morally justified) call for greater preservation efforts. In addition, it is the seeds, or genetic strains, that are often "saved," but the people and communities who have stewarded them are forgotten, ignored. and/or alienated.

This viewpoint has been explored by Helen Anne Curry, documenting efforts of the USDA and other organizations to save native corn varieties while the same government pursued policies of displacement and destruction of tribal communities who stewarded the corn (Curry, 2022). To save seeds by extracting them from communities deeply connected to them assumes that the communities are not capable of maintaining the varieties themselves, discounting the intergenerational labor, skill, and wisdom of those who developed the varieties into desirable "genetic resources." Loss of connec-

tion to community seeds and seed-keeping traditions is a tragedy, especially for communities where violence and displacement forced that loss upon them.

In addition, this storing and mining of specific genetic traits often ignores (or at least undermines) the plants' ability to change and adapt. Seeds grown and saved in relation to a specific environment by relational seed-keepers significantly contributes to community resilience and agrobiodiversity. A people-first approach to seed preservation would focus on protecting and promoting environments and systems in which communities are empowered to steward their seeds. Seed sovereignty is the right of a person or community to save their own seeds, but also requires access to regionally or culturally appropriate seeds and having the knowledge and skills to cultivate and save them. In many Indigenous and peasant farming communities, seeds are thought of as living beings, relatives, or kin, which connects strongly to the concept of relational seed-keeping. When seeds become family, a history and a future and a depth of relationship extends beyond a single growing season: "There is a maternal quality to seed stewardship that exists in the relationship between the seedkeeper and the seed" (Valeriote, 2021, para. 7). Seed rematriation is a movement led by Indigenous women to return seeds to their places and peoples of origin, a very different approach from the seeds-as-commodity relationship that industrial agriculture promotes, while the highly consolidated global seed industry continues to threaten peasant and Indigenous communities around the world (Peschard & Randeria, 2020).

Within smaller seed industry movements, there is increasing acknowledgment of the harm done, both past and ongoing, by seed commercialization, and a growing focus on rematriation projects and culturally meaningful seeds. The Ujamaa Cooperative Farming Alliance, for example, is a BIPOC-led organization doing important seed work. At nearly all of their workshops, they engage in deep healing and dialog, asking questions like, "What did your grandmother eat?" and "What ten crops can you not live without?" These are simple but powerful questions because they ask about relationships, family, food, and culture. In Black communities (but also more broadly across the American South), collards are almost always on the list of important cultural crops, and yet they have suffered the same fate of varietal loss. The HCP offers a clear example of the complexities of institutional seed preservation, and opportunities for reigniting community seed-keeping efforts.

Collards Part I: Saving the Collards

As early as 1992, Mark Farnham, a USDA research geneticist specializing in *Brassica*, the genus of cruciferous vegetables that includes collards, noticed a severe lack of genetic diversity in collards (*Brassica oleracea subsp. viridis*), and began collecting samples. In the early 2000s, he connected with cultural geographers Ed Davis and John Morgan, who were researching what made the South unique and had arrived at collards as a lens through which to answer the question. Farnham, Davis, and Morgan received USDA funding to travel across the Southeast in search of collard diversity. They collected 78 samples from backyard seed-savers, traveling over 12,000 miles across 12 states. None of these collards were in seed catalogs or had documented histories. Furthermore, many of the seed-keepers were elderly and reported that they had no one to pass the seeds to when they died, indicating that the varieties would likely die with them. The researchers reported that only one seed-keeper declined to share seeds, and most of the seeds were offered with great thanks. The collected varieties were added to the National Plant Germplasm System, through which they are publicly available for research and education work through GRIN.

We can easily imagine a scenario that had these collards not been collected and stored by the USDA, they would no longer exist. Because these varieties lacked documented histories, we would not even know that they had ever existed. Thus we should give great thanks to the efforts of Davis and Morgan, and acknowledge that many varieties—collards and otherwise—are surely already lost. Nevertheless, while it is undoubtedly true that we are in real danger of losing many seed varieties, the work of preserving biodiversity is not linear or simple: "Only by safeguarding crop diversity in perpetuity, and making it available for use by researchers, plant breeders, and farmers, can we adapt agricul-

ture to the climate crisis, reduce environmental degradation, improve livelihoods, and feed everyone adequately" (Crop Trust, n.d., para. 2).

Such statements trigger immediate questions. Who safeguards this diversity? Who decides to whom to make it available? And, who decides what it means to feed everyone adequately? Institutional seed preservation separates seeds from the communities that steward them, placing a high value on the genetics of seeds without considering the importance to both the people and the seeds of in situ preservation efforts. As the collards example shows, ex situ work is urgent. However, while the seeds are technically saved, when the community seed-keepers die the seeds will still be lost to the communities. The separation of seeds from people and land is a core problem. Seeds sitting in a seed bank and not freely exchanged and grown within a community will not be able to live and adapt to the needs of the community and a changing environment. Katharine Dow writes, "If seeds bring with them their worlds, then they are inherently malleable, so seed savers are concerned about how commercial seed breeding and ex-situ conservation denatures seeds' embodied relationships with their environments and, with that, their inherent intergenerational malleability" (2021, p. 496). While the collard collection trip demonstrates how institutional seed preservation can play an important role in agrobiodiversity conservation, especially in times of socio-political unrest (Andersen, 2016), there needs to be much greater effort for community seed-keeping if seeds (and therefore food) are to remain in relation with people (Graddy, 2014; van Dooren, 2009).

Called the "Godmother of Southern Seeds" by *The New York Times* (Roach, 2023), Ira Wallace is a seed-keeper and educator who lives at Acorn Community, an egalitarian intentional community in central Virginia that manages the heirloom-focused seed company, Southern Exposure Seed Exchange. In 2016 Wallace chanced upon a collard variety trial in Charleston, South Carolina, that Mark Farnham was running. The trial included around 60 of the varieties collected by Davis and Morgan. Wallace was astounded by the diversity on display and made a vow to get these varieties back to people who cared about collards (Smith, 2021). This was the beginning of an idea that developed into The HCP. Through a diverse network of community-based seed stewards, The HCP is working to regenerate and reintroduce collard diversity back into the food system. The aim is to develop relationships—including traditions of growing, cooking, and eating them—with these varieties beyond the standard seed catalog transaction. so that they can return to communities without the threat of extinction.[2] A friend of the project, Jon Jackson of Comfort Farms, describes the relationship of conservation by consumption: if people are not eating the collards, no one is going to care about growing them and saving the seeds.

The Limitations of "Catalog" Heirlooms

There are many organizations and seed companies that have been promoting heirloom seed preservation for a long time. Seed Savers Exchange was founded in 1975, and there are many heirloom-focused seed catalogs representing thousands of unique varieties. Through this lens, genetic diversity is alive and well. Modern seed-saving practices stress the need to control "open" cross-pollination with isolation by species, distance, and barrier, thus ensuring that the variety continues to grow "true to type," i.e., as it did last year and the year before ad infinitum. This preservation mentality is embedded in the concept of heirloom seeds and compels us to save seeds in a way that both preserves the purity of their story (also known as the seed description) and of their genetics. In Europe, seeds must conform to a rigid definition of distinctiveness, uniformity, and stability (DUS) to be sold (Animal and Plant Health Agency, 2022).[3] Even in the U.S., over the past century the expectations of "stability"

[2] This work and the work of The HCP have been widely reported, for example, in the book *Collards, A Southern Tradition from Seed to Table* (Davis & Morgan, 2015) and the National Public Radio story, "A community of seed savers has a recipe to revive rare varieties of collard greens" (Wood, 2022). Information about The HCP is available at https://www.heirloomcollards.org. I would also like to note that both Dr. Ed Davis and Dr. Mark Farnham have been highly supportive of this work.

[3] This is slowly changing in Europe. In 2022, a new European regulation of organic production was introduced, opening up the possi-

and "uniformity" have been codified in a model of regulation, control, and profit (Page-Mann, 2022). Basically, if you can name and describe it, you can own and sell it, making varietal purity a precursor to profit.

The timeline of most catalog heirlooms coincides with the formation of the American Seed Trade Association (ASTA) in 1883, which established business alliances with the seed industry (previously government-sponsored) and by 1924 had persuaded the federal government to stop its free seed distribution program.[4] Naming and describing an heirloom seed variety traps that seed at a single point in time, reinforcing the notion that the seed is a static thing. This arbitrary beginning (e.g., "This heirloom can be dated back to 1885") in actuality becomes the last page of the seed's story, which is rewritten every year as well-meaning seed savers strive to preserve the seed so it grows true to type. "What was that seed before 1885?" is a question generally unasked, further erasing peasant and Indigenous contributions to agrobiodiversity. With the static, objectified premise of catalog heirlooms, a core problem is that many varieties are highly inbred, but seeds are living organisms and are not meant to be held in stasis generation after generation. When the seeds are removed from their communities, cultures, and people, a relationship is broken. Seed savers may step in to steward those varieties, but they are merely caretakers of those seeds, guided by the name and description of the heirloom, but rarely empowered to be in relation with them.

In reality, a seed has a fascinating past and an immeasurable future. The story contained within a seed should be one without beginning or ending, a story in which the seed-keepers are active participants, and the seed-people relationship co-evolves every year. Katherine Dow, exploring community seed-saving of the London Freedom Seed Bank, writes of community seed activists, "Their focus on seeds and the worlds in which they grow and how these are transmitted across both species and generations suggests that, for them, seeds are not only embedded in their environments but also *embody* their environments" (2021, p. 495). As the seed continues to evolve with the changing environment and the seed-keepers themselves, then we should see the seed (and the people) as dynamic, rather than static.

A seed story is ongoing because the seeds remain in relation with the seed-keepers in the community. Peasant and Indigenous communities generally embrace dynamic, relational seed-keeping practices. Martín Prechtel describes an ancient practice of reintroducing wild genetics into stable corn populations in a 12-year cycle to reinvigorate the corn. This deep cultural ceremony has been recorded in corn-growing communities of people from Peru, Guatemala, and certain tribal districts of Mexico and New Mexico. With similar intent, Appalachian old-timers have described the community tradition of scooping a handful of bean seeds from a neighbor and dumping them in the seed stock of another neighbor, ensuring the genetic diversification of community seeds. Prechtel criticizes conventional notions of purity: "To keep seeds alive, clear, strong and open-pollinated, purity as the idea of a single pure race must be understood as the ironic insistence of imperial minds and should probably be boiled down into the tears of grief its insistence descends from and composted into something useful" (2012, p. 348). Seed-saver and farmer Michael Carter spent time farming in Ghana, where community seed-keeping is common. During an interview about seed heritage he commented on southern peas he'd seen growing in West Africa, and commented, "The thing with the cool ones is that they don't have no names, they're just beans" (Blackwood & Kadish, 2022, 19:12). There are millions of mothers out there, but they all share one name, mom (or version of). The reason we know our own mom's are special isn't because of their name, but because of our relationship with them. As with seeds, if everyone knows who the special (to them) seeds are, then specific names may not be necessary. This type of work requires a deep relationship with the seeds and

bility of marketing seeds of "organic heterogeneous material" (OHM) without the need to register in official catalogs (Lorimer, 2022).
[4] The free seed distribution was not without its problems; it was basically a tool to advance settler colonialism by supporting farmers to grow food on recently stolen land.

plants, and a deep knowledge of seed-saving. There is a substantial level of confidence and wisdom in mixing and sharing genetics without fearing loss of culturally important traits and varieties.

Collards Part II: Intravariety Diversity

Diversity is a component of a resilient system, and genetic diversity in a food system can form naturally when community seed-keeping is prominent. The varieties that The HCP works with have been called heirlooms because they are old enough to meet the definition, having been grown and saved in place for many generations. However, the seeds did not come with descriptions, and most of them did not have names before being collected by Davis and Morgan. They were just collards. Occasionally they would carry a name for a subtype or color, such as yellow cabbage collards. The original collard seed stewards were invited to name the collard seeds, and most varieties are now named for the people or places they came from (HCP, 2023). Brassicas can cross-pollinate over a long distance, and there are many crop types in the species *Brassica oleracea*, so the potential for intervariety cross-pollination is quite high. There is clearly large genetic variability within the heirloom collard varieties, which naturally leads to a high level of climate resilience (Ceccarelli & Grando, 2020). It has been observed that the size of populations from which seeds were saved was often quite low compared to the recommended population size to maintain genetic integrity, which is around 80 plants (Buttala & Siegel, 2015). Genetic diversity within each variety likely buffered the smaller population size and helped maintain genetic integrity; that is, population size for genetic integrity is inversely proportional to intravariety diversity. Due to observed diversity, seed-saving and selection for strict varietal purity did not seem to be a primary goal for the original seed-keepers.

This style of fluid, community-level seed-keeping is arguably what keeps agrobiodiversity alive and strong while also supporting community food resilience. It is how seeds were traditionally kept, with many peasant and Indigenous communities maintaining landrace populations rather than strict varieties. A landrace has been described as locally adapted, genetically variable, and promiscuously pollinating (Lofthouse, 2021). Some crops are more prone to promiscuous pollination than others. Perfect flowers contain both pollen producing and pollen-receiving anatomy (e.g., beans and tomatoes), monoecious plants have separate pollen-producing and pollen-receiving flowers (e.g., squash and corn), diecious plants have separate pollen-producing and pollen-receiving flowers (e.g., spinach and asparagus), and some perfect flowers are self-incompatible (e.g., collards and broccoli). The mechanism of pollination determines the level of promiscuity, with perfect flowers usually self-pollinating (not very promiscuous) and the other types usually outcrossing (more promiscuous). Regardless of the level of promiscuity, most modern cultivars and heirlooms are not genetically variable, and if the variety starts with limited genetic variance then the adaptive capacity of that variety will also be limited. Regional adaptation is widely considered to be an inherent advantage of seed-saving, but since most people are saving seeds from genetically limited heirlooms, the full advantages of seed-saving may not be realized (Lofthouse, 2021). The level of climate adaptiveness is improved with greater genetic diversity (Ceccarelli & Grando, 2020). Thus, the genetically diverse HCP varieties support more rapid regional adaptation because of the inherent variability of the varieties. We have seen evidence through our informal farmer network; one farmer seed-saver, Sandra Osterkatz, grew a variety named Tabitha Dykes and noticed some plants with more purple coloration, which her CSA customers liked. After just two years of selecting and saving the purple plants, she has a purple-dominant Tabitha Dykes seed line quite distinct from the original population (Osterkatz, 2023).

Ultracross: Reconnecting Forward

In 2020, TUSP allowed 21 varieties of heirloom collards to intercross. The plants that produced seeds were the plants that had survived extreme winter weather, yielding a diverse population of environmentally selected collards which we called Ultracross Collards. As a breeding method this would be described as a composite cross, but the concept of diverse seed populations is ancient. The model of hyper-uniform varieties, created in a cen-

tralized system, and sold through seed companies is the modern concept, distinct from the varieties held within communities and stewarded (and selected) in relation with those communities, like the heirloom collards. The Ultracross concept stands on the shoulders of traditional landrace cultures, although it is the author's belief that true landraces are intergenerational in nature. Many seed companies are beginning to offer breeders mixes and landraces for sale:

- Common Wealth Seed Growers is a plant breeding-focused seed collective that regularly releases varieties that are "in progress," offering genetics of F3, F4, F5, etc. breeding lines.[5]
- Fruition Seeds uses a model called Versions to describe "dynamic iterations of diversity we are growing-and-adapting with over the years" (Page-Mann, 2022, para. 1).
- Native Seeds/SEARCH sells heirloom and landrace seeds, offering varieties like the *Rarámuri Multicolor* corn, which they describe as "beautiful and diverse" (n.d., para. 1).
- Southern Exposure Seed Exchange, a traditional heirloom seed company, published a blog post on the advantages of promiscuous pollination in seed-saving, questioning the strict variety isolation model (Hollowell, 2020). It now sells the TUSP Collard Ultracross.
- The Experimental Farm Network increasingly sells seeds described as breeders mixes and landraces. In 2023, its seed store listed 152 products under the category Landraces and Breeding Stock (Experimental Farm Network, 2023).
- Two Seed in a Pod sells many highly diverse Turkish varieties from a tradition of domesticated regional landraces.
- Ujamaa Cooperative Farming Alliance has a seed company, Ujamaa Seeds, and it is a strong partner in developing and distributing the Ultracross model; we are working with the alliance to create a Sorghum and Southern Pea Ultracross to support its community.
- Wild Garden Seeds sells many of the early lines of Frank Morton's breeding projects as well as diverse mixes of multiple breeding populations, offering people the opportunity to grow and select their own varieties.

These projects and others embrace genetic diversity, in stark contrast with the institutional seed-saving practices that have come to prominence in the past few decades. By embracing radical genetic diversity, the Ultracross project offers (and encourages) climate-resilient varieties with high adaptive capacity and rapid regional adaptation. The broad genetic base of the population can be highly responsive to a wide range of stressors, creating opportunities for natural environmental selection in response to erratic weather and emergent pests and pathogens (Ceccarelli & Grando, 2020). An important distinction of Ultracross compared to highly diverse breeding populations is that its purpose *is* diversity, rather than diversity as a precursor to a "releasable" distinct, uniform, and stable variety.

The Ultracross seeds are more than just a genetic tool; they are an invitation to develop a relationship in an ongoing story. Growing catalog heirlooms compared to growing diverse seed mixes could be seen as the difference between reading a history book, where everything has already happened, and reading a sci-fi novel, where anything can happen. Or, to follow the analogy to a niche subgenre, in an episode of The Seed Growers Podcast, Rowen White, an Indigenous seed-keeper, described growing these diverse populations as "choose your own adventure" (Brisebois, 2022, 1:05:32).

If we are to encourage a mass mobilization of seed-people relationships, then it is important to shift the way we see seeds from static to active,

[5] The F# system denotes the filial generation after a specific intervariety cross has been made. In general it can be expected to take around 7 filial generations to create a stable, uniform, and distinct variety after a cross, so releasing earlier generations offers up seeds with lower varietal predictability but higher genetic diversity.

from histories to futures, from preservation to adaptive. SeedLinked is a digital resource for collaboration and networked varietal trialing that uses the term "breeding ecosystem" to express that plant genetics is a fluid concept, shifting and flowing based on community needs and environmental pressures: "Increased availability and use of diverse seed would create more diversity in agricultural landscapes, contributing to 'breeding ecosystems' that could evolve much quicker in face of climate change, boost local adaptation and performance, and bring climate resiliency and food sovereignty to local economies in an era of globalizing fragility" (Seedlinked, n.d., para. 5). SeedLinked is facilitating increased access to crop varieties, but the concept can be applied to radical seed diversity as well.

A regional Ultracross breeding ecosystem places the seed selection decisions back into the community, subverting the power imbalance of top-down centralized breeding strategies. The inherent genetic diversity of the Ultracross means that the seeds can be rapidly infused into food and farming communities, with all the associated benefits of regional adaptation and climate resilience. This kind of empowered, forward-thinking seed-keeping demands a relationship with the seed and appeals to our natural tendencies of curiosity and exploration. On a very visceral level, people are simply excited about Ultracross seeds and are willing to actively explore and engage with the plants. The excitement is further supported because many of the technical barriers to seed-saving, such as perceived complexity, lack of knowledge, strict requirements, minimum isolation distances, and population sizes, are removed. Strict adherence to varietal purity can be more or less abandoned.[6] And hybrid vigor and heirloom values can be combined without the issues of proprietary ownership and heirloom inbreeding.

Collards Part III: Community Seed Selection: from Whidby White Okra to Ultracross Collards

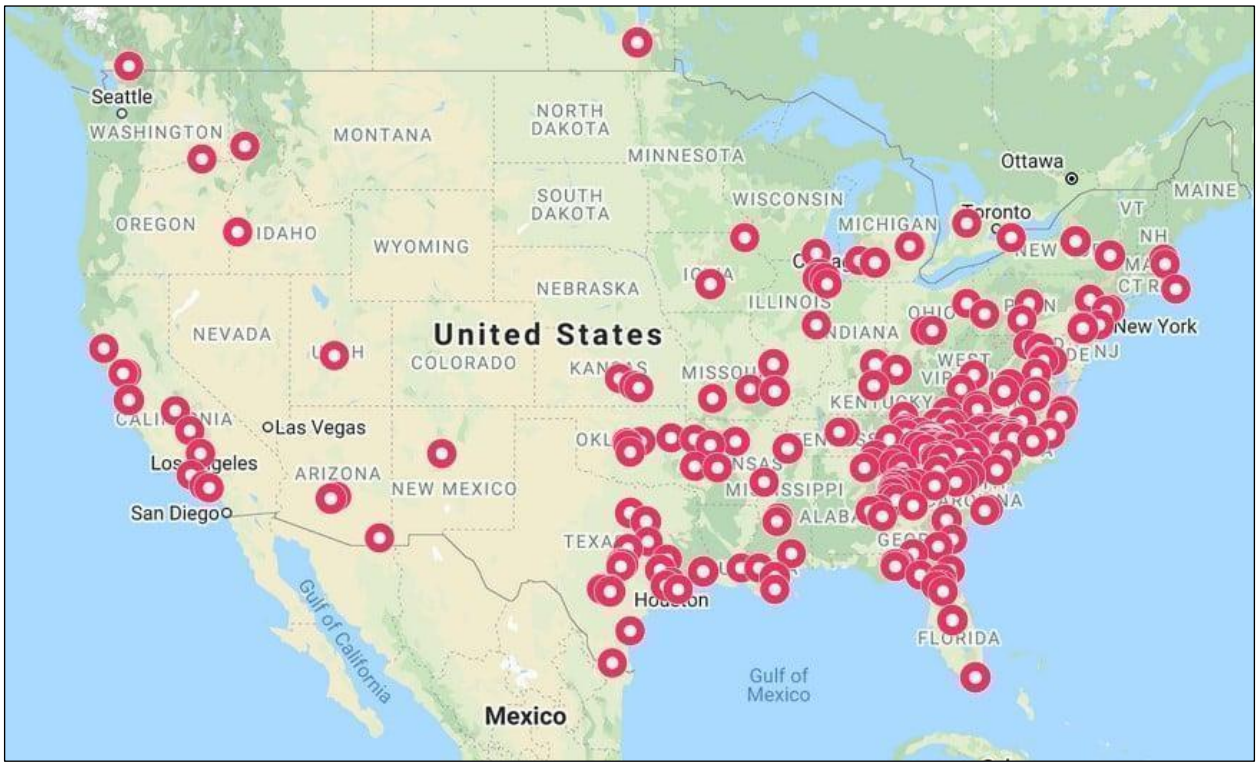
TUSP has been exploring varietal and crop diversity at our experimental farm, which grows large numbers of different varieties of traditional southern crops as well as new crops for the region. The project has always valued outreach and education as part of its work and has used the farm as a platform to showcase regional agrobiodiversity and expansive and exciting food systems.

In 2018, before our work with highly diverse seed populations really took off, TUSP assisted Seed Savers Exchange in selecting the heirloom okra variety Whidby White back to its original phenotype. The variety had experienced some accidental cross-pollination and was expressing a wide range of off-types. The basic method to recover phenotype was to grow out the seeds, wait until the plants had produced pods, visually assess the palest producing plants, cull the other plants and strip all the pods/flowers from the on-type plants, then save seeds from the subsequent pods. In 2020, TUSP produced a large number of seeds from this project and decided to attempt accelerated variety selection by outsourcing to other growers. In 2021, with financial sponsorship from Sow True Seed, TUSP launched the Whidby White Community Seed Selection (CSS) Project (TUSP, 2021b). The concept is based on a participatory plant breeding model, which invites farmers to grow breeding lines to help inform the plant breeding process and widen the scope of data collection. The CSS project sent Whidby White okra seeds to more than 250 growers who had volunteered to participate after we put out a call online (Figure 1). Our basic request was for growers to select the okra plant producing the palest pods and save and return seeds. TUSP provided educational support through monthly YouTube videos (TUSP, 2021c) and a Facebook group (TUSP, 2021a) to help growers through the selection, isolation, and seed-saving process. Over 50 packets of seeds were returned at the end of the season and a 2022 grow-out of those seeds produced a population of plants with a majority of pale pods.

A surprising and rewarding aspect of this pro-

[6] A creative writing teacher of mine once told me that you can break all the literary rules you want, as long as you know you're breaking them. To some extent, this might be true for Ultracross seed-saving, when there could be certain traits you do not want to accidentally cross into the population, such as Queen Anne's Lace into carrots; we had *Abelmoschus manihot subsp. tetraphyllus* cross into an Okra Ultracross, which was not desirable. We are not advocating complete seed-saving anarchy!

Figure 1. Distribution of Participants in the 2021 Whidby White Community Seed Selection Project, 2021

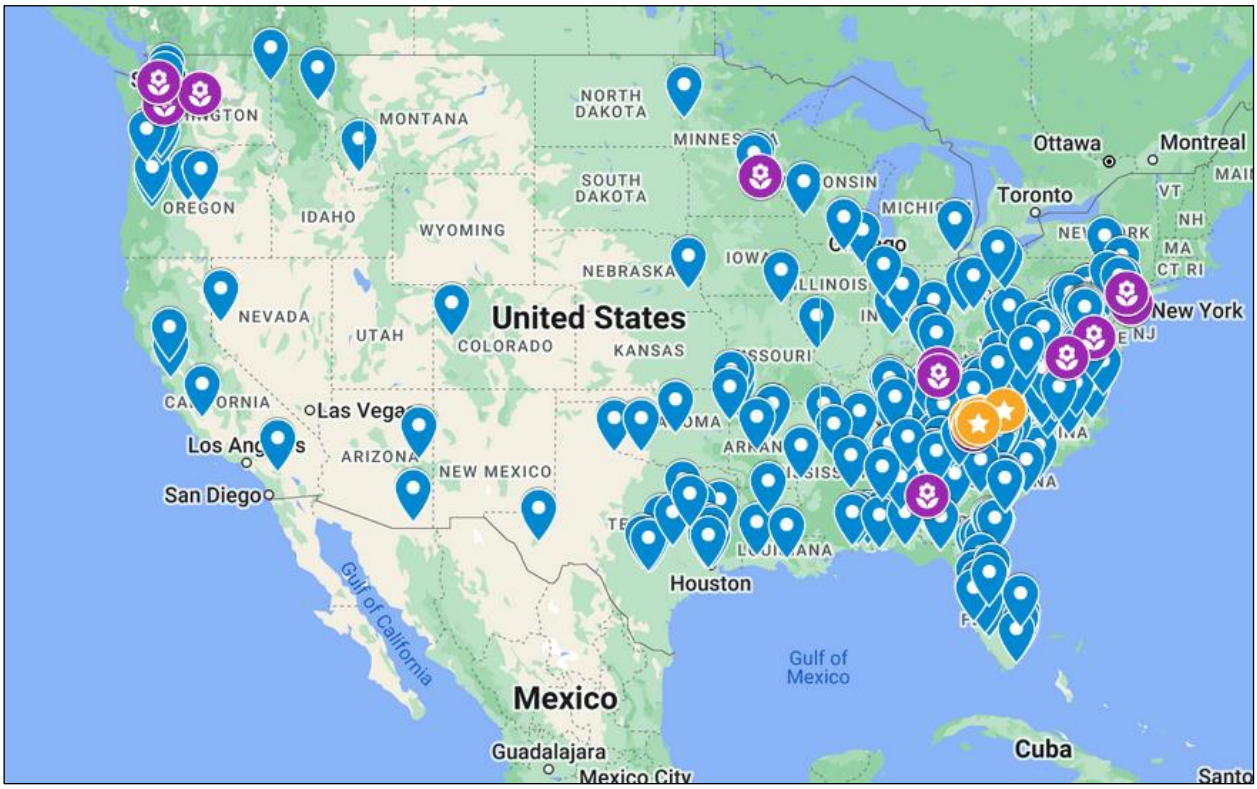


ject was the high level of community engagement. Participants, many of whom had never saved seeds before, were actively assessing their plants, sharing pictures on social media, asking questions in our Community Seed Selection Facebook group, and other members were supporting and answering those questions. As someone who had taught the standard form of seed-saving for almost a decade, it was extremely refreshing to experience the enthusiasm around this objective-based seed-saving process. The primary difference is that the end goal of standard seed-saving is to save seed (process driven, seed preservation), and for the CSS project seed-saving was merely a required tool to achieve the goal of a pale podded okra (objective driven, seed futures). It felt that we were succeeding in inviting people to be an active part of the seed's ongoing story and creating a deeper relationship that is missing with standard seed preservation efforts.

In July 2021 we harvested, processed, and saved the seeds from the winter survivors of the 2020 heirloom collard trial as discussed previously. We harvested around eight pounds of Ultracross Collard seeds, and we realized that we wanted to use them for the next CSS project. Southern Exposure Seed Exchange agreed to partner for seed distribution and we were able to get seeds out to growers in time for fall 2021 planting. Over 500 packets were distributed that first fall (Figure 2). This time we did not have a shared goal of creating something distinct, uniform, and stable, as with the Whidby White Okra; rather, we encouraged participants to pursue their own paths—in the words of Rowan White, to choose their own adventure—and create their own seed relationships.

One interesting barrier we ran into was the way that people were locked into the existing system. More than one farmer/gardener responded with the question, "But, what are we selecting for?" The honest answer was, "Whatever you want." However, we recognized that a project completely without parameters could be overwhelming to growers shaped by a seed-saving practice so heavily influenced by seed industry control. It felt like a kind of Stockholm Syndrome or form of code-

Figure 2. Distribution of Ultracross Collard Seeds Distributed in 2021 and 2022
Blue pins represent individuals who bought a packet of seeds. Purple flowers represent institutions growing larger populations of Ultracross Collards. Yellow stars represent a subgroup of growers working together to select for regional adaptation in Western North Carolina.



pendency. Our aim with the Ultracross is to encourage open-minded inspiration and community empowerment. Below are some examples of where people have (or could) take the Ultracross Collards:

- Cold tolerance: The initial environmental selection was a cold snap in winter 2020, and a primary goal is to maintain a population of collards that is beautifully diverse, delicious, and extremely cold-tolerant.
- Sweetness: TUSP works with a broad range of chefs, whom we often ask to taste plants in trials and then flag or mark their favorites. There is an opportunity to steer the Ultracross Collards toward an ultrasweet collard!
- Glazed: A diverse subset of the collards that have a glazed look (Green Glaze is a well-known variety).
- Purple: Many Ultracross growers have responded strongly to the purple coloration that is flourishing in the mix. Selecting a purple Ultracross population is a goal shared by many. An interesting side note is that the parent population had very little purple coloration, but it is a strong trait in the offspring.
- Perennial (high vernalization): Some of the original plants never went to seed, and there is a subset of collards often described as perennial or tree collards. It should be possible to select a collard population that rarely flowers and can survive multiple seasons.
- Low vernalization: Growers in the Deep South often can not save collard seeds because they do not experience enough cold days to satisfy the vernalization requirements. A selection goal could be reliable Deep South seed production.

- Pest and disease tolerance: A diverse population selected for pest and/or disease tolerance over time will lead to broad horizontal resistance (Robinson, 1995).

The Ultracross Community Seed Selection does not prescribe specific outcomes, but rather guides people with examples of what other folks are doing with the Ultracross Collards. It is important to maintain the open-book, never-ending-story concept of relational seed-keeping. Ultracross Collards are still a nascent CSS project, but they have been spread quickly and the concept has gained traction. They are helping seed-savers to understand the freedom that can be involved in seed-keeping, liberating community seed-keepers from the narrow vision of heirloom preservation. Already the concept of what Ultracross Collards actually are has become fragmented, diverse, and adapted to different regions and tastes, so much so that attempting to pin down a definition or description is futile. The seeds have found their people and the people have refound their seeds.

Conclusion

This paper has connected two problems:

1. We are experiencing declining agrobiodiversity, which has many associated problems, including food systems that are vulnerable to weather- and climate-related shocks. Institutional seed-preservation efforts exist to preserve biodiversity, but, somewhat ironically, the Western-led commodification of seeds and cultivar improvement undermines the availability of the agrobiodiversity on which it relies.
2. As people become disconnected from their seeds, community-based seed-keeping declines, which results in the loss of the traditional system for maintaining and advancing agrobiodiversity. As community seed-keepers age and pass away, their seeds often die with them. Heirloom seed-preservation efforts fall short because the focus is on preserving the seeds in stasis and not on reestablishing relational seed-keeping practices—that is, seeds and people existing in complex community-based relationships that change over time with both the needs of the people and the plants.

These problems exist as climate change is creating volatile environments that make growing food more and more challenging, which is unfortunate because agrobiodiversity and community seed relations offer tools for resilience, and therefore food security, in the face of climate chaos. Climate change is also shifting the seasons so as to impact what can and cannot be grown in regions; as crops, pests, and diseases shift geographically, regional agrobiodiversity will be essential for ongoing adaptation. Both seeds and people will need to grow and adapt together as they face climate-related challenges.

We have argued that these interrelated problems can be tackled by introducing radically diverse seed populations into communities that are invested in caring for them, which creates the opportunity for both rapid, adaptive diversity and community reconnection through relational seed-keeping. The HCP provides a model by which seeds can be withdrawn from institutional seed preservation facilities and used as a tool to re-engage community seed-keepers and generate radical seed diversity, like the Ultracross Collards. Following this model, TUSP has already developed an Okra Ultracross (2021), a Squash Ultracross using *C. maxima* and *C. moschata* (2022), and the beginnings of both a Southern Pea and a Sorghum Ultracross (2023). The Ultracross method produces radically diverse plant populations that support high adaptive capacity and climate resilience while inspiring community-based relational seed-keeping. People often ask, how many collard varieties are you growing? With the Ultracross, the answer is, As many plants as we have in the ground. And that is just at the TUSP farm; Ultracross creates and encourages limitless futures and never-ending stories.

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Social enterprise, food justice, and food sovereignty: Strange bedfellows or systemic supports?

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Abstract

There is a debate in the literature about whether one can address food system problems with market-based approaches while seeking food justice or food sovereignty. However, as part of a team of researchers and community leaders, we have found that this debate is less relevant in practice. The concepts are interrelated within real-world food systems. As such, we were motivated to ask, how do social enterprises (SEs) interact with food justice and food sovereignty movements and their visions in order to realize more democratic and equitable local food systems in communities? To answer this question, we conducted a systematic review at the intersection of SE, food sovereignty, and food justice literature. Analyzing nine articles, which included 17 food-related SEs, we found evidence of potential interactions between food SEs, food justice, and food sovereignty that are compatible (e.g., create employment) and incompatible

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(e.g., limited ability to address issues like community employability and green gentrification). The literature includes at least three important characteristics that inform how food-related SEs may interact with food justice and sovereignty, including employee and ownership demographics, the enterprise business model, and aspects of the food system targeted by the enterprise via market activities. If we consider a systems perspective, we can envision the ways in which the aspects are embedded and interdependent in a neoliberal society. SEs, as market-based agents for social change, exist in the same system as justice and sovereignty.

Keywords
food justice, food sovereignty, social enterprise, United States, urban food movement, community, literature review, neoliberal

Abbreviations
FJ: Food justice
FS: Food sovereignty
PAR: Participatory action research
SE: Social enterprise

Introduction

The conventional food system functions within inequitable societal structures, creating and reinforcing inequities. Whether the negative impacts are obesity and metabolic diseases, lack of access to fresh and healthy foods, environmental degradation, barriers to farm ownership, or dangerous low-wage food system jobs, the impacts are disproportionately experienced by racialized groups (Alkon & Agyeman, 2011; CDC, 2022, 2020; Walker et al., 2010). There have been calls for food system change to address inequities (see, for example: Alattar, 2021; Alkon, 2014; Allen, 2008), but despite the implementation of many food system initiatives, interventions in the food system have insufficiently addressed these underlying inequities. This has happened, at least in part, because of limited awareness of the food system as a "system" (Cohen & Ilieva, 2021).

In a project called foodNEST 2.0, a team of community leaders and researchers in Cleveland, Ohio, set out to understand what levers could be used to change the food system in historically redlined neighborhoods to realize justice and equity goals. Cleveland has a long history of innovation and investment in food, and this project builds upon that foundation. Before diving into the research, the team took a step back to examine the systemic forces that both structure the rules of the game and impact the foods we put on our collective tables. Together, we used a deliberative and situated systems approach to map out the complex web of forces that shape food security; access to affordable, fresh, and healthy foods; and economic opportunity. Our approach meant democratizing research via relationship building, extensive dialogue, co-learning situated in lived experiences, and ultimately generating knowledge to transform the food system to achieve justice (Freedman et al., 2021).

The results of foodNEST 2.0 motivated this review. While developing dynamic systems models in the project, SEs arose as a mechanism for food system change (Freedman et al., 2021; Modeling the Future of Food in Your Neighborhood Collaborative, 2020). We embedded SEs within our model in a set of systems relationships, including a domain of feedback that the team hypothesized would catalyze community empowerment and sovereignty, ultimately bringing forth equity and, as a result, food justice. Many scholars make a clear distinction between two of the concepts that became central to the foodNEST 2.0 project—food sovereignty and food justice (Holt-Giménez, 2010; McEntee & Naumova, 2012)—but a clear distinction did not seem relevant to our practice. This is not to say that these terms meant the same thing to team members, but the mechanisms to achieve these twin goals were inextricably linked. Further, while there is debate in the literature about addressing symptoms of food system problems with market-based approaches, like SEs (for example, see Holt-Giménez, 2010), these activities are interrelated in local food systems, as understood by our community–university team.

In response to this work, the authors asked a question: how do SEs interact with food justice and food sovereignty movements and their visions to realize more democratic and equitable local food systems in communities? Further, what does the literature have to say about these concepts? Are they

strange bedfellows, or can SEs bring about justice and sovereignty? We looked to existing literature to answer our question, and we found that little published research has focused on the specific interaction in our research question. SEs have been extensively studied, and food justice and food sovereignty have extensive bodies of research, but few authors have analyzed how SEs (a market-based strategy) interact with the goals of these food movements.

Driven by our practice-oriented need, we conducted a systematic literature review to answer this question, attending to the Cleveland, Ohio, context. As such, we limited the review of literature to comparable neoliberal contexts. We begin by reviewing the basic concepts of SE, food justice, and food sovereignty. Then we describe, in detail, the systematic literature review methods used to answer our research question. We present the results and then discuss the findings. We conclude by offering some future directions for research. We believe the insights from our systematic review are valuable not only to our foodNEST 2.0 team, but also to owners of SEs, entities funding social enterprises, policymakers, and others who are interested in market-based approaches to further equity in the food system.

Understanding Social Enterprise, Food Justice, and Food Sovereignty

Social enterprises (SEs) are generally understood as organizations that use business-like strategies to address social issues, such as homelessness, racial inequity, unemployment, or health disparities. Many SEs value the participation of beneficiaries (the individuals a SE seeks to help) as customers, suppliers, employees, managers, and owners (Defourny & Nyssens, 2010). According to Defourny and Nyssens (2010), SEs also value their autonomy and prioritize experimental approaches in addressing social issues.

SEs may be contrasted with nonprofit organizations. Whereas nonprofits tend to rely solely on nonmarket sources of income (such as grants and donations), SEs mobilize income from both market activities and nonmarket sources (Defourny et al., 2020). This empowers SEs to be more self-sufficient than nonprofit organizations (Luke & Chu, 2013). For this reason, SEs often coexist in sectors traditionally dominated by nonprofits, especially those sectors in which basic human needs are not met by mainstream political, economic, and social institutions (Laidlaw & Magee, 2016; Luke & Chu, 2013). The food sector fits this criterion: food is a basic human need, many individuals in the U.S. do not have economic or physical access to adequate food, and nonprofits like food banks and soup kitchens are primary actors in the charitable food sector. Charitable food-sector nonprofits often have goals in common with food-focused SEs (such as increasing food security), but they do not have the same emphasis on market activities to generate income that is seen with SEs.

Alter (2007) writes about a food-focused SE called Cepicafé, an association of small coffee-producing organizations that seeks to improve the living standards of rural communities in Peru by increasing incomes and providing educational opportunities for coffee farmers. Cepicafé promotes fair trade for small rural farmers who do not receive sufficient income from selling their crops in international markets. Low commodity prices take advantage of producers in inequitable trade relationships, as small farmers have little power to negotiate higher commodity prices with international buyers. To increase incomes of farmers, Cepicafé takes a business-like approach, acting as an intermediary between Peruvian producers and importers overseas. The rural farming organizations that Cepicafé helps are democratically involved in Cepicafé's decision-making. In addition, Cepicafé receives income from fees paid by its producer organizations (market income) and from grants (nonmarket income, such as a grant from the European Commission), which allow the organization to offer educational programs and invest in rural crop infrastructure.

In this example, Cepicafé helps rural Peruvian coffee farmers receive higher incomes, but it does not seek to overturn the neoliberal international trade system that drives low coffee commodity prices and inequitable trade relationships. Although many issues addressed by SEs are rooted in socio-economic forces that are seen as consequences of neoliberally influenced economies, SEs do not generally seek to overhaul entire economic systems.

Rather, they push against high market reliance, or high "marketness," in economies or specific economic sectors. Block (1990) conceptualized the continuum of "marketness" to describe the degree to which actors in a market rely on price signals when deciding whether to buy or sell products. High marketness implies that price is the only signal considered by market actors, whereas low marketness describes a market wherein actors consider other factors (such as a product's social or environmental impacts) in addition to price when making business decisions. Many businesses in neoliberal economies demonstrate high marketness, making business decisions primarily based on price and profit, and they often do not prioritize the social or environmental consequences of their actions (Thornburg, 2013). For SEs, on the other hand, at least some priority is given to social or environmental interests when making business decisions; profit-maximization through price decisions is not the main goal of SEs (Defourny & Nyssens, 2010). In this way, SEs display low marketness, and they push back against high marketness to motivate social change. SEs demonstrate resistance from *within* neoliberal economic systems.

Food justice (FJ) emphasizes the goal of addressing inequities in the food system and society that lead to disparities in health, economic, and environmental outcomes along the lines of race, class, gender, ethnicity, ability, and citizenship (Hislop, 2014, as cited in Smith, 2019; Institute for Agriculture and Trade Policy, 2012, as cited in Bain et al., 2021). These inequities build barriers that prevent low-income individuals and people of color from accessing adequate sources of affordable, healthy foods, including local and organic foods, both as producers and as consumers (Alkon, 2014). FJ activists generally support the use of food entrepreneurship activities (often in the form of SEs) to address these barriers. Scholars often view FJ as a direct response to historic and current state-sanctioned discriminatory policies, such as neighborhood redlining or funding discrimination against Black farmers by the U.S. Department of Agriculture (USDA; Alkon, 2014; Alkon & Norgaard, 2009, as cited in Smith, 2019).

Food sovereignty (FS), in contrast with the FJ movement, overtly opposes the corporate food regime and neoliberal ideology that dominate national and international food systems (Carney, 2012; McEntee & Naumova, 2012). The FS movement was popularized in the 1990s by the La Via Campesina peasant movement of the Global South (Brent et al., 2015), which seeks to secure the right of communities around the world "to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems" (Via Campesina, 2007, para. 3). FS activists envision regionally based food systems in which producers receive fair prices, farming communities are not reliant upon international trade, and activists engage in policy advocacy and protests to push for their visions (Desmarais, 2007; Holt-Giménez, 2006; McMichael, 2005, as cited in Alkon & Mares, 2012; Wittman, 2009). The U.S. has a growing FS movement inspired by the political objectives and visions for democratic food systems seen in the FS movement associated with La Via Campesina (Alkon & Mares, 2012; Brent et al., 2015). The U.S. FS movement draws upon the country's complex history of class and racial justice inequities, especially involving Black Americans. Therefore, its priorities do not completely align with the priorities of the FS movements seen in the Global South (Brent et al., 2015).[1] The framework of racial justice in American FS activism contributes to the convergence of the FS and FJ movements in the U.S. context. The idea that America's food system inequities are inextricably intertwined with racial and socioeconomic inequities is a foundational motivation of the FJ movement (Alkon, 2014).

The theoretical difference in the literature between FS and FJ movements primarily relates to their view on how to best effect change. FJ is seen as a progressive movement that resists but also coexists with the neoliberally minded corporate

[1] It is important to note there is also a push for FS among Native American communities that seeks to restore their rightful land occupancy and resist the assimilatory pressures they face and have faced from the American government (Norgaard et al., 2011). However, the Native American FS movement is not the focus of this review.

food system, whereas FS is seen as a radical movement whose ideology seeks to overturn neoliberal economic systems (Alkon & Mares, 2012; Holt-Giménez, 2010). While this theoretical distinction can be made in academia, it seems less relevant in practice to food activists in the literature and those on our foodNEST 2.0 team. Clendenning et al. (2016) interviewed food activists, academics, farmers, and other individuals involved in food movements in the U.S. (specifically New Orleans, Louisiana, and Oakland, California) to investigate how FJ and FS theory compares to practical applications. They found that urban U.S. food movements had ideologies aligning with both FJ and FS: FJ ideologies were seen more in the short-term goals of urban food movements (such as building community wealth), and FS ideologies were seen more in their long-term goals (such as addressing political and economic structures that exert substantial influence over the food regime).

Methods

We conducted a systematic review to answer the research question: how do SEs interact with food justice and food sovereignty movements and their visions in order to realize more democratic and equitable local food systems in communities? This question was practically motivated by the community–university project foodNEST 2.0 and the debate in the literature (and lack of debate within the project team) surrounding the concepts of FJ and FS and the use of market-based solutions like social enterprises to address food system problems. As such, we decided to begin our research with a systematic review. A systematic review allows researchers to identify, analyze, and summarize existing research and is useful to map out areas of uncertainty and areas for new research (Petticrew & Roberts, 2008). This review involved four stages: (1) developing a search strategy, (2) screening initial results, (3) screening full-text documents of selected literature, and (4) extracting data for analysis from selected literature. Methods were modeled on the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P), as explained by Shamseer et al. (2015).

To address the potential for bias, we designed a clear research question, developed clear search concepts and transparent inclusion and exclusion criteria, utilized standard search engines identified with the assistance of a university librarian, and included multiple reviewers on our team. We present our procedures in an easy-to-read flow chart in this section (Figure 1) and list the stages below. The first author was the lead researcher for all stages of the literature review. The second and third author co-developed the protocol (Stage 1), and then jointly reviewed the results at Stages 2–4. Decisions on eligibility were made via consensus.

Stage 1: Developing a Search Strategy

The target body of literature for our research question included the specific overlap of SE, FS, and FJ literature. The inclusion criteria for the search included: (1) empirical research on how SEs have been used in the food system *and* (2) analysis of how the SEs studied contributed to the visions of the FS or FJ movement. Information sources included in the review were databases and search engines: Web of Science, ProQuest, and Google Scholar. These sources were selected through consultation with a university librarian.

The search terms we developed for use in these databases and search engines were based on four concepts, shown in Table 1. The first concept was the goal or outcome being studied: influence

Table 1. Four Concepts Used to Develop Search Terms

Concept 1: Goal?	Concept 2: How?	Concept 3: Who?	Concept 4: Where?
Food sovereignty	Social enterprise	Community	United States
Food justice	Social entrepreneur	Local	Global North
Democratic food system	Social economy	Urban	Neoliberal-leaning capitalist economy
	Social business		
	Third sector		

on the FS and FJ movements. The second concept characterized the means by which the outcome or goal was being approached: through SE, also known as "social entrepreneurship," the "social economy," or the "third sector." The third concept included who does the work to achieve the outcome and the scale on which the work is done: the community, on a local level, especially in urban neighborhoods and neighborhoods of color. The fourth concept was the geographic context in which the interaction between social enterprise and food sovereignty was occurring: in the U.S., the Global North, and in a capitalist-leaning economy. Context is important to the outcomes and goals of social enterprises and the food sovereignty movement, and geographic location plays a large role in determining political, economic, and social context.

The final set of search terms used in ProQuest and Web of Science is included in Table 2. This set of terms included three of the four concepts described in Table 1; location (Concept 4 in Table 1) was omitted from search terms. We screened results by hand for location criteria because the inclusion of location phrases in search terms overlimited search results. We limited the "goal" and "how" concepts to abstracts ("AB="), while the "who" concept was a topic search of the whole article and abstract ("TS="). We did not use the above set of search terms in Google Scholar due to limitations in the Google Scholar Advanced Search Engine, which does not process Boolean operators and lacks specificity for complex searches. Instead, we used a hand-searching strategy in Google Scholar with the search terms listed in the third row of Table 2.

Stage 2: Screening Initial Results

We conducted the searches in March and April 2021, placing no limitations on the searches for discipline of literature, date of publication, or location of publication. Our inclusion criteria included both peer-reviewed literature and non–peer-reviewed dissertations. We identified a total of 24 records in initial searches of the databases and Google Scholar, including five duplicates. Therefore, we checked 19 abstracts for applicability to the research question (Figure 1). We included records in the next stage of the systematic review only if the research focused on the U.S. or similar contexts (such as Australia, Canada, and European countries) and they were original research. Based on this selection criteria, we omitted six records and moved forward with 13 records for full-text analysis. The "Stage" labels in Figure 1 correspond to the stages described in Methods. While we acknowledge the inclusion of publication bias could be present because we did not include gray literature sources, the purpose of this search was to understand the conversation in the peer-reviewed literature.

Stage 3: Screening Full Texts of Selected Results

In the full-text screening stage, our selection criteria consisted of original research, focus on the U.S. or similar contexts (such as Australia, Canada, and European countries), and focus on SE, FJ, and/or FS movements. After obtaining and reviewing full texts for applicability to the research question, we omitted four more records. Three of these were not original research, and one article focused on a food movement other than FS or FJ. Therefore, we systematically analyzed nine articles for this review.

Table 2. Search Engines and Search Terms

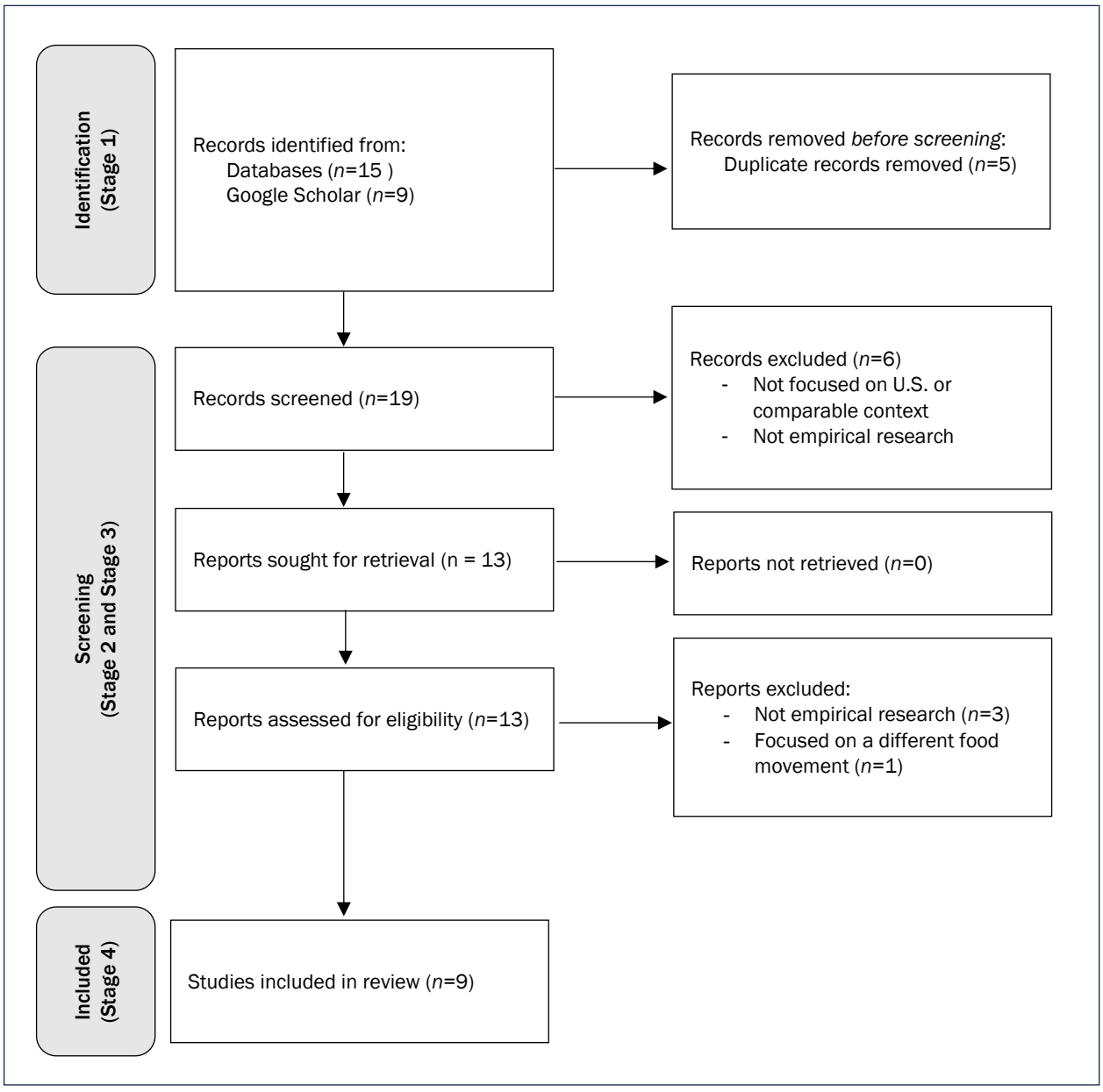
Search Engine or Database	Search Terms
Web of Science	AB=("food sovereignty" OR "food justice") AND AB=("social enterprise*" OR "social economy" OR "social entrepreneur*" OR "social business*" OR "third sector") AND TS=(urban OR local OR community)
ProQuest	AB=("food sovereignty" OR "food justice") AND AB=("social enterprise*" OR "social economy" OR "social entrepreneur*" OR "social business*" OR "third sector") AND TS=(urban OR local OR community)
Google Scholar	Hand-searched: food AND social AND enterprise AND ("food sovereignty" OR "food justice") AND (sovereign OR justice OR urban OR local)

Stage 4: Process of Data Extraction and Synthesis

The data collection process for full-text records included an initial surface-level data extraction, followed by an in-depth coding process to record our outcomes of interest. The data was managed using Microsoft Excel.

The goal of the initial data extraction was to record basic information about the study and general characteristics of the SE(s) and food movement(s) studied. We identified nine relevant criteria for this: keywords, geographical area of focus, methods for the study, type of SE in the study (based on business model, market activity, and other factors), how the SE was implemented in the food system, impact of the study, challenges for SE/FS/FJ, visions for FS/FJ held by subjects in the SE examples studied, and notable findings of the study. We recorded the number of SE exam-

Figure 1. PRISMA Diagram Based on Guidelines from Page et al. (2021), Showing Article Selection Process



The labels on the left correspond to stages of the search process in Methods.

ples provided in each article. Additionally, we recorded the definitions of FS/FJ and SE (or a comparable term, such as "food entrepreneurship") as stated by authors in the articles, with an emphasis on common characteristics between article definitions.

Then, we used an in-depth coding process to record the specific characteristics of the SEs implemented in the food sector, as well as the tensions and contradictions between SE and FS/FJ that arose in the study. These were our outcomes of interest. We created two domains of codes for this process: Domain 1 for specific characteristics of SEs in the food sector, and Domain 2 for the tensions and contradictions recorded in the article between SE and FS/FJ. The codes in each domain had subcodes where applicable for further categorization of data. We sorted the codes into Domain 1 and Domain 2 based on how they were developed. Domain 1 codes were characteristics we identified as relevant before beginning the coding process, whereas Domain 2 codes were inductively determined as we read through articles (we did not identify these codes before starting the data extraction process). Additionally, Domains 1 and 2 differed in how they were measured—the frequency of codes was recorded for Domain 1 but not for Domain 2.

As explained previously, Domain 1 codes included empirical information about SE in practice, and they were established before beginning data extraction. The Domain 1 codes were explicit goals of the SE, business model of the SE, market activities of the SE, and challenges for the SE, as well as who runs the SE, who is employed by the SE, and who are the consumers or target audience of the SE. Because Domain 1 involved empirical characteristics of food-related SEs from the literature, such as the market activities of SEs, the frequency of Domain 1 subcodes occurring in articles was relevant to the analysis of SEs that have been implemented in the food system to further goals of the FS and FJ movements. We defined a "data point" as the presence of a subcode in an article; this subcode was attached to the specific SE example with which it was discussed. Each article focused on specific SE examples in practice. Some articles had up to six empirical SE examples, while others were case studies of one SE. If an article discussed multiple SEs, then we identified the same subcode for different SEs and recorded multiple data points, when applicable. However, we did not double-count multiple subcode appearances for the same SE.

Unlike Domain 1, Domain 2 coding was inductively determined during the data extraction process. Domain 2 codes reflected on the tensions, contradictions, and important considerations that were identified throughout the systematic review. These codes included interactions between the intentions of an SE and its results, as well as theories of SE, FJ, and FS versus their practical results. Analysis for Domain 2 codes differed from those of Domain 1 due to the nature of the Domain 2 codes. Not all Domain 2 codes had subcodes beneath them, as further categorization of codes was not always applicable. Additionally, we did not tabulate data point frequencies for the Domain 2 codes, because the counts were not relevant for Domain 2 in the way they were for Domain 1. The appearance of a tension in only one article, for example, did not make that tension less relevant than a tension mentioned in multiple articles. Therefore, the synthesis of Domain 2 codes included noting tensions and contradictions that were present in the articles and analyzing how these interacted with other Domain 2 codes.

The process of coding for Domain 1 allowed us to explore patterns in the characteristics and goals of food-focused SEs studied in the literature, and Domain 2 coded how these SEs interacted with FS and FJ movements. We analyzed the relationship between Domain 1 codes and Domain 2 codes to understand how SEs in the food system favorably or unfavorably interact with FS and FJ movements—for example, how do the goals of the social enterprise (Domain 1) compare to their effect on the community (Domain 2)?

Results

The nine articles systematically reviewed included 17 examples of SEs. Two articles, Alkon (2018) and Alkon et al. (2019), analyzed the same four SE examples from Oakland, California. We did not double-count these SE examples in the total number of SE examples stated above or in any coding processes, since the SEs had matching characteri-

zations in the Alkon articles. Geographic regions of study in the articles reviewed represented three countries, as shown in Table 3. Six articles included SE examples from the U.S. in Oakland, California; New Orleans, Louisiana; Burlington, Vermont; and Portland, Oregon. There were three articles with SE examples from Melbourne, Australia. One article focused on SE examples from France, specifically in Lyon. As a note, one article focused on SEs in both the U.S. and Australia, making the total number of articles listed with geographic locations greater than nine.

Table 3 also shows details about the SE examples in each article, including the name of the SE, its market activity, and its location. The total number of SE examples in each article is indicated next to the author's name.

Four articles provided a definition of FJ, two articles provided a definition of FS, and three articles did not explicitly define FJ or FS. Common characteristics in FJ definitions included seeking social justice in health and food access disparities (*n*=3); creating economic opportunity and local capital (*n*=2); empowering local producers, food system actors, and marginalized voices (*n*=2); providing an alternative to the conventional food system and/or the charitable food sector (*n*=2); and increasing affordability and access to healthy food (*n*=2). Common characteristics of FS definitions included bringing consumers and producers closer together (*n*=2) and providing an alternative to the conventional food system (*n*=2).

Eight articles defined SE or a term deemed comparable to SE, such as "food entrepreneur" or "entrepreneurial urban cultivation." One article did not define SE explicitly. Common characteristics of

Table 3. Descriptions of the Social Enterprise Examples in Each Article Included in the Systematic Review

Author (*n*=# of social enterprises)	Social Enterprise	Market Activity	Location
Alkon, 2018 (*n*=4)	Mandela Co-op	Grocery store	Oakland, California, U.S.
	Planting Justice	Landscaping service	Oakland, California, U.S.
	Red Bay Coffee	Coffee shop (restaurant)	Oakland, California, U.S.
	Town Kitchen	Food delivery and catering service	Oakland, California, U.S.
Ballantyne-Brodie, 2020 (*n*=1)	Peach 'n' Pear	Distribution of local produce to consumers through produce boxes	Melbourne, Australia
Kato, 2020 (*n*=1)	50 entrepreneurial urban cultivation growers	Producers selling produce to consumers and restaurants	New Orleans, Louisiana, U.S.
Laidlaw and Magee, 2016 (*n*=2)	Sweetwater Organization (SWO)	Producers selling produce to restaurants	Milwaukee, Wisconsin, U.S.
	Centre for Education and Research in Environmental Strategies	Producers selling produce to consumers (food box delivery service)	Melbourne, Australia
Lanciano et al., 2019 (*n*=6)	A 2 prés de chez vous	Distribution of fruit and vegetable boxes to consumers	Lyon, France
	Arbralégumes	Distribution of fruit and vegetable boxes to consumers	Lyon, France
	Passerelle d'Eau de Robec	Grocery store	Lyon, France
	Marmite urbaine	Catering service	Lyon, France
	VRAC	Distribution as a buying group for organic products	Lyon, France
	Légumerie	Cooking workshops	Lyon, France
Macias, 2008 (*n*=1)	4 organic market farmers associated with the Intervale Foundation	Producers selling produce to consumers at farmers markets	Burlington, Vermont, U.S.
McKay et al., 2018 (*n*=1)	Food Justice Truck	Grocery store	Melbourne, Australia
Waddell, 2016 (*n*=1)	Village Market	Grocery store	Portland, Oregon, U.S.

SE definitions between articles included prioritizing community employment and building local capital (*n*=3), prioritizing social needs over profit maximization (*n*=3), decreasing or omitting reliance on grants and donations to fund the business (*n*=2), the importance of using different measures of success than traditional economic efficiency (*n*=2), and combining economic and social value creation (*n*=1).

Table 4 summarizes the results of Domain 1 coding. Because each data point is attributed to one empirical SE example, the number of data points for a subcode can be greater than the number of articles. The table indicates when multiple data points of a subcode came from different SE examples within the same article (indicated by the number in parentheses next to an author's name).

The Domain 1 characteristics of SE examples provide insight into how SEs have been implemented in the food system with goals that further FS or FJ (Table 4). The most common and explicitly stated objective of SEs was facilitating community education and engagement (*n*=11). Other goals included increasing community access to a diversity of fresh, healthy foods (*n*=9); providing community employment opportunities (*n*=5); furthering racial justice (*n*=4); providing an alternative to the charitable food sector due to stigmas, lack of choice, and limitations of the model (*n*=3); addressing basic human needs not met by market and public sectors (*n*=1); and contributing to a positive environmental impact (*n*=1). Most SEs were affiliated with larger existing organizations, often a nonprofit (*n*=6), as opposed to standalone SEs, which were not affiliated with larger organizations (*n*=3). Affiliation with a larger organization had both negative and positive consequences for the SEs.

SEs pursued a wide range of market activities related to the food system. Some SEs consisted of producers who distributed produce directly to consumers and local businesses like restaurants (*n*=4), while other SEs acted as an intermediary between local producers and local consumers (*n*=4). Equally common market activities of SEs included grocery stores (*n*=4) and educational workshops, such as cooking classes (*n*=4). Other less-common activities of SEs included catering and hosting events (*n*=3); running a restaurant (*n*=1); and landscaping (*n*=1).

Ownership and employment were important characteristics in pursuing FS and FJ because SE owners and workers have the potential to benefit economically, socially, and politically from the business. Workers and owners were either beneficiaries or nonbeneficiaries (Lanciano et al., 2019). Only three of the 17 SEs were owned and operated by beneficiaries. One of these SE examples, in Alkon et al. (2019), was worker owned. More SEs (*n*=5) prioritized the employment of beneficiaries and marginalized community members, but four of these examples came from Alkon (2018), in an article that emphasized how SEs in the food system can combat gentrifying neighborhoods and prevent displacement of long-term community members. Two SE examples were *explicitly* not owned by or staffed with beneficiaries. Notably, two articles with seven SE examples between them had no direct information about ownership or employee demographics.

The target consumer base of SEs included beneficiaries, nonbeneficiaries, or a mix of both. This was a relevant code to track, because consumers provide SEs with their market income and affect their financial sustainability, as well as their social goals. Five SE examples sought to increase the affordability of their products or services for lower-income consumers. Thirteen SE examples, on the other hand, targeted higher-income consumers who were able to pay higher prices for goods and services. This business model constituted an important pattern of SEs relying on higher-income consumers to fund their operations, while often seeking social goals such as helping people of lower-income demographics. Seven SE examples had price variation depending on the income level of the consumer, with higher-paying consumers allowing them to provide reduced or free prices for lower-income consumers.

SE is a business model that comes with challenges, both endogenous (within the control of the SE) and exogenous (outside the control of the SE). Endogenous challenges faced by the SE included business model confusion or inefficiency (*n*=4); financial sustainability issues (*n*=3), which were especially seen in SEs with for-profit and not-for-

Table 4. Coding Results for Domain 1

Domain 1 Categories [a]	Codes (*n*=number of social enterprises)						
Explicit goals	Facilitate community education and engagement (*n*=11)	Increase community access to fresh, healthy foods (*n*=9)	Provide community employment opportunities (*n*=5)	Promote racial justice, racial equity (*n*=4)	Provide alternative to the charitable food sector (*n*=3)	Address basic human needs not met by market and public sectors (*n*=1)	Contribute to a positive environmental impact (*n*=1)
Citations	*Alkon (2); Ballantyne-Brodie; Kato; Laidlaw and Magee (2); Lanciano et al. (2); Macias; McKay et al.; Waddell*	*Alkon; Ballantyne-Brodie; Laidlaw and Magee (2); Lanciano et al. (3); Macias; Waddell*	*Alkon (4); Waddell*	*Alkon (4)*	*Kato; Lanciano et al.; McKay et al.*	*Laidlaw and Magee*	*Laidlaw and Magee*
Business model	Affiliated with larger nonprofit/ existing organization (*n*=6)	Standalone SE (*n*=3)	Worker ownership (*n*=1)				
Citations	*Alkon (2); Laidlaw and Magee; Macias; McKay et al.; Waddell*	*Alkon (2); Laidlaw and Magee*	*Alkon*				
Market activities	Producer distributing produce directly to consumers or local businesses (*n*=4)	Grocery (*n*=4)	Partner with producers to help with distribution to consumers and local businesses (*n*=4)	Education (*n*=4)	Catering and hosting events (*n*=3)	Restaurant (*n*=1)	Landscape service (*n*=1)
Citations	*Kato; Laidlaw and Magee (2); Macias*	*Alkon; Lanciano et al.; McKay et al.; Waddell*	*Ballantyne-Brodie, Lanciano et al. (3)*	*Lanciano et al. (4; for 2 this was a minor market activity)*	*Alkon; Kato; Lanciano et al.*	*Alkon*	*Alkon*
Ownership and employees	Prioritize employing community members and beneficiaries, especially marginalized (*n*=5)	Owned and operated by people with a direct stake in equitable change (beneficiaries; *n*=3)	Not owned by community members with direct stake; no preference for employing community members (*n*=2)	No data for SE employee or owner demographics (*n*=7)			

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Table 4, continued.

Domain 1 Categories	Codes (*n*=number of social enterprises)			
Ownership and employees	Prioritize employing community members and beneficiaries, especially marginalized (*n*=5)	Owned and operated by people with a direct stake in equitable change (beneficiaries; *n*=3)	Not owned by community members with direct stake; no preference for employing community members (*n*=2)	No data for SE employee or owner demographics (*n*=7)
Citations	*Alkon (4); Waddell*	*Alkon; Kato; Waddell*	*Laidlaw and Magee; McKay et al.; Ballantyne-Brodie*	*Macias, Lanciano et al. (6)*
Consumers/ target audience	Higher-class consumers, willing to pay higher prices (*n*=13)	Different prices for some consumers based on income (*n*=7)	Lower-income consumers, seeking to increase affordability/access (*n*=5)	
Citations	*Alkon (4); Ballantyne-Brodie; Kato; Lanciano et al. (6); Macias*	*Alkon; Kato; Lanciano et al. (3); Macias; McKay et al.*	*Lanciano et al. (3); Macias; Waddell*	
Challenges—Exogenous	Business model inefficiency (*n*=4)	Financial sustainability (*n*=3)	Balancing social and financial missions (*n*=2)	Community perception of the SE (*n*=1)
Citations	*Ballantyne-Brodie; Laidlaw and Magee; McKay et al.; Waddell*	*Ballantyne-Brodie; Lanciano et al.; McKay et al.*	*Lanciano et al.; Waddell*	*Waddell*
Challenges—Endogenous	Gentrification (*n*=4)	Market entry and competition, threatening financial sustainability (*n*=3)	Unsupportive local/state/federal government policy (*n*=1)	
Citations	*Alkon (4)*	*Laidlaw and Magee; Macias; Waddell*	*Laidlaw and Magee*	

[a] The number of articles in a code is indicated by "*n*=," with the author's names specified below each code. Numbers next to author names indicate that multiple SE examples in the article fit the code.

profit model overlaps; balancing social and financial missions of the SE (*n*=2); and poor community perception of the SE due to misjudgments and insensitive actions by the SE or its employees (*n*=1). Exogenous challenges included gentrifying forces in the communities SE sought to help (*n*=4); market entry and competition struggles, which threatened financial sustainability (*n*=3); and unsupportive local, state, or federal government policy contexts (*n*=1).

Moving to Domain 2, this systematic review showed that the intentions of SEs are not always realized in their outcomes. An example is green gentrification, in which "green" SEs (those that are environmentally conscious, promote healthy foods and lifestyles, use organic and local terminology, etc.) contribute to trendy "green" food cultures in cities, which have been shown to raise property values and drive displacement of long-time community residents (Alkon et al., 2019). Alkon et al. (2019) recorded green gentrification tensions for four SEs located in communities battling rising living costs and real estate values. This tension contradicts the social goals of SEs, which seek to prevent displacement of employees by providing living wages and educational support. Alkon et al. (2019) argues that the SEs in Oakland, California, themselves may have contributed to the green gentrification forces seen there.

Another recorded tension explains a reason why green SEs may be associated with green gentrification: assumptions about consumer food preferences based on income, class, and race. Green SEs may signal that a neighborhood is ready for real estate investment by attracting wealthier clientele who did not previously frequent the area, according to the assumption that local and organic foods are purchased more often by higher-income consumer bases. Several articles discussed this assumption (Alkon, 2018; Kato, 2020; Lanciano et al., 2019; Waddell, 2016). Targeting wealthy clientele with local or artisan products allowed the SEs to generate more market income in most of these examples (Alkon, 2018; Kato, 2020; Lanciano et al., 2019; Waddell, 2016). SEs in other articles sought to challenge this income-based assumption regarding consumer preferences, as they based their business models on providing local and organic foods at affordable and reduced prices for low-income consumers (Lanciano et al., 2019; Macias, 2008; McKay et al., 2018).

A few articles discuss the effectiveness of SE as a market-based approach to address food system inequities. Some of the SE examples in Alkon (2018) were unable to prevent the displacement of their employees from the community, despite providing living wages. A few authors argue this does not render SEs ineffective, though. Alkon (2018) proposes that SEs as market-based activities can motivate change on a scale larger than themselves, such as by raising the profile of marginalized groups participating in the local food system. Another perspective in Ballantyne-Brodie (2020) argues that an extensive network of small-scale SEs can together create a movement that pushes larger-scale change. Although SEs having some potential to motivate larger-scale change, many articles concluded that market-based activities are limited in furthering the goals of the FS and FJ movements (Alkon, 2018; Kato, 2020; Macias, 2008; Waddell, 2016). Alkon et al. (2019) also emphasized advocacy as a necessary complement so SEs can effect change in the current food system.

Discussion

As mentioned in the introduction, foodNEST 2.0, our community-based systems dynamic project, identified social enterprises as a potential lever to catalyze community empowerment and sovereignty, to bring equity and, ultimately, food justice. In the face of theoretical contradictions and gaps in the ideologies of FS and FJ (FS is based on the rejection of neoliberalism, whereas FJ supports entrepreneurship and market-based initiatives to further food system equity), our review sought to explore interrelations between SE, FS, and FJ and explain how they may be compatible in facilitating more democratic and equitable local food systems in U.S. communities. We find evidence that there is potential for the interactions between food SE and FS/FJ movements to be both compatible and incompatible. Compatible interactions may include increasing community employment, building community wealth, and raising marginalized voices; incompatible interactions may include the limited ability of SE to address issues like community

employability, the perpetuation of stigmas against marginalized groups, and the threat of green gentrification.

Beginning with theory, this review finds commonalities between the definitions of FS/FJ movements and SE. Generally, FS/FJ and SE support community agency and self-determination in addressing local issues, rather than relying on prescriptive solutions from external, noncommunity powers (such as the federal government). Further, SE and FJ definitions both include building local capital and prioritizing community employment to create local economic opportunity as goals. The potential alignment in these goals may be a mechanism through which SE can further the goals of the FJ movement. Both FS and FJ definitions have a common goal of providing an alternative to the conventional, mostly market-based food system.

We identified at least four important empirical characteristics of SEs that inform how they may interact with FS and FJ movements: (1) SE ownership and employee demographics, (2) the business model of the SE (degree of self-sustainability), (3) aspects of the food system targeted by the SE via market activities, and (4) target consumer base.

In terms of SE ownership demographics, the most notable finding of this review is that a substantial proportion of the articles (two articles accounting for seven out of 17 SE examples) do not mention the demographics of SE owners. Owners of SEs are particularly important in deciding how profits of the SE are reinvested and who it employs, in addition to its business model—all factors that play a primary role in determining the SE's interaction with FJ and FS movements. Additionally, when a SE owner comes from a marginalized group, they may be better able to raise the voices of other marginalized individuals in the community. As the concepts of ownership and agency are central themes in FS and FJ movements, the lack of data on SE ownership shows that this is an area calling for more scholarship to understand how a SE can interact with FJ/FS.

The employment of community members is one strategy a SE can use to build local capital—a priority which aligns with the goals of FJ. There are other ways to build local capital, such as through the development of community education and engagement programs. The SEs in this review were more likely to use the latter approach to building local capital than to prioritize community member employment, according to the "explicit goal" code of Domain 1. While we know both strategies can be effective, this finding raises the question of the relative impact of each strategy: for an organization with limited resources, what approach should they focus on to maximize their community impact and their business efficiency? More research is needed to answer this question.

Although community employment may be particularly effective in furthering FJ, there were varying levels of success for SEs in this review that used this strategy. For example, Alkon (2018) described the Town Kitchen SE, which employed community members and provided support to employees in getting a college education by providing letters of recommendation, mentorship, and a living wage. Town Kitchen helped employees develop real-world skills to increase their qualifications for future jobs, showing how community employment can be a form of education and training for community members (in addition to a source of income). Town Kitchen was the only SE in this review that explicitly sought to provide educational opportunities for its employees to further enhance their individual capital. Other SEs found it difficult to employ community members, which they attributed to a lack of qualifications. In Waddell (2016), the "Village Market" SE sought to employ community members when possible, but it had to pull workers from outside the community when there was difficulty finding residents with appropriate skills and motivation to serve its mission. This demonstrates that there are other systemic issues regarding worker education and training that may hinder an SE's ability to hire from the community, as SEs alone cannot deliver or facilitate all necessary training and education needed to pull employees from the community. Other initiatives to improve worker education and training must coexist in marginalized communities to help SEs further FJ through community employment (such as government-funded training and education initiatives).

The next empirical characteristic of SE that informs how it interacts with FJ and FS move-

ments is its business model. Two important aspects of business models that should be considered are the self-sustainability of a SE and its target consumer base. Self-sustaining SEs include those in which most income comes from market activities or is otherwise self-generated. A non-self-sustaining SE relies more on grants and charitable contributions than a self-sustaining SE. As such, these SEs may find their dependence on external resources impacts their organizational and management decisions to align with external objectives, perhaps counter to the goals of FJ and FS movements (Malatesta & Smith, 2014). Since a major goal of FJ is community empowerment, self-sustaining SEs may more effectively empower communities than non-self-sustaining ones. A self-sustaining business model may also allow a SE to provide an alternative to the charitable food sector, which was a goal of three SEs in this review based on the "explicit goal of SE" Code (from Domain 1).

The third empirical characteristic of SE we identified as important for understanding how the SE interacts with food movements is the market activity of the SE. Market activities can be classified based on how they engage with the food system (for example, as a grocery store or a restaurant). Some modes of engagement with the food system in this review had high barriers to entry, hindering SEs' ability to be competitive and sustainable. Ideally, SEs should be competitive with other businesses in the area so they can stay open and further FS/FJ. Grocery SEs struggled with competitiveness. The Village Market in Waddell (2016), a grocery SE, had difficulty keeping prices of items low enough to be competitive with large supermarkets. To target lower-income community members, prices and quality had to be comparable to those of other grocers because there is often little product differentiation between items from a grocery SE and a supermarket. Another difficult aspect of the food system targeted by SEs was producers distributing produce directly to consumers or local businesses. In Macias (2008), organic market farmers struggled to enter the local produce market because many local businesses already had contracts with well-established producers and distributors. SEs may still have market activities in the grocery and direct-to-consumer distribution sectors and be successful, but SE owners should be aware of and address potential challenges that may arise due to the nature of the food system aspect targeted.

The last empirical characteristic of SEs identified as important were the target consumer base. SEs were more likely to target higher-income consumers that could pay higher prices, rather than lower-income consumers by trying to increase affordability of the SEs' products or services (n=13 versus n=5). For many SEs, if income is a primary goal, setting prices may involve a choice between self-sustainability and improving affordability for community members, because targeting higher-income consumers generates more income for the SE than targeting lower-paying consumers. A potential strategy to address this choice may be for SEs to offer different prices based on consumer income. In McKay et al. (2018), Food Justice Truck attracted a mix of customers, with some paying full price and others receiving a discount based on their level of need. Income from full-paying customers allowed the Food Justice Truck to offer discounted prices to customers with lower income (asylum seekers, in this case). A consideration for price discrimination is the stigma that may come with it in practice. At the Food Justice Truck, lower-income consumers were required to ask employees about price reductions, since these were not listed on shelves, which many customers reported as embarrassing. Another approach that allows SEs to target lower-income customers without compromising self-sustainability is government coupons. For the organic market farmers in Macias (2008), state-sponsored coupons offered discounted prices for low-income consumers, and customers not using the coupons paid full price. Lastly, because price discrimination allows a SE to target high-income consumers, green gentrification must be considered as an unintended consequence. SEs may signal a rise in property values in an area due to an impending influx of higher-income consumers in the neighborhood, which potentially hinders the SE's ability to help the people it seeks to empower. To resist green gentrification most effectively, Alkon (2018) argues that SEs must be owned by or employ community members vulnerable to dis-

placement and provide a living wage.

With these findings about SEs and their interactions with FS and FJ, we now return to the FoodNEST 2.0 project to understand how these concepts fit food systems models. A core modeling team of about 10 researchers and 20 community members, including nutrition and agriculture educators, grassroots food justice advocates, community leaders living in historically redlined neighborhoods, nonprofit leaders, emergency food assistance providers, public health practitioners, and local government staff. The team used a "deliberative, situated approach" to create a systems model that reinforces nutrition equity (Glickman et al., 2022; Freedman et al., 2021). At its foundation, a deliberative, situated approach is participatory action research (PAR) that aims to share power and translate knowledge into action. PAR is coupled with a deliberative and inclusive process and systems thinking situated in lived experience. Through a three-year process, the team determined nutrition equity as an aspirational goal for local food systems, defined as "freedom, agency, and dignity in food traditions resulting in people and communities healthy in mind, body, and spirit" (Freedman et al., 2021, p. 8).

A model built on systems thinking enabled the team to see the components, the relationship between components, and the feedback in the food system, all of which give rise to nutrition equity. In this way, we can picture the ways that SE, FS, and FJ are embedded and interdependent in a neoliberal society. Given the purpose of the systems model, we can also see the levers that create change throughout the system.

The system dynamics model of nutrition equity had three major feedback domains: (1) meeting basic food needs (such as through emergency food provisioning or government assistance) with dignity, (2) providing supply and demand for fresh and healthy foods (through market mechanisms), and (3) supporting community empowerment and food sovereignty (Freedman et al., 2021). Connecting meeting basic food needs with these three domains suggests a need for "both/and" thinking, attending to feedback in systems by simultaneously meeting today's needs, attending to market-based changes (at least in the neoliberal context), and facilitating empowerment. Both/and thinking suggests that solutions might need to simultaneously address food insecurity by providing food today (short-term), while attending to increasing wages (longer-term) and still aiming for an ultimate goal of self-determination (systems change). Only focusing on today's needs will not solve the problem, and only focusing on market solutions does not feed people today, nor does it change systems of oppression. In the FoodNEST 2.0, this focus on longer-term and systems-change outcomes was reinforced by inclusion of community power building as a feedback mechanism related to community empowerment and food sovereignty as well as the other two domains of feedback. Furthermore, the FoodNEST 2.0 team identified voter engagement as an exogenous factor that would accelerate or delay nutrition equity.

In "both/and" thinking, it is critical to emphasize that the third domain, community empowerment and food sovereignty, has the potential to be a countervailing force to structures of racism embedded in the first two. As such, it becomes a leverage point for changing the dynamics of both emergency feeding and retail markets. Therefore, SEs alone are unlikely to shift communities into a state of FS or FJ, although they may contribute to more democratic and equitable food systems. In addition, reflecting on the literature review, a SE must attend to key design questions—for whom, with whom, and by whom. SEs centering community assets and leadership may be more likely to transform the food system.

This literature review is limited by the fact that we chose to review only dissertations and peer-reviewed, published literature to understand how SEs have been implemented and systematically documented in the food system. It is likely that SEs have been implemented that aim for FJ or FS and are documented elsewhere, such as government reports.

Conclusion

Market-based solutions are often counterposed to movements for justice and sovereignty, but this distinction appears to be irrelevant in the U.S., given our experience in practice. Indeed, our university–community group spent three years

developing a food systems model that illustrated the relationships between the two. Examining this relationship, our systematic review of the literature finds that SEs come in many forms and engage in many different markets, but they have some common goals, such as facilitating community education and engagement, increasing access to healthy foods, and providing community employment opportunities. Further, we find that intersections of SE, FS, and FJ are about supporting community agency and self-determination. In order to do this, attention must be paid to who creates and owns an SE and who benefits from the business model, while simultaneously contending with market-based realities that can impact the ability to pursue FS and FJ goals.

Examining the relationship between SEs and FJ and FS, we are reminded that food systems change requires systems thinking. In a neoliberal context, this means that markets exist within the same sets of relationships as justice and sovereignty, suggesting that SEs can be a lever for change. Because SEs are based within the food system, it is important to be cognizant of unintended consequences (such as green gentrification and reinforcing elitism). However, systems thinking also reminds us that changing only a single variable (such as an individual enterprise) or set of relationships in a larger system will not create systems change. Instead, we must continue to leverage entire domains to counteract historical forces of racism embedded within the system. We build on a call by Allen (1999) for a "both/and" approach to systems change: market-based solutions AND emergency feeding AND community empowerment, with attention to modulating current factors in the system that can accelerate equity for communities and their members, while maintaining a long-view focus on changing the rules that perpetuate inequities in the food system over time.

This review points to at least three areas for future research. First, further empirical exploration of the relationships between FS/FJ and SE such as community agency, self-determination, and building local capital is needed. We suggest focusing on the potentially important characteristics of SEs, such as ownership and employee demographics, the business model of the SE, aspects of the food system targeted by the SE, and the target consumer base. A community-based participatory systems modeling approach could be taken as was done in foodNEST 2.0. Second, to take this further, one could go about validating the underlying assumptions of these relationship via techniques such as stock-and-flow modeling. Finally, funding support from the Foundation of Food and Agriculture Research (FFAR) was critical to the development of foodNEST 2.0. Future research could examine how different funders conceptualize and support research and practice focus on the FS/FJ movements and SEs.

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An evaluation of the federal Transition Incentives Program on land access for next-generation farmers

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Abstract
Next-generation farmers face immense challenges in securing land. In recent years, some state- and federal-level land access policy incentives (LAPIs) have been implemented to address these challenges. In this paper, we assess the Transition Incentives Program (TIP), an initiative of the U.S. Department of Agriculture's Conservation Reserve Program that is funded by Congressional farm bills. TIP offers landowners two years of financial incentives for leasing or selling to a beginning or socially disadvantaged farmer or rancher (categories of farmers defined by the U.S. Department of Agriculture). In our study, we characterize TIP participants to understand where and how TIP assists beginning and socially disadvantaged farmers and ranchers. Our findings demonstrate that TIP serves some landowners and next-generation farmers, primarily in the Midwest and Mountain West. We demonstrate a spatial mismatch between where next-generation farmers live and high rates of TIP participation. Variable participation may be due to inconsistent outreach and limits to the program design. We identify key barriers and provide insights to improve TIP and other land access programs for next-generation farmers.

Keywords
farm bill, farming, land access, food systems, federal policy, beginning farmers, farmers of color, socially disadvantaged farmers and ranchers, transition

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Introduction and Literature Review

Next-generation farmers face many barriers to succeeding in farming, a concern well documented by many farmer advocates like American Farmland Trust (Freedgood & Dempsey, 2014) and the National Young Farmers Coalition (2017), government agencies like the U.S. Department of Agriculture Economic Research Service (USDA ERS) (Callahan & Hellerstein; 2022), and scholars and researchers (Beckett & Galt, 2014; Horst & Gwin, 2018; Ruhf, 2013). Collectively, they identify the lack of access to affordable land as a barrier for next-generation farmers (Calo & Master, 2016; Horst & Gwin, 2018).

Among next-generation farmers, Native American, Black, Latino, Asian, and other immigrant farmers and farmers of color often experience a combination of barriers, which makes their land access even more fraught. For example, Native American farmers have experienced systemic racism such as the Indian Removal Act (1830), Homestead Act (1862), and Dawes Act (1887), which collectively removed Native Americans from their lands and forced them into individualized property holdings (Dunbar-Ortiz, 2014). White homesteaders were the recipients of much of the land. Likewise, African American farmers have experienced systemic racism stemming from past histories of slavery and sharecropping that left most Black farmers without land ownership or financial assets (Reynolds, 2002). Stemming from policies like this, farmers of color typically have less generational wealth and family land access than white farmers, who own 98% and operate 94% of all farmland (Horst & Marion, 2019).

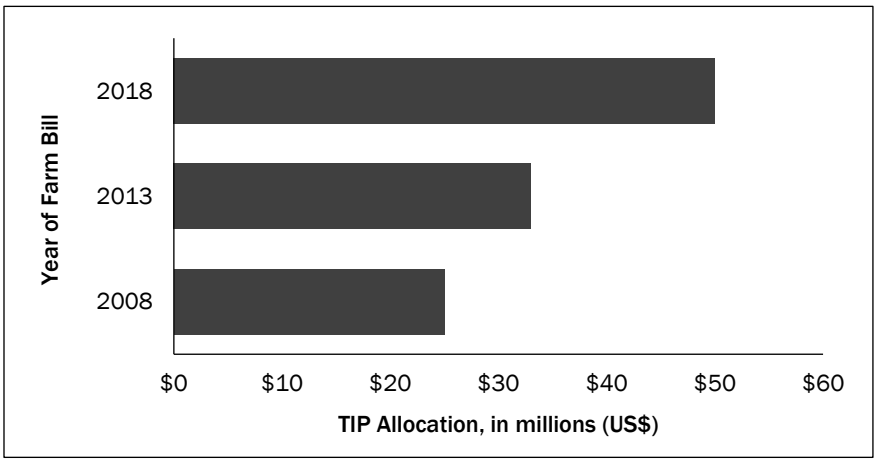
Federal and state governments recognize that next-generation farmers need land access. They have created a variety of incentive programs like state-level beginner tax credits, easements, and financial assistance programs and the federal Transition Incentives Program (TIP; Valliant & Freedgood, 2020). We collectively call these programs land access policy incentives, or LAPIs. Despite the rising interest in replicating and scaling up these programs, there has been little critical evaluation of them. Most of the existing research is based on small samples and case studies of specific programs. There is a significant gap in knowledge of the policies' characteristics, impacts, and extent (Schilling et al., 2015; Valliant & Freedgood, 2020). Only one study by the Center for Rural Affairs has attempted a review of the TIP, but this study examined four states and is now outdated (Johnson & Ready, 2017).

Congress passed TIP as a part of the 2008 farm bill. At that same time, Congress decreased the amount of funding and land for the Conservation Reserve Program (CRP). As a result, millions of acres of land retiring from CRP were not eligible for re-enrollment (Myers, 2021). The National Sustainable Agriculture Coalition (NSAC, 2019) helped to develop the policy proposal for TIP during this time period. A core premise of TIP, as a program under the broader umbrella of CRP, is that it provides an alternative to landowners to continue to receive federal payments after their land has expired out of CRP. Early legislative support came from midwestern legislators like Senator Tom Harkin (D-IA), Representative Tim Walz (D-MN), and Representative Jeff Fortenberry (R-NE) (NSAC staff, personal communication, September 2021). The states represented by these legislators share proportionally high white and aging populations, large farm sizes, a large percentage of farmland and farm practices dedicated to commodity agriculture, and land in CRP (USDA National Agricultural Statistics Services [USDA NASS], 2017; U.S. Census Bureau, 2020).

TIP provides landowners with an additional two years of CRP payments if they lease for five years or sell their land to a beginning or socially disadvantaged farmer or rancher. The USDA defines beginning farmers and ranchers as those who have less than 10 years of farming experience, regardless of age, and socially disadvantaged farmers and ranchers as producers that are Black or African American, American Indian or Alaska Native, Hispanic or Latino, and/or Asian or Pacific Islander (USDA Economic Research Service [USDA ERS], 2023).

Funding for TIP is a small percentage of the farm bill. Conservation program funding has received about 7–8% of farm bill funds in recent years. Of that, CRP has received nearly $2 billion annually, and TIP is a fraction of that (NSAC, 2018). As shown in Figure 1, the amount of

Figure 1. Funding for the Transition Incentives Program (TIP), 2008–2018



funding for TIP has gradually increased with each farm bill, to $50 million in the 2018 farm bill, which includes $5 million earmarked for data analysis and outreach. TIP funding is considered discretionary and has to be renewed every farm bill.

It is helpful to understand CRP to understand TIP. CRP is authorized by the Food Security Act of 1985, although the roots of CRP extend back to the 1950s. The 1985 act directed the USDA to enroll 40 to 45 million acres by 1990 with two primary goals: reducing soil erosion on highly erodible cropland and curbing the production of surplus commodities (Barbarika & USDA Farm Service Agency [FSA], 2021). CRP is administered by the Farm Service Agency. As noted on the USDA FSA (n.d.-a) CRP website,

> In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality. Contracts for land enrolled in CRP are from 10 to 15 years in length. The long-term goal of the program is to re-establish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat. (para. 1)

There are a few different kinds of CRP enrollment: continuous, general, and grasslands. Continuous enrollment land is considered "environmentally sensitive land devoted to certain conservation practices" (USDA FSA, 2022, p. 2). To be eligible for general sign-up, land must be highly susceptible to soil erosion or be located in a national or state CRP conservation priority area. Grassland CRP helps landowners and operators protect grassland, including rangeland, pastureland, and certain other lands, while maintaining the areas as grazing lands.

The extent and geographic range of CRP enrollment has an impact on TIP participation, because only land retiring from CRP is eligible for TIP. CRP enrollment has varied over the years (Table 1), with interest sometimes over the federal cap on acres permitted to enroll, and sometimes under it. CRP enrollment varies across the country, with the highest enrollment in 2020 in the Texas Panhandle, portions of western Kansas, eastern Colorado, Iowa, North and South Dakota, and eastern Washington. In 2020, the annual payment for CRP land was on average US$82 per acre, although the payment varied widely by geography, general farm economic conditions, soil type, and environmental practices (USDA FSA, 2020). TIP payments are equivalent to CRP payments. The amount of payment, relative to what they might make from farming the land for example, is a factor in whether landowners participate in either program.

In the TIP program, the discrepancy in terms of payment term (two years) and required lease term (five years) is built into the program. The landowner can choose to charge prevailing rental rates to next-generation farmers, though it is possible that some choose to pass on savings from their TIP payments. The contract for TIP is simple and requires very little information about the landowner or next-generation farmer (see Appendix, Figure A1). The next-generation farmer's signature certifies that they are a beginning or socially disadvantaged farmer or rancher as defined by the USDA, but they are not required to identify which one they are or provide any information beyond

Table 1. Transition Incentives Program (TIP) Participation

Year	Total TIP contracts	Sum of acres enrolled in TIP	Sum of total TIP payments (US$)	Average acres per contract	Average payment per contract (US$)
2014	534	85,446	$8,548,804	160	$16,009
2015	253	39,765	$4,039,906	157	$15,968
2016	186	33,489	$3,737,993	180	$20,097
2017	284	46,380	$3,806,516	163	$13,403
2018	250	19,658	$2,616,740	79	$10,467
2019	3	95	$12,168	32	$4,056
2020	732	126,237	$11,560,462	172	$15,793
2021	392	71,886	$7,221,972	183	$18,423
2022	43	9,818	$726,280	228	$16,890
2023	4	150	$15,752	37	$3,938
Sum or average	**2,681**	**432,923**	**$42,286,593**	**161**	**$15,772.69**

that. They also agree to develop and implement a conservation plan. Scarce information limits subsequent analysis.

TIP is promoted and administered in each state primarily by staff at the FSA as part of their work portfolio. From stakeholder interviews, county FSA officers typically communicate with interested landowners and next-generation farmers. Meanwhile, staff at the National Resources Conservation Service (NRCS) often offer technical support to interested TIP landowners. Staff at extension services and nonprofit organizations sometimes do outreach regarding TIP, although this varies state by state based on local capacity and interest.

TIP targets new and beginning farmers and farmers of color, who have some things in common as well as important differences. According to the 2017 Census of Agriculture, both categories of farmers run smaller farms, in terms of both acres and sales. They are more likely to sell directly to consumers. There are also noteworthy differences. For example, Black farmers tend to be older. There are also differences in where these farmers live (discussed later in this article). While targeted in other USDA programs, TIP is not directed toward women farmers or Limited Resource Farmers or Ranchers (USDA NRCS, n.d.; USDA FSA, n.d.-b).

There is not much research or documentation about TIP. In fact, advocacy coalitions like NSAC have publicly called for greater analysis of TIP, including an examination of the average size of participating parcels and conservation practices utilized while the land is in CRP (Obudsinki, personal communication, 2020). Our study responds to some of these information gaps and explores how TIP serves the land access needs of next-generation farmers.

Applied Research Methods

We used USDA data to examine participation, and we interviewed those familiar with TIP to hear about their experience with the program. The data on TIP participation was obtained in 2022 using a Freedom of Information Act request. We examined participation over time, the types of landowners and farmers who participated, their geographic distribution, and the types of farmland enrolled. Unfortunately, there are significant limitations to the data on TIP. The USDA does not collect detailed information about land owners or eligible farmers or about the farming or environmental practices adopted under the program.

To complement our data analysis, we also conducted interviews with key informants, including staff at advocacy organizations such as Center for Rural Affairs, National Farmers Union, and NSAC; federal employees and state leads (with FSA and NRCS); and other people familiar with the program. In total, we conducted 13 interviews over phone or video. Each interview lasted 45 minutes to an hour. We asked questions about the inter-

viewees' knowledge of TIP, local program participation, known impacts, barriers specific to participation by beginning and socially disadvantaged farmers and ranchers, and their overall reflections on the program. We asked for their reactions and additional perspectives to our maps and tables. Our interview approach was reviewed by the Portland State University Human Research Protection Program and determined exempt, with reference number HRRP 217502-18.

We transcribed all the interviews by hand and then coded them in the program atlas.ti, software designed to facilitate qualitative data analysis. We looked through the transcripts for perspectives on key themes including overall TIP participation, statewide and countywide variation, participation by next-generation farmers, and barriers to participation. These themes are now the subheadings in the below section. Within each theme, we discuss where there was significant overlap in perspectives, and we also highlight key differences. Per our IRB-exempted protocol, we kept the interviews confidential, since some USDA staff expressed hesitation about participating and particularly about sharing critical insight if they were personally identified. As such, identifying traits of interviewees have been excluded. In addition to these methods, our research was guided by a national advisory team consisting of researchers and practitioners from across the country who are knowledgeable about land access barriers and policy initiatives.

Results

Overall TIP Participation by the Numbers

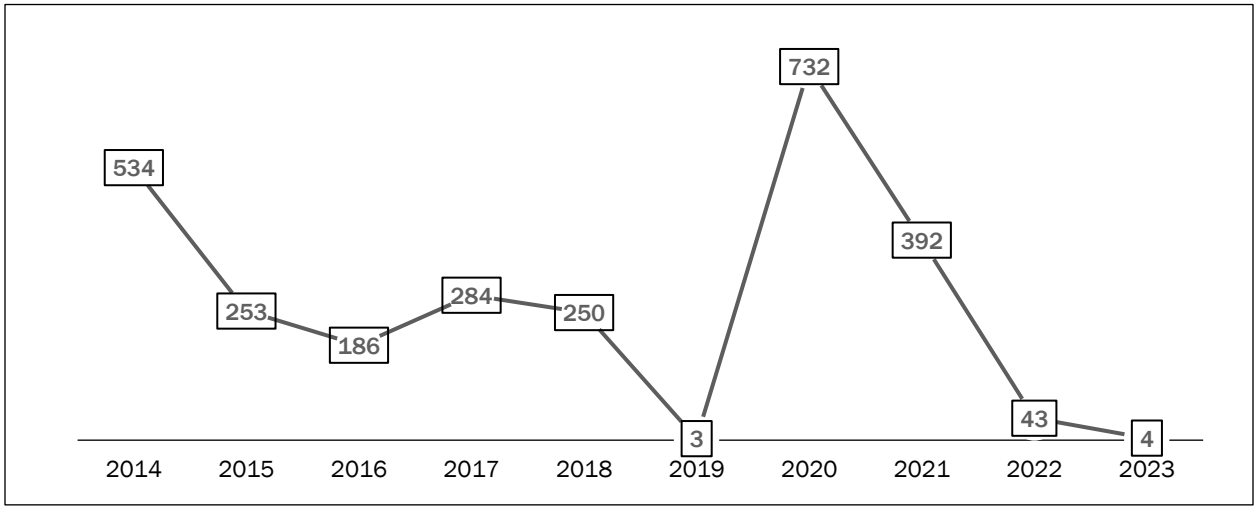
From January 2014 to April 2023, there were 2,682 TIP contracts, or about 300 on average annually, as shown in Table 1 and Figure 2. Annual participation has been highly variable, with the most contracts initiated in 2020 by far (732) and the fewest in 2019 (3) and 2022 (43).

From 2014 to 2022, about US$42.3 million was spent on TIP payments to landowners, or about US$2.2 million annually, with the most money being spent in 2014 and 2020 (over US$8 million and US$11 million, respectively), and very little in 2019 and 2022. USDA staff suggested that the reasons that 2019 was a low enrollment year "could have something to do with the transition from the manual process to CCMS [a new electronic database], as this was occurring at the time. Also, there was a limited signup period for 2019 TIP." (Sign-ups in 2019 lasted from June 3, 2019, through August 23, 2019.) The year 2019 was subsequently followed by a high-enrollment year. Explanations like these may also account for other variation.

Statewide and Countywide Variation

TIP participation varies across the country, with most of the projects, acres enrolled, and payments directed to counties in the Mountain West, Midwest, and Plains states, as shown in the maps in Figure 3. The five states with the highest numbers

Figure 2. Number of Transition Incentives Program (TIP) Contracts Over Time (2014–2023)

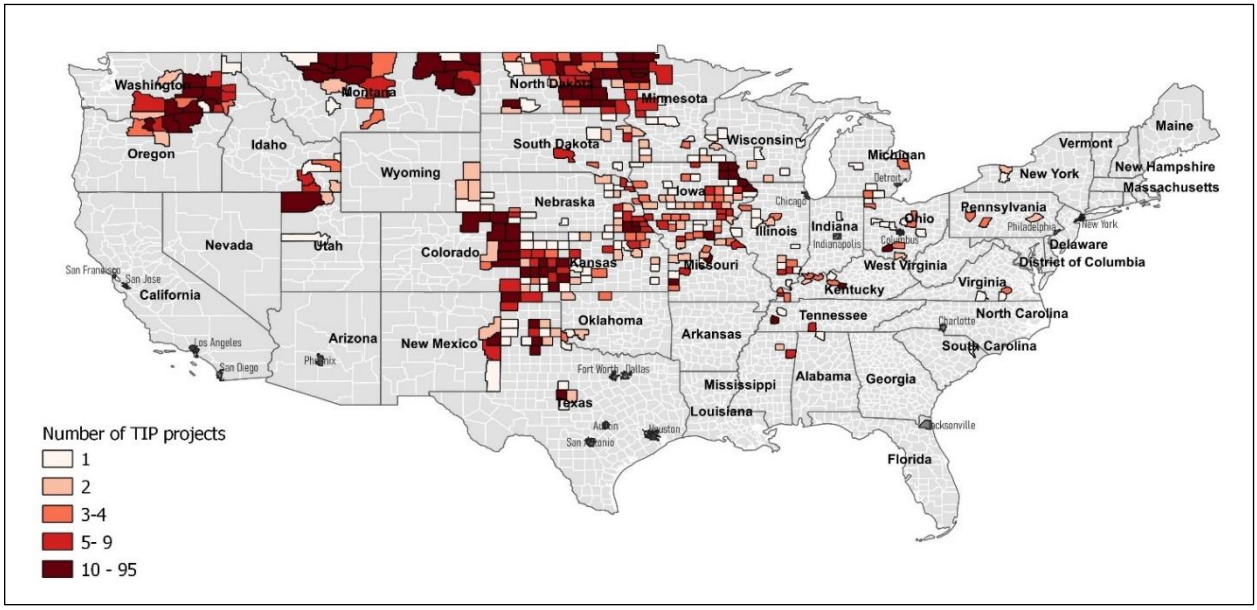


of TIP projects are Montana (408), Minnesota (295), North Dakota (259), Kansas (248), and Iowa (224). The counties that each had over 50 TIP projects were Chouteau County, Montana (96); Roseau County, Minnesota (83); Hill County, Montana (82); Marshall County, Minnesota (58); Kittson County, Minnesota (56), Cimarron County, Oklahoma (56), and Curry County, New Mexico (52).

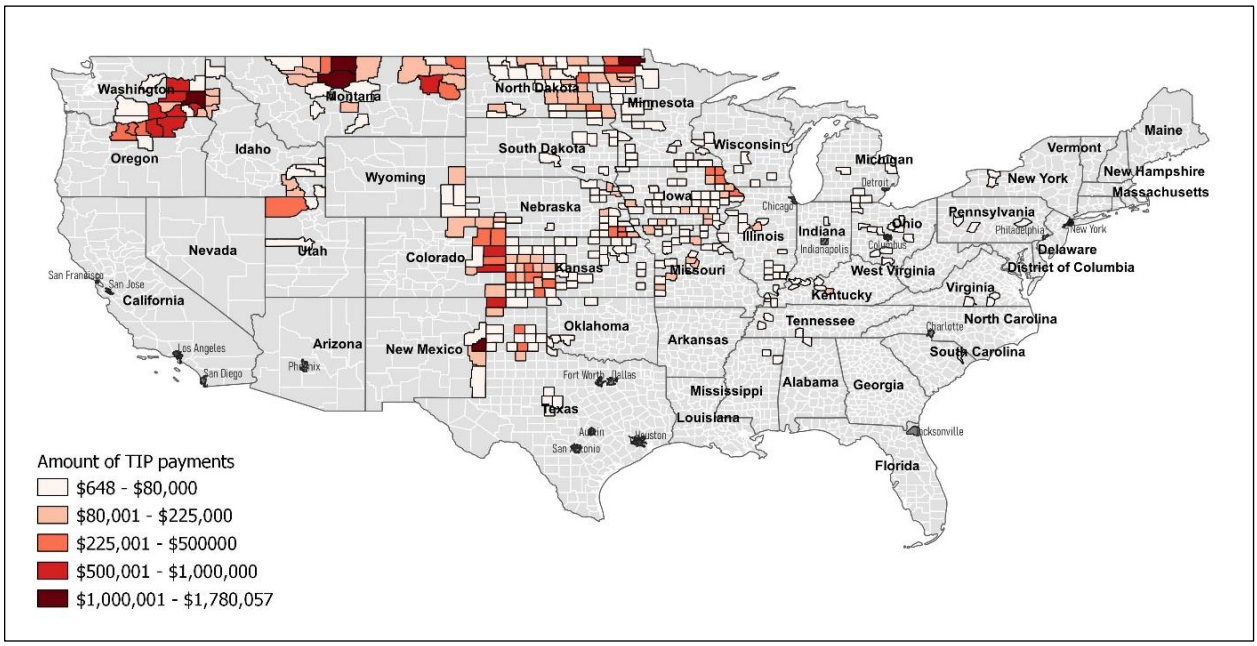
Generally, interviewees observed that TIP participation is higher where there have been higher amounts of CRP land (and thus land retiring from CRP). Interviewees commented on the variability of farmland expiring from CRP and thus becoming eligible for TIP. They noted that some CRP lands

Figure 3. Transition Incentives Program (TIP) Participation by County

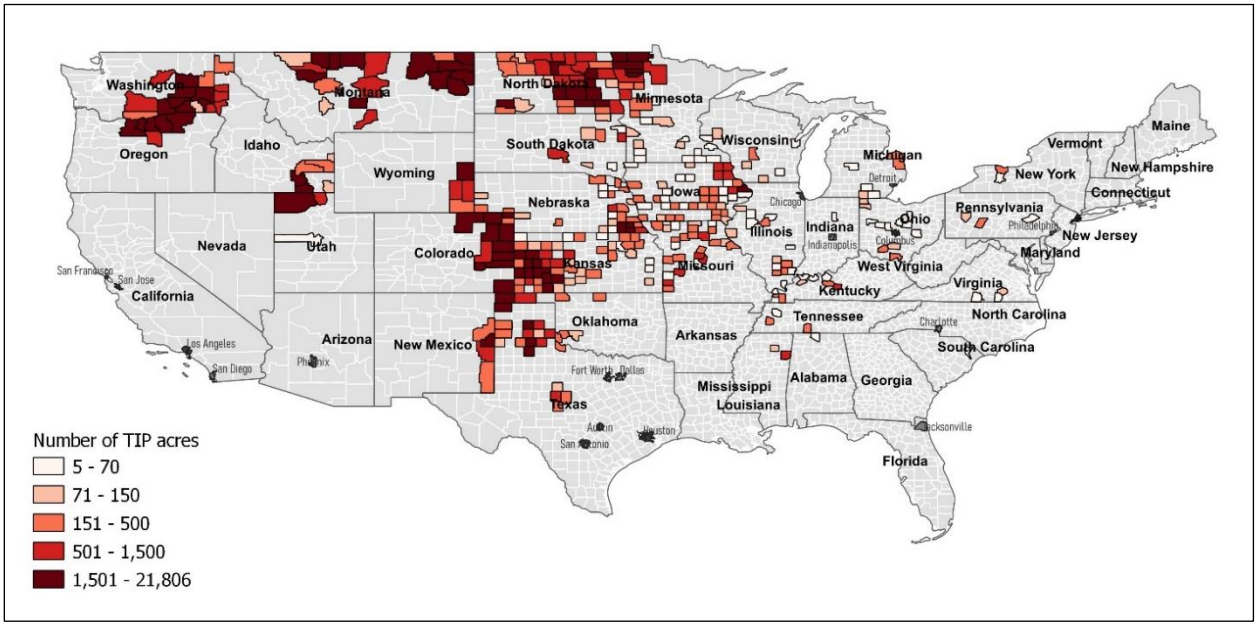
(a) Number of TIP Projects in 2014-2023



(b) Amount of TIP Payments, 2014–2023 (US$)



(c) Number of TIP acres, 2104–2023



may be more suitable for agricultural production than other land and may contribute to the variation in participation in TIP. For example, USDA staff in the Midwest explained that:

> CRP land varies by location, history, et cetera. In [this state], we have land that is "not as productive" and hence in CRP, but compared to Colorado, it is probably pretty productive. … Our most marginal lands are still pretty productive—these are mainly in the southern and northeastern areas of the state.

Within states, many noted that the higher-participation areas of TIP are areas where there is a high concentration of CRP land and also interest from beginning farmers from generational farming families. For example, a NRCS employee in the Northwest explained that:

> Most of our CRP land, and all of TIP participation, is in the southeast [part of the] state. [Those counties] are all mostly generational farming, four to five generation communities. So, you have a lot of beginning farmers wanting to stay in the community, take over dad's ground, the neighbor's farm, et cetera. Once you have a few contracts, that sets an example, gets more interest. I have not seen as much in other counties.

In addition, interviewees noted that certain types of TIP-eligible farmland, for example large tracts of grassland, are currently attractive to some beginning farmers. A USDA employee in the Midwest commented:

> TIP is very popular in the northwest corner of the state. [This state] is one of the larger CRP states, which means there is more land that would be potentially eligible for TIP. [This state] also has a fair amount of beginning farmers. In the northwest part of the state, there also tends to be large tracts of land that are enrolled in grass practices. For a beginning farmer, having access to a larger tract in one spot would be more desirable than smaller fields that are spread out. … A beginning rancher, for example, might want to expand their herd, and it would probably be pretty easy to transition for that.

In the central part of the country, USDA staff noted that TIP participation is highest along the border near Nebraska and Kansas, where there is more CRP land, mainly in grassland. It may be

somewhat easier for next-generation farmers to convert that land to livestock and grazing, though, in the words of interviewees, it is still "not an easy road." Interviewees also noted that parts of Kansas and Nebraska have relatively lower prices for farmland compared to near the Denver metro area, though there can be problems with insufficient rainfall.

One USDA employee in the Northwest observed that recent caps on CRP enrollment or delayed CRP enrollment periods have led some landowners to participate in TIP to at least receive rental payments plus the additional two years of TIP payments:

> In the last four years, we have seen a big decrease in CRP payments in some areas, a 50% decrease—that is a big deal for 10-year enrollment, … so some landowners look at TIP, see two years of payments (at higher values) and only five-year commitment—and they try TIP out, as it seems to financially make sense.

Another interviewee commented that rising commodity prices and rising costs of maintenance from CRP lands can influence landowners to look to TIP:

> Commodity prices play a big role—if there is more drought, like this past summer, it might push some landowners into CRP payments, others might think about how can I raise my cattle, maybe I can have some expanded grazing land managed by TIP. … Depending on commodity prices, a lot of land goes into TIP that the landowner was planning to rip out of CRP anyway, due to rising commodity prices, or maybe to manage grasses that are coming up.

Interviewees suspect that variation in TIP participation may be due to some states and county offices doing more outreach. For example, the Minnesota Department of Agriculture does outreach to next-generation farmers proactively. The state also has a relatively robust and reasonably well-resourced FarmLink program that connects retiring farmers with beginning farmers.

While formal outreach is important, informal outreach via word-of-mouth is also influential. In the Northwest, a USDA employee explained that where TIP participation is high, "word spreads quickly when a landowner is looking to enroll in TIP. If a beginning farmer is interested in more land, he usually tells them [the landowner] long before their CRP contract is expiring."

Interviewees also offered some reflections on reasons for low participation. Some interviewees noted that there is land that probably should be eligible for CRP designation but is not due to the history, technical parameters, and cultural bias within the program. As one USDA employee in the Northwest explained:

> One reason for lower TIP participation in some areas… It's unfortunate because a lot of Indian land should be eligible for CRP. But we've had people come to the land to try to farm it, and then abandon it because not very good for farming—high erosion, etc. … but then the land doesn't get put into CRP/isn't seen as eligible for it.

TIP Participation by Next-Generation Farmers

Unfortunately, the USDA does not systematically collect demographic information about participating landowners or farmers. Without that data, we are unable to assess participation in a quantitative manner. Instead, we highlight spatially where TIP participation is concentrated (Figure 4) and show that these areas do not overlap with areas with high numbers of next-generation farmers. The counties with higher-than-average percentage of beginning farmers are generally located in the upper Northwest, Southeast, and Southwest, with not much overlap with TIP participation, except in a few areas in Minnesota, North Dakota, Oregon, and Washington.

In terms of socially disadvantaged farmers, there is no overlap among TIP participation and counties with higher percentages of Native American, Black, Latino, or Asian farmers. Native American and Latino farmers tend to be located in higher percentages in the Southwest, Black farmers in the Southeast, and Asian farmers in California. In

those areas, TIP participation is low or nonexistent.

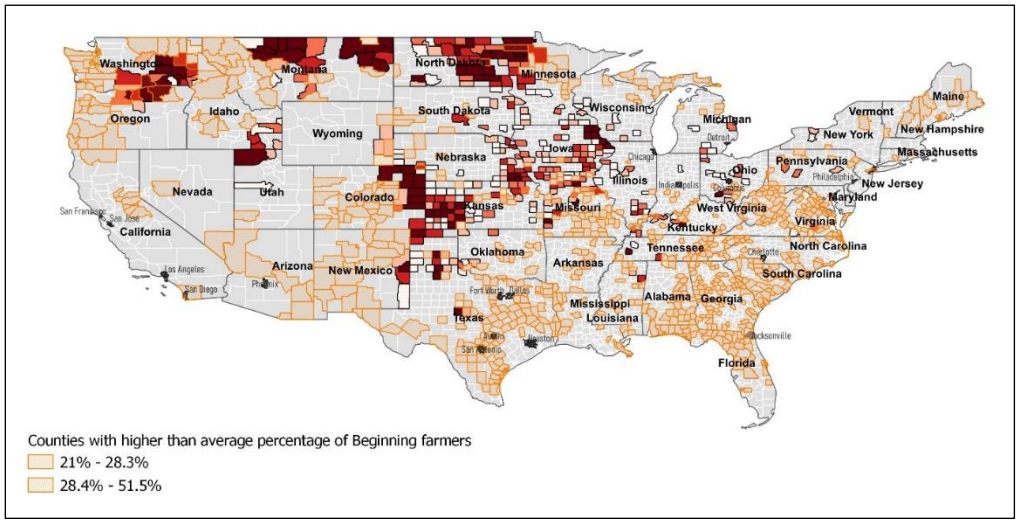
Our key informants confirm these geographic patterns. TIP appears to be serving some beginning farmers and ranchers, especially those from generational farming families. In their experience, participants came from already-established farm or ranch families, typically raising commodity crops or livestock. Most interviewees do not experience that TIP is serving farmers from nonfarming families for farmers of color. Below are some example quotes from USDA employees:

> Often ends up just being the neighbor kid. It often is somebody in the community, who does not have children that want to farm, that sells to a neighbor kid.

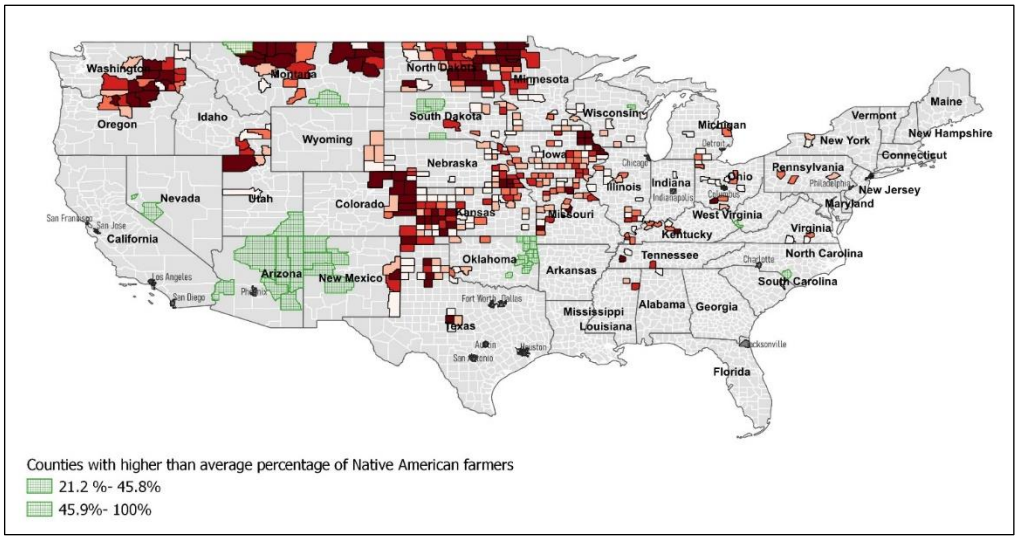
> It doesn't work like someone else intended it to work, does not get new people into farming.

Figure 4. Maps of Transition Incentives Program (TIP) Participation and Counties with Higher-than-Average Percentages of Beginning and Socially Disadvantaged Farmers and Ranchers, 2014–2023

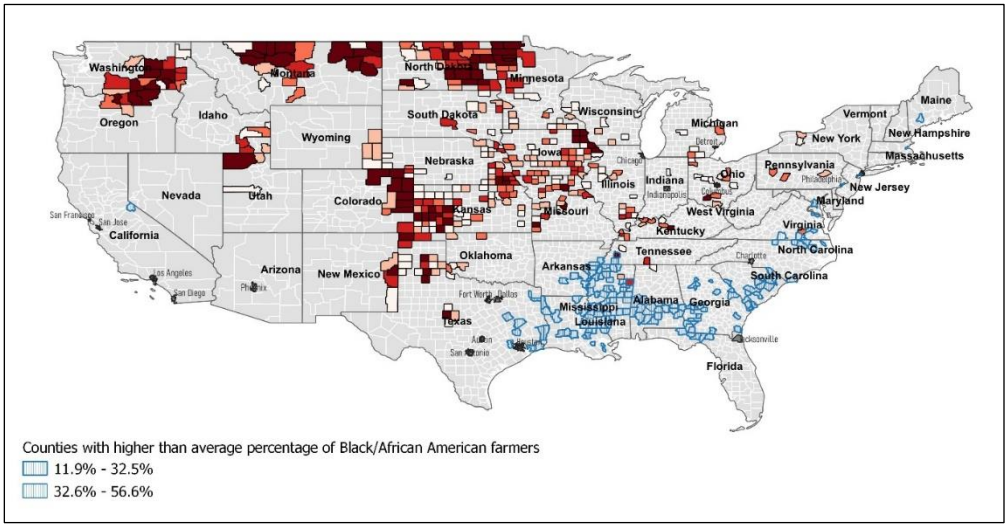
(a) Counties with Higher-than-Average Percentage of Beginning Farmers



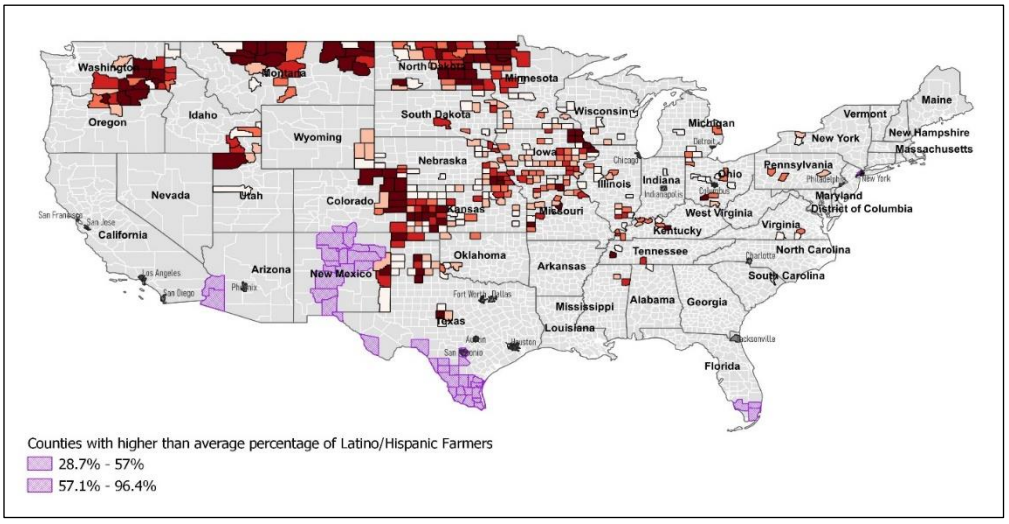
(b) Counties with Higher-than-Average Percentage of Native American Farmers



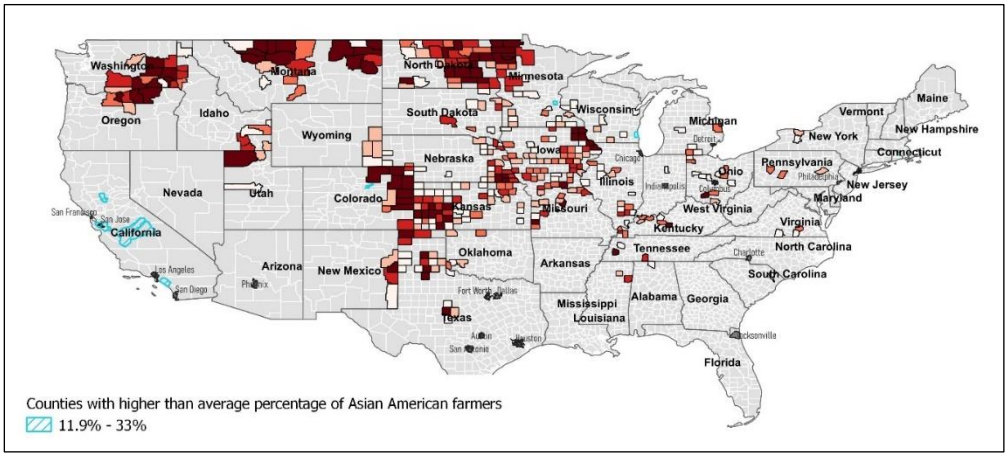
(c) Counties with Higher-than-Average Percentage of Black/African American Farmers



(d) Counties with Higher-than-Average Percentage of Latino/Hispanic Farmers



(e) Counties with Higher-than-Average Percentage of Asian American Farmers



> The people who use it are already farming, though they are eligible according to the law.

Interviewees commented that the program is less accessible and attractive to socially disadvantaged farmers, in part due to the spatial mismatch of eligible land relative to where socially disadvantaged farmers live and farm. An interviewee in the southern part of the U.S. noted that "many Black farmers are in East Texas, and there is not much CRP land there. … There are many Black farmers and other socially disadvantaged farmers around Austin, where all the land is waiting for urban development." An interviewee in the Northwest had similar observations:

> There are concentrations of minority farmers on the West Coast, e.g. on the west side of the Cascades, but there is only one general CRP enrollment on west side. Instead, the west side has Conservation Reserve Enhancement Program lands, which are intended for permanent protection.

Another interviewee commented, "In Wisconsin, there is some CRP land in the north, but that is not a desirable resource for socially disadvantaged farmers. Many of them are nearby cities like Milwaukee or Madison."

Several staff mentioned that their offices are attempting to do more culturally specific outreach to farmers of color and farmers from different ethnic identities. For example, several FSA office interviewees mentioned they are translating outreach materials into other languages including Russian, Spanish, and Hmong. Several interviewees discussed their efforts to build relationships with various racial and ethnic farming communities. One USDA employee explained, "We have a lot of Latino farmers. We have good relationships with the Latino Farmers Association." An NRCS employee noted that she sees effort in terms of culturally specific outreach, noting that:

> [Government] departments have a division focused on race, justice, etc.; it seems to be doing good work. We are getting requests for more training on how to work with tribes, Asian farmers, et cetera, including more for Farm Service Agency employees. This has continued through the pandemic online, though ultimately we believe field visits, in person, are the best kind of training.

Identified Barriers

Stakeholders identified some key barriers that are likely educing participation in TIP, both by landowners and farmers. These are discussed below.

Program design

Program design serves as a barrier to TIP participation. As one NRCS employee explained, "If you're doing CRP correctly, you are putting the worst land in protection." She relayed that many lands enrolled in CRP have high rates of soil erosion and compaction, which would make them difficult to farm. Likewise, one interviewee noted that in Texas and Oklahoma,

> the lands in CRP are often the same lands that were famous for the Dust Bowl, identified as some of the worst 15% of production for agriculture in the country, and highly erodible with low annual rainfall. While land up in the Panhandle is cheap, it is also highly erodible; it may be difficult to get a conservation plan. It is difficult to get water, and more difficult all the time.

Many interviewees commented on the high costs of converting CRP land back into production. One USDA employee noted that for land "with well-established CRP cover, the equipment and cost to get a field back into production status can be costly to a new farmer."

Because TIP is an alternative for landowners with retiring CRP land, the benefits accrue to private landowners, who are typically land-wealthy compared to many next-generation farmers (Mock, 2021). One interviewee, a USDA employee, described CRP as a "grant engine chugging along with little accountability." Meanwhile, the program does not require landowners to sell their land permanently to next-generation farmers, and many interviewees observe that they choose to lease only. A representative of an advocacy organization rep-

resenting beginning farmers noted how this approach is problematic:

> Just renting out to beginning farmers is just not wealth-building in the way that the promise of agriculture implies. You may not make a lot farming, but you build a generational asset. If we are building a vocation that folks can build a life in, just renting the land doesn't do that.

Interviewees also did not think the incentives were sufficient to lure landowners. One problem is that incentives are only two years, while the commitment to a next-generation farmer is five years. One USDA employee noted that "landowners need to sign a five-year lease in exchange for two extended CRP payments. If a beginning farmer gets out of farming before the five-year lease is up, it may complicate things for the landowner."

Uneven and limited program, staffing outreach and implementation

Interviewees commented on the high variability among federal staff at FSA, NRCS, and among the Beginning Farmer Coordinators in terms of their attention to TIP. General knowledge about TIP seems very low, and the program is not visible. For example, most state websites don't offer much information about TIP, while CRP is often highly visible. Even finding USDA and NRCS staff who felt knowledgeable enough to talk about TIP was challenging for our research team.

FSA and NRCS staff generally agreed that most of the specific TIP outreach efforts are targeted at landowners, rather than at next-generation farmers, and usually take the form of mailed letters and electronic newsletters. Interviewees commented that initial outreach to landowners with expiring CRP contracts is often too late, as landowners often make decisions well in advance of their contract deadline. Response times to interested applicants are lengthy. For example, a stakeholder commented that it took years to establish a TIP contract.

Few interviewees reach out to next-generation farmers about TIP. Instead, they rely on next-generation farmers inquiring about TIP. Interviewees explained that they do little outreach because they cannot easily help next-generation farmers find land. USDA employees typically mentioned relying on other organizations, such as local extension offices, to reach next-generation farmers. However, some interviewees acknowledged that Extension and other partners may not have sufficient capacity to promote TIP. One interviewee commented:

> I am not sure how much Extension knows about the program, how much they promote it. Another challenge for beginning farmers is that, that state has cut Extension funding, services, … which negatively impacts beginning farmers who can learn a lot from them.

There are instances where USDA staff promote TIP, but that is not the case everywhere. In some cases, FSA and NRCS staff were described as "dysfunctional," as in the words of one interviewee. The interviewee referenced that the staff did not fully understand how TIP works, were not timely in communicating with prospective participants, and did not process paperwork in a timely manner. According to USDA staff, some of the beginning farmer and rancher coordinators are highly engaged, and it is a good match with their experience and other job duties, while for others, it is more of a stretch and less of a personal interest. Meanwhile, in some federal jobs related to TIP and other programs targeting next-generation farmers, there is high turnover and a lack of institutional knowledge.

Some interviewees indicated that federal staff do not have the trusting relationships with landowners or next-generation farmers necessary to discuss land transfers. The federal staff commented on their constraints in making connections among landowners and prospective next-generation farmers. Many of them perceive making any sort of personal connection as unethical, because of its potential for violating implied or explicit privacy rights and the inherent perception of being biased in their offer of assistance. One interviewee noted, "Landowners and potential renters may struggle to connect. If a landowner is not interested in renting their land to a person they do not know or who has

a limited farming history, this could deter them from considering TIP."

Barriers to participation for retiring and retired landowners

While landowners seem to be somewhat enthusiastic about transferring their land to next-generation farmers (Valliant & Freedgood, 2020), interviewees identified key barriers to TIP enrollment experienced by landowners. One is that re-enrollment in CRP is often easier and more lucrative than enrolling in TIP, in which landowners need to sign a five-year lease in exchange for two extended CRP payments. They also have to risk that their land—which has not been in production for a while—may not be economically viable for farming, or that the farming partner may fail.

Leasing or selling land to a new farmer is a fraught and delicate issue. Interviewees commented that many landowner families face conflicts about their future. Landowners do not easily develop relationships of trust with viable next-generation farmers and ranchers who are in position to fulfill the intent of the TIP program. Landowners, who are predominantly white, may also have their own implicit and explicit biases that negatively impact their ability to connect to socially disadvantaged farmers and ranchers.

Landowners may have family relationships with beginning farmers and ranchers, but TIP does not allow participation by direct family members. This is seen by some landowners as a barrier, though another perspective is that the intent of the program is to expand opportunities to people who do not already have family access to farming.

Landowners may have other plans for the land that may include rewilding or selling their land. Some landowners are not motivated to find a successor. Some interviewees said they "never met a retiring farmer," the implication being that some landowners do not actually want to or plan to stop farming and transfer to next-generation farmers.

Barriers to participation for next-generation farmers and ranchers

Many commented on the spatial mismatch, as discussed earlier and demonstrated in maps, or that TIP-eligible lands are often not located where there are significant concentrations of next-generation farmers. One USDA employee in the Midwest wondered, "How many next generation farmers want to move to [Example] County? It is not necessarily a match with the beginning farmer needs, targeted farmer needs." Another USDA employee commented on the burden the program puts on beginning and socially disadvantaged farmers and ranchers:

> They also need to be very, very flexible as to where they are willing to go to make it work for them. Sometimes you have to go where you are not always comfortable and may not have as much familiarity.

In the Midwest, an interviewee from an organization serving beginning farmers and ranchers commented that it is not just the location but also that many communities with significant CRP lands do not have the cultural and social infrastructure sought by many next-generation farmers and their families:

> The need for social infrastructure—broadband, hospitals, et cetera. It is a tough decision for a farmer to leave in order to be closer to a hospital, but that stuff is important for people. There are different kinds of needs.

Many are not aware of land on the market. One USDA staff member shared:

> Among beginning farmers and ranchers, we hear that it is impossible to get a bid in. If a neighbor is selling, they might get three bids from neighbors, all behind closed doors. New and beginning farmers and ranchers did not even know about the opportunity.

Another said:

> It can be a challenge to get connected to existing agricultural landowners to talk about either leasing or buying land. There is no one place to find information to make a connection, and when you do, there is a trust-building process that has to occur. Even experienced farmers face these challenges.

Developing a relationship with a willing landowner can be difficult for all next-generation farmers and can be potentially harmful for socially disadvantaged farmers who face both structural and interpersonal racism. As one stakeholder in the Midwest noted, TIP does not fund mechanisms to support the careful emotional labor that would likely be needed to enhance trust among these groups and reduce stress and harm for farmers who have experienced structural and interpersonal racism. There also likely needs to be additional support for farmers of color in navigating social barriers. One interviewee reflected on the implicit expectation that farmers of color must move to parts of the state and country where CRP land exists: "And on top of that (all the other barriers of TIP), there is the topic of race. … Will Black farmers feel okay? Maybe it is different where there are more Black farmers."

Even if next-generation farmers make a connection, the cost for them to rent or buy TIP land is also a big barrier. Many next-generation farmers do not have sufficient capital. TIP offers no support for next-generation farmers in addressing the financial risks, including the high costs of renting land and operations. TIP may be inaccessible to all but financially well-positioned next-generation farmers and/or those that already have extensive farming backgrounds and connections.

While some landowners may pass on some of their TIP benefits to next-generation farmers in the form of reduced rents, many likely will not. As one interviewee noted, "Unless it is someone who has worked with beginning farmers, I cannot envision a reduced rental rate passed along." Another interviewee elaborated:

> The intent of TIP might be that landowners offer reduced rental rates, redacted crop share rates, to help beginning farmers and ranchers, but I don't know that is happening. … TIP is really geared towards making more land available, not necessarily cheaper.

As discussed earlier, the costs of transitioning CRP land back into farming is often high.

According to a USDA employee in the central U.S.,

> Beginning farmers and ranchers already are usually cash strapped, … and land coming out of CRP likely not going to have really good productivity, will need a lot of investments, … so many of our beginning farmers and ranchers have not seen it as possible.

One interviewee especially noted the costs needed to raise livestock: "Growing up in beef—maybe someone can come on and do a big market garden, or you are going to raise livestock, in which case you need infrastructure—water/power.

External barriers

In addition to the barriers specific to TIP itself, interviewees commented on well-known external barriers, notably the poor economics of farming such as high land prices, high risk, and low profit margins. Every interviewee commented on the high cost of farmland and competition from other buyers. For example, a USDA employee described some of the competition next-generation farmers face in accessing retiring CRP land in the Texas Panhandle, including from corporations growing organically certified peanuts:

> One of the buyers up there are organic growers, like peanut farmers, buying CRP land since it is easy to qualify as organic—that is a niche for expiring CRP land. … So you have these beginning farmers and ranchers competing with organic corporations, and they cannot compete on price.

Many interviewees commented that landowners near urban areas are more likely to want to sell to developers, rather than lease or sell to next-generation farmers. A USDA employee in the Northwest reflected on similar trends of rising land prices near the large cities: "There has been a huge population spike and housing crunch in Spokane, Boise. … Three Amazon companies have bought three farm properties. The landowners… make much more money off of that [selling the land to developers] than farming."

In addition, interviewees commented frequently and in depth about how difficult farming is as a livelihood for next-generation farmers, with many

barriers beyond the focus of the TIP program. Many interviewees commented on the poor economics of farming. As one USDA employee in the southern U.S. noted:

> Agriculture is just not a productive sector—I mean you can look at the … numbers, it takes an extraordinary number of cattle, sheep to be successful. To ask a beginning farmer to compete seems nuts. … You've got to consider the monopolies, oligopolies—let's get down to the brass tacks. There are really only about 200,000 farmers in the US actually making a living farming. They are BIG Farms, and the inputs that go into that—fertilizer, seeds, equipment—it is NOT a buyer's market. So, the problem is at the top and bottom.

Finally, interviewees reflected on the limitations of TIP as a program solely focused on land access. Many next-generation farmers likely have needs beyond land access, including housing. As one interviewee working with beginning farmers in the Midwest described, "you also need marketing assistance, transportation, cold storage for folks doing livestock. … A lot of folks closer to the market are successful. Institutional markets are really important. Some folks have success with farm to school and the like."

Discussion

TIP serves some landowners and next-generation farmers, primarily in the Midwest and Mountain West. Variable participation may be due to inconsistent outreach and to the limited program design. TIP, in its design, gives financial incentives to landowners rather than both landowners and next-generation farmers. Next-generation farmers, especially those from non-farming families, those from socially disadvantaged categories, those from low-income backgrounds, and those doing nonconventional agriculture, often need more than a short-term lease on CRP lands. This last point echoes some of the issues raised in literature that enrolled CRP lands are frequently the least productive that a landowner has and thus may not be practical or desirable for next-generation/TIP farmers. As one scholar put it, it is "unrealistic to expect that much of this CRP land will be returned to production" (Meuleners, 2013).

Some potential reforms to TIP that may expand participation and better serve next-generation farmers include:

1. Refocus incentives to next-generation farmers. TIP incentives could be expanded to all farmland. Another strategy would be to give the incentives to next-generation farmers directly, so they could more proactively seek suitable land near their markets.
2. Allocate funds for underrepresented next-generation farmers, notably socially disadvantaged farmers and ranchers, to increase TIP participation. Incentivize lease-to-own or actual sales and transfer of farmland ownership, rather than leasing.
3. Expand targeted outreach and technical assistance to next-generation farmers. There are regional variations in where these next-generation farmers tend to farm, which has implications for how and where different TIP outreach should occur. For example, TIP outreach in the Southwest and Florida should be particularly inclusive and relevant for Hispanic and Latino farmers. In 2022, FSA signaled it would award 15 to 20 one-to-two-year proposals that focus on increasing awareness about CRP/TIP with a primary goal of connecting landowners and land seekers interested in program participation. The request for proposal materials promised 15 to 20 awards ranging between $50,000 and $300,000 for a total of $4.5 million. As an example of technical assistance, staff should provide culturally relevant technical assistance and ongoing support to next-generation farmers to plan and implement the conservation farm plan requirements. In addition, they should connect them to other programs and assistance (such as financial classes) to best position next-generation farmers for economic and other success.
4. Support federal staff with timely program announcements, public outreach materials,

education about the systemic causes of inequities in farming/farmland access, best practice tips for outreach, and opportunities for state and local FSA staff to exchange ideas. Apply accountability measures to outreach completed by staff.

5. Engage landowners with expiring CRP contracts years before their contract expires. This could be part of a broader outreach effort to use USDA's comprehensive database on landowners and engage landowners not just in TIP but in the broader range of alternative land access strategies and tools.

In addition to the program reforms above, there is also a need for transparent reporting and evaluation. The USDA should collect more detailed data and publish data on annual TIP participation on their website, as done for CRP. Staff should publish reports on program applications and participation by next-generation farmers. Finally, evaluations of TIP should be done in collaboration with more comprehensive studies on beginning and socially disadvantaged farmers and ranchers to learn more about the reasons they are not participating in USDA programs.

Conclusion

TIP stands out among land access policy initiatives for its attempt to focus on beginning and socially disadvantaged farmers and ranchers. However, it seems that TIP only serves a subset of farmers, and benefits appear to mainly accrue to landowners. TIP alone is unlikely to have a significant impact on addressing the core land transition challenges faced by retiring farmers or the access challenges faced by next-generation farmers. Some of the above reform ideas may enhance participation and better serve next-generation farmers, though a more holistic approach is needed.

This research was based on limited data on program participation and a set of interviews from key informants. More can be learned about TIP participation if the USDA makes available better data on demographics and farming practices. Future research could implement expanded research methods such as surveys, interviews, and focus groups of landowners and farmers who have participated in TIP or case studies of high- and low-participation areas.

TIP alone is insufficient in helping next-generation farmers succeed in the context of many of the persistent problems in farming, including the legacies of racialized capitalism and private land ownership, the rising cost of land and the poor economics of farming. If these are not resolved, next-generation farmers will continue to struggle, even if they access land. One interviewee summarized succinctly, "The system has to change."

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Appendix A

Figure A1. Transition Incentives Program (TIP) Contract

CLOSE

This form is available electronically.

CRP-1R (05-14-10) U.S. DEPARTMENT OF AGRICULTURE Commodity Credit Corporation **CONSERVATION RESERVE PROGRAM TRANSITION INCENTIVES PROGRAM CONTRACT**	1. ST. & CO CODE & ADMIN. LOCATION	2. TIP CONTRACT NUMBER	
	3. ACRES FOR ENROLLMENT	4. FARM NUMBER	5. TRACT NUMBER(S)
6. COUNTY OFFICE ADDRESS *(Include Zip Code)* TELEPHONE NUMBER *(Include Area Code)*:	7. RENTAL RATE	8. CONTRACT PERIOD A. BEGINNING *(MM-DD-YYYY)*	B. ENDING *(MM-DD-YYYY)*

NOTE: *The following statement is made in accordance with the Privacy Act of 1974 (5 USC 552a, as amended). The authority for requesting the information identified on this form is 7 CFR Part 1410, the Commodity Credit Corporation Charter Act (15 U.S.C. 714 et seq.), and the Food, Conservation, and Energy Act of 2008 (Pub. L. 110-246). The information will be used by CCC to consider and, if so decided, process the offer to enter into a Conservation Reserve Program contract, to assist in determining eligibility, and to determine the correct parties to the Conservation Reserve Program contract. The information collected on this form may be disclosed to other Federal, State ,and Local government agencies, Tribal agencies, and nongovernmental entities that have been authorized access to the information by statute or regulation and/or as described in applicable Routine Uses identified in the System of Records Notice for USDA/FSA-2, Farm Records File (Automated). Information provided hereunder will be subject to the provisions of section 1619 of Pub. L. 110-246, section 2004 of Pub. L. 107-171, the Privacy Act, and other applicable privacy laws. Providing the requested information is voluntary. However, failure to furnish the requested information will result in a determination of ineligibility to offer to enter into a Conservation Reserve Program contract.*

This information collection is exempted from the Paperwork Reduction Act, as it is required for administration of the Food, Conservation, and Energy Act of 2008 (see Pub. L. 110-246, Title II, Subtitle J – Miscellaneous Conservation Provisions). The provisions of appropriate criminal and civil fraud, privacy, and other statutes may be applicable to the information provided. The provisions of appropriate criminal and civil fraud, privacy, and other statutes may be applicable to the information provided. ***RETURN THIS COMPLETED FORM TO YOUR COUNTY FSA OFFICE.***

9. CERTIFICATION:

By signing below, the retired or retiring participant in Item 10A(1) certifies to all of the following: (1) I /we have either retired from farming or am retiring from farming within 5 years; (2) effective on the date in Item 8A, I have sold, have a contract to sell, or leased under a non-revocable long-term lease of at least 5 years, the acres identified in Item 3 to the beginning or socially disadvantaged farmer(s) or rancher(s) identified in Item 10B(1); (3) I will no longer operate the acres identified in Item 3 beginning on the date in Item 8A; and (4) the beginning or socially disadvantaged farmer(s) or rancher (s) in Item10B(1) may: a) begin Organic Foods Production Certification, b) develop a conservation plan and install practices and initiate land improvements consistent with the conservation plan as necessary, and c) offer to enroll under continuous Conserva tion Reserve the acres identified in Item 3.

By signing below, the beginning or socially d isadvantaged farmer or rancher identified in Item 10B(1) certifies: (1) I am a beginning farmer or rancher or a socially disadvantaged farmer or rancher as defined i n the regulations at 7 CFR Part 1410; (2) I agree to develop and implement a conservation plan in compliance with the Conservation Compliance Provisions of the Food Security Act of 1985, Pub. L. 99 - 198 (the 1985 Act), which requires completion of form AD-1026; (3) I agree to develop and implement a conservation plan that meets applicable standards for sustainable grazing and/or crop production methods on t he acres identified in Item 3; (4) I understand that I may be eligible to enroll in the Conservation S tewardship Program under 7 CFR Part 14 70 or the Environmental Quality Incentive s Program under 7 CFR Part 14 66, (5) I understand that I may be eligible to enroll under the continuous Conservation Reserve Program; and (6) I understand that I may begin Organic Foods Production Certification.

10. PARTICIPANTS: ***(As a signatory to CRP contract _____, I agree to allow this contract to be modified under the TIP provisions.)***

A(1) RETIRED OR RETIRING FARMER OR RANCHER NAME AND ADDRESS *(Zip Code)*:	(2) SHARE %	(3) SIGNATURE *(BY)*:	DATE *(MM-DD-YYYY)*
		(4) TITLE/RELATIONSHIP *(of Individual Signing in the Representative Capacity)* *(If more than three individuals are signing, continue on attachment.)*	
B(1) BEGINNING OR SOCIALLY DISADVANTAGED FARMER OR RANCHER NAME AND ADDRESS *(Zip Code)*:	(2) SHARE %	(3) SIGNATURE *(BY)*:	DATE *(MM-DD-YYYY)*
		(4) TITLE/RELATIONSHIP *(of Individual Signing in the Representative Capacity)* *(If more than three individuals are signing, continue on attachment.)*	
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Challenging power relations in food systems governance: A conversation about moving from inclusion to decolonization

Session on Participatory Food Systems Governance at the 2021 Global Food Governance Conference [a]

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Abstract

This reflective essay explores power relations, with a particular focus on racialization, that flow through dominant forms of food systems governance, with an aim to create more participatory governance models. Four of the authors asked a group of five scholars, activists, and practitioners (also authors) who identify as Black, Indigenous or People of Color (BIPOC) to discuss during a conference session issues of Indigenous food sovereignty, decolonization, Whiteness, and inclusivity in food systems governance. This paper presents and analyzes the content of the session, part of the 2021 Global Food Governance Conference. We reflect on common themes from the session and put forth recommendations: encouraging greater inclusion in existing forms of food systems governance, achieving decolonization through creating diverse new governance models, and addressing the deeper power structures that underpin the dominant food system itself. We also suggest a

[a] Authorship is attributed to the Session on Participatory Food Systems Governance at the 2021 Global Food Governance Conference, followed by the speakers and then the session organizers listed in alphabetical order. See speakers' bios in the Appendix and all authors' affiliations at the bottom of the next page.

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research agenda, with the "what" of the agenda unfolding from a process of agenda development that centers BIPOC scholarship. The frameworks offered by the panelists are a starting point, as more work is needed to move towards decolonizing food systems governance research. Finally, a collaborative agenda must attend to the inextricable links of food systems governance to other fundamental issues, such as the emerging field of planetary health.

Keywords
neocolonialism, racialization, settler colonialism, Whiteness, decolonization, food systems, governance

Introduction

This reflective essay is based on a session of the 2021 Global Food Governance Conference, which explored the power relations flowing through dominant forms of food systems governance. The session emphasized issues in food systems governance of Whiteness, racialization, decolonization, Indigenous food sovereignty, and inclusion. The session was co-developed by co-authors Drs. Peter Andreé, Charles Levkoe, Jill Clark, and Belinda Reeve. All are white, settler academics based in Canada (Andreé and Levkoe), the United States (Clark), and Australia (Reeve), with research experience in various aspects of food systems governance. They aimed to respond to dominant governance models in each country in which they are based, which typically—and continue to—privilege the values, participation, and leadership of white people and settlers, while marginalizing the voices and self-determination of Black, Indigenous, and People of Color (BIPOC)[1] communities, despite their active resistance.

The aim of the discussion, and this essay, was to disrupt and critique dominant governance approaches, and to generate new directions for practice, research, and policy. Accordingly, BIPOC scholars, activists, and practitioners with diverse backgrounds and areas of expertise (co-authors Guinto, Holley, Pictou, Wiremu, and Tinirau) were invited to join settler researchers in exploring these issues, and to generate proposals for more participatory models of food systems governance that center the voices and perspectives of people and communities that are traditionally excluded. This essay provides context for the discussion of food systems governance, presents abridged versions of the five co-authors' presentations, and summarizes key themes across each of them, focusing on recommendations for innovative and participatory approaches to food systems governance.

Context and Key Organizing Concepts

In the conference session and this ensuing essay, we aimed to explore various forms of power relations that impede more equitable approaches to

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[1] At the time of writing this manuscript, the authors note and appreciate that terms such as *racialized* and *BIPOC* are complicated and contested.

food systems governance. We define *governance* as the "relationships, processes, rules, practices, and structures (both institutional and discursive) through which power and control are exercised and decisions are made" (Clark et al., 2021, p. 176). We define *Whiteness* as an ideology and powerful social construct based on beliefs, values, behaviors, and attitudes that result in an unequal distribution of power and privilege based on skin color (Calgary Anti-Racism Education, 2021). As a system of privilege, Whiteness remains invisible and rarely acknowledged. We also refer to *neocolonialism*, which describes relationships between decolonizing[2] peoples and countries and former colonizing countries that perpetuate and reinforce colonial power structures through "unrecognized actions, behaviors, attitudes, and beliefs" (Eichbaum et al., 2021, p. 329; Fofana, 2021). We point to *settler colonialism* as another key form of power and control, an ongoing process of invasion that systematically erases and displaces Indigenous Peoples with settler populations and identities (Bohunicky et al., 2021; Wolfe, 2006).

A growing body of research shows how these ideologies intersect with capitalism and patriarchy to produce power relations in dominant forms of food systems governance that typically marginalize and oppress the voices, perspectives, and self-determination of BIPOC communities (Alkon & Agyeman, 2011; Conrad, 2020; Holt-Giménez & Wang, 2011; Moragues-Faus et al., 2022). For example, U.S. scholars and activists have exposed how dominant forms of food systems governance privilege white values, objectives, and decision-making processes (Conrad, 2020). The same privileging is often true of many alternative, local, or community-led food movements (Alkon et al., 2020; Guthman, 2008; Mayes, 2018; Ramírez, 2015; Slocum, 2006).

Scholars in settler colonial countries such as the U.S., Canada, Aotearoa/New Zealand, and Australia have described how processes of colonization, including the dispossession and forced removal of Indigenous Peoples from their traditional territories, have led to the deliberate destruction of Indigenous food systems, knowledge, culture, and identity, as well as contributing to the disproportionate burden of food insecurity and poor diet-related health that falls on Indigenous Peoples (Browne et al., 2021). Similarly, a growing body of literature documents food injustice and power imbalances between the Global North and Global South, with settler colonization and neocolonization, trade liberalization, and foreign aid policies promulgated by colonizing countries creating a globally inequitable distribution of food system-related health, environmental, and economic costs and benefits (Gonzales, 2015). However, binaries between, for example, the Global North and the Global South, are artificial and hide nuances in how these forces and ideologies interact in complex, multifaceted ways, resulting in the homogenization of the food system to the benefit of some groups and actors, and at the expense of others.

BIPOC communities continue to resist these processes, including through anti-racist, decolonizing, and Indigenous food sovereignty and food justice movements and initiatives, which have diverse objectives and approaches (Alkon & Agyeman, 2011; Cadieux & Slocum, 2015; Daigle, 2019; Grey & Patel, 2015; Levkoe et al., 2019; Ramírez, 2015; Settee & Shukla, 2020). Further, a growing number of researchers and practitioners describe principles and approaches for creating more participatory food systems governance models (Coté, 2016; Levkoe et al., 2019, 2020; Pictou et al., 2021). However, these perspectives are too often omitted from the mainstream conversation on food systems governance. Accordingly, the session presented here sought to create a forum for discussing inclusion/exclusion in food systems governance, and what truly participative governance models might look like, that would be led by BIPOC scholars, practitioners, and activists.

Organizing the Conference Session

The session formed part of the 2021 Global Food Governance Conference, which explored how law, regulation, and policy impede or facilitate access to safe, nutritious, sustainable, and equitable food.

[2] We intentionally do not include a definition of decolonization and allow the term to be interpreted through the speaker's presentations.

The Conference had previously been run in 2016 and 2019 in Sydney, Australia, and was created by two white Australian researchers (Reeve, based at The University of Sydney Law School, and Alexandra Jones, at The George Institute) with expertise in food law, regulation, and policy. The Conference is a collaboration between The University of Sydney, The George Institute for Global Health, and the Global Center for Legal Innovation on Food Environments at Georgetown University and is not affiliated with any professional society or industry organization, nor is it sponsored by any such organization. Originally a nationally focused Australian event, it expanded to an international audience in 2021 when it moved online due to the COVID-19 pandemic.

The academic institutes hosting the Conference are white-majority organizations. While the 2016 and 2019 Conferences emphasized including First Nation Australians, BIPOC speakers and participants were underrepresented. Moving the Conference online in 2021 presented the opportunity to address this issue; for example, ensuring a greater representation of BIPOC keynote speakers, as well as those from Low- or Middle-Income Countries (LMICs). However, the Conference was still run within a white/high-income country/ settler-colonial institutional context, and remained dominated by white speakers, organizers, and participants.

The organizers of the session (co-authors Reeve, Andrée, Clark, and Levkoe) had a pre-existing collaboration, exploring intersections in their respective research on food system s governance in Canada, the U.S., and Australia. Via Reeve, the Conference organizers invited these scholars to create a session on inclusive food systems governance. The session organizers believed that BIPOC scholars and activists should lead the discussion and invited five BIPOC speakers to address issues of Indigenous food sovereignty, decolonization, Whiteness, and inclusivity in food systems governance. At the time, each speaker was also an academic or researcher working in this field, and thus were not offered remuneration. All speakers were invited, and agreed, to participate as co-authors in the process of developing the presentations into this reflective article.

Dr. Yandisa Ngqangashe, former research fellow at the Australian National University, chaired the session. The organizers, session chair, and speakers met twice to finalize the format and the guiding questions for speakers. During the session, Dr. Ngqngashe briefly introduced each speaker, who then spoke to their area of experience, before reflecting on three questions from the chair, which concerned each speaker's own approach to issues of governance, power, and inclusion; how issues of power and inclusion/exclusion intersect within the context of food systems governance; and what "inclusive food systems governance" meant to them. The session was conducted via an online conference hosting platform, recorded, professionally transcribed, edited by the organizing authors for clarity and reviewed by the speakers to ensure it reflected each person's intent. One organizer created a shortened version of each presentation, which was shared with the speakers to ensure that it accurately reflected their remarks and to offer the opportunity to expand upon or clarify any of the content. These shortened presentations are set out below. Speaker responses to the questions are excluded for reasons of space—as is the constructive discussion between the speakers and audience members—but these inform the final section, which reports on major themes across the presentations, generated in an interpretative process post-Conference. All authors collaborated on drafting and revising this essay.

The session had five speakers. (See Appendix for full biographies.) Dr. Renzo Guinto was the Chief Planetary Health Scientist and co-founder of the newly established Sunway Centre for Planetary Health in Kuala Lumpur, Malaysia. Concurrently, he is the associate professor of the practice of global public health and inaugural director of the Planetary and Global Health Program of the St. Luke's Medical Health Centre College of Medicine in the Philippines. He is also the convener of Planetary Health, Philippines. Kip Holley is an independent consultant focusing on community engagement and organizational equity. He was most recently a research associate at the Kirwan Institute for the Study of Race and Ethnicity at Ohio State University. Fiona Wiremu is from the New Zealand tribes Tūhoe and Ngāti Ranginui.

She is an educator of Indigenous businesses and holds several governance roles across the health and social sectors. Dr. Rāwiri Tinirau is of Te Āti Haunui-a-Pāpārangi descent and has genealogical connections to several hapu [sub-tribes] and iwi [tribes] throughout Aotearoa/New Zealand. He is a director of Te Atawhai o Te Ao, an independent Māori institute, as well as deputy chair of Ngā Tāngata Tiaki o Whanganui. Dr. Sherry Pictou is a Mi'kmaw woman from L'sɨtkuk, "water cuts through high rocks," known as Bear River First Nation, in Nova Scotia. She currently holds a joint appointment at The Schulich School of Law and the Faculty of Management at Dalhousie University as an assistant professor and is the Canada Research Chair in Indigenous Governance.

The next section provides a condensed version of each presentation. Note that one of the speakers, Fiona Wiremu, experienced technical difficulties, but her research collaborator Rāwiri Tinirau was able to complete the part of her presentation that described the Mana Kai Framework.

Synthesized Presentations

Renzo Guinto

Over the past two years, I have been involved in the movement for decolonizing global health and I am also very active in the emerging field of planetary health. Tracing its roots back to colonial tropical medicine, planetary health is now a broad field pertaining to transnational health problems that affect our world today and our global responses to them (Koplan et al., 2009)—for example, the ongoing COVID-19 pandemic and our collective (or fragmented) actions to address it. Planetary health is an integrative concept that brings together the health of people and that of the natural systems on which their health depends (Whitmee et al., 2015). It is a reaction to the inadequacy of global health in responding to the worsening climate emergency and the other environmental crises affecting us today, including our defective food systems that make us unhealthy, destroy the planet, and even increase the likelihood of future pandemics. Here, I would like to explore how the global health community and the emerging planetary health community can work together with the movement advocating for food systems transformation so we can come up with better, more sustainable, healthier, and more just food systems.

There are many interpretations of the term "decolonizing"; one that is widely known concerns interrogation of the superiority and dominance of Western epistemology and culture. There is no question that power is very much concentrated in the Global North, whether it is global health institutions and their leaders, the policies and the practices adopted in the global health community, how we educate our global health professionals, or the manner in which we conduct our research. We need more Indigenous voices, we need People of Color and people from the Global South to be involved in decision making, policy making, and knowledge creation. That is what we have been calling for when we say we need to decolonize global health. There are parallels between decolonizing global health and decolonizing the food system, including food policies and the structures that regulate food production and consumption.

Sadly, we are not talking sufficiently about these parallels and interconnections. For instance, right now in the context of the COVID pandemic, we know that there is still scandalous vaccine inequality around the world. Some have described it as "vaccine apartheid," generated by the colonial structure of the global health system, the pharmaceutical industry, and the policies we have created at global and national levels. But this is not an entirely new phenomenon, because for some time now we have already seen food inequality and even food apartheid around the world, which is not just creating global hunger and making food inaccessible to many people, it is also creating the pandemic of undernutrition, stunting, and underweight that affects nearly one billion people, especially children. The inequitable distribution of food is parallel with the inequitable worldwide distribution of vaccines and other health commodities. There is much to learn in terms of trying to dismantle the power asymmetries that govern both the global health system and the food system at all levels.

Furthermore, we have colonized not only our food system, our health system, and the health of people, we have also colonized the planet, the land, the water, the atmosphere through greenhouse gas

emissions and various forms of pollution. We have also colonized the ability of the future children of the world to live and thrive and survive. We are making the planet less inhabitable for them because of the slow pace of climate action. We also need to talk about how to create safeguards, not only from old colonial powers but also from neocolonial corporate forces, which are stealing the limited seats around the decision-making table from the rightful owners, such as Indigenous Peoples, local communities, farmers and fisher folks, women, LGBT people, and children. What we must begin to realize is that the small tweaks in policies and practices that we have been employing under the guise of decolonizing are superficial and cosmetic, and are not sufficient to achieve the bigger transformations that we want to see. We really need to examine the structural causes and identify who these "colonizers" and "neocolonizers" of the food system are.

This brings me to "planetary health," which I have described as a powerful concept that brings together the health of people and the health of the planet (Whitmee et al., 2015). I may be a physician by training, but I cannot just treat the human patient anymore in this day and age. I also have to take care of the planetary patient on which the health of people depends, now and in the future. We need a planetary health approach, which I believe is also a decolonial approach to advancing the health of people and of the planet. After all, the idea that the health of people and of the natural ecosystems are deeply intertwined is something that many Indigenous cultures have embraced for centuries. We must incorporate a decolonial planetary health approach, enriched by Indigenous wisdom, to be incorporated into all kinds of discussions about the future of our food system, from local to global. Moving forward, I would love to see Indigenous perspectives positioned at the front and center whenever we discuss climate change and its relation to food and health.

Kip Holley

The research that we do, in Kip Holley's former position at the Kirwan Institute, has one foot in academia, creating knowledge and acquiring new knowledge, and another foot in communities. We work with community organizations, nonprofits, and governments to understand how to remove racial barriers to create opportunities for marginalized people to succeed and thrive. My place is to understand the role of community engagement and racial inequity. I do that by working in the academy to research and publish articles, but mostly I partner with organizations to understand and interrogate inequitable systems and policies that either purposely or inadvertently keep People of Color out of important decision-making in their communities. This work occurs through three domains.

First is to think about civic and community engagement beyond disparate, separate decisions or activities. We look at these efforts as a connected group of activities, understandings, decisions, structures, and other things that happen within communities in an environment for decision-making. Crucial principles of this work include recognizing the gifts of diverse voices to understand power and injustice, understanding trust building and empowerment, and different ways of dealing with and managing conflict that favor more diverse voices. These principles are meant to enable community and civic engagement activities to change the underlying structures to be more equitable and inclusive. They are intended to help us think about how we can make our individual activities more equitable and more inclusive, and also about how we can use those activities in connection with each other to change the underlying structures to be more authentically empowering to a larger range of people.

Empowerment and inclusivity are critical to the second domain, which involves community leadership and organizational equity. It is about interrogating the nature of the ideals that we have about leadership and success and organizing communities and organizations through a non-white lens. Most of those ideals are usually set up under a series of white-centered norms, such as perfectionism, objectivity. Instead, we really need to think about what we are not seeing. This approach informs a lot of our work in neighborhood leadership development, in which we find leaders that would otherwise be overlooked, change the way we are looking at leadership structures, and support new leaders in taking control of their neighbor-

hoods and playing a meaningful role. We also look at how organizational processes reify racial inequities both within communities and in the nonprofit and governmental sectors. We work with community members to learn more about some of the processes that we take for granted and widen the space for different practices, different understandings, and different vocabularies for organizing and engagement.

The third domain involves taking a closer look at how the underlying structures and opportunities for engagement can be a more equitable and empowering space for People of Color. We identify attributes that are harmful, more closed off and restrictive, as well as those that are coming from more anti-racist, feminist, and Indigenous traditions that widen the space. These latter attributes tend to create an environment that is more empowering and inclusive. They include, for example, the frameworks and language that we use, the practices that we abide by, the many identities that we hold, and whether we are coming from an ownership or an advocate standpoint. All these things affect the space in which we make decisions.

It is our collective situation that tends to bound the type of decisions that we make. Almost all of the equity challenges that we run into are based on how people are interacting with assumptions, frameworks, and motivations. Many of the people that we talk to who want to bring equity to the table, whether it be in a food context or any other context, are stopped immediately because we ask them to explain and re-explain the very reason for equity. Even before getting to a decision, we need to examine the motivations and backgrounds that we have set up for those kinds of decisions. When we're asked by food advocates or food policy councils in America to help with outreach to a wider group of people or to help them create more racial equity, we often back up and ask: What does your organization look like? Who created that organization? What are the underlying ideals, and assumptions about why it is done this way rather than another way? Could it be different? Equity almost always means changing the environment drastically. It's not just about making more room in a system or an environment that is already racist or inequitable to start with, but how we can change that environment in some very foundational ways. It needs to be more than simply inclusive, ultimately creating culturally authentic ways of empowering people who are usually not involved.

Fiona Wiremu

Western conceptions underpinning the politics of food are generally unable to fully account for Māori understandings related to kai [food]. The project "He moumou kai, he moumou tāngata: Kai governance, kai sovereignty and the (re)production of kai—Enhancing culturally matched outcomes" focused on kai as a culturally defined Māori notion and examined ways in which Māori are protecting, maintaining, retaining, and controlling decision-making authority over their traditional and customary kai sources, kai systems, and kai practices. The concept of kai for Māori is holistic, it is spiritual, it has deep-rooted connections to who we are and our origins.

Our research included cross-sectorial and multidisciplinary collaboration across three hapori [community] organizations (Te Atawhai o Te Ao, Te Puna Ora o Mataatua, and REKA Trust), four Ngā Pae o te Māramatanga partner institutions (Te Whare Wānanga o Awanuiārangi, Te Atawhai o Te Ao, the University of Waikato, and the University of Otago), specialist expert advisory mātauranga Māori members (Waitangi Tribunal, Te Whare Wānanga o Awanuiārangi, and the Māori Land Court), and specialist expert advisory kai members from the University of Waikato and the University of Otago. The mātauranga Māori [Māori knowledge] gathered from hundreds of participants informed this research. The research was funded by Ngā Pae o te Māramatanga, Aotearoa/New Zealand's Māori Centre of Research Excellence.

"He moumou kai, he moumou tāngata" focused on traditional and customary mātauranga Māori practices that we as Māori undertake in relation to our kai sources, systems, and practices. A transforming framework of culturally matched outcomes was developed using a kaupapa Māori methodology and process, which was then utilized to test a sample selection of kai sovereignty initiatives. The purpose was to determine whether kai research purported to benefit Māori met the tenets developed within the framework. Three sample

cases were tested: Whanganui: Te Morehu Whenua, Whakatāne: REKA Trust, and Ōpōtiki: Whakatōhea Mussels Ltd.

The Mana Kai Framework is based on the seven tenets of mana atua, mana tūpuna, mana Māori, mana whenua/mana moana, mana tangata, mana rawa, and mana motuhake, which are discussed by Dr. Rāwiri Tinirau.

Rāwiri Tinirau

Our foods have a genealogy that connects us to our gods and to our ancestors. To fully appreciate the responsibilities we have to our natural environment, and the teachings of our ancestors, you must unravel, rediscover, and speak to those genealogies, speak to our gods, and speak to our ancestors. When you do that, you understand that the kai, the food that you eat, is their gift for you and provides those that partake with spiritual and physical nourishment. When you partake of the foods, you become more connected with your natural environment and more concerned with the state that it is in. You begin to understand everything that impacts on your places and spaces and how those things impact on your ability to grow, gather and harvest kai. You turn to the environment, and you ask it to teach you about what you can do to ensure that there is food available for future generations. Kai sovereignty projects must be deeply rooted, stem from and be grown within the community. When you are able to share kai, you enhance the prestige of the people and the community, you contribute to their health and wealth. Therefore, what is critical here are the relationships that you form locally, nationally, and, internationally, because everyone's efforts contribute to the greater purpose.

The Mana Kai Framework (Wiremu et al., 2022) was designed based on key tenets that allows for kai sovereignty initiatives to be analyzed against each of these tenets, with the overarching aim of developing a robust Kaupapa Māori process that allows each of those initiatives to be considered against the seven expressions of mana already introduced by Fiona: Mana atua, mana tūpuna, mana Māori, mana whenua/mana moana, mana tangata, mana rawa, and mana motuhake. The Mana Kai framework is informed by the previous work of many individuals and groups to define the multiple expressions of mana.[3]

Mana atua refers to activities associated with various gods. Their power is embodied in those who uphold sacred rituals and principles. Our origin stories, based on the escapades and attributes of atua [gods], provide a way to understand the interrelationships between animals and fish, between land and ocean, and between people and the living environment. Kai sovereignty initiatives must respect that kai has a whakapapa [genealogy]. Kai is derived from domains associated with particular atua, and links between and across atua and their domains is critical to understanding the importance of kai.

Mana tūpuna is power derived through lineage, tribal identity, language, and customs, as passed down through the generations. Those inheriting mana tūpuna are responsible for carrying out duties to maintain this power. Mana tūpuna embraces tribal identity and heritage, as well as knowledge, te reo Māori [Māori language], and tikanga Māori [Māori customs]. The importance of carrying inherited responsibilities must be articulated and realized through kai sovereignty initiatives. Mana tūpuna implies a duty of care to our ancestors and the collective, in ways that are meaningful to a particular whānau [extended family], hapū [sub-tribes] and iwi [tribes].

Mana Māori are the rights and authority associated with being Māori. The expression of Māori cultural values through tikanga might differ across whānau, hapū and iwi, but are broadly similar. Māori values, concepts, and practices such as whakapapa, whanaungatanga [relationships], and tikanga are central to mahinga kai [kai gathering and harvesting]. Our histories refer to times when atua and tūpuna [ancestors] enjoyed food-secure lifestyles and good health. These histories provide inspiration for applying universal Māori values in

[3] As detailed in Wiremu et al. (2022), this framework is informed by the work of Williams (1971), Barlow (1991), Durie (1994; 1998), Smith (1997), Marsden and Hēnare (2003), Knox (2005), Forster (2012), Phillips et al. (2016), Te Atawhai o Te Ao (2016), Tinirau (2017), and Wiremu et al. (2019).

contemporary times within kai sovereignty initiatives, to promote healthy living and wellness, as Māori.

Mana whenua refers to the power associated with the ability of the land to be bountiful. Barlow has noted that a "person who possessed land has the power to produce a livelihood for family and tribe, and every effort is made to protect these rights" (1991, pp. 61–62). Connection to one's traditional territories also enhances well-being. Mana moana involves a similar authority over lakes and seas. A Māori worldview would consider mana whenua and mana moana together with the obligations that come with tiakitanga [custodianship]. Kai sovereignty initiatives must have regard for these authorities and responsibilities. They require the safeguarding of knowledge, resources, and the protection (or sustainability) of kai and the natural environment.

Mana tangata is mana held according to one's personal abilities, crafted through experience and knowledge acquisition. It includes both what Mahuika called the power to "direct human activity" (1992, p. 45), and the "continuity of life, humility, caring for others, and leading by example" (Te Atawhai o Te Ao, 2016, p. 1). Mana tangata implies that a person or a people must use their skills and abilities for the benefit of others, including intergenerationally, with those who require greater assistance receiving the necessary support. Thus, kai sovereignty initiatives must enhance the mana of others, now and in the future, and address equity issues for those Māori who are vulnerable.

Mana rawa is grounded in a holistic understanding of rawa as wealth and prosperity. It is important to consider kai sovereignty initiatives against economic development and well-being imperatives of whānau, hapū and iwi, including participation in micro- and/or macro-economies. Furthermore, kai sovereignty initiatives should encourage broader and deeper explorations of concepts such as wealth, prosperity, and well-being, from Māori and Indigenous perspectives.

Mana motuhake is the enactment of Māori sovereignty and authority through self-determination. Following Durie (1998), we see mana motuhake as requiring commitment to Māori advancement, and emphasis on independence from state and Crown, implying a "measure of defiance" (p. 220). Against a backdrop of various consequences of colonization, Māori have had to reconfigure and adjust to ensure our survival and have formed and maintained relationships with those who share similar values and struggles, including Māori-to-Māori and Māori-to-Indigenous partnerships. Kai sovereignty initiatives, therefore, must be sensitive to the struggle to maintain mana motuhake, and must be committed to activating self-development strategies locally and internationally.

One kai sovereignty initiative that we can analyze through the Mana Kai Framework is Te Morehu Whenua, a hapū environmentalist group, led by our youth and by our children. The focus has been on our freshwater fisheries, which include the kākahi [freshwater mussel], tuna [eels], kōura [freshwater crayfish], ngaore [smelts], and atutahi [whitebait]. Wānanga, or traditional knowledge exchange events, teach our children and our youth about the way our ancestors fished. We are seeing more contemporary fishing practices taking hold, but we have maintained our traditional and customary practices as well. We have taught the kids how to eel the way that our ancestors eeled, how to weave the fishing baskets that our ancestors wove, to use traditional materials, to do the things that they did and to take our lead from the environment. What we have observed is that the kids start to help each other in their learning, the kids are teaching themselves, and they are having a lot of fun along the way.

Research has been a big element of this particular project, which includes teaching these children and the youth how they connect genealogically to the lands and the waterways where they practice our traditional fishing. We have gathered and continue to gather knowledge associated with our subtribe from our elders, repositories, family homes, museums, and archives—places where some of that knowledge lies dormant. The children and youth are also learning and practicing what it means to be an active member of their marae [traditional gathering place], and that there are certain protocols and responsibilities that must be carried out.

Our knowledge exchange events are held at our traditional gathering places, and there are certain things that children need to learn while they are in those spaces. Some have been disconnected from these places, or their whānau have been away for a few generations—our knowledge exchange events have helped them to understand the expectation we have of our upcoming generations, and to get on and do the work. Our children and youth are contributing to our sub-tribal aspirational framework by leading activities and critiquing some of the environmental and food aspirations that we have for ourselves, with guidance from our elders. The themes, outcomes, and indicators that have been set for us as a hapū—they've been reviewed, critiqued, and refined by our children and youth, and these are offerings and contributions to our hapū aspirational framework when it comes to our environmental priorities, based on their learnings through being involved in this kai sovereignty project.

Sherry Pictou

My people, the Mi'kmaw, have occupied our lands for at least 13,000 years. This is an important context for the struggle to decolonize governance today. We have long had treaties with other Indigenous peoples, and we did so again with the British in the 1700s. Since then, we have fought for our treaty rights, particularly the right to hunt and fish for food. In 1999, we won a landmark decision, the Donald Marshall Jr. Decision [*R. v. Marshall*, [1999] 3 S.C.R. 456] that upheld the 1760 and 1761 Peace and Friendship Treaties to commercially fish. Unfortunately, the government responded with fishing agreements to assimilate this treaty back into the existing management regimes that catered to the privatization of the fisheries. My work centers on trying to figure out what treaties mean to the people at the grassroots.

As Indigenous people, we have found ourselves caught between neocolonial-liberal concepts of development, such as industrial resource extraction, on the one hand, and very no-human-footprint types of conservation or "fortress conservation" (protected areas) practices on the other. These approaches impact our treaty rights. In interviewing my own people, I learned that we could not talk about a treaty without talking about food. That was of the utmost importance. Food for us would be animals, plants, and fish that come from the land and waterscapes. These have become displaced by neocolonial development or conservation and industrial types of food systems, such as industrial or monoculture agriculture.

My work also focuses on the role of women and 2SLGBTQ+ persons in treaty negotiations. What is their role in governance systems? This is a gap that was highlighted here in Canada by *Reclaiming Power and Place: The Final Report of the National Inquiry into Missing and Murdered Indigenous Women and Girls* (National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019). I've done some work on how resource extraction has impacted Indigenous women and how Indigenous women land and waterscape defenders are often criminalized for resisting development. My work shows that it is not that they are anti-development; it is that they are aware of their treaty rights, their ancestral homelands, the food and livelihoods that come from those ancestral homelands, and the importance of those lands and waters as sources of food. I've always asked the question, "Why are they defending that?" They are portrayed in the media as troublemakers, but I try to create spaces so they can discuss this in terms of Indigenous governance, and, in particular, the governance of food. How do we reconcile the various impacts of displacement on our food systems?

We need to consider different forms of food and food systems along with the power structures that are governing them. We also need to consider the degree that patriarchy and heteropatriarchy play in those food systems, especially when it comes to the displacement of Indigenous ancestral homelands as sources of food and water. With colonialism comes patriarchy, and it has been here in Canada for 500 years. We are a rich northern country, but do not let that fool you. It disguises what is really going on in Canada. This is the essence of my work right now. It comes down to the commodification of the consultation processes with Indigenous people; and that is the reason why you see so many grassroots, and particularly women and gender-diverse, persons standing up to protect their lands and waters. In some cases, they even

have to stand up against their own leadership, which has been presented (or permitted) only one way of exercising their treaty and Aboriginal rights.

When we think about inclusive food systems governance, we must ask: What does inclusivity mean? Who is being included? Who is doing the including? What are people being included into? And when we talk about food governance, whose food governance? Can multiple food systems coexist? Can the different knowledges and food knowledges coexist? Inclusivity in food governance must address the power structures of inequity, especially those that cater to the commodification of food systems to the point where only those who can afford food can have access to food. I think about food prices in North America that are rising with the pandemic, and they are triple and quadruple that in the far North. There should be no excuse for anybody to go hungry. Those are the power structures we are going to have to address, particularly in a global context. And I would even go as far as the local and national contexts, too, because there are so many power structures, and it is really about the commodification of our food systems.

The Creation of More Participatory and Empowering Forms of Food Systems Governance

The speakers described how dominant food systems governance structures privilege the interests and objectives of settlers, the patriarchy, city dwellers, the intellectual elite, and the large corporate actors in the food system ("Big Food"), which can be conceptualized as neocolonizers. Speakers also discussed how colonial, patriarchal, and racist power structures and inequalities continue to inform dominant food systems and food systems governance, displacing the participation and decision-making of BIPOC communities and people living in decolonizing (Global South) countries. As a result, the dominant forms of food systems governance produce various forms of dysfunction, including profound inequalities in food distribution and consumption, as well as modes of food production, distribution, and consumption that are environmentally harmful. Guinto argued that these pathologies in food systems governance are often perpetuated by the same forces that shape inequalities more broadly, as in global and planetary health (Abimbola et al., 2021).

Key themes can be drawn from the presentations as to how to create more participatory and empowering forms of food systems governance. One is the inclusion of a much more diverse range of people in food systems organizations and governance initiatives, which also must be designed to meet the needs of BIPOC communities and residents (Moore & Swisher, 2015; Slocum, 2006). Inclusion can be an important first step if combined with accountability mechanisms that ensure true diversity and equity (Abimbola et al., 2021). However, by itself, inclusion risks the co-option of BIPOC communities in forms of governance that only serve to maintain existing power imbalances and exclusionary structures and processes (Kepkiewicz & Rotz, 2018).

The presentations stressed that scholars, activists, and decision makers must break down and challenge the basic structures, assumptions, terminology, paradigms, and power distributions informing governance models. As discussed by Holley, these fundamental elements shape decision making by all food system actors, irrespective of their gender, socioeconomic status, geographical location, or ethnicity. The need for a transformative approach to food systems governance is illustrated by the Six Principles for Equitable and Inclusive Civic Engagement framework developed by Holley (2016), calling for forms of civic engagement that acknowledge and address racial bias, power inequalities, and historical inequities; share leadership, resources, and decision-making power more equitably; build trust; empower the most vulnerable; and overall question norms created by those in power. These principles assert that food system organizations should explicitly adopt anti-racist, feminist, and decolonizing frameworks in their policies, demonstrate active support for such concepts as Indigenous self-determination, treaty rights, and restitution (Bohunicky et al., 2021), and change organizational operating styles, cultures, values, and forms of decision making accordingly (Moore & Swisher, 2015).

These principles also indicate that white/settler-led/majority food movement organizations and food systems governance initiatives must be

based on a different model of engagement with BIPOC communities, and residents of the Global South, one that involves genuine sharing of resources, power, and authority (Moore & Swisher, 2015; Slocum, 2006) and enables problem identification, governance structures, and leadership to develop from the ground up—to be shaped and led by those who are most affected (Choudry & Kapoor, 2010; Slocum, 2006). As with Holley's discussion of the need for bottom-up governance structures, Tinirau discussed the need for Indigenous food sovereignty projects to be rooted in the community. Further, reform of existing governance models to enhance democratic deliberation is not enough: new initiatives are needed that reflect different values, cultures, traditions, and decision-making styles if we are to develop truly equitable, lasting, and empowering solutions (Moore & Swisher, 2015; Slocum, 2006). This also reflects the contemporary reality of food systems governance, which is not a universal whole but is contextual and place-based, with many diverse (and sometimes conflicting) viewpoints and voices.

There is a particular need for decision makers to learn from Indigenous frameworks and understandings of food and food systems, to challenge white norms of governance and how dominant forms of food systems governance should be conducted. Pictou, Wiremu, and Tinirau presented holistic, interconnected models that moved beyond white/settler conceptions of food as a commodity and, in doing so, challenged fundamental, dominant assumptions about how food should be produced, distributed, and governed. These models echo recent challenges to the use of terms such as sovereignty that are sourced in Western/settler governance models (Daigle, 2019; Mayes, 2018; Whyte, 2018) and point to the need for reframing the basic terminology and conceptualizations on which food systems governance is based. Panelist models presented food as interconnected with land, water, and environmental systems, and embedded in ancestral and interpersonal relationships and relationships with all of creation, which have formed a sense of place, identity, and belonging. This illustrates how the interconnections between food, health, and the environment that are increasingly recognized in research and policymaking have long informed Indigenous understandings of food and food systems. These models also speak to the ways in which different issues and sectors influence each other, showing that food systems governance needs to take a holistic approach that recognizes the multiple ways in which food is embedded in planetary systems and human relationships (as discussed by Guinto). The idea of duty and responsibility to the environment and the food systems embedded within it may be particularly salient in an era of climate change and the escalating degradation of environmental systems.

Finally, creating more inclusive forms of food systems governance means addressing the root causes of exclusion and the deeper structural forms of power in the food system, including settler-colonialism, patriarchal power structures and institutions, capitalism, and food system corporatization. These deeper inequities can only be partly addressed by efforts at inclusion in governance models or by creating new versions of such models. Importantly, transforming food systems and food systems governance means acknowledging and facilitating the efforts of BIPOC communities to exercise their own sovereignty. This includes requiring that states recognize the land rights and rights of self-determination of Indigenous peoples and consider proposals for "Land Back" (Kepkiewicz & Rotz, 2018), as well as ensuring that BIPOC communities, and people of the Global South, have greater control over governance of the food systems of which they are part, and over political and governance structures more broadly. As the causes and symptoms of inequality and exclusion are similar across multiple planet-based and human systems, there is an opportunity to learn across sectors, as discussed by Guinto, with Tinirau also emphasizing the importance of establishing open and honest communication across different issue areas and governance domains.

These recommendations lend themselves to further research. Rather than suggesting a list of issues, we believe a more informed approach requires taking a step back. The "what" of a research agenda should flow from the process of agenda development. To center marginalized voices requires making the invisible visible, requiring new ways of seeing and doing, for which the frame-

works and principles offered by the speakers are a starting point. Collaboration with BIPOC researchers and practitioners can be used as a step toward decolonizing approaches to food systems governance research. However, collaboration needs to begin with agenda setting, rather than with BIPOC collaborators being invited to the table after an agenda has already been set, and should be based on shared leadership, decision-making power, and relationships of trust with BIPOC collaborators. Further, any collaborative research agenda should be action-oriented, and attend to the inextricable links of food systems governance to other fundamental issues, such as planetary health.

Conclusion

This paper reported on a conference session that explored how power relations inform current models of food systems governance and generated recommendations for more participatory governance models, with a particular emphasis on facilitating the voices, perspectives, and self-determination of BIPOC communities and people living in the Global South. At one level, this entails inclusion of traditionally marginalized groups in governance initiatives. However, taken together, the presentations demonstrated the need for a more fundamental reconfiguration of existing governance models, adopting organizational structures, values, objectives, and leadership that serve the interests of and empower BIPOC communities, as well as creating new models that reflect diverse perspectives and ways of governing. At an even deeper level, there is a need to address the unequal power structures and marginalizing influences that inform the dominant food system itself, which can only be partly addressed by governance reforms, and to facilitate BIPOC communities and Global South residents in achieving food justice and reclaiming sovereignty in food systems.

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Appendix. Speakers' Biographies

Renzo Guinto is the Chief Planetary Health Scientist and co-founder of the newly established Sunway Centre for Planetary Health in Kuala Lumpur, Malaysia. Concurrently, he is the Associate Professor of the Practice of Global Public Health and Inaugural Director of the Planetary and Global Health Program of the St. Luke's Medical Health Centre College of Medicine in the Philippines. He is also the convener of Planetary Health, Philippines, a community of Filipino planetary health advocates, scholars, and practitioners who are exchanging ideas, forging collaborations, and advancing the new discipline of planetary health. An Obama Foundation Asia-Pacific Leader and Aspen Institute New Voices Fellow, Renzo has served as a consultant for various organizations, sits on editorial boards for multiple journals, and is a member of several international groups, including the Lancet-Chatham House Commission on Improving Population Health Post-COVID-19 (University of Cambridge) and the Lancet One Health Commission (University of Oslo). Renzo obtained his Doctor of Public Health degree from Harvard University and his Doctor of Medicine degree from the University of the Philippines, Manila. In 2020, Renzo was included by *Tatler* magazine in its Gen.T List of 400 leaders of tomorrow who are shaping Asia's future.

Kip Holley is an independent consultant focusing on community engagement and organizational equity. He was most recently a research associate at the Kirwan Institute for the Study of Race and Ethnicity at Ohio State University, where he studied using community engagement, cultural community, and civic leadership strategies to promote racial equality. Kip is the author of *The Principles for Equitable and Inclusive Civic Engagement: A Guide to Transformative Change*, Kirwan's keystone publication regarding civic engagement. He has also played a primary role in developing the curriculum and administration for the United Way of Central Ohio Neighborhood Leadership Academies and has facilitated over 200 presentations, trainings, and workshops related to equitable civic engagement. Kip is a graduate of the Ohio State University, with an M.S.W. from the College of Social Work and a B.S. in city and regional planning from the Knowlton School of Architecture.

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Gender, sexuality, and food access: An exploration of food security with LGBTQIA2S+ university students

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Abstract

Although research has been limited to date, food insecurity in the United States has been shown to be more pervasive among the lesbian, gay, bisexual, transgender, queer, questioning, intersex, agender, asexual, and Two-Spirit (LGBTQIA2S+) community, affecting millions annually. College and university students also experience statistically significantly higher rates of food insecurity than nonstudents. This research examines food insecurity at the intersection of the LGBTQIA2S+ community and the university and college student population, as told by the community itself. A qualitative, participatory approach and methods of Photovoice and semi-structured interviews with eight self-identified LGBTQIA2S+ university students studying at the University of North Carolina

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at Greensboro (UNCG) were used to explore the factors influencing participants' food access. Data were analyzed using thematic decomposition analysis guided by intersectionality and queer theories. LGBTQIA2S+ identities were found to significantly impact food access, which was further influenced by physical, socio-cultural, and political environments. Barriers to food access include experiences with discrimination on and off campus, poor support systems, a lack of full-selection grocery stores on or near campus, religious influences, the stigma associated with needing food assistance, mental and physical health conditions, financial constraints, time limitations, and lacking transportation options. Understanding the intersectionality of LGBTQIA2S+ students' experiences and providing relevant and effective support is needed to improve equitable access to nutritious and affordable foods. The findings of this research provide novel insights into food insecurity, an issue that is increasingly influencing the health and well-being of LGBTQIA2S+ university students.

Keywords
LGBTQIA2S+, university students, qualitative research, food insecurity, photovoice, queer theory, intersectionality theory, North Carolina

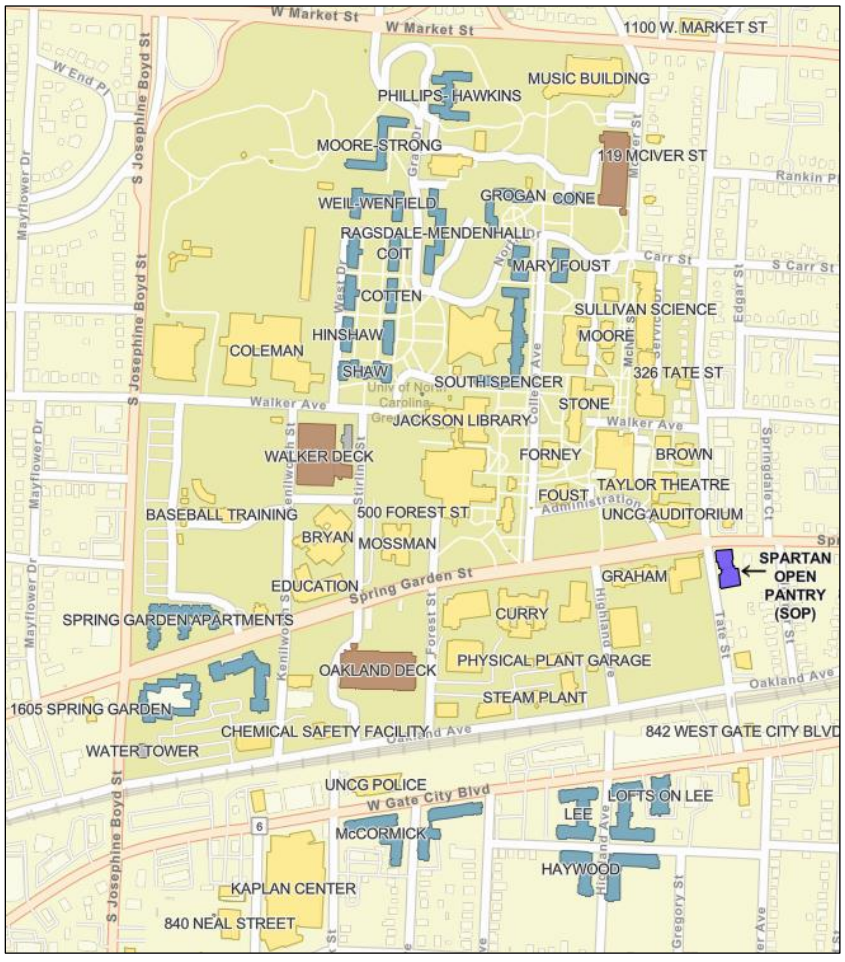
Introduction

In the United States, 33.8 million individuals, or 10.4% of the civilian noninstitutionalized population, reported experiencing food insecurity in 2021, with roughly one-third suffering from disrupted eating patterns, reduced food intake, and nutritional insufficiency due to lack of finances and resources (Coleman-Jensen et al., 2022). Individuals outside of the demographic norm, that is, not "white, thin, male, young, heterosexual, Christian, and financially secure," are more likely to experience food insecurity due to hierarchical relations of power steering food policy, attempting to change individuals rather than address sources of inequity (Kepkiewicz et al., 2015; Lorde, 2016). The consequences of contemporary food security policies catering to dominant groups are highlighted when focusing on the experiences of a specific systemically marginalized group, such as the lesbian, gay, bisexual, transgender, queer, questioning, intersex, agender, asexual, and Two Spirit (LGBTQIA2S+) community (Manuel, 2006). LGBTQIA2S+ adults are more than twice as likely to have diminished food access for themselves or their households in comparison to the general population (Patterson, Russomanno, & Jabson Tree, 2020; Wilson & Conron, 2020). In 2020, more than 27% of adults in the LGBTQIA2S+ community, or 3 million people, experienced food insecurity (Wilson & Conron, 2020). College and university students also experience statistically significantly higher rates of food insecurity than nonstudents, with 34% of students reporting experiencing previous 30-day food insecurity in fall 2020, according to The Hope Center for College, Community, and Justice (The Hope Center). The Hope Center administers the nation's largest, longest-running annual assessment of basic needs insecurity among college students: the #RealCollege Survey (Baker-Smith et al., 2020; The Hope Center, 2021). The Hope Center found that students who identify as LGBTQ were more likely to experience basic needs insecurity and reported that 65% of LGBTQ students experience some form of basic needs insecurity, such as food insecurity, housing insecurity, and/or homelessness (The Hope Center, 2021). There has, however, been a lack of in-depth research on food insecurity amongst LGBTQIA2S+ university students, although recent research has begun to explore this topic (Collier et al., 2021; Henry et al., 2023). A myriad of factors may contribute to this gap in research, such as research on specific population intersections being more complex to study and analyze in comparison to studies focused on single population factor or a lack of research funding. To further address this gap, this research examines food insecurity experiences of LGBTQIA2S+ students at the University of North Carolina at Greensboro (UNCG) and the sociocultural, political, and environmental factors that pose barriers and create opportunities to improve food access.

The overall food insecurity rate (among all ages) in North Carolina was 10.9% in 2019 through 2021, close to the US average of 10.4% (Coleman-Jensen et al., 2022). UNCG, located in the city of Greensboro (Figure 1) in north-central North Carolina, is a four-year, public university with a student population of over 19,000. Wesley-Luther, a

nonprofit campus ministry, was identifying significantly high rates of food insecurity among university students in Greensboro and in 2009 established the Spartan Open Pantry (the Pantry) to address this. The Pantry now serves the students, staff, and faculty of UNCG and students of Greensboro College (a private college affiliated with the United Methodist Church). At the time of this research, the Pantry was located within College Place United Methodist Church (Figure 1; Wesley-Luther, n.d.-b). The Pantry is open two evenings a week and provides a client-choice food pantry that mimics a traditional grocery store. Individuals choose their own food and nonfood items, including a to-go hot meal service offering one entrée and one or two side dishes with vegetarian options, a water bottle, and condiment packets.

Figure 1. The Spartan Open Pantry Shown in Relation to the University of North Carolina at Greensboro Campus at the Time of This Research



We selected UNCG as the site of this research because of the first author's familiarity with the university and the Pantry, and their location within the American South, the region of the U.S. with the highest rate of food insecurity (Coleman-Jensen et al., 2022; Food Research & Action Center [FRAC], 2020). While there is no single shared characteristic among the southern states to explain the high incidence of food insecurity, there are higher levels of poverty, high white–minority wage gaps, and high unemployment rates, and lower rates of educational attainment, participation in federal nutrition programs, and access to healthy food in the South compared to other regions (FRAC, 2020; U.S. Census Bureau, 2020). Situated in North Carolina, the first author was responsible for the data collection as part of their master's degree research. As a genderfluid, queer, white researcher, they wanted to fully capture LGBTQIA2S+ university students' experiences of food access within this setting. The second and third authors served as co-supervisors for this research and have expertise in critical food studies and community-engaged research with systemically marginalized populations.

Queer theory and intersectionality theory informed the selection of methodology and research methods used to explore food access with individuals who self-identify with the LGBTQIA2S+ and student communities. Looking at the implications of race and ethnicity, as is characteristic of a traditional intersectionality theoretical lens, was excluded as a research parameter due to time and recruitment constraints during a global pandemic. Additionally, participants shared that they were comfortable speaking with our corresponding author due to

a shared LGBTQIA2S+ identity. Researcher self-reflexivity and a queer theoretical framework supported the mitigation of power relations between researcher and participants. However, this would not have existed had we also studied the implications of systemically marginalized racial or ethnic identities on food security.

The remainder of this article begins with an overview of literature relevant to the guiding theoretical frameworks as well as an examination of food insecurity among the LGBTQIA2S+ university student community in the context of North Carolina. We will then provide an overview of the methodology and methods followed by a presentation of key findings and themes emerging from the study. These findings are then thematically analyzed in relation to the literature before providing concluding comments.

Literature Review

Guiding Theoretical Frameworks

Informed by intersectionality theory and queer theory, we explored food access at the intersection of specific markers of identity and distinction, specifically gender, sexuality, and status as a college or university student. Intersectionality theory examines ways individuals occupy multiple social positions simultaneously, creating complexities in how they interact with the world. This theory challenges the established notion that individual-level factors and failings are the reason for poor health and food insecurity, as opposed to decreased food access being the result of institutional influences and contemporary biopolitics (Carney, 2014; Kapilashrami & Marsden, 2018; Manuel, 2006; Patterson, Russomanno, & Jabson Tree, 2020). Queer theory challenges exclusionary tendencies of sex, sexuality, and gender identity categories and promotes intentional self-reflexivity by the researcher (Harris, 2001; Jagose, 1996; Meyer et al., 2022). This intentional self-reflexivity allows researchers to mitigate power relations between themselves and the research participants, which may prompt willingness for participants to share their experiences due to shared identities or experiences, as was the case with our first author, a member of the LGBTQIA2S+ community.

Food Insecurity in the American LGBTQIA2S+ Community

The LGBTQIA2S+ community faces barriers to food access, some of which are shared with their cisgender, heterosexual counterparts, and some of which are unique to the community. At younger ages, individuals in the LGBTQIA2S+ community may grow up feeling different from their family of origin or household, which may be exacerbated by underlying sentiments of rejection and judgment from their families, friends, peers, and teachers (Abramovich, 2012). Those sentiments may result in tense or even hostile living spaces and decreased social support networks, which have even greater impact when they escalate to housing insecurity for youth who are less likely to have options for alternative accommodations (Abramovich, 2012). Youth are also less likely to have support systems through established chosen family, or a network of friends that act as a family outside of their family of origin or household (Abramovich, 2012). Macklin et al. (2023), with The Williams Institute, found that about one third of LGBT high school youth experienced bullying in the past year, nearly double the rate of their non-LGBT peers, which increases their likelihood of skipping school or avoiding spaces such as the lunchroom or cafeteria, decreasing their access to school-based meals. While these characteristics may change as LGBTQIA2S+ individuals age, additional factors impact food security, especially for those who are also situated within one or more other systemically marginalized communities.

Patterson, Russomanno, and Jabson Tree (2020) conducted a study in the U.S. at the intersection of women's race and sexual orientation to look at the population-level prevalence of food insecurity, the relative prevalence of food insecurity in Black and white sexual-minority women versus white heterosexual women, and the excess prevalence of food insecurity due to belonging to two or more systemically marginalized groups. They found 9.85% of white heterosexual women had experienced food insecurity over the past 12 months, compared to 24.16% of white sexual-minority women (Patterson, Russomanno, & Jabson Tree, 2020). However, when Patterson, Russomanno, and Jabson Tree (2020) looked at the intersection

of race and sexual orientation with Black sexual-minority women, they found a rate of 38.07%, an increase of 386% over their white heterosexual counterparts. These findings have been supported by recent research, including an April 2022 report from The Williams Institute, which found that LGBT people of color were three times more likely than white non-LGBT adults to face food insufficiency during the COVID-19 pandemic (Conron et al., 2022). The Williams Institute study shows not only that individual markers of identity and distinction affect food access, but also that the intersectionality of those markers can drastically affect food access and, consequently, health. In an attempt to mitigate barriers to food access, many LGBTQIA2S+ individuals turn to public food assistance programs, such as supplemental nutrition financial programs and community-based emergency food assistance services.

Research shows that sexual-minority adults are 1.36 times more likely than heterosexual adults to participate in the Supplemental Nutrition Assistance Program (SNAP), and approximately 27% of sexual-minority adults received SNAP benefits in 2013 (Brown et al., 2016; Patterson, Russomanno, Teferra, & Jabson Tree, 2020). Among transgender and cisgender adults, Conron and O'Neill (2021) found that transgender adults experienced food insecurity at a rate of 19.9%, compared to 8.3% of cisgender adults. However, less than one-third (28.7%) of income-eligible transgender adults reported they or a household member currently received SNAP, in contrast to 38.5% of cisgender adults (Conron & O'Neill, 2021). For transgender adults, a barrier to enrollment in public benefits programs like SNAP is obtaining identity documents aligning with a person's gender presentation, as prior negative experiences such as verbal harassment and being denied benefits or service on the basis of being transgender inhibits seeking food resources (Conron & O'Neill, 2021; James et al., 2016). In an effort to mitigate barriers and promote equitable access to SNAP for LGBTQIA2S+ individuals, the U.S. Department of Agriculture (USDA) announced a policy in May 2022 including discrimination based on sexual orientation or gender identity in the prohibition against sex discrimination under Title VII of the Civil Rights Act of 1964. This prohibition is consistent with the Supreme Court's 2020 decision in *Bostock v. Clayton County*, in which the Court held that the prohibition on sex discrimination under Title VII extends to discrimination based on sexual orientation and gender identity (Cheyne, 2022; U.S. Equal Employment Opportunity Commission [EEOC], n.d.). There is no data on its effects, if any, thus far. In addition to, or instead of, supplemental nutrition financial programs, many individuals in need turn to community-based emergency food assistance services.

Community-based emergency food assistance services like food pantries and soup kitchens are a vital source of food access, but a lack of comprehensive coverage and support from the political environment threatens this access by failing to protect LGBTQIA2S+ individuals from discriminatory practices (Abramovich, 2012; Patterson, Russomanno, Teferra, & Jabson Tree, 2020). Most community-based emergency food assistance services in the U.S. are run by faith-based organizations, which may display pervasive anti-LGBTQIA2S+ bias (Patterson, Russomanno, Teferra, & Jabson Tree, 2020; Russomanno & Jabson Tree, 2020; Wilson & Badgett et al., 2020). Additionally, the federal Religious Freedom Restoration Act (RFRA) and related state laws allow institutions, such as food banks and community-based emergency food assistance services, to deny services to community members based on religious beliefs (Russomanno & Jabson Tree, 2020). While research suggests personal pride in one's gender identity or sexual orientation may buffer against potential issues of discrimination or transphobia while utilizing local community-based emergency food assistance services, anti-LGBTQIA2S+ bias can decrease available resources even further for already systemically marginalized individuals (Russomanno & Jabson Tree, 2020). In its 2020 decision in *Bostock v. Clayton County*, the Supreme Court noted that its decision did not address issues related to religious liberty, including the RFRA (EEOC, n.d.). However, at the time of this study, there was no definitive data on whether or how the USDA's expansion of protections under Title VII of the Civil Rights Act of 1964 will affect the RFRA.

Food Insecurity in North Carolina

North Carolina was ranked 17th of the top 20 states with the highest rates of food hardship in the United States in 2016 and 2017, and the Greensboro–High Point metropolitan statistical area (MSA), defined by the Census Bureau as areas that include central cities plus surrounding counties with strong socio-economic relations to the central cities, was ranked 14th of the top 20 MSAs (FRAC, 2018). In their 2018 study, FRAC defined food hardship as a measure of whether households had adequate financial resources to purchase food over the previous 12 months in 2016 and 2017. Factors contributing to food insecurity in North Carolina include the physical, sociocultural, and political environments.

Physical Environment

The physical environment refers to a geographic area and the opportunities and barriers it allows for, such as place-based food environments in addition to characteristics of the built environment like sidewalks and availability of public transportation (Ver Ploeg et al., 2009). Place-based food environments play a large role in food access at the community level because agri-food systems determine food access options (Jang & Kim, 2018). A significant limitation at the community level is having little to no reasonable food access. The term "food desert" has been commonly used in the U.S. to describe such conditions in specific geographic areas, such as through the US Census Bureau labeling individual census tracts as food deserts. The term "food apartheid" is gaining traction as a way to better capture the reality of the conditions of these communities. Food activists argue that the reference to a desert detracts from the inherent life and vibrancy of a community, while also implying that this is similar to a naturally occurring ecosystem (Lu, 2021). The term also creates the impression that the issue is a general scarcity of food, rather than the reality that there is a scarcity of fresh produce and affordable nutritionally dense food (Lu, 2021). The shift in language to use the word "apartheid" is significant, as it represents the manmade political and economic systems that have perpetuated unequal access to resources and networks through racial discrimination and segregation in South Africa (Lu, 2021). Comparatively, food insecurity is greatly impacted by systemic racism, which has created the political and economic systems that segregate communities of color and historically marginalized communities into lower-income neighborhoods that grocery stores do not cater to (Jang & Kim, 2018; Lu, 2021; Ver Ploeg et al., 2009).[1]

An example of food apartheid is the Greensboro–High Point MSA, which was found to have a 19.2% rate of food hardship, defined by the Food Research & Action Center as a measure of whether households had adequate financial resources to purchase food over the past 12 months in 2016 and 2017 (FRAC, 2018). However, the 2018 National Survey of Student Engagement found that half of the UNCG student population worries about paying their basic bills and 20% of students skip meals due to finances (Wesley-Luther, n.d.-a). Furthermore, a 2017 study conducted by Wesley-Luther and the Dean for Students Office found 34.9% of UNCG students are food insecure in a given year (Wesley-Luther, n.d.-a). This is significantly higher than the local MSA rate of food hardship (19.2%), showing there is a concentrated rate of food insecurity specifically on the university campus, shown in Figure 1 (FRAC, 2018; Wesley-Luther, n.d.-a).

Sociocultural Environment

Sociocultural environmental factors include those within immediate physical surroundings, social relationships, and social groups as created by distinguishing categories within society (Barnett & Casper, 2001; Manuel, 2006). For the LGBTQIA2S+ community specifically, the sociocultural environment of North Carolina is greatly influenced by factors such as social inequality and religious institutions and practices, largely due to the state's location in the American South (Barnett

[1] Throughout this article when referring to food apartheid in others' research, we use the terms the authors utilized in their own work, most commonly "food desert." Using the terms as originally used by the researchers best reflects their findings because the terms used affect how findings are interpreted.

& Casper, 2001). The South is part of a region referred to as the "Bible Belt," known for an intense devotion to church and conservative views on gender and sexuality (Worthen, 2018). Those beliefs often include acute stigmatization, or societal disapproval, driven by a strong narrative of "sin" and "immorality" related to being in the LGBTQIA2S+ community, as well as societal rejection of those who are different from the perceived norm due to misconceptions and fear (Worthen, 2018). This stigma is present from birth through adulthood, and is often internalized, especially during and after the initial process of coming out (Worthen, 2018). Research has shown people in the American South are the most likely to have negative attitudes towards the LGBTQIA2S+ community compared to the rest of the country (Worthen, 2018). These stressors can have a significant impact on health and quality of life, positioning LGBTQIA2S+ individuals to have an increased risk of health disparities such as poor physical and mental health; however, a lack of culturally sensitive and competent care often exacerbates these disparities, causing individuals to avoid preventative and regular healthcare (Rowan & Beyer, 2017).

Political Environment

The LGBTQIA2S+ community experiences a different political environment in North Carolina than their non-LGBTQIA2S+ counterparts. Many LGBTQIA2S+ individuals are excluded from protections that come with legislative policies and programs, such as those that protect individuals from loss of employment, which lessens their ability to sustain adequate food access. To further illustrate how the American South creates blanketed oppression toward gender- minority individuals, an example of a North Carolinian law with clear ramifications is presented: the 2016 House Bill 2 (HB2), or the Bathroom Bill. House Bill 2 was passed to counter an ordinance from the Charlotte City Council allowing transgender individuals to choose to use public bathrooms corresponding to their gender identity (Harrison, 2016). Additionally, HB2 nullified existing antidiscrimination ordinances across the state and prevented cities and counties from passing and establishing their own in-house antidiscrimination policies and practices and from putting antidiscrimination requirements on private contractors (Gordon et al., 2016).

At the political level, public policies such as HB2 contribute to loss of self-esteem and confidence for LGBTQIA2S+ individuals. Such policies show policymakers and employers do not care about the well-being and protection of employees. In addition to declines in mental and emotional well-being contributing to depression, its consequences, and its severity, the lack of protections also endangers the financial livelihoods of LGBTQIA2S+ employees, jeopardizing their housing, healthcare, and food access stability. While HB2 was partially repealed in April 2017, the ban on local governments passing nondiscrimination ordinances remained in effect until December 2020 (Silva, 2017). Since the ban's expiry, several towns, cities, and counties have approved ordinances to protect LGBTQIA2S+ individuals against discrimination from businesses and public services, such as lodging and dining (Robertson, 2021). While some progress has been made toward the LGBTQIA2S+ community's recovery from years of lacking protections and politically-backed discriminatory practices, that progress has faced significant opposition and setbacks.

One of the most notable pieces of legislation on this topic is the Equality Act, which was first passed in May 2019 by the U.S. House of Representatives and is intended to amend existing civil rights laws to explicitly add sexual orientation and gender identity as protected classes (Human Rights Campaign [HRC], n.d.; Killough, 2019). The companion bill that was introduced in the U.S. Senate died in committee. The Equality Act was reintroduced and passed for a second time in the House of Representatives in February 2021, after which the companion bill introduced in the Senate again died in committee (Freking, 2021). Despite the significant opposition the Act has faced in the Senate thus far, the Act was reintroduced to the House of Representatives and a companion bill introduced in the Senate in June 2023, with no decisions having been made at the time of this study (HRC, n.d.). Successful passage of this legislation would create uniform protections for the LGBTQIA2S+ community nationally (Freking, 2021; HRC, n. d.). Also in June 2023, the U.S.

Supreme Court ruled that the Colorado Anti-Discrimination Act, a civil rights law stating that businesses and organizations cannot refuse services to customers based on sexual orientation, race, or disability, is in violation of the First Amendment right to free speech (Liptak & VanSickle, 2023). The Supreme Court in a six-to-three vote ruled in favor of a web designer in Colorado who claimed she had a First Amendment right to refuse wedding-related artistic services for same-sex marriages, which prompted a dissent from the three justices against the ruling, who noted that the decision marked the first time in Supreme Court history that a business open to the public had been granted a constitutional right to refuse service to people from protected classes (Liptak & VanSickle, 2023). This decision could provide precedent for business owners to evade punishment for discrimination against LGBTQIA2S+ customers across the country, where about 20 states currently have laws that explicitly protect people from being refused services or otherwise discriminated against in public due to their sexual orientation or gender identity (Graham, 2023; Liptak & VanSickle, 2023). Of the remaining states, several interpret existing laws prohibiting sex discrimination to apply to bias relating to sexual orientation and gender identity, while municipal laws cover many residents in states that do not offer those protections, all of which are now on questionable legal footing (Graham, 2023). These represent a fraction of the recent legal and judicial decisions highlighting the precarious nature of legal protections for the LGBTQIA2S+ community. They also highlight the vital importance of protecting against discrimination, such as in food and nutrition access, as well as public services and accommodations, employment, healthcare, and housing access, as these all impact economic stability and long-term physical, mental, and emotional health outcomes.

Methodology and Methods

We utilized a qualitative, community-based methodology in this research. Participants in this study were self-identified LGBTQIA2S+ students enrolled at UNCG. Self-selection sampling was used to decrease the influence of any biases or preconceived notions of real or assumed LGBTQIA2S+ identities. No other requirements were placed upon participants, allowing for a diverse array of experiences from participants with varied demographics and backgrounds. Information about the study was disseminated through multiple channels at the university, including the Pantry, the Office of Leadership and Civic Engagement, the LGBTQ+ Education & Research Network listserv, master's and doctoral listservs, and more. Participants were each provided a gift card valued at US$20.00 to support their food access for their participation in this study. They were made aware they would receive the gift card even if they withdrew from the study, and each participant was able to choose the store they would prefer a gift card to, with the understanding that lessening their financial burdens in any category would increase their available financial capacity for food purchases. Despite this, recruitment of participants was challenging, which may have resulted from internalized stigma such as homophobia, biphobia, and transphobia, as well as the stigma associated with needing food assistance. Recruitment may have also been affected by the impacts of the COVID-19 pandemic (see Kobakhidze et al., 2021), as data collection took place between February 2022 and June 2022, but that was not investigated as a factor affecting participants' food access.

Of the eight participants recruited, in terms of gender, most identified as cisgender (n=5) and/or as female (n=5). In terms of sexual orientation, participants identified as either bisexual (n=3), lesbian (n=3), or queer (n=2). The first author shared their LGBTQIA2S+ identity with participants to position themselves in relation to their research during an information and consent meeting. This meeting took place with each participant prior to beginning data collection, and participants may have also been made aware of the shared identity through third parties that disseminated the study information. All participants were full-time students, and most were enrolled in graduate studies (n=5). Participants were not asked to self-identify their ethno-cultural, immigration, or racial backgrounds. However, based on appearance and interview content, more than half of the participants in this study were white or white-passing (n=5).

The research consisted of two iterative phases

for data collection. Prior to the start of data collection, each participant met with the corresponding author for an introduction and consent meeting, in which they discussed and consented to the research study procedures, risks and benefits related to participation, voluntary participation terms, and confidentiality and anonymity information, and could ask questions for clarification. A third phase would have consisted of a focus group during which participants would have been given an opportunity to reflect on and discuss key findings. The third phase was originally planned, but due to researcher and participant time constraints, COVID-19 precautions, and the protection of individual anonymity, it did not take place.

In Phase 1, participants used photovoice methods to identify local physical, socio-cultural, and political environmental factors that serve as opportunities and barriers to food access.[2] Photovoice (Wang & Burris, 1997) was chosen as a participatory method to prompt reflection on environmental factors and their perceived influence on food access (Kapilashrami & Marsden, 2018). Each participant was given an orientation to the photovoice technique during their initial information and consent meeting and utilized their own devices, such as cell phones, for the activity. Definitions of each environment and examples of various environmental factors were provided to help guide participants. Participants were asked to take notes on why they chose to photograph particular environmental factors. Participants collectively took 65 photos during Phase 1. In Phase 2, each participant submitted their photos and notes for review, and one-on-one semi-structured interviews were conducted to discuss photovoice materials. Each interview began with participants reflecting and elaborating on their photos and notes to help understand their opportunities for or barriers to food access. Interviews were used to explore how participants' individual LGBTQIA2S+ identities affect their food access and to identify any overlap between environmental factors and LGBTQIA2S+ identities. Semi-structured interviews lasted 15 to 75 minutes, with an average duration of 35 minutes.

Due to COVID-19 precautions and scheduling constraints, all interviews were conducted via Zoom meetings, audio-recorded, and transcribed verbatim. The audio transcription feature of Zoom meetings was enabled to create preliminary transcripts that were then reviewed and cleaned for accuracy. All data (photovoice materials and interviews) were subjected to Stenner's thematic decomposition analysis to identify, code, and analyze data into themes reflective of individuals' social positions (as cited in Ussher & Mooney-Somers, 2000; Braun & Clarke, 2006). Coding was done by hand without the use of a software program. This research was approved by the University of Alberta's Research Ethics Office for research with human subjects.

Findings

In this section, we present and analyze the data gathered through Photovoice and semi-structured interviews with the eight self-identified LGBTQIA2S+ university students enrolled at UNCG who took part in this study. Three major themes emerged from the data: (a) LGBTQIA2S+ identities and food insecurity, (b) spatial opportunities and barriers to food access on- and off-campus, and (c) intersectional factors affecting food security. Findings associated with these themes and related subthemes are discussed in the following sections.

LGBTQIA2S+ Identities and Food Insecurity

The first major theme centers on participants' experiences with food insecurity as relates to their LGBTQIA2S+ identities. While some limitations to food access this community faces are shared with other populations, this section focuses on unique challenges identified by participants. These challenges result from a combination of environmental factors and systemic marginalization.

Passing as Cisgender and/or Heterosexual

Discrimination on the basis of gender identity and/or sexual orientation, or homophobia, biphobia, and/or transphobia, significantly affects

[2] Wang and Burris (1997) define photovoice as an image-based technique by which individuals can "identify, represent, and enhance their community" (p. 369) through capturing their surroundings and experiences in photographs.

LGBTQIA2S+ individuals. Three participants spoke about how they are able to pass as cisgender and/or heterosexual, meaning someone would not look at them or their relationship and assume they were transgender and/or non-heterosexual, thereby decreasing their risk of garnering negative attention. When asked whether identifying as queer and Two-Spirit had affected his initial or sustained food access, one participant said: "I personally don't feel like it's had that much of an effect. But that's also mostly because most of the time I present as a cis man, which allows me privilege in different spaces" (Participant 7). In response to the same question, a cisgender, queer participant stated:

> Personally, I don't think so. I think for many people it absolutely could be harmful. Being a straight-passing man in a straight relationship, I do have a lot of the privilege of not experiencing a lot of the exploitation that other queer folks go through. … I am very lucky to say and privileged to say that my food insecurity is not impacted by my queerness. (Participant 3)

Discrimination and Microaggressions On Campus

Participants identified UNCG as either actively participating in discrimination or passively supporting discriminatory attitudes through microaggressions, such as comments or actions that subtly and often unconsciously or unintentionally express a prejudiced attitude toward a member of a systemically marginalized group like the LGBTQIA2S+ community (Merriam-Webster, n.d.). Staff at UNCG are not required to go through trainings, such as SafeZone and TransZone, focused on the LGBTQIA2S+ community. One participant, who was researching the transgender community on campus, found while students felt supported by their direct academic supervisors, support was diminished or absent during interactions with others in positions of authority. For example, participants commented they often felt mistreated (e.g., the wrong pronouns placed on IDs and business cards, despite requests otherwise) and their life experiences and challenges were generally not acknowledged by UNCG staff.

> If it gets to that point for a student who is transgender and they're going through their transition and exploring their transgender identity, that's gonna hit a little harder than it will hit me. Like how are you working with students in this when you keep using this type of language and passive microaggressions? (Participant 5)

Another participant spoke about UNCG's passive support of discriminatory attitudes in terms of corporations UNCG supports and provides space and funding to house on campus (see Figure 2). She remembered "feeling deterred" by having her main dining options aside from the cafeteria include "several companies that are either publicly anti–queer marriage or have funded right-wing political campaigns in the past" such as Chick-fil-A, Taco Bell, and Pizza Hut (Participant 6).

Support Systems

Support systems made up of friends, family, and other figures are important for everyone and can influence thoughts and feelings and affect perceptions of safety and comfort. For LGBTQIA2S+ individuals, having an affirming support system and connection to other LGBTQIA2S+ people promotes feelings of belonging and comfort. Most participants characterized their support systems as affirming their identities while also positively and/or negatively influencing their food access. Two participants lived with their partners, which prompted feelings of support and affirmation, as well as increasing their household income and therefore their food security. Both participants also noted related barriers, such as conserving gas for a partner with a longer commute, hence limiting grocery shopping options, or needing to purchase more expensive foods that a partner with food allergies could eat. Three participants spoke to various levels of reliance on their families for food access. Two participants said their families were unsupportive of or uneducated about LGBTQIA2S+ identities. One participant shared:

> I was homeless before, my mom kicked me out, and it had to do with, you know, me being bisexual. … I kind of forgot about that one. I

guess it did impact me. Yes, yeah. I try not to think about that one. (Participant 2)

Employment

Participants brought up employment in relation to how they are treated as LGBTQIA2S+ individuals. One participant said she was treated so poorly that she quit her job, while another stated: "[The university] put the wrong pronouns on my business cards and my ID because I said she/they, and they just put she/her/hers. And I was like 'okay, it's already starting'" (Participant 5). A third participant spoke about lost economic opportunities resulting from unemployment related to being part of the LGBTQIA2S+ community, saying:

> Obviously I didn't bring up the fact that I'm a lesbian in job interviews, but I think the fact that, regardless of how good I did or did not quote unquote pass, looking at background checks and employment history and stuff like, it would be very, very easy for employers to figure out that I'm trans. And I do think that's a big contributing factor to why, after I initially lost my job back in 2017, I was continuously unemployed until I started going back to school because genuinely up until the point that I was openly living as a woman, I never had any issues getting a job. I never got an interview for a job and did not immediately get the position offered to me afterwards. So that was a very new experience for me, going through like several interviews, and like not getting offered positions. And considering that the only thing that inherently changed is like "hi, I'm trans now," you kind of have to figure. … With the lost economic opportunity of being unemployed for an extended period of time, obviously, that has an impact on my ability to access food. (Participant 8)

Spatial Opportunities and Barriers to Food Access On and Off Campus

The UNCG is located in an area experiencing food apartheid with little to no reasonable food access, so students experience additional difficulties accessing food and food stores. While spatial accessibility of food, or lack thereof, affects all students at UNCG, the LGBTQIA2S+ community experiences described below are directly influenced by their identities.

Welcoming Attitudes at the Spartan Open Pantry

The Pantry (see Figure 3) is off campus and affiliated with, though not run by, UNCG and Wesley-Luther campus ministry, and participants men-

Figure 2. List of Dining Options at the University of North Carolina Greensboro and Their Respective Hours of Service During Spring 2022 Finals Period

tioned the Pantry specifically was "very welcoming of LGBTQ people and so it feels comfortable there." Compared to other off-campus options for groceries, one participant said: "The food Pantry represents one of the most readily available sources of cheap, healthy food for me. It is within walking distance, and I can carry what I get back" (Participant 7). Participants mentioned that having the Pantry as an option was a significant opportunity for food access, but the Pantry also highlighted shortcomings of the university in addressing food insecurity. One participant described the relationship between the university and the Pantry by saying:

> [UNCG is] not actively combating food insecurity. … I think there are great, really fantastic resources like the Spartan Open Pantry. But they are not a recognized part of campus because they are off campus. And it's Wesley-Luther; it's not UNCG Spartan Open Pantry. (Participant 3)

Figure 3. Shelves of Food and Nonfood Items at the Spartan Open Pantry

Welcoming Attitudes Off-Campus in Downtown Greensboro

Two participants described downtown Greensboro as being "inclusive," "politically active," and a "queer-friendly … bubble." One participant provided a photo of the Green Bean Coffee House (Figure 4) on Elm Street in downtown Greensboro and noted:

> The pride and trans pride flags can be seen displayed in the window. I captured this because I have always felt that Elm Street is an inclusive area, adorning several pride flags at restaurants, as well as Black Lives Matter street art. (Participant 6)

For these reasons, both participants shared they prefer to visit, eat, and socialize in the downtown area when they venture off campus.

Lack of Full-Selection Grocery Stores On and Near Campus

Most participants identified differences between foods they could purchase on campus or just off campus in comparison to available options further off campus. Participants expressed the further they traveled away from either the UNCG campus or the downtown Greensboro area, the less safe they

Figure 4. The Green Bean Coffee House on Elm Street in Downtown Greensboro

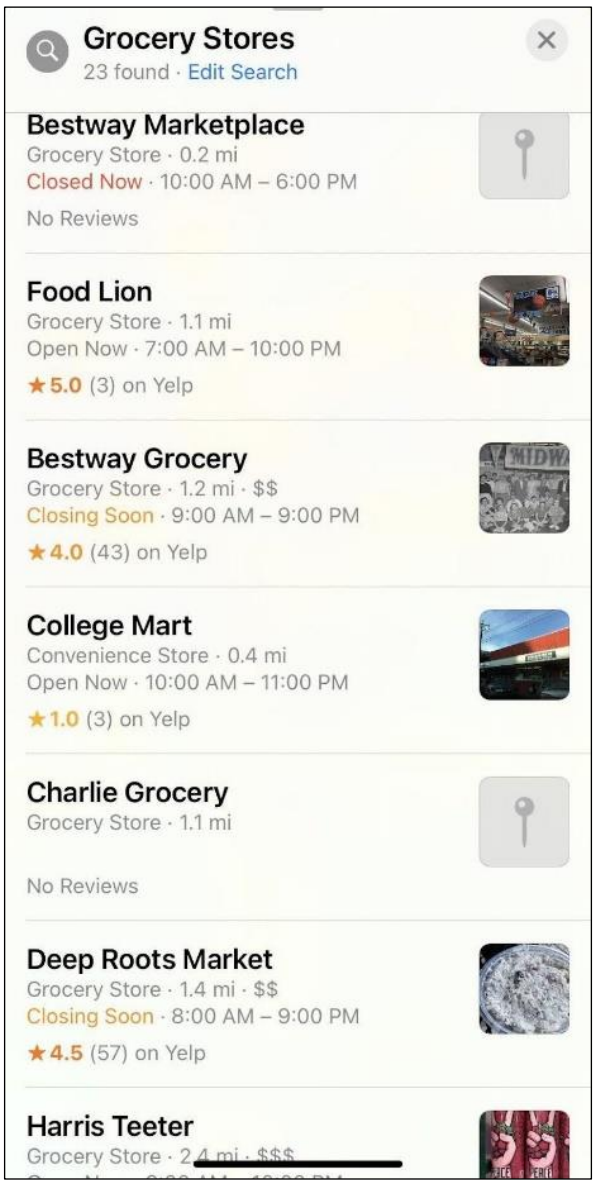
felt due to negative attitudes toward the LGBTQIA2S+ community in surrounding areas. However, a lack of full-selection grocery stores on and near campus forces many students to leave the area they feel safest in order to access food (see Figure 5).

Aside from the convenience store in the student center, there is one grocery-type store on campus: Bestway Marketplace. While this store does offer food items to students and accepts Flex dollars, participants describe it as having limited and often expired stock of meat and fresh product and high prices. Participant 8 commented that most of its shelving dedicated to "snack foods, candy, convenience items, and sodas," giving the overall impression of being "less of a grocery store and more of a hybrid convenience store." A secondary location, Bestway Grocery, is just over a mile from campus. Participants mentioned Bestway Grocery has a larger selection overall and better-quality produce than Bestway Marketplace, but similarly has high prices and sells more prepackaged snacks and sodas. Rather than devoting most of its shelving to convenience items, Bestway Grocery dedicates a great deal of its selling space to alcohol. Aside from the Bestway locations, just off campus is Firehouse Grocery. One participant who had previously shopped there commented:

> I've only gone there a few times for snacks just because they are essentially a convenience store. They don't have groceries; they have some grocery items, like loaves of bread, but I'm not getting my bread there because it's $4 or $5 for a loaf of bread, and I'm not doing that. I can't justify it. (Participant 5)

One participant noted the "closest full-size full-selection grocery store to campus is a 1.1-mile walk" through a residential area without sidewalks for the entire distance. The area is perceived as being "more dangerous" than surrounding areas due to it being a low-income neighborhood (Participant 8).

Figure 5. Screenshot from Google Maps of Grocery and Convenience Stores near the University of North Carolina at Greensboro Campus, with Distances



Negative Attitudes Off-Campus

Participants spoke about feeling uncomfortable and unsafe when going off-campus and away from the downtown area. Two participants specifically noted they avoid cities, towns, and general areas that make them feel uncomfortable or unsafe, decreasing their access to food stores. Describing their feelings about leaving the downtown Greensboro "bubble," one participant said: "Once I start going outside of the bubble, I get a little bit more uncomfortable like hitting Summerfield, and Burlington, and Jamestown" (Participant 5).

Another participant said some areas surrounding Greensboro have an environment she avoids because "I don't necessarily feel like I can just kind of go in holding my partner's hand. … And that just makes me not want to go in the stores that make me feel like that" (Participant 1).

Religious Presence Off Campus

Some participants expressed unease with religious presences in their local environments, which was noted as an aspect that was impossible to avoid in not only Greensboro but America altogether. One participant spoke of their discomfort with the close proximity of a voting poll location to a Baptist church (see Figure 6):

> Despite state being separated from church in the U.S. centuries ago, it is still nearly impossible to avoid Christian-affiliated symbols. For example, almost every NC license plate states "In God We Trust," as well as other federal signage. Voting is imperative for marginalized groups to gain access to food, stability, and political representation. Thus, the close proximity of policy to Baptist influence … can further distance LGBTQ+ people from their community and beyond. (Participant 6)

Intersectional Factors Affecting Food Security

This study yielded findings that represented experiences that affect a larger population but disproportionately position the LGBTQIA2S+ community to have diminished food access due to systemic minority identity–specific stressors, as reflected in the findings above (Kepkiewicz et al., 2015). For example, while this is not the case with the Pantry, most community-based emergency food assistance services in the U.S. are run by faith-based organizations, which may display pervasive anti-LGBTQIA2S+ bias (Patterson, Russomanno, Teferra, & Jabson Tree, 2020; Russomanno & Jabson Tree, 2020; Wilson & Badgett et al., 2020). So, while the stigma associated with needing food assistance does impact those outside of the LGBTQIA2S+ community as well as within it, for example, individuals within the LGBTQIA2S+ community have the added stress of decreased access to emergency food assistance solely based on their gender and/or sexual orientation.

Stigma Associated with Needing Food Assistance

Two participants mentioned that the stigma associated with needing food assistance influenced their likelihood of utilizing the Pantry or seeking assistance from other charitable food services. Both participants identified their families and upbringings as the roots of this internalized stigma. One participant spoke of her mother's influence throughout her upbringing:

> It's just like growing up she'd always tell me to never ask for help, you know, and never tell our personal business. We were poor growing up, … and I have that mindset of like you shouldn't ask for help. And so like whatever I do, go to the Spartan Open Pantry or whatever, I always just feel extremely guilty and stuff for asking for help. (Participant 2)

Figure 6. A Baptist Church across the Street from a Voting Location

Mental and Physical Health

Four participants spoke about their mental and physical health and related effects on their food access. One participant mentioned her upbringing playing a key role in developing an eating disorder, stating: "Ever since I was a child, [my grandma] would constantly call me fat. … Her constant put-downs really impacted me mentally and emotionally" (Participant 2). Three participants mentioned food allergies and sensitivities and dietary restrictions as significant barriers to their food access due to increased costs and decreased available selection of safe foods. One participant receives food from her parents at home because she has "many food sensitivities and, consequently, can't eat a lot of the food on campus" (Participant 4). However, the university's size limits on cold storage such as mini-fridges and freezers limit the amount of food she can accept.

> What [my mom] brings is limited by the amount that I can store in my refrigerator and freezer. I can't just simply buy a bigger appliance because each one is at the size limit for what is allowed on campus. I had to obtain accommodations and doctor's notes just to have a separate freezer. (Participant 4)

Finances

Six participants reported finances as significantly impacting their food access. In addition to increasing food prices, inflation has increased gas prices (see Figure 7), which makes it more difficult for students to seek off-campus food options. Students with Flex dollars as part of their meal plans can access only one limited-selection grocery store with high prices, one coffeeshop, and an array of eateries that are often either unhealthy, run by corporations that are "either publicly anti-queer marriage or have funded right-wing political campaigns in the past," or both (Participant 6).[3] Two participants mentioned that university is expensive, especially for students living and/or eating on-campus. One participant stated: "I can't help but feel there's something deeply broken about higher education if we're forcing people into tens of thousands of dollars of debt and they can't all even eat consistently" (Participant 8). Participants shared strategies they utilize to decrease food costs, though each had noted drawbacks. For example, multiple participants reported that they received food assistance through the Federal Supplemental Nutrition Assistance Program (SNAP), which one participant described as a "huge—unbelievably huge—benefit in terms of our food access and security," but also noted that the food assistance is a set monthly budget, so "there are some times, and maybe the end of the month, where things are a little harder" (Participant 1). Another strategy that one participant explained was using coupons for free meal-kit boxes, though their experiences with the service's quality have not been ideal:

> I've done HelloFresh before, because like I've had friends say, "Hey, I have a free box. Do you want it?" Yeah, yep, right now. I don't love it because they say they're really environmentally friendly, and there's so much packaging here. And the food is also … I've never gotten a quality vegetable from them; it's always like zucchini that you can bend in half, and it'll go right back. (Participant 3)

Figure 7. Cost of Gas per Gallon (US$)

[3] The UNCG defines Flex as: "a non-refundable stored value account on your SpartanCard which allows you to eat at UNCG" (UNC Greensboro, n.d.).

Time Limitations

Half of the participants identified the hours of the university's dining options as a significant barrier to their food access. While classes at UNCG can run until 8:30 p.m., most dining options on campus are not open past 7:00 p.m. This pushes students to seek off-campus options for dinner, which requires spending additional time and money. Even during the day, students who are seeking healthier options than what are available on campus or seeking groceries from a full-selection grocery store are forced to go off campus. Then, they have to factor in additional time for travel, which can be difficult for students with full-time course loads, jobs, extracurricular activities, health conditions, or other time-consuming factors to consider. One participant often goes to coffee shops for "filler" foods to get through the day:

> Sometimes I am too busy to go to the grocery store to get food. If I'm driving 15 to 20 minutes there and back, and also that's not accounting for the amount of time it takes me to get groceries … but I use these to get through the day. These make me not necessarily feel super hungry to eat so I can get by until I can find time or anything open in my schedule to go grocery shopping. (Participant 5)

Transportation

Three participants did not have cars, so they had to factor in walking time and distance whenever they left campus. This represents a safety concern, as one participant noted the walk to the nearest full-selection grocery store is 1.1 miles through a residential area without sidewalks the entire way so students "end up faced with either walking in the street or through people's yards to get [there]" (Participant 8). While there is a Greensboro Transit Agency bus system for which the university provides passes, two participants spoke of the unreliability of the bus system: "you can't really depend on them to get there at a certain time or anything, even if it does have a time associated with the website or the app" (Participant 4).

Discussion

Consistent with existing literature, our findings indicate stressors related to being part of a sexual and gender minority group have significant impacts on health and quality of life, in addition to the stressors already faced by college and university students (see for example, Frost et al., 2022; Haas & Lannutti, 2021; Henry et al., 2023; Laska et al., 2021). To buffer the negative effects of these stressors, many LGBTQIA2S+ individuals manage the visibility of their sexual orientations and/or gender identities by deciding whether to out themselves through subtle or overt expressions of sexual orientation or gender identity (Frost et al., 2022; Haas & Lannutti, 2021; Henry et al., 2023; James et al., 2016; Vale & Bisconti, 2021). Some participants in this research spoke about their ability to pass as cisgender and/or heterosexual. Passing was described as a privilege because it decreased their risk of garnering negative attention. This is corroborated by Frost et al. (2022) and Vale and Bisconti (2021), whose research shows that concealing one's sexual orientation and/or gender identity acts as a shield from overt forms of minority stress. Although participants did not explicitly speak to the stress and cognitive effort that comes with concealing one's identity, they did speak of avoiding areas and interactions that required them to conceal their identities and described their responses when faced with unsupportive environments. Participants described feeling chronic devaluation of their identities through prejudicial events, such as microaggressions and overt acts of discrimination by faculty and staff at UNCG. One participant, who identifies as non-binary, shared they felt the "type of language and passive microaggressions" used by faculty and staff would have a more intense effect on a transgender student going through their transition than on a student who had already transitioned.

The beginning of the coming-out process is a vulnerable time for many LGBTQIA2S+ individuals, especially for those in discriminatory, biased, or generally unsupportive environments, and many seek to create support systems to decrease negative effects of stressors (Frost et al., 2022; Goldberg, 2018; Haas & Lannutti, 2021; HRC, 2018; James et al., 2016). While participants shared the positive impacts of their support systems, such as affirmation of their identities, increased household income

and food security as a result of living with a partner, and receiving food from family members, they also described ways in which their support systems negatively impacted their food access to various degrees. This ranged from taking partners' needs into account (e.g., limiting vehicle use for food shopping to enable a partner's long work commute, or spending more money on groceries for a partner with food allergies) to relying on food support from family members who were unsupportive of or uneducated about LGBTQIA2S+ identities. One participant described a period of homelessness due to unacceptance of their identity by family members, a phenomenon found to be common especially for LGBTQIA2S+ youth, who make up between 20% and 45% of homeless youth and experience housing insecurity at disproportionately high rates (Abramovich, 2012; Applied Survey Research, 2017; Johnson, 2018; Romero et al., 2020; Wilson & Choi et al., 2020).

Mallory et al. (2020) and James et al. (2016) found discrimination against LGBT people contributed to decreased employee productivity, retention, and recruitment, in addition to resulting in unfair treatment by employers in hiring, pay, and promotions. In this study, participants also linked their experiences with anti-LGBTQIA2S+ discrimination to their employment history by sharing ways in which their identities are linked to negative workplace experiences and employment status. Participants' reports of quitting jobs over poor treatment highlight the importance of inclusive and safe working environments. Microaggressions such as misgendering negatively impact mental and emotional well-being, contributing to the prevalence of depression and can lead to eventual job loss or voluntarily leaving a workplace. Rates of under- and unemployment have been shown to be higher in the LGBTQIA2S+ community compared to the non-LGBTQIA2S+ population in the U.S. (Conron et al., 2022; James et al., 2016; Mallory et al., 2020), which creates a domino effect on housing, healthcare, and food access stability. Research shows that LGBTQIA2S+ community members have higher poverty rates when compared to cisgender individuals (James et al., 2016; Mallory et al., 2020). One participant in this research explicitly stated she considers transgender identity to be a "big contributing factor" to why she was unemployed for several years, and "the lost economic opportunity of being unemployed for an extended period of time, obviously, has had an impact on [her] ability to access food" (Participant 8). North Carolina is an employment-at-will state, meaning employers can treat their employees as they see fit and fire employees at will for any or no reason unless there is a specific law or employment contract providing protection (North Carolina Department of Labor, n.d.). The Supreme Court decision in *Bostock v. Clayton County* did hold that discrimination based on sexual orientation or gender identity is sex discrimination and, therefore, a violation of Title VII of the Civil Rights Act of 1964. However, the Court's decision did not address issues related to religious liberty, including not only the Religious Freedom Restoration Act but also the First Amendment and exemptions Title VII provides for religious employers. The Court's decision leaves some question as to how protected against discrimination LGBTQIA2S+ individuals are in the workplace, something many experience in North Carolina (EEOC, n.d.; North Carolina Department of Labor, n.d.).

In addition to a lack of political protections in North Carolina, participants also spoke about their feelings of discomfort and lack of safety when leaving the UNCG campus and the downtown Greensboro area due to negative attitudes towards the LGBTQIA2S+ community. The sociocultural environment of North Carolina is significantly influenced by power relations, such as social inequality and religious institutions and practices, especially due to the state's location within the conservative "Bible Belt" area (Barnett & Casper, 2001; Worthen, 2018). This was reflected in the research with participants expressing discomfort with religious and conservative presences in their local environments. However, while the effects of conservative sociocultural environments on the LGBTQIA2S+ community have been studied, current research has not examined those effects in the context of food access. One participant specifically shared their discomfort with a voting location across the street from a Baptist church due to the negative relationship between organized religion and the LGBTQIA2S+ community. This religious

presence may deter LGBTQIA2S+ voters from visiting this polling location, endangering their access to political representation. Having supportive representation within the political environment is important, especially for systemically marginalized communities, because those representatives can influence and advocate for public policy expanding protections for stability, security, and equitable access to resources such as food. When voters are deterred from the polls, their ability to gain such representation is endangered.

A lack of full-selection grocery stores on and near the UNCG campus was also discussed as a significant barrier to food access. While the geography of food access has been well explored in the literature, there has been little research analyzing food access through an intersectionality theory lens, much less a queer theory lens. Much of the research on spatial intersectionality and food access focuses on associations in place-based food environments between food availability and sociodemographic characteristics, specifically socioeconomic status and race (Jang & Kim, 2018; Yang et al., 2020). This research shows neighborhoods with higher proportions of communities of color, systemically marginalized communities, and/or low-income communities in the U.S. are more likely to have fewer retail sources of affordable nutritionally dense foods and more sources of foods that are either not nutritionally dense, not affordable, or some combination thereof (Jang & Kim, 2018; Ver Ploeg et al., 2009; Yang et al., 2020). Although the lack of full-selection grocery stores on and near the UNCG campus may be due to aforementioned factors, when viewed through a queer theory lens, this research indicates additional factors not explored in current literature. Specific power relations affecting the LGBTQIA2S+ community in North Carolina such as social inequality and religious institutions and practices have created an additional, invisible spatial barrier to food access. The university campus, the Pantry, and the nearby downtown Greensboro area were identified by participants as forming a "bubble" that fostered feelings of safety and security. The campus itself was identified as such largely due to participants' familiarity with the area, while the Pantry and the downtown Greensboro area were specifically noted as being inclusive and queer-friendly. Participants reported that as they travel further away from these areas, they encounter negative attitudes toward the LGBTQIA2S+ community, which decreases their feelings of safety and security. However, in order to access full-selection grocery stores, they are forced to be in environments where they often have to conceal their sexual orientation and/or gender identity for safety.

Intersectional factors that affect a larger population but disproportionately affect the LGBTQIA2S+ community were also explored in this study. Analysis of these factors was informed by both intersectionality and queer theories and focused on how institutional influences, contemporary biopolitics, and exclusionary tendencies of simplistic explanations and universal truths have coalesced to further disadvantage the LGBTQIA2S+ community (Barker & Scheele, 2016; Carney, 2014; Jagose, 1996; Kapilashrami & Marsden, 2018; Meyer et al., 2022). Participants spoke about their food access in relation to their mental and physical health, a relationship well explored in the literature, but with the additional context of belonging to the LGBTQIA2S+ community. For example, one participant shared that she had many food sensitivities preventing her from eating most food on campus, so she relies on her parents to provide food for her. However, those relying on support from family members who are unsupportive of or uneducated about LGBTQIA2S+ identities may have to conceal their sexual orientation and/or gender identity, which pushes them to choose between the negative mental and emotional health effects of concealment or the negative comprehensive health effects of diminished food access (Frost et al., 2022; Vale & Bisconti, 2021).

Additional intersectional factors identified in the study included finances, time limitations, transportation, and the stigma associated with needing food assistance. Due to sexual- and gender-minority stressors, LGBTQIA2S+ individuals are more likely to experience significant impacts on their quality of life, including their ability to secure and maintain employment (Frost et al., 2022; Hoy-Ellis, 2016). Periods of underemployment and unemployment create financial insecurity, which

further exacerbates already unstable food security for LGBTQIA2S+ individuals. As shown in this research, individuals may need to travel outside of their local environment to access food, but financial insecurity can create additional barriers such as difficulties financing a personal vehicle and its related expenses. In this situation, participants either walked, asked for rides from friends, or utilized passes for the Greensboro Transit Agency bus system provided by UNCG. However, each of those options creates additional temporal barriers, as they either require additional time, rely on a schedule not set by the individual, or both. Financial insecurity also endangers budgets for food costs, so some participants with vehicles or having secured transportation opted to utilize the Pantry rather than visit a grocery store to purchase food. Although the Pantry was identified as a queer-friendly space, its location inside of a church may be a deterrent for some. Previous negative experiences with charitable food services that maintained anti-LGBTQIA2S+ biases are also deterrents. Combined with the stigma associated with needing food assistance overall, this research showed these factors pose significant barriers to food access for LGBTQIA2S+ individuals.

Conclusions

This research examines experiences of LGBTQIA2S+ university students with food insecurity and provides valuable information about the effects of identity and physical, sociocultural, and political environments on food access. This is an under-researched topic, and this research contributes novel insights into the factors influencing food access for LGBTQIA2S+ university students at North Carolina University at Greensboro in the American South. There is a tendency for contemporary food studies research to focus on individual-level factors and individual failings as reasoning for poor health and food insecurity, rather than identifying decreased food access as the result of institutional influences and contemporary biopolitics (Carney, 2014; Kapilashrami & Marsden, 2018). Thus, the physical, sociocultural, and political characteristics of place-based food environments, and the extent to which these create opportunities and barriers to food access, have not been widely researched, especially with a focus on systemically marginalized communities such as the LGBTQIA2S+ community or the university and college student population. Additionally, few, if any, food studies have utilized either intersectionality or queer theories as frameworks with which to explore their findings.

The findings discussed here relate to the overlap between local physical, sociocultural, and political environmental factors and LGBTQIA2S+ identities in the context of food access through the use of a qualitative, community-based approach. Eight self-identified LGBTQIA2S+ university students enrolled at UNCG took part in the study, which included using the Photovoice method followed by one-on-one semi-structured interviews. Three major themes emerged from the photographic and interview data: (a) LGBTQIA2S+ identities and food insecurity; (b) spatial opportunities and barriers to food access on and off campus; and (c) intersectional factors affecting food security. The themes that emerged from this research indicate LGBTQIA2S+ identities impact food access for university students studying at UNCG. In addition to unique LGBTQIA2S+ experiences with food access, our findings also include intersectional factors, such as the stigma associated with needing food assistance and financial constraints that affect a larger population but disproportionately position the LGBTQIA2S+ community to have diminished food access.

Although recent research has begun to explore the topics of food insecurity within the LGBTQIA2S+ community and amongst university students, the dearth of in-depth research on this specific population limits the ability to comment on whether the findings reported here are generalizable, highlighting a need for additional research. For this study, a better representation of LGBTQIA2S+ university students could have been achieved with a larger sample size. However, it was a challenge to recruit participants, which may have resulted from internalized stigmas such as homophobia, biphobia, and transphobia, in addition to the stigma associated with needing food assistance. Additionally, participants' significant time limitations, which also decreased available time to participate in the study, and COVID-19

precautions likely deterred some from participating altogether. Future studies could strive to include more participants and be designed to generate longitudinal evidence to provide a deeper understanding of factors involved and to show changes in food access over time with respect to the influences of LGBTQIA2S+ identities. Further research is also needed on experiences specific to sexual minorities and gender minorities, as well as the overlap thereof, in addition to intersectional factors disproportionately positioning the LGBTQIA2S+ community to have diminished food access. For all future research, it is important that studies respect the autonomy of the LGBTQIA2S+ community by fostering sustainable relationships through intentional engagement strategies that consider the interest, capacity, and resources that community members have to engage with the research (Durham et al., 2014).

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Disparities in COVID-19 vaccine uptake, attitudes, and experiences between food system and non–food system essential workers

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Abstract

The COVID-19 pandemic has disproportionately affected the health of food system (FS) essential workers compared with other essential and non-essential workers. Even greater disparity exists for workers in certain FS work settings and for certain FS worker subpopulations. We analyzed essential worker respondents (n = 151,789) in May–November 2021 data from the National Immunization Survey Adult COVID Module (NIS-ACM) to assess and characterize COVID-19 vaccination uptake (≥1 dose) and intent (reachable, reluctant), attitudes about COVID-19 and the vaccine, and experiences and difficulties getting the vaccine. We

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compared rates, overall and by certain characteristics, between workers of the same group, and between FS (n = 17,414) and non–food system (NFS) worker groups (n = 134,375), to determine if differences exist. FS worker groups were classified as "agriculture, forestry, fishing, or hunting" (AFFH; n = 2,730); "food manufacturing facility" (FMF; n = 3,495); and "food and beverage store" (FBS; n = 11,189). Compared with NFS workers, significantly lower percentages of FS workers reported ≥1 dose of COVID-19 vaccine or vaccine requirements at work or school, but overall vaccine experiences and difficulties among vaccinated FS workers were statistically similar to NFS workers. When we examined intent regarding COVID-19 vaccination among unvaccinated FS workers compared with NFS counterparts, we found a higher percentage of FMF and FBS workers were reachable whereas a higher percentage of AFFH workers were reluctant about vaccination, with differences by sociodemographic characteristics. Overall, results showed differences in uptake, intent, and attitudes between worker groups and by some sociodemographic characteristics. The findings reflect the diversity of FS workers and underscore the importance of collecting occupational data to assess health inequalities and of tailoring efforts to worker groups to improve confidence and uptake of vaccinations for infectious diseases such as COVID-19. The findings can inform future research, adult infectious disease interventions, and emergency management planning.

Keywords
COVID-19, COVID-19 vaccine, essential workers, food system, food security, occupational health, agriculture workers, food workers, health equity, vaccine equity

Introduction

The Food and Agriculture Sector is one of 16 critical infrastructure sectors considered essential by the U.S. Cybersecurity and Infrastructure Security Agency for continuing critical infrastructure operations during emergencies, including the COVID-19 pandemic (Cybersecurity & Infrastructure Security Agency, 2020). This sector generally includes farming and food manufacturing, processing, and operating storage facilities, as well as operating retail food stores and restaurants. It accounts for 10.3% of total U.S. employment (19.7 million part- and full-time jobs) and 5.2% of U.S. gross domestic product (Kassel & Morrison, 2020).

Research demonstrates that a variety of factors can influence COVID-19 vaccine uptake, such as age, education level, health insurance status, work and school vaccine mandates, and attitudes or behaviors such as perceived efficacy of the vaccine and concern about getting sick with COVID-19 (Centers for Disease Control and Prevention, 2023a; Roy et al., 2022). Further, group traits can affect the actions and attitudes of members. The COVID-19 pandemic posed an increased occupational health risk to many essential workers; for instance, being unable to stay home during community shutdowns, inadequate personal protective equipment, and regular interactions with individuals of unknown COVID-19 status. But the increased risk was not experienced equally by all essential workers. In the case of food and agriculture workers (hereafter, food system workers, or FS workers), overlapping pandemic occupational vulnerabilities elevated risk, such as close proximity to fellow workers for long periods of time, work conditions with poor airflow and ventilation, riding to and from work in overcrowded buses or vans, and being exposed for prolonged periods to customers/the general public, including some who had to remove protective masks to eat and drink, or refused to comply with masking protocols in general. Structural barriers to mitigating FS worker risk included factors such as limited institutional capacity of organizations to support workers (e.g., funding, translation services) and logistical challenges (e.g., mobile nature of some FS jobs). FS worker health was known, pre-pandemic, to be disproportionately affected by the cumulative precarity resulting from overlapping vulnerabilities. These encompass the overrepresentation of racial and ethnic minorities, immigrants, and workers who are financially and socially vulnerable due to factors such as low pay, occupational exceptionalism,[1]

[1] Exceptionalism is the perception or belief that a species, country, society, institution, movement, individual, or time period is

temporary or precarious job situations, shift work, immigration status, limited English proficiency, lack of health insurance, and discrimination and systemic racism (Dempsey et al., 2022; Fan & Pena, 2021; Flynn et al., 2014; Flynn, Cunningham et al., 2015; Flynn, Eggerth et al., 2015; Gelatt, 2020; Gravel & Dubé, 2016; Parks et al., 2020; Ramos et al., 2020; Rodman et al., 2016; Rolland & Kim, 2021; Sajjanhar & Mohammed, 2021; Thomas et al., 2021). These pre-pandemic and pandemic vulnerabilities have been extensively linked to increased and excessive morbidity and mortality among FS workers during the pandemic compared with some other essential and non-essential workers; the impacts were even greater for workers in certain FS work settings and for those from some racial/ethnic minority and immigrant groups (Billock et al., 2022; Bui et al., 2020; Chen et al., 2022; Cummings et al., 2022; Dyal et al., 2020; Hawkins, 2020; Lusk & Chandra, 2021; Obinna, 2021; Rubenstein et al., 2020; UCLA Labor Center, 2022; Waltenburg et al., 2021).

FS workers were a priority population for COVID-19 vaccination. On December 20, 2020, the Advisory Committee on Immunization Practices recommended prioritizing FS workers in Phase 1b (food and agricultural workers, grocery store workers, food manufacturing) and Phase 1c (food service workers) for COVID-19 vaccine allocation (Dooling et al., 2020). FS essential workers have been identified as a group of focus for achieving vaccine equity (CDC, 2020). Other studies have assessed vaccine uptake, intent to vaccinate, attitudes and perceptions toward the vaccine, and barriers to uptake among varying sectors of essential workers, particularly those in healthcare. To our knowledge, however, no large-scale COVID-19 vaccine-related studies or surveillance has focused solely on FS essential workers (Henneberger et al., 2022; King et al., 2021; Nguyen et al., 2021; Schneider et al., 2021; Steege et al., 2022).

Work is a social determinant of health. Collecting information about occupations and work settings facilitates improved understanding of the causes of health inequities, provides information to evaluate risks among various groups of workers, and helps refine guidance for specific industry and occupational groups (Ahonen et al., 2018; Flynn et al., 2022; Luckhaupt et al., 2020; Marovich et al., 2021; Silver et al., 2022). Recognizing these facts, as well as the information gaps related to COVID-19 status, intent, attitudes, and behaviors for FS essential workers, the objectives of this study were to describe and characterize COVID-19 vaccination status and intent, attitudes about the vaccine and COVID-19, and vaccine experiences, from April 22 through November 27, 2021 for three groups of FS workers in the U.S., and to compare differences between FS and non–food system (NFS) worker groups, and between workers in the same occupational group, to determine if disparities exist. Findings can inform the refinement of future analyses of these topics and groups, interventions for adult vaccination for infectious diseases, and planning for programmatic and policy aspects of future emergency management.

Methods

Study data, measures, qualitative analysis (the inclusion of free-text responses) and statistical analysis are described below.

Data

The National Immunization Survey-Adult COVID Module (NIS-ACM)[2] is a random-digit-dialed cellular telephone survey of U.S. adults 18 years and older . Survey respondents were sampled within all 50 states and the District of Columbia, as well as selected local areas (Bexar County, Texas; Chicago, Illinois; Houston, Texas; New York, New York; and Philadelphia County, Pennsylvania) and U.S. territories (Guam [April–July 2021], Puerto Rico, and the U.S. Virgin Islands). Surveys were conducted in English and Spanish. Participants prefer-

exceptional. The term conveys, whether or not specified, that the referent is superior in some way. In the domain of occupation/work, exceptionalism reflects exemption of certain workers from social, labor, health, and safety policies and protections. For example, despite difficult working conditions, farmworkers in the United States are excluded from much federal-level labor protection that applies to most other workers (Rodman et. al., 2016).

[2] https://www.cdc.gov/vaccines/imz-managers/nis/about.html

ring another language were interviewed using contracted phone interpretation services (LanguageLineSolutions, over 140 languages available).

Survey respondents from April 22 through November 27, 2021 (hereafter "May to November 2021") who reported that they were a frontline or essential worker (hereafter referred to as "essential workers") were included in the analysis (n = 151,789). Monthly survey response rates were calculated according to the American Association for Public Opinion Research type 3 response rate[3] and ranged from 17.2% to 21.4%.

Measures

NIS-ACM[4] included questions about COVID-19 vaccination status and intent, attitudes and perceptions about COVID-19 vaccine, experiences getting a COVID-19 vaccine, sociodemographic characteristics, and essential worker status. Two questions assessed COVID-19 vaccination status and intent: "Have you received at least one dose of a COVID-19 vaccine?" and if not, "How likely are you to get a COVID-19 vaccine? Would you say you would definitely get a vaccine, probably get a vaccine, probably not get a vaccine, definitely not get a vaccine, or are not sure?" Those who reported having at least one dose were considered "vaccinated"; those who said they definitely will get vaccinated, probably will get vaccinated, or were unsure were considered "reachable"; and those who said they probably or definitely would not get vaccinated were considered "reluctant." Three questions assessed respondents' attitudes and perceptions about COVID-19 and the vaccine (n = 151,789), and five questions assessed experiences and difficulties getting the vaccine (n = 129,994); vaccination status/intent was not a prerequisite for questions about attitudes or experiences, and respondents could answer regardless of vaccination status. Outcomes related to experiences and difficulties getting the vaccine were stratified by vaccination status (vaccinated, unvaccinated).

Respondents self-reported their sex, race and ethnicity, age, household income, health insurance status, foreign-born status, comorbidity[5] status (have any or none), and zip code or city of residence. Urbanicity, as defined by metropolitan statistical area (MSA) classification (MSA principal city, MSA non-principal city, and non-MSA), was determined based on household-reported city and county of residence (Office of Management and Budget, 2010). Household income was categorized relative to the U.S. Census Bureau 2020 poverty threshold and at the level of $75,000 (U.S. Census Bureau, 2022).

Essential worker status was self-reported and based on the questions "Are you a frontline or essential worker according to your state or region?" and "In what location or setting do you currently work?" Respondents who reported being a frontline or essential worker provided the interviewer with a work location or setting; then interviewers selected a grouping category from a predetermined list of 14 frontline/essential industry/ occupation groups,[6] or grouped the respondent in an "other" category if they could not be grouped in the existing list of 14. The list of 14 industry/occupation groups included FS categories: "agriculture, forestry, fishing, or hunting" (AFFH); "food manufacturing facility" (FMF); and "food and beverage store" (FBS). For those who selected the "other" category, interviewers entered a free-text response for the respondent's self-reported occupation type or setting. Free-text responses are open-ended responses that allow respondents to answer in their own words; these qualitative data require additional analysis to summarize and organize to be useful.

Inclusion of Free-text Responses

To assess whether free-text responses from respondents who answered "other" (n = 19,464) to the occupation location or setting question contained essential industries and occupations from the predetermined list in the survey questionnaire,

[3] https://aapor.org/wp-content/uploads/2022/11/Standard-Definitions20169theditionfinal.pdf
[4] https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-ACM-Questionnaire-Q3-2021.pdf
[5] See ACIP 3: https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-ACM-Questionnaire-Q3-2021.pdf
[6] See ACIP 2 for complete list of industry/occupation options:
https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-ACM-Questionnaire-Q3-2021.pdf

we used the National Institute of Occupational Safety and Health (NIOSH) Industry and Occupation Computerized Coding System (NIOCCS), a web-based software tool designed to translate industry and occupation text to standardized industry and occupation codes (NIOSH, 2022). NIOCCS output produces an Excel file with titles and codes for four items: Census Industry, Census Occupation, North American Industry Classification System, and Standard Occupational Classification. Occupational title/codes from NIOCC output were manually reviewed for classification into one of our three FS groups (AFFH, FMF, or FBS), and remaining entries, such as education and health occupations, were assigned to the NFS worker group. Two authors completed two rounds of random 10% samples: 10% of entries from the total 19,464 sample (n = 1,946) and 10% of all entries that were assigned to a FS industry occupation group (n = 136). Discrepancies were discussed until group consensus could be reached on a final grouping determination. See Table 1 for results of the free-text analysis.

Analysis

Weighted estimates and 95% confidence intervals (CIs) were generated for vaccination status and intent, vaccine attitudes and perceptions, and experiences getting COVID-19 vaccination. Respondents grouped in AFFH, FMF, or FBS were considered to be FS workers. The remaining industry occupation response options were considered NFS[7] workers. All analyses were stratified by the three groups of FS workers (AFFH, FMF, FBS) and one group of NFS workers. T-tests for proportions tested for differences between workers within the same worker group[8] and between FS and NFS workers,[9] with P values <0.05 considered statistically significant. Data were weighted to represent the noninstitutionalized U.S. adult population and calibrated to state-level vaccine administration data reported to the Centers for Disease Control and Prevention (CDC, 2023a, 2023b). Analyses were conducted using SAS (version 9.4; SAS Institute) and SUDAAN (version 11; RTI International). CDC reviewed this activity, which was conducted consistently with applicable federal law and CDC policy (45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq).

Results

Below, we describe results for vaccination status and intent, attitudes and perceptions of COVID-19 and the COVID-19 vaccine, and experiences and difficulties with the vaccine.

Vaccination Status and Intent

Results for three outcomes related to vaccination status and intent are described.

Table 1. Results of Free-Text Analysis, Additional Essential Workers Categorized in Final Essential Worker Groups

Essential Worker Groups	Number of distinct free-text responses added to final sample[a]
Food System (FS) Essential Worker: Agriculture, forestry, fishing, or hunting (AFFH)	227
FS Essential Worker: Food manufacturing facility (FMF)	100
FS Essential Worker: Food and beverage store (FBS)	844
Non–food system Essential Workers (NFS)	18,293

[a] Distinct, free-text responses from 19,464 essential worker respondents who answered "Other" to survey question "In what location or setting do you currently work?"; many of the distinct free-text responses had multiple respondents.

[7] NFS essential workers included several categories: healthcare, social service, preschool or daycare, K-12 school, other schools and instructional settings, first response, death care, correctional facility, non-food manufacturing facility, public transit, United States Postal Service; see ACIP 2 https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-ACM-Questionnaire-Q3-2021.pdf
[8] Denoted in results tables with ¶.
[9] Denoted in results tables with §

Vaccinated (>1 dose)

Overall, uptake of ≥1 COVID-19 vaccine dose was significantly lower among all FS worker groups (AFFH 58.5%, FMF 59.8%, FBS 61.6%) compared to NFS worker groups (68.5%) (Table A1).

When assessed by sociodemographic characteristics within each worker group, coverage significantly differed for FS and NFS workers by race/ethnicity (higher coverage among Asian compared with referent non-Hispanic White (NH-White)), age (higher coverage among 40–49, 50–64, or 65+ compared with referent 18–29), health insurance status (lower coverage among uninsured compared with referent insured), urbanicity (lower coverage in non-MSA compared with referent principal city MSA), and month of interview. There were additional significant differences among workers with ≥1 dose within each of the three FS groups; for example, large differences among AFFH workers by comorbidity status, and statistical variation by FBS worker race/ethnicity groups (Hispanic, AI/AN) compared with NH-White workers not seen with other FS worker groups.

When FS worker groups were stratified by sociodemographic subgroups and compared with NFS counterparts, significantly lower percentages of FS workers who were NH-White, 30–39 years, insured, non-foreign born, without comorbidities, and residing in a non-principal city MSA or non-MSA reported having ≥1 dose (Table A1).

Unvaccinated, Reachable

The overall percentage of reachable workers was significantly higher among FMF (18.9%) and FBS (20.4%) workers compared with NFS (13.3%) workers. When compared to workers in the same worker group, reachable FS and NFS workers significantly differed by race/ethnicity (but not consistently the same subgroups, compared with referent NH-White groups) and age (lower percentage of ages 40–49, 50–64, or 65+ reachable, compared with referent ages 18–29). Reachable FS workers did not statistically differ by sex or foreign-born status, whereas NFS workers did.

When FS groups were stratified by sociodemographic subgroups and compared with NFS counterparts, higher percentages of FMF and FBS workers who were NH-White, Hispanic, ages 30–39, male, female, above poverty <US$75k, insured, not foreign-born, with comorbidities or without comorbidities were considered reachable. Finally, there were additional significant differences among those reachable in each FS group (Table A1).

Unvaccinated, Reluctant

Higher percentages of AFFH workers (26.3%) were reluctant to get vaccinated compared with NFS workers (18.2%). When comparing workers in the same worker group, FS and NFS workers had consistently significantly different rates of reluctance by race/ethnicity (lower rates of reluctant Hispanic workers compared with NH-White), age (lower rates of reluctant ages 50–64 compared with ages 18–29), and language of interview (lower rates of reluctant Spanish interview compared with English interview). Reluctance did not significantly differ by insurance status for FS workers, whereas it did for NFS workers. When FS groups were stratified by sociodemographic subgroups and compared with NFS counterparts, higher percentages were reluctant of AFFH workers who were NH-White; male; ages 18–29, 30–39, or 50–64; above poverty <US$75k or ≥US$75k; insured; not foreign-born; without comorbidities; interviewed in English; and non-principal city MSA residents. Finally, there were additional significant differences among those reluctant in each FS group (Table A1).

Attitudes and Perceptions of COVID-19 and the COVID-19 Vaccine

Compared with NFS workers, significantly lower overall proportions of FS workers reported concern about getting COVID-19; significantly lower proportions of AFFH and FMF workers think the vaccine is important for protection; and lower percentages of AFFH workers think that the vaccine is safe. There were large differences in concern about getting COVID-19, confidence that the vaccine is safe, and in attitudes about its importance for protection, within FS worker groups and between FS and NFS worker groups by race/ethnicity, sex, age, household income, insurance, foreign-born status, language of interview, comorbidity status, and urbanicity (Table A1). Significantly lower percentages of FS workers reported that work or school

require the vaccine compared with NFS essential workers (Figure 1).

Experiences and Difficulties Getting the Vaccine

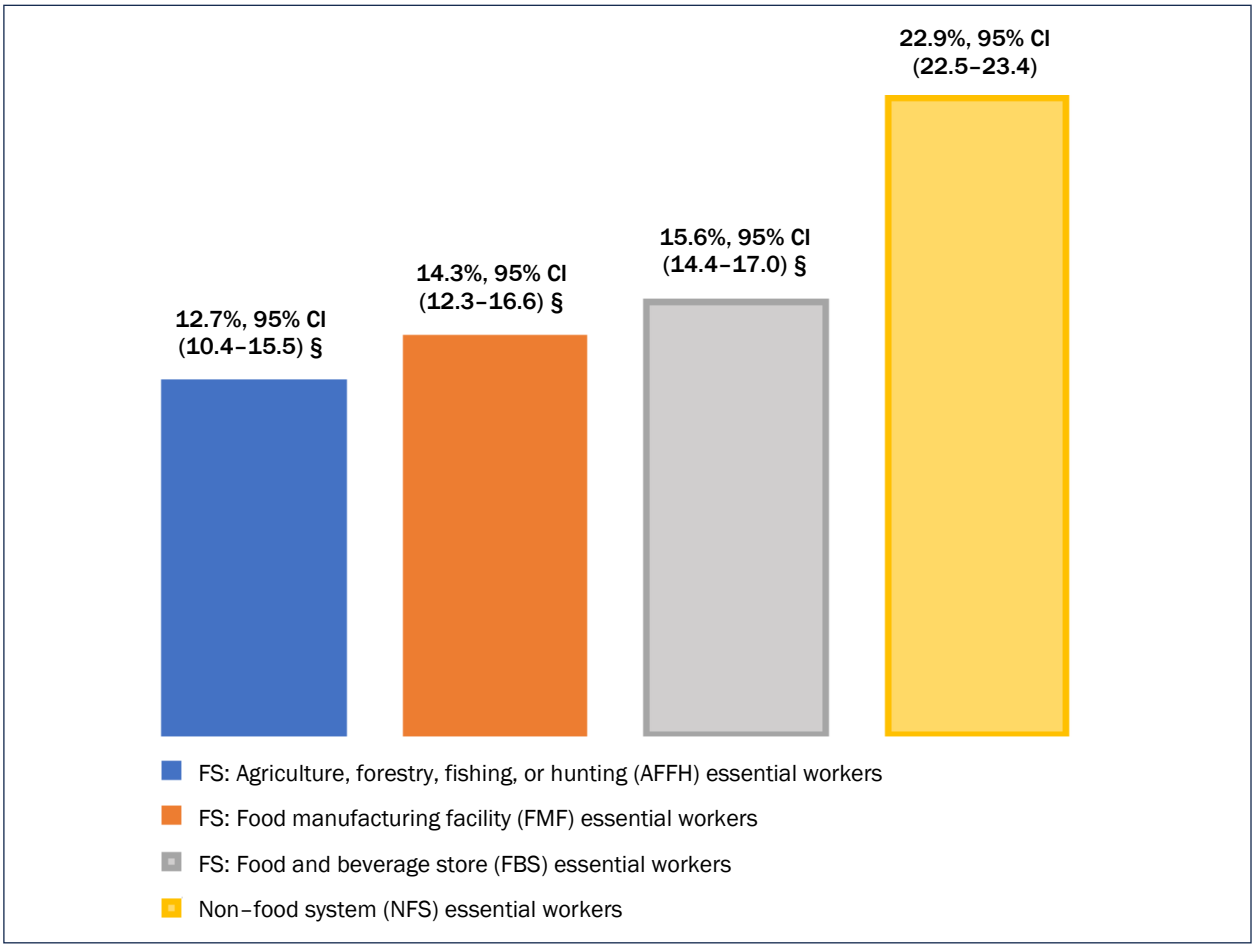
Overall, fewer than 10% of vaccinated FS workers reported difficulties knowing where to get vaccinated, how to get to vaccination sites, and whether vaccination sites were open at convenient times. Less than 20% of vaccinated workers reported difficulty getting the vaccine or getting an appointment online—all of which were not statistically different from NFS workers. A significantly higher proportion of unvaccinated AFFH and FBS workers compared with vaccinated counterparts reported that it was hard to get to vaccination sites, or that sites were not open at convenient times. Significantly lower proportions of unvaccinated FMF and FBS workers compared to vaccinated counterparts reported difficulties getting an appointment online; a higher proportion of unvaccinated FBS workers reported difficulties getting an appointment online or getting to vaccination sites compared with NFS workers (Table 2).

Tables B1–B3 offer a summary of statistically significant results of Tables A1–A3; Table B4 provides results overall and by month that were summarized in Table 2. These tables are found in Appendix B.

Discussion

The results show that from May to November 2021—a period that included primary and booster

Figure 1. Percentage (%) of Essential Workers Reporting Work or School COVID-19 Vaccine Requirements, National Immunization Survey Adult COVID Module, April 22–November 27, 2021



§ Statistically significant at $p < 0.05$ compared with the referent group (differences compared with non–food system workers).

shot availability, a summer SARS-CoV-2 Delta variant surge, and the onset of the new Omicron variant[10]—significantly lower percentages of FS workers (AFFH, FMF, FBS) reported being vaccinated with ≥1 dose when compared with NFS essential workers. This could be related to results that showed significantly lower proportions of FS workers that reported concern about getting COVID-19, or stronger work/school COVID-19 vaccine requirements compared with NFS workers. Less than 20% of FS and NFS workers reported vaccine difficulties, but with differences by work group and vaccination status. More research may be needed to understand what factors affected the differences in vaccine uptake between FS and NFS workers. Recovery from a past COVID-19 infection or variation in prioritizing and distributing vaccinations for frontline/essential worker groups could explain some results for FS workers compared to NFS workers (Johnson, 2021; Lutrick et

Table 2. Overall Experiences and Difficulties with Getting the COVID-19 Vaccine among Food System (FS) and Non–Food System (NFS) Essential Workers, by Worker Vaccination Status, National Immunization Survey Adult COVID Module, April 22–November 27, 2021

	Agriculture, Forestry, Fishing, or Hunting (AFFH) (*n* = 1,772 vaccinated; 288 unvaccinated)	Food Manufacturing Facility (FMF) (*n* = 2,440 vaccinated; 413 unvaccinated)	Food and Beverage Store (FBS) (*n* = 8,014 vaccinated; 1,470 unvaccinated)	Non–food system (NFS)[g] (§Ref) (*n* = 106,001 vaccinated; 9,596 unvaccinated)
Vaccine Related Outcome	%[a] (95% CI)	%[a] (95% CI)	%[a] (95% CI)	%[a] (95% CI)
Difficulty getting vaccinated [b]				
Vaccinated (≥1 dose) (¶ref)	14.1 (11.0–17.9)	15.5 (12.8–18.5)	13.4 (12.0–15.0)	13.8 (13.4–14.3)
Unvaccinated	17.9 (10.2–29.3)	12.5 (8.4–18.2)	16.6 (13.7–20.1)	13.7 (12.5–14.9)
Difficulty getting an appointment online [c]				
Vaccinated (≥1 dose) (¶ref)	15.8 (12.7–19.4)	17.1 (14.5–20.0)	16.2 (14.7–17.8)	15.3 (14.9–15.8)
Unvaccinated	9.7 (5.6–16.3)	*5.8 (3.8–9.0) ¶*	*10.2 (7.9–13.0) ¶§*	*7.0 (6.2–8.0) ¶*
Difficulty with not knowing where to get vaccinated [d]				
Vaccinated (≥1 dose) (¶ref)	7.5 (5.6–10.1)	6.7 (5.1–8.9)	8.2(7.1–9.4)	7.0 (6.7–7.3)
Unvaccinated	14.7 (7.9–25.7)	9.1 (6.1–13.5)	10.4 (8.2–13.1)	8.8 (7.9–9.8)
Hard to get to vaccination sites [e]				
Vaccinated (≥1 dose) (¶ref)	3.5 (2.2–5.4)	3.9 (2.7–5.7)	5.8 (4.9–6.9)	4.4 (4.2–4.7)
Unvaccinated	*12.1 (6.3–22.1) ¶*	6.1 (3.8–9.7)	*11.6 (9.0–14.8) ¶§*	7.5 (6.6–8.5)
Sites are not open at convenient times [f]				
Vaccinated (≥1 dose) (¶ref)	6.6 (4.5–9.4)	6.2 (4.7–8.1)	5.9(5.0–6.9)	5.9 (5.6–6.2)
Unvaccinated	*18.2 (10.3–30.1) ¶*	10.5 (6.8–15.9)	*14.1 (11.4–17.3) ¶*	12.2 (11.1–13.4)

[a] Weighted percents.
[b] Respondents who reported getting a vaccine is or would be "very difficult" or "somewhat difficult."
[c–f] Vaccination status/intent was not a prerequisite for questions about experiences and difficulties, and respondents could answer regardless of vaccination status; respondents who answered "not at all difficult" to question listed in b were not asked these questions.
[g] "Non–food system essential workers" included healthcare, social service, preschool or daycare, K-12 school, other schools and instructional settings, first response, death care, correctional facility, non-food manufacturing facility, public transit, and U.S. Postal Service. NIS Adult COVID Module (NIS-ACM) Hard Copy Questionnaire: Q3/2021 (https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-ACM-Questionnaire-Q3-2021.pdf)
¶ Statistically significant at $p < 0.05$ difference between vaccinated and unvaccinated worker in the same group.
§ Statistically significant at $p < 0.05$ difference between FS worker and NFS counterpart.

[10] CDC Museum COVID-19 Timeline. https://www.cdc.gov/museum/timeline/covid19.html

al., 2022, National Academy for State Health Policy, 2021).[11] Fewer reports of work/school requirements among FS workers may be explained by the NFS worker group including healthcare workers, who are more likely to be subject to workplace COVID-19 vaccination requirements.[12] Finally, a number of other overlapping vulnerabilities such as occupation or work setting, which we discuss below in the context of results that were statistically significant, could have influenced results for FS workers. Overall results for uptake and demand, and work-related vaccine mandates, are consistent with other studies during this time period; however, they are not directly comparable due to differing industry/occupation groupings (Henneberger et al., 2022; King et al., 2021; Nguyen et al., 2021; Steege et al., 2022).

Stratifying worker groups by sociodemographic characteristics to compare outcomes between population subgroups of the same worker group revealed some similarities between FS and NFS workers, including lower percentages of uninsured FS and NFS workers receiving at least one dose. These similarities could suggest that some vaccine disparities by sociodemographic characteristics in our sample were not necessarily related to specific types of essential work. Many of these results among essential worker population subgroups, which are consistent with other sociodemographic data from this period, highlight how sociodemographic identities may be more broadly linked with certain disparities that stretch beyond occupation, essential worker status, or industry (CDC, 2023a, 2023b, 2023c). When we stratified worker groups by sociodemographic characteristics to compare with NFS counterparts, there was also some evidence to suggest that some results for FS worker subgroups were connected to specific workgroups. All three FS groups [AFFH, FMF, FBS] compared to NFS counterparts had significantly lower proportions of workers overall reporting uptake of ≥1 dose, particularly those who were NH-White, aged 30–39, insured, not foreign-born, or without comorbidities. However, compared to NFS counterparts, significantly higher percentages of FMF and FBS workers overall, and from the same sociodemographic subgroups, were unvaccinated and reachable, while AFFH workers were more reluctant.

Individual FS Worker Groups (AFFH, FMF, FBS)

Results for the three individual FS worker groups are discussed below.

Agriculture, Forestry, Fishing, or Hunting (AFFH) Workers

Overall, AFFH workers compared with NFS workers had less uptake and more reluctance to get vaccinated. We also found that a significantly smaller proportion reported concern about getting COVID-19, or belief that the COVID-19 vaccine is safe or important for protection. These results may have been influenced by work setting characteristics that could affect perceived risk of getting COVID-19 and importance of the vaccine, such as work that is mostly performed outside, in rural and remote locations, and away from the general public. Further, a larger proportion of unvaccinated AFFH workers reported difficulties getting to vaccination sites, or sites not being open at convenient times, compared to vaccinated AFFH workers. Some work-related factors could have influenced vaccine access in different work sectors and settings across the AFFH workforce. For example, fishing industry/sector AFFH workers may have challenges with vaccine access related to working offshore, on a boat, for extended periods of time, whereas other sectors/industries of AFFH may not be as remote.

Some AFFH findings were notable despite low uptake for the group overall, such as high uptake for AFFH workers with comorbidities (75.7% vs no comorbidities 55.3%). Those with any comorbidity had higher coverage in all groups, but we noted greater than 20 percentage points difference by comorbidity status for AFFH workers whereas

[11] Johns Hopkins University. State Vaccination Plans. https://coronavirus.jhu.edu/vaccines/vaccine-state-plans
[12] Centers for Medicare & Medicaid Services (CMS), Medicare and Medicaid Programs, Omnibus COVID-19 Health Care Staff Vaccination. (*Federal Register*, 2021). https://www.federalregister.gov/documents/2021/11/05/2021-23831/medicare-and-medicaid-programs-omnibus-covid-19-health-care-staff-vaccination

the differences for other groups were more modest (percentage points difference for other groups ranged from 5.9% to 12.7%). Understanding these findings could suggest future areas of research that would inform interventions to improve adult infectious disease vaccine confidence and demand in vulnerable populations. Women are underrepresented in the AFFH workforce, and vulnerable populations such as people with comorbidities are overrepresented; AFFH workers were a population of focus for significant public and private efforts during the pandemic to address known overlapping vulnerabilities, and to close disparities in trusted, convenient, and linguistically and culturally appropriate ways (Corwin et al., 2021; Flynn, Eggerth et al., 2021; Flynn, Rodriguez Lainz et al., 2021; Hahn & Yiannas, 2021; Marcom et al., 2020; National Center for Farmworker Health, 2022; Stebbins & Pellizzari, 2021).

Food Manufacturing Facility (FMF) Workers

When compared with NFS workers, significantly lower proportions of FMF workers overall reported vaccine uptake, concern about getting COVID-19, and the sentiment that the vaccine is important for protection, but a higher proportion of FMF workers were unvaccinated and considered reachable. Early experiences with COVID-19 could have impacted vaccine attitudes and behaviors for these workers; for example, changes in risk perception related to recovery from past COVID-19 infection, or work setting characteristics such as shift work schedules and rural/remote work locations that limited access to vaccine sites (Corkery & Yaffe-Bellany, 2020; Douglas, 2020, 2021; Parks et al., 2020).

Food and Beverage Store (FBS) Workers

FBS workers reported significantly less coverage and concern about getting COVID-19 than NFS workers, but FBS workers compared with NFS workers were overall more likely to be unvaccinated and reachable, and overall had more favorable beliefs about the vaccine. As with other worker groups, FBS job functions and characteristics could have influenced overall results. These characteristics include having been classified as essential workers during the pandemic and the resulting public moralization of their work, regular exposure or interaction with the general public in work settings where customers remove protective masks to eat/drink, vaccine messaging through on-site pharmacies, and workplace vaccine mandates (Cameron et al., 2022; Mayer et al., 2022).

Compared with unvaccinated NFS workers, higher percentages of unvaccinated FBS workers reported difficulty getting online appointments and accessing vaccination sites, and reported sites not being open at convenient times compared to vaccinated FBS workers; however, a lower percentage of unvaccinated FBS workers reported difficulty getting online appointment compared with vaccinated FBS. Although some FBS workers may have more regular access to vaccine sites and exposure to vaccine messaging (for example, through grocery store pharmacies), this may not be the case for other FBS workers. The food and beverage industry, including the FBS group in this study, is composed of a wide variety of sectors and workers (e.g., grocery store cashier, waiter/waitress, food delivery driver) with largely varied work roles and responsibilities that may shape uptake, attitudes, and experiences. Schneider and colleagues (2021), analyzing vaccine uptake and intent among workers in various FBS sectors, found that 68% of service sector workers were vaccinated by November 2021. but that rates were lowest among large food service employers and widely variable between grocery sector employers (60%–86%).

Strengths and Limitations

Strengths of this study include being the first national-level representative study to assess and characterize differences of self-reported COVID-19 vaccination coverage, intent, attitudes, and experiences among three different types of FS workers, and between FS and NFS workers, to determine if disparities exist. We used cross-sectional data from a large survey of U.S. adults conducted monthly and made available in languages other than English. The large overall sample size allowed for analysis of FS workers and stratification by sociodemographic characteristics. Finally, we differ from other studies using NIS-ACM data in that we are the first to analyze essential worker respondents grouped in the "other" category.

Using NIOCCS to further identify FS and NFS workers from NIS-ACM data allowed us to analyze over 19,000 additional respondents in our sample who otherwise would have been excluded. In doing so, we were able to expand our analysis to include FS worker jobs that otherwise would not have been included in the original FS industry/occupation worker groups from the survey, such as food delivery drivers and online grocery order shoppers. Additionally, updated versions of the NIS-ACM survey now include expanded examples for the food system worker group industry/occupation classifications.[13] NIOCCS is an accessible way to refine and incorporate occupational information into research and practice that is free, and easy to learn and use overall.

Results are subject to several limitations. First, COVID-19 vaccination was self-reported and might be subject to recall or social desirability bias. Second, our study captured data from May to November 2021 and may not reflect attitudes or experiences beyond this time period. Third, the response rate for NIS-ACM was low (<25%) although similar to those in other NIS surveys.[14] Although data were weighted to reduce possible bias from incomplete sample frame or non-response and were calibrated to the COVID-19 vaccine administration data reported by jurisdictions to the CDC, bias might still persist and may impact generalizability of results from this study. Fourth, relatively small sample sizes for some sociodemographic groups may have resulted in low statistical power to detect differences by sociodemographics in stratified analysis.

Conclusion

Results from our study demonstrated that, compared to NFS workers in May–November 2021, significantly lower proportions of FS workers (AFFH, FMF, FBS) overall were vaccinated with ≥1 dose. Less than 20% of vaccinated and unvaccinated FS and NFS workers and NFS counterparts reported vaccine difficulties, with differences by worker group and by vaccination status. Some disparities between certain FS worker sociodemographic subgroups were also found between the same NFS subgroups. Differences in attitudes and perceptions by occupational identity and sociodemographic characteristics were also noted. Nonetheless, our study shows that many disparities in vaccine uptake and intent existed between FS and NFS workers, and between workers in the same group. Results reflect the diversity of food system work and its workforce. Considering preservation of the functioning of essential businesses that supply food to the population during emergency and non-emergency times, and contribute to the health protection of communities and individuals, our findings present implications for both research and practice.

Implications for Research

It may be important to collect and analyze occupational data and key demographic indicators—individually and in combination—to identify social determinants that could contribute to specific health inequities. Identifying these overlapping vulnerabilities may allow for a strategic tailoring of public health interventions, health-promotion systems, and infrastructure to address health inequities more effectively. Equitable vaccination for infectious diseases, such as COVID-19, is an important tool for closing persistent disparities, including preventing excess morbidity and mortality (Wong et al., 2021).

As previously noted, our study is perhaps the first to explore these outcomes in a representative national sample and with a specific emphasis on FS workers. The novelty of this research alone underscores the need for attention to and support for FS

[13] This study used NIS-ACM data from Q3 of 2021 (https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-ACM-Questionnaire-Q3-2021.pdf); beginning with Q3 of 2022 (https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-ACM-Questionnaire-Q3-2022.pdf), the FBS option includes additional examples to help capture an expanded group of essential food workers such as food services, delivery, and distribution, that are not otherwise captured in the other FS group options.
[14] CDC. National Immunization Surveys (NIS) Data, Tables, and Documentation. https://www.cdc.gov/vaccines/imz-managers/nis/data-tables.html

workers, given the vast literature examining these and further outcomes among other essential workers during the pandemic. Future research can further investigate work-related inequities, and could explore and refine our results with more advanced statistical methods or in the context of the unmeasured factors this study did not assess. These could include specific work sectors, the impacts of occupational exceptionalism, certain policies known to impact these workers (such as free COVID-19 vaccines for everyone regardless of immigration or health insurance status), or assessing these outcomes in relation to work-specific risk perception (for example, lower perceived risk of COVID-19 because of work mostly performed outdoors and away from the public during the pandemic). We contribute a rich sociodemographic and occupational dataset for three groups of essential FS workers during the COVID-19 pandemic, and direction for more refined analyses of these topics and populations in future research, interventions for adult infectious disease vaccination, and programmatic and policy aspects of future emergency management. Data and tools used in this study, such as NIOCCs and NIS-ACM data,[15] are free, publicly accessible, and can be used to fill data gaps about FS workers and more broadly, support inclusion of work into research and programs.

Implications for Practice

These results show opportunities for practitioners and organizations to find effective ways of reaching workers with vaccine and health information and interventions, and providing institutional support. Public health institutions can build and enhance collaborative partnerships with trusted organizations working to improve health outcomes in populations that have been marginalized. Providing funding, training, and technical assistance to build capacity of trusted organizations can help expand the reach and impact of the shared priorities of improving health and addressing disparities (e.g., improving vaccine uptake).

Trusted organizations supporting FS workers, and that are familiar with the community and specific to the occupational landscape, can help decrease intervention costs and improve the chances of adoption, implementation, and maintenance of interventions. Not only will priority populations be more likely to consider the trusted source credible, but these organizations can leverage existing assets and infrastructure to support interventions. For example, tailoring activities to occupational and workforce characteristics, such as developing and delivering messaging in linguistically and culturally appropriate ways, prioritizing and distributing vaccines in ways that consider the remote workplace nature and unique schedules that some FS workers face (e.g., working off-shore for long periods of time), delivering programs/interventions in familiar and convenient places (e.g., at worksites), and connecting workers to key community services.

Improved data collection and interpretation can help inform these efforts. For instance, practitioners and trusted organizations can collect and assess FS worker data to better document and characterize needs and barriers of these workers. Further, involvement with comprehensive planning for future emergencies that consider occupation-related barriers and health disparities can help sustain health promotion efforts, such as to take part in emergency response planning processes to help identify areas of greatest need, elevate FS worker considerations in certain emergency cases, and develop and deliver messaging in linguistically and culturally appropriate ways.

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[15] NIS-ACM data are publicly accessible in a controlled environment via the National Center for Health Statistics Research Data Center (RDC) at https://www.cdc.gov/rdc/index.htm

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Appendix A.

Table A1. Vaccination Status and Intent[b] among Food System (FS) and Non–Food System (NFS) Essential Workers, by Sociodemographic Characteristics, National Immunization Survey Adult COVID Module, April 22–November 27, 2021

	Agriculture, forestry, fishing, or hunting (AFFH)				Food Manufacturing Facility (FMF)				Food and Beverage Store (FBS)				Non–food system (NFS)[g] (§ref)			
		Vaccinated[c]	Reachable[d]	Reluctant[e]		Vaccinated[c]	Reachable[d]	Reluctant[e]		Vaccinated[c]	Reachable[d]	Reluctant[e]		Vaccinated[c]	Reachable[d]	Reluctant[e]
	n	%[a] (95% CI)			*n*	%[a] (95% CI)			*n*	%[a] (95% CI)			*n*	%[a] (95% CI)		
Overall	2,708	58.5 (54.7-62.2) §	15.2 (12.6-18.2)	26.3 (23.0-29.9) §	3,484	59.8 (56.4-63.1) §	18.9 (16.5-21.6) §	21.3 (18.3-24.7)	11,156	61.6 (59.7-63.5)§	20.4 (19.0-22.0) §	17.9 (16.4-19.6)	133,913	68.5 (68.0-69.1)	13.3 (12.8-13.7)	18.2 (17.8-18.7)
Race/Ethnicity[f]																
White, non-Hispanic (¶ref)	1,917	56.8 (52.4-61.1) §	13.1(10.5-16.2)	30.1 (26.0-34.5) §	2,060	60.9 (56.5-65.0) §	15.2 (12.6-18.3) §	23.9 (20.0-28.4)	6,326	60.3 (57.8-62.8) §	18.5 (16.6-20.5) §	21.2 (18.9-23.7)	80,604	67.9 (67.2-68.6)	11.1 (10.6-11.6)	21.0 (20.4-21.6)
Black, non-Hispanic	96	60.6 (42.0-76.5)	26.3(13.2-45.6)	13.2 (5.4-28.8) ¶	349	49.9 (39.5-60.3) §	26.4 (18.9-35.6) ¶	23.6 (13.9-37.2)	1,240	55.5 (50.2-60.6) §	26.6 (22.1-31.7) ¶§	17.9 (13.9-22.7)	17,024	67.1 (65.5-68.6)	19.4 (18.1-20.8) ¶	13.5 (12.4-14.7) ¶
Hispanic	394	64.1 (54.8-72.5)	18.3 (12.1-26.7)	17.6 (11.2-26.5) ¶	618	62.9 (55.5-69.7) §	25.5 (19.3-32.8) ¶§	11.7 (7.8-17.1) ¶	1,918	65.7 (61.5-69.6) ¶§	24.8 (21.3-28.8) ¶§	9.5 (7.2-12.5) ¶§	18,129	71.3 (69.8-72.6) ¶	16.1 (15.0-17.3) ¶	12.6 (11.6-13.7) ¶
Other	217	60.6 (45.5-73.9)	11.0 (3.5-29.6)	28.4 (17.4-42.7)	363	59.3 (45.5-71.8)	15.5 (9.2-24.9)	25.2 (13.5-42.0)	1,439	68.9 (63.6-73.7) ¶	15.0 (11.7-19.0)	16.2 (12.3-20.9) ¶	14,706	71.9 (70.0-73.7) ¶	11.9 (10.6-13.4)	16.2 (14.7-17.9) ¶
American Indian/ Alaska Native	55	50.3 (30.6-69.8)	2.0 (0.5-7.5) ¶	47.7 (28.3-67.8)	44	45.7 (20.6-73.1)	12.5 (4.7-29.4)	41.8 (18.4-69.7)	148	36.8 (26.1-48.9) ¶§	31.6 (20.2-45.9) §	31.5 (18.7-48.1) ¶	1,764	53.6 (48.4-58.8) ¶	17.4 (13.6-22.0) ¶	29.0 (23.9-34.7) ¶
Asian	52	86.0 (66.5-95.0) ¶	5.7 (1.1-25.6) §	8.3 (2.5-24.5) ¶	124	91.8 (79.4-97.0) ¶	7.4 (2.4-20.3)	0.8 (0.2-3.4) ¶	605	94.0 (89.9-96.5) ¶	5.2 (2.8-9.3) ¶	0.9 (0.4-1.9) §	6,010	91.1 (89.1-92.9) ¶	6.8 (5.2-8.8) ¶	2.1 (1.5-3.0) ¶
Native Hawaiian/ Pacific Islander	<30 [h]	.	.	46	67.3 (40.0-86.5)	28.1 (10.8-56.0)	4.5 (0.7-24.2) ¶§	123	68.7 (50.6-82.4)	17.3 (8.8-31.1)	14.0 (5.6-30.9)	1,695	71.9 (65.6-77.5)	10.4 (7.4-14.4)	17.7 (13.0-23.6)	
Multiple races/other	86	48.4 (27.6-69.7)	17.9 (4.7-49.1)	33.8 (16.2-57.4)	149	41.4 (24.1-61.1)	19.2 (8.7-37.3)	39.4 (19.4-63.8)	563	51.7 (43.6-59.7)	20.8 (14.9-28.2)	27.5 (20.4-36.0)	5,237	56.4 (53.2-59.5) ¶	16.1 (13.8-18.8) ¶	27.5 (24.5-30.7) ¶
Sex																
Male (¶ref)	2,081	54.4 (50.0-58.7) §	16.2 (13.1-19.9)	29.4 (25.4-33.7) §	2,299	59.2 (55.3-63.1)	19.8 (16.8-23.2) §	21.0 (17.7-24.7)	5,943	61.1 (58.5-63.6)	21.6 (19.6-23.8) §	17.3 (15.2-19.6) §	65,393	62.6 (61.8-63.4)	15.4 (14.7-16.0)	22.0 (21.3-22.7)
Female	601	73.7 (66.7-79.7) ¶	11.3 (7.4-16.8)	15.0 (10.4-21.2) ¶	1,148	59.9 (53.4-66.1) §	17.7 (13.9-22.3) §	22.3 (16.3-29.7) §	5,126	62.0 (59.2-64.7) §	19.3 (17.2-21.6) §	18.7 (16.4-21.3) §	67,587	74.8 (74.1-75.5) ¶	11.1 (10.6-11.7) ¶	14.1 (13.5-14.7) ¶
Age																
18-29 (¶ref)	509	37.7 (30.6-45.3) §	26.2 (18.8-35.2)	36.2 (28.4-44.7) §	878	49.1 (43.1-55.1)	24.9 (20.2-30.4)	26.0 (20.2-32.8)	3,840	54.5 (51.5-57.5)	26.6 (24.1-29.4) §	18.8 (16.3-21.6) §	24,579	52.2 (50.9-53.4)	22.3 (21.2-23.5)	25.5 (24.4-26.7)
30-39	543	51.9 (43.9-59.7) ¶§	17.4 (11.8-24.9)	30.7 (23.8-38.7) §	741	52.9 (45.4-60.3) §	23.2 (17.5-30.1) §	23.9 (17.4-31.9)	2,320	55.7 (51.8-59.6) §	24.0 (20.5-27.7) §	20.3 (17.2-23.8)	28,672	63.7 (62.5-64.8) ¶	15.4 (14.5-16.4) ¶	20.9 (19.9-22.0) ¶
40-49	498	62.1 (53.8-69.8) ¶	11.0 (6.9-17.0) ¶	26.9 (20.3-34.8)	640	63.8 (55.8-71.1) ¶	16.2 (11.7-21.8) ¶	20.1 (13.5-28.7)	1,762	63.1 (57.9-68.0) ¶§	17.1 (13.9-21.0) ¶§	19.8 (15.4-25.1)	27,499	69.3 (68.1-70.5) ¶	11.1 (10.3-12.0) ¶	19.6 (18.5-20.7) ¶

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50-64	804	70.4 (63.4-76.6) ¶§	10.3 (7.3-14.3) ¶	19.3 (13.8-26.4) ¶§	1,026	70.6 (64.2-76.3) ¶§	12.8 (9.1-17.8) ¶§	16.5 (11.8-22.7) ¶	2,553	78.0 (74.4-81.2) ¶	8.7 (6.8-11.1) ¶	13.3 (10.6-16.5) ¶	41,657	80.5 (79.6-81.4) ¶	7.8 (7.2-8.4) ¶	11.7 (11.0-12.5) ¶
65+	316	81.2 (67.0-90.2) ¶	7.3 (3.5-14.3) ¶	11.5 (4.2-28.2) ¶	170	84.4 (70.2-92.5) ¶	5.9 (1.2-24.2) ¶	9.7 (4.6-19.5) ¶	559	87.0 (75.8-93.5) ¶	3.7 (1.6-8.4) ¶	9.2 (3.6-21.7) ¶	9,724	89.6 (88.0-91.1) ¶	4.7 (3.7-6.1) ¶	5.6 (4.6-6.8) ¶
Household income																
Below poverty	204	54.3 (41.1-66.9)	23.5 (13.3-38.1)	22.3 (13.5-34.4)	327	45.8 (35.4-56.6) ¶	31.8 (22.9-42.2) ¶	22.4 (12.6-36.6)	1,596	54.6 (49.9-59.2) ¶	27.2 (23.2-31.6) ¶	18.2 (14.6-22.4)	7,701	56.1 (53.8-58.4) ¶	23.6 (21.6-25.7) ¶	20.3 (18.4-22.3) ¶
Above poverty, <$75K	875	59.5 (53.1-65.6)	15.6 (11.5-20.8)	24.9 (19.6-31.0) §	1,361	54.2 (48.8-59.4) ¶§	21.6 (17.6-26.3) ¶§	24.2 (19.4-29.9) ¶§	4,763	58.9 (56.0-61.7) ¶§	22.2 (19.9-24.7) ¶§	18.9 (16.5-21.7)	42,703	65.0 (64.0-66.0) ¶	16.3 (15.5-17.1) ¶	18.7 (17.9-19.5) ¶
Above poverty, ≥$75K (¶ref)	1,060	60.3 (54.1-66.2) §	11.1 (8.1-15.2)	28.6 (23.0-34.9) §	1,133	72.8 (67.6-77.5)	11.8 (8.8-15.6)	15.4 (11.6-20.1)	2,530	72.3 (68.3-76.1)	11.1 (8.9-13.8)	16.5 (13.3-20.4)	59,519	74.9 (74.1-75.7)	8.8 (8.2-9.3)	16.3 (15.6-17.0)
Unknown income	569	56.6 (48.3-64.5) §	16.8 (11.4-24.0)	26.6 (19.8-34.7)	663	60.0 (52.1-67.5) ¶	16.4 (11.7-22.4)	23.6 (16.8-32.2)	2,267	60.7 (56.6-64.6) ¶§	22.0 (18.7-25.7) ¶§	17.3 (14.2-20.9)	23,990	65.8 (64.5-67.1) ¶	13.6 (12.6-14.6) ¶	20.6 (19.5-21.8) ¶
Health insurance																
Insured (¶ref)	2,246	62.4 (58.4-66.3) §	13.0 (10.5-15.9)	24.6 (21.2-28.4) §	2,941	62.7 (59.1-66.2) §	17.1 (14.6-19.9) §	20.2 (17.0-23.8)	8,960	65.3 (63.2-67.3) §	17.4 (15.8-19.0) §	17.3 (15.6-19.2)	120,919	70.9 (70.3-71.5)	12.1 (11.6-12.5)	17.0 (16.6-17.5)
Not insured	382	44.9 (35.6-54.5) ¶	21.1 (14.1-30.3)	34.1 (24.9-44.6)	449	43.5 (35.0-52.3) ¶	29.4 (22.0-38.0) ¶	27.2 (18.5-38.0)	1,838	47.1 (42.8-51.4) ¶	33.0 (28.9-37.3) ¶§	19.9 (16.4-24.0) §	9,847	48.7 (46.8-50.6) ¶	23.6 (21.8-25.4) ¶	27.8 (26.0-29.6) ¶
Foreign born status																
Foreign born	311	63.0 (51.4-73.3) §	21.6 (13.8-32.1)	15.4 (7.9-27.9) ¶	511	73.1 (64.7-80.2) ¶	21.9 (15.2-30.5)	4.9 (2.8-8.7) ¶	1,597	74.2 (69.2-78.7) ¶	20.5 (16.4-25.3) §	5.3 (3.3-8.4) ¶	17,331	78.2 (76.7-79.6) ¶	15.0 (13.7-16.3) ¶	6.9 (6.0-7.8) ¶
Not foreign born (¶ref)	2,258	57.8 (53.7-61.7) §	13.4 (10.9-16.4)	28.9 (25.2-32.8) §	2,799	57.0 (53.2-60.8) §	18.2 (15.7-21.1) §	24.7 (21.1-28.7) §	9,021	59.4 (57.4-61.5) §	20.4 (18.8-22.1) §	20.1 (18.3-22.1)	111,059	67.3 (66.7-67.9)	12.8 (12.4-13.3)	19.8 (19.3-20.4)
Language of interview																
English (¶ref)	2,545	58.1 (54.3-61.8) §	13.6 (11.3-16.4)	28.3 (24.8-32.0) §	3,351	59.3 (55.8-62.7) §	18.0 (15.7-20.6) §	22.7 (19.5-26.2) §	10,807	61.2 (59.3-63.1) §	20.1 (18.6-21.7) §	18.7 (17.1-20.4)	132,232	68.6 (68.0-69.1)	12.9 (12.5-13.3)	18.5 (18.1-19.0)
Spanish	160	61.2 (47.5-73.3)	23.8 (14.2-37.0)	15.0 (6.9-29.6) ¶	120	66.3 (48.5-80.5)	32.5 (18.5-50.6)	1.2 (0.3-4.1) ¶§	278	66.0 (55.5-75.1)	33.1 (24.0-43.7) ¶	0.9 (0.3-2.5) ¶§	1,407	64.2 (59.4-68.7)	31.2 (26.8-36.0) ¶	4.6 (3.1-6.9) ¶
Other	<30	.	.	.	--	.	.	.	71	98.1 (93.0-99.5) ¶§	1.3 (0.2-7.0) ¶§	0.5 (0.1-3.5) ¶	274	83.9 (74.9-90.1) ¶	11.9 (6.7-20.2)	4.2 (1.6-10.5) ¶
Comorbidities																
Yes (any)	552	75.7 (68.0-82.0) ¶	10.5 (6.3-16.8)	13.8 (9.1-20.4) ¶	788	64.9 (57.4-71.7) §	18.8 (13.7-25.3) §	16.3 (10.8-23.9)	2,621	71.1 (67.2-74.7) ¶§	14.9 (12.4-17.8) ¶§	14.0 (11.0-17.7) ¶	33,614	78.3 (77.2-79.2) ¶	9.8 (9.1-10.5) ¶	12.0 (11.2-12.8) ¶
No (¶ref)	2,124	55.3 (51.0-59.4) §	15.7 (12.8-19.2)	29.0 (25.2-33.2) §	2,666	59.0 (55.2-62.7) §	18.9 (16.2-21.9) §	22.1 (18.8-25.9)	8,405	59.1 (57.0-61.2) §	21.9 (20.2-23.8) §	19.0 (17.2-20.9)	99,157	65.6 (65.0-66.3)	14.2 (13.7-14.7)	20.1 (19.6-20.7)
Urbanicity																
MSA, principal city (¶ref)	443	66.7 (57.7-74.7)	13.9 (7.8-23.6)	19.4 (13.9-26.4)	1,009	66.7 (59.9-72.9)	15.7 (11.8-20.6)	17.6 (12.1-24.8)	3,621	65.9 (62.7-69.0) §	20.9 (18.2-23.8) §	13.2 (11.0-15.8)	40,761	72.7 (71.7-73.7)	13.4 (12.6-14.2)	13.9 (13.1-14.7)
MSA, non-principal city	1,132	60.5 (54.8-65.9) §	14.4 (10.9-18.8)	25.1 (20.2-30.7) §	1,661	60.2 (55.4-64.9) §	20.6 (17.2-24.5) §	19.2 (15.0-24.2)	5,298	62.5 (59.9-65.0) §	20.0 (18.0-22.1) §	17.5 (15.4-19.9) ¶	66,381	68.8 (68.0-69.5) ¶	13.2 (12.6-13.8)	18.0 (17.4-18.7) ¶
Non-MSA	1,133	50.0 (44.1-55.9) ¶§	17.3 (13.4-22.0)	32.7 (27.1-38.9) ¶	814	47.8 (41.1-54.6) ¶§	18.9 (14.0-25.2)	33.3 (27.2-39.9) ¶	2,237	49.4 (44.7-54.1) ¶§	21.3 (17.7-25.4) §	29.3 (24.6-34.4) ¶	26,771	58.8 (57.4-60.2) ¶	13.2 (12.2-14.3)	28.0 (26.7-29.3) ¶

Month of interview																
May (¶ref)	523	49.2 (41.3-57.1) §	17.9 (13.0-24.1)	32.9 (25.7-41.0) §	703	47.8 (41.2-54.5) §	28.4 (22.5-35.1) §	23.8 (18.6-29.9)	2,076	49.2 (45.2-53.3) §	34.2 (30.3-38.4) §	16.6 (13.6-20.0) §	22,650	58.3 (57.0-59.7)	20.3 (19.1-21.5)	21.4 (20.2-22.6)
June	350	53.0 (42.5-63.3)	15.9 (9.5-25.5)	31.1 (21.7-42.4)	471	49.8 (39.9-59.8) §	18.4 (12.7-26.0) ¶	31.7 (21.4-44.2)	1,392	57.1 (51.8-62.2) ¶	25.8 (21.3-30.8) ¶§	17.2 (13.3-22.0)	16,587	61.0 (59.4-62.6) ¶	18.0 (16.6-19.5) ¶	21.0 (19.7-22.4)
July	434	58.1 (48.7-66.8)	20.7 (13.4-30.6)	21.2 (15.0-29.0) ¶	548	58.5 (49.9-66.6)	19.1 (13.6-26.1) ¶	22.4 (15.1-31.9)	1,809	57.2 (52.4-61.9) ¶§	21.1 (17.3-25.5) ¶§	21.7 (17.7-26.4)	21,447	63.9 (62.5-65.3) ¶	15.1 (14.1-16.3) ¶	21.0 (19.7-22.3)
August	393	62.0 (53.2-70.1) ¶	14.3 (9.4-21.3)	23.7 (16.8-32.3)	457	71.2 (63.0-78.3) ¶	11.5 (7.3-17.7) ¶	17.2 (11.4-25.2)	1,501	65.0 (60.3-69.4) ¶	18.8 (15.3-22.8) ¶§	16.2 (12.8-20.4)	18,335	68.3 (66.9-69.7) ¶	13.4 (12.3-14.5) ¶	18.3 (17.2-19.6) ¶
September	374	64.2 (54.1-73.1) ¶	14.5 (8.5-23.6)	21.3 (14.6-30.1) ¶	518	63.1 (54.5-71.0) ¶§	19.3 (12.9-27.8) §	17.6 (11.8-25.4)	1,677	63.8 (59.1-68.2) ¶§	17.1 (13.9-20.8) ¶§	19.1 (15.2-23.8)	20,636	73.0 (71.8-74.3) ¶	11.2 (10.3-12.2) ¶	15.7 (14.7-16.8) ¶
October	438	71.5 (62.2-79.4) ¶	9.2 (5.4-15.2) ¶	19.3 (12.6-28.3) ¶	551	66.1 (58.6-72.8) ¶§	14.8 (10.2-21.0) ¶§	19.1 (13.8-25.8)	1,832	68.6 (63.6-73.2) ¶§	13.9 (10.8-17.8) ¶§	17.5 (13.5-22.2)	22,782	76.4 (75.1-77.6) ¶	8.0 (7.2-8.8) ¶	15.7 (14.6-16.8) ¶
November	196	59.4 (46.3-71.3) §	10.3 (4.0-23.9)	30.3 (19.8-43.4) §	236	72.5 (60.8-81.8) ¶	16.5 (9.3-27.8) ¶§	11.0 (5.6-20.2) ¶	869	73.0 (66.5-78.6) ¶	10.0 (6.9-14.2) ¶	17.1 (12.1-23.5)	11,476	79.2 (77.5-80.8) ¶	6.6 (5.6-7.8) ¶	14.2 (12.9-15.7) ¶

[a] Weighted percents.
[b] Vaccination status and intent is among those who answered both the vaccination question (Have you received at least one dose of a COVID-19 vaccine?) and the intent question (How likely are you to get a COVID-19 vaccine? Would you say you would definitely get a vaccine, probably get a vaccine, probably not get a vaccine, definitely not get a vaccine, or are not sure?).
[c] Respondents who self-reported having at least one dose of a COVID-19 vaccine.
[d] Respondents who self-reported that they "Definitely plan to get vaccinated" or "Probably will get vaccinated or unsure.'"
[e] Respondents who self-reported that they "Probably or definitely will not get vaccinated."
[f] Race and ethnicity were assessed by the following two questions: "Are you of Hispanic or Latino origin?" and "Now, I am going to read a list of categories. Please choose one or more of the following categories to describe your race. Are you White, Black or African American, American Indian, Alaska Native, Asian, Native Hawaiian or other Pacific Islander?" Persons were categorized into mutually exclusive categories of race and ethnicity; persons who did not identify as Hispanic were categorized by their reported race or races.
[g] "Non–food system essential workers" included healthcare, social service, preschool or daycare, K-12 school, other schools and instructional settings, first response, death care, correctional facility, non-food manufacturing facility, public transit; and United States Postal Service. NIS Adult COVID Module (NIS-ACM) Hard Copy Questionnaire: Q3/2021 (cdc.gov)
[h] Cells with denominator n <30 are suppressed.
¶ Statistically significant at p <0.05 compared with the referent group (Differences within worker group).
§ Statistically significant at p <0.05 compared with the referent group (Differences compared with non-food system workers).

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Table A2. Attitudes and Perceptions of COVID-19 Vaccine Uptake among Food System (FS) and Non–Food System (NFS) Essential Workers, by Sociodemographic Characteristics, National Immunization Survey Adult COVID Module, April 22–November 27, 2021

	Agriculture, forestry, fishing, or hunting (AFFH)				Food Manufacturing Facility (FMF)				Food and Beverage Store (FBS)				Non–Food System (NFS) [e] (§ref)			
	n	Concerned about getting COVID-19[b]	Thinks a COVID-19 vaccine is safe[c]	Thinks a COVID-19 vaccine is important protection[d]	*n*	Concerned about getting COVID-19[b]	Thinks a COVID-19 vaccine is safe[c]	Thinks a COVID-19 vaccine is important protection[d]	*n*	Concerned about getting COVID-19[b]	Thinks a COVID-19 vaccine is safe[c]	Thinks a COVID-19 vaccine is important protection[d]	*n*	Concerned about getting COVID-19[b]	Thinks a COVID-19 vaccine is safe[c]	Thinks a COVID-19 vaccine is important protection[d]
		%[a] (95% CI)				%[a] (95% CI)				%[a] (95% CI)				%[a] (95% CI)		
Overall	2,730	29.9 (26.6-33.4) §	49.8 (46.0-53.6) §	67.4 (63.8-70.8) §	3,495	35.7 (32.7-38.7) §	55.4 (52.1-58.7)	72.0 (68.6-75.2) §	11,189	37.0 (35.3-38.8) §	56.5 (54.5-58.4)	77.2 (75.4-78.8)	134,375	39.0 (38.5-39.5)	57.5 (56.9-58.1)	75.6 (75.0-76.1)
Race/Ethnicity																
White, non-Hispanic (¶ref)	1,926	25.0 (21.5-28.8) §	50.6 (46.1-55.1) §	61.1 (56.6-65.3) §	2,064	28.3 (24.9-31.9) §	56.6 (52.4-60.8)	70.7 (66.6-74.5)	6,344	30.5 (28.4-32.6) §	58.7 (56.1-61.3)	73.4 (70.9-75.8)	80,835	33.0 (32.3-33.6)	59.9 (59.2-60.7)	72.1 (71.4-72.7)
Black, non-Hispanic	97	55.4 (36.6-72.7) ¶	42.3 (26.1-60.3)	75.1 (50.6-89.9)	349	50.9 (40.4-61.4) ¶	52.1 (42.7-61.3)	70.0 (57.4-80.2) §	1,242	44.4 (39.4-49.6) ¶§	46.3 (40.9-51.8) ¶	77.7 (72.7-82.0)	17,057	54.4 (52.9-55.9) ¶	50.1 (48.5-51.7) ¶	82.4 (81.0-83.7) ¶
Hispanic	396	38.5 (30.4-47.3) ¶	50.4 (41.6-59.3)	86.0 (79.2-90.8) ¶	619	44.7 (37.7-51.8) ¶	56.3 (48.8-63.4)	80.9 (73.6-86.5) ¶	1,925	47.2 (43.1-51.3) ¶	55.4 (51.1-59.6)	86.3 (83.1-89.0) ¶§	18,172	44.8 (43.3-46.2) ¶	57.2 (55.7-58.7) ¶	82.3 (81.1-83.4) ¶
Other	221	32.4 (20.2-47.6)	52.2 (37.6-66.3)	60.2 (46.0-72.8) §	366	41.8 (30.6-53.9) ¶	50.3 (37.1-63.4)	61.7 (47.1-74.4) §	1,443	45.1 (39.9-50.4) ¶	58.9 (53.3-64.2)	79.9 (74.8-84.2) ¶	14,770	45.8 (44.0-47.6) ¶	56.9 (54.9-58.8) ¶	78.8 (77.1-80.4) ¶
American Indian/ Alaska Native	56	15.9 (7.8-29.8) §	38.4 (20.8-59.7)	46.1 (27.2-66.1)	45	32.5 (12.0-63.0)	22.9 (8.8-47.9) ¶	29.8 (13.9-52.9) ¶§	150	36.0 (24.0-49.9)	46.8 (33.5-60.5)	65.3 (50.0-77.9)	1,774	38.3 (33.6-43.1) ¶	43.3 (38.6-48.1) ¶	63.1 (57.8-68.1) ¶
Asian	52	43.9 (20.8-69.9)	84.3 (68.0-93.1) ¶§	80.4 (56.1-92.9) ¶	124	67.1 (50.3-80.5) ¶	77.3 (60.1-88.5) ¶	98.3 (95.2-99.4) ¶§	605	55.4 (47.0-63.4) ¶	71.9 (64.1-78.6) ¶	95.6 (86.4-98.7) ¶	6,012	56.3 (53.5-59.0) ¶	71.0 (68.4-73.6) ¶	94.8 (93.3-95.9) ¶
Native Hawaiian/ Pacific Islander	<30	[f]	--	--	46	32.4 (13.5-59.5)	68.5 (39.3-87.9)	71.8 (43.2-89.5)	123	34.1 (19.4-52.7) §	56.5 (36.6-74.4)	81.0 (62.9-91.5)	1,702	53.8 (47.1-60.3) ¶	46.5 (39.7-53.4) ¶	80.6 (75.1-85.1) ¶
Multiple races/other	89	32.5 (14.9-57.0)	39.7 (21.0-61.9)	54.1 (32.7-74.1)	151	30.2 (16.2-49.1)	36.5 (19.9-57.1)	46.3 (27.3-66.5) ¶	565	38.3 (30.6-46.7)	48.2 (39.9-56.7) ¶	68.1 (59.7-75.5)	5,282	35.6 (32.8-38.5)	46.2 (43.1-49.4) ¶	65.7 (62.5-68.7) ¶
Sex																
Male (¶ref)	2,099	26.4 (22.7-30.3) §	48.2 (43.8-52.6) §	63.6 (59.3-67.7) §	2,309	33.3 (29.8-37.0)	57.0 (53.1-60.8)	72.4 (68.7-75.8)	5,961	33.3 (31.1-35.6)	59.1 (56.5-61.7) §	76.6 (74.2-78.9) §	65,671	32.2 (31.5-33.0)	55.0 (54.1-55.8)	69.9 (69.1-70.7)
Female	602	42.7 (35.6-50.1) ¶	56.2 (48.4-63.7)	81.7 (75.6-86.6) ¶	1,148	41.0 (35.4-46.8) ¶	52.2 (45.9-58.3) §	71.9 (64.7-78.2) §	5,140	41.1 (38.5-43.7) ¶§	53.3 (50.5-56.1) ¶§	77.7 (75.0-80.1) §	67,727	46.1 (45.3-46.8) ¶	60.3 (59.5-61.1) ¶	81.7 (81.1-82.4) ¶
Age																
18-29 =(¶ref)	512	22.0 (16.1-29.2)	34.6 (27.5-§42.3)	59.3 (51.1-67.0) §	878	29.8 (24.7-35.4)	47.4 (41.6-53.2)	64.2 (57.5-70.5)	3,848	32.9 (30.3-35.7) §	56.9 (53.8-59.8) §	76.2 (73.3-78.8) §	24,636	28.7 (27.7-29.8)	48.0 (46.8-49.3)	67.7 (66.5-68.9)
30-39	547	28.6 (21.7-36.8) §	44.4 (36.4-52.7) §	61.8 (53.8-69.2) §	746	34.5 (27.7-42.0)	52.1 (44.9-59.1)	70.8 (64.1-76.8)	2,328	35.2 (31.6-38.9)	51.2 (47.2-55.2) ¶	74.8 (71.1-78.1)	28,757	37.7 (36.6-38.8) ¶	54.3 (53.1-55.5) ¶	72.4 (71.3-73.5) ¶
40-49	500	30.1 (23.0-38.2) §	45.7 (37.0-54.8) §	65.0 (56.3-72.8) §	642	40.7 (33.9-47.9) ¶	55.5 (47.3-63.3)	75.1 (66.5-82.2) ¶	1,772	39.2 (34.7-43.9) ¶	52.0 (46.7-57.2)	73.6 (68.1-78.4)	27,601	40.8 (39.6-42.0) ¶	56.8 (55.5-58.0) ¶	74.2 (73.0-75.3) ¶
50-64	808	36.9 (30.4-43.8) ¶§	60.6 (53.2-67.6) ¶	75.7 (68.7-81.6) ¶§	1,027	40.6 (35.0-46.5) ¶	64.5 (57.8-70.7) ¶	77.6 (71.0-83.0) ¶	2,558	46.4 (42.5-50.3) ¶	63.1 (59.0-67.0) ¶	83.8 (80.5-86.6) ¶	41,781	45.1 (44.0-46.1) ¶	64.7 (63.7-65.7) ¶	82.5 (81.6-83.3) ¶

65+	319	33.1 (23.1-44.9) §	76.9 (67.1-84.4) ¶	84.0 (75.0-90.2) ¶	172	30.2 (20.1-42.6) §	73.9 (59.4-84.6) ¶	87.3 (76.8-93.4) ¶	559	42.1 (34.0-50.7) ¶	67.9 (57.9-76.4) ¶	88.7 (77.0-94.9) ¶	9,751	47.2 (45.0-49.4) ¶	74.6 (72.6-76.6) ¶	90.8 (89.4-92.0) ¶
Household income																		
Below poverty	204	48.7 (35.9-61.7) ¶	48.3 (34.9-61.9)	77.5 (65.5-86.2)	327	34.4 (25.2-44.9)	49.8 (40.0-59.6) ¶	77.5 (69.1-84.2)	1,603	40.8 (36.3-45.3)	48.4 (43.7-53.2) ¶	78.5 (74.4-82.1)	7,741	42.2 (40.1-44.4) ¶	46.2 (43.9-48.5) ¶	74.9 (72.8-76.9) ¶
Above poverty, <$75K	880	31.4 (26.0-37.4) §	49.3 (42.9-55.8)	69.1 (62.9-74.7)	1,366	35.0 (30.3-39.9)	50.0 (44.7-55.2) ¶	67.8 (62.0-73.1) ¶§	4,775	37.4 (34.8-40.0)	54.8 (51.8-57.7) ¶	76.4 (73.6-79.1)	42,799	39.5 (38.6-40.4)	54.6 (53.6-55.6) ¶	75.1 (74.2-76.0) ¶
Above poverty, ≥$75K (¶ref)	1,064	27.7 (22.8-33.1) §	56.3 (50.1-62.3) §	67.5 (61.5-73.0) §	1,137	35.4 (30.4-40.8)	67.3 (61.7-72.4)	77.7 (72.7-82.1)	2,537	34.9 (31.4-38.7)	67.2 (63.1-71.0)	78.8 (74.8-82.3)	59,647	38.7 (38.0-39.5)	65.0 (64.2-65.9)	77.9 (77.2-78.7)
Unknown income	582	22.9 (17.3-29.8) §	41.1 (33.3-49.4) ¶§	60.1 (52.1-67.6) §	665	38.2 (31.5-45.4)	51.1 (43.1-59.1) ¶	68.7 (60.1-76.2)	2,274	35.8 (32.2-39.5)	53.6 (49.4-57.7) ¶	75.8 (71.9-79.3) §	24,188	37.4 (36.2-38.6)	50.3 (48.9-51.6) ¶	71.6 (70.4-72.9) ¶
Health insurance																		
Insured (¶ref)	2,260	30.2 (26.7-33.9) §	51.6 (47.5-55.8) §	66.9 (63.0-70.7) §	2,949	36.3 (33.1-39.6)	56.7 (53.2-60.1)	73.3 (69.8-76.6)	8,983	37.8 (35.9-39.8)	58.5 (56.3-60.6)	78.1 (76.1-80.0)	121,290	39.7 (39.1-40.2)	59.3 (58.7-60.0)	76.8 (76.3-77.3)
Not insured	386	29.4 (21.1-39.4)	44.9 (35.1-55.0)	69.9 (60.6-77.9)	452	31.8 (24.3-40.3)	48.8 (39.0-58.7)	66.2 (55.8-75.3)	1,845	34.4 (30.5-38.6)	49.0 (44.5-53.5) ¶§	73.6 (69.4-77.4) §	9,897	34.3 (32.5-36.1) ¶	43.2 (41.3-45.2) ¶	66.3 (64.4-68.1) ¶
Foreign born status																		
Foreign born	313	44.1 (33.9-54.9) ¶	55.1 (44.4-65.4)	92.3 (87.8-95.2) ¶§	512	50.6 (42.5-58.8) ¶	63.6 (55.1-71.3) ¶	88.7 (81.6-93.3) ¶	1,600	47.4 (42.6-52.3) ¶	61.7 (56.6-66.6) ¶	89.5 (85.6-92.4) ¶	17,361	50.2 (48.6-51.8) ¶	63.0 (61.4-64.6) ¶	87.8 (86.6-88.9) ¶
Not foreign born (¶ref)	2,274	27.8 (24.4-31.5) §	49.4 (45.3-53.6) §	62.2 (58.1-66.1) §	2,808	33.1 (29.9-36.5) §	53.9 (50.2-57.6)	68.7 (64.8-72.3) §	9,048	35.2 (33.4-37.1) §	55.8 (53.7-58.0)	75.1 (73.1-77.0)	111,443	37.4 (36.9-38.0)	57.2 (56.6-57.9)	74.0 (73.4-74.5)
Language of interview																		
English (¶ref)	2,565	29.3 (26.1-32.9) §	50.4 (46.4-54.3) §	62.9 (59.0-66.5) §	3,361	35.1 (32.1-38.2) §	55.1 (51.7-58.5)	70.9 (67.4-74.1) §	10,837	37.1 (35.4-38.9) §	56.2 (54.3-58.2)	76.5 (74.6-78.2)	132,679	39.1 (38.5-39.6)	57.6 (57.0-58.1)	75.3 (74.8-75.8)
Spanish	162	32.7 (22.0-45.6)	45.9 (33.5-58.8)	93.3 (86.8-96.7) ¶§	121	43.3 (28.4-59.5)	63.1 (46.6-77.0)	88.1 (70.7-95.8) ¶	281	35.4 (26.3-45.7)	62.4 (52.3-71.6)	91.8 (85.0-95.7) §	1,420	31.7 (27.6-36.3) ¶	53.9 (48.9-58.9)	85.1 (81.0-88.4) ¶
Other	<30	--	--	--	<30	--	--	--	71	37.5 (21.7-56.5)	57.0 (34.8-76.7)	100.0 (99.8-100.0) §	276	58.4 (47.0-69.1) ¶	56.4 (44.5-67.5)	96.8 (93.4-98.5) ¶
Comorbidities																		
Yes (any)	553	41.9 (34.3-49.9) ¶§	60.4 (52.1-68.2) ¶	77.5 (69.6-83.8) ¶	790	45.8 (39.2-52.5) ¶	60.2 (52.6-67.4)	77.1 (69.2-83.5)	2,627	52.4 (48.5-56.2) ¶	59.7 (55.6-63.6)	83.9 (80.2-87.0) ¶	33,678	52.5 (51.4-53.6) ¶	63.0 (61.8-64.1) ¶	84.3 (83.4-85.2) ¶
No (¶ref)	2,142	27.3 (23.7-31.3) §	47.8 (43.5-52.1) §	65.4 (61.4-69.3) §	2,674	33.0 (29.7-36.5)	54.4 (50.8-58.1)	71.0 (67.3-74.4)	8,429	32.8 (31.0-34.8)	55.6 (53.4-57.8)	75.4 (73.4-77.4) §	99,484	34.7 (34.1-35.3)	55.9 (55.2-56.6)	73.0 (72.3-73.6)
Urbanicity																		
MSA, principal city (¶ref)	451	38.2 (30.1-47.1)	59.8 (50.9-68.1)	75.8 (68.5-81.9)	1,012	43.6 (37.6-49.9)	56.9 (50.1-63.4)	74.8 (67.6-80.8)	3,629	41.1 (38.1-44.2)	58.6 (55.4-61.8)	81.6 (78.7-84.2)	40,890	43.5 (42.5-44.5)	61.0 (60.0-62.1)	80.7 (79.8-81.5)
MSA, non-principal city	1,140	29.8 (25.1-35.0) §	47.5 (42.0-53.2) ¶§	69.0 (63.4-74.1) §	1,666	36.1 (32.0-40.4)	58.9 (54.5-63.2)	74.4 (69.7-78.5)	5,313	36.0 (33.7-38.4) ¶	58.1 (55.4-60.7)	77.7 (75.2-80.0) ¶	66,601	38.2 (37.5-39.0) ¶	57.8 (57.0-58.6) ¶	75.6 (74.9-76.3) ¶
Non-MSA	1,139	24.7 (20.2-29.8) ¶§	47.0 (41.0-53.1) ¶	59.0 (53.2-64.6) ¶	817	22.3 (17.9-27.3) ¶§	43.1 (35.9-50.5) ¶	61.1 (54.1-67.7) ¶	2,247	32.1 (28.1-36.5) ¶	45.9 (41.0-50.9) ¶	65.9 (60.7-70.7) ¶	26,884	32.6 (31.3-33.8) ¶	48.8 (47.3-50.2) ¶	64.8 (63.4-66.1) ¶
Month of interview																		
May (¶ref)	525	30.8 (23.9-38.7)	42.6 (34.8-50.8) §	64.4 (56.1-71.9) §	704	32.4 (26.4-38.9)	54.4 (47.3-61.3)	71.4 (64.7-77.2)	2,081	37.9 (34.0-42.0) §	54.2 (49.9-58.5)	79.2 (75.5-82.4) §	22,715	33.5 (32.3-34.8)	55.7 (54.3-57.0)	74.4 (73.1-75.6)

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June	353	22.5 (14.7-32.9)	48.6 (38.3-59.0)	70.9 (61.2-79.1)	473	24.0 (17.4-32.1)	52.8 (43.5-62.0)	68.9 (57.7-78.3)	1,399	29.4 (24.9-34.2) ¶	57.8 (52.3-63.1)	78.0 (73.0-82.3)	16,624	29.3 (27.9-30.8) ¶	55.6 (53.9-57.2)	73.7 (72.2-75.2)
July	436	28.8 (20.8-38.4)	49.2 (39.9-58.6)	75.7 (68.4-81.8) ¶	551	33.5 (26.4-41.4)	53.2 (44.4-61.7)	70.4 (61.0-78.3)	1,813	34.3 (30.1-38.8)	53.7 (48.8-58.5)	77.0 (72.6-80.9)	21,519	33.5 (32.2-34.7)	55.3 (53.9-56.7)	74.0 (72.7-75.3)
August	399	27.9 (21.0-35.9) §	54.6 (45.7-63.2)	64.1 (55.3-72.1) §	460	41.8 (34.2-49.8)	60.4 (52.0-68.3)	77.4 (69.2-84.0)	1,504	37.7 (33.6-42.1) §	54.2 (49.4-58.9)	77.9 (73.3-81.8)	18,401	44.3 (42.9-45.7) ¶	55.1 (53.6-56.5)	76.2 (74.9-77.4)
September	375	41.2 (31.4-51.7)	53.5 (43.0-63.6)	63.8 (53.5-73.0) §	520	43.3 (35.9-51.1) ¶	54.5 (46.1-62.7)	73.6 (64.5-81.0)	1,683	43.2 (38.9-47.6)	53.6 (48.9-58.2) §	76.2 (71.5-80.3)	20,715	47.0 (45.7-48.3) ¶	58.8 (57.4-60.1) ¶	76.6 (75.4-77.8) ¶
October	445	41.0 (31.8-50.9)	56.7 (46.1-66.7) ¶	66.1 (55.8-75.1) §	551	36.4 (29.8-43.5) §	52.4 (44.7-60.0) §	68.3 (60.9-75.0) §	1,839	40.4 (36.2-44.8)	61.8 (57.0-66.4) ¶	74.5 (69.4-78.9)	22,876	44.3 (43.0-45.6) ¶	61.1 (59.7-62.5) ¶	77.3 (76.1-78.5) ¶
November	197	23.4 (15.8-33.3) §	46.7 (34.6-59.2) §	64.6 (51.5-75.8)	236	45.3 (34.1-57.0)	62.6 (50.2-73.5)	76.5 (64.2-85.5)	870	36.6 (31.0-42.5)	60.5 (54.0-66.6)	77.3 (70.7-82.8)	11,525	41.3 (39.5-43.1) ¶	60.9 (59.0-62.7) ¶	76.8 (75.0-78.4) ¶

[a] Weighted percents.
[b] Respondents who answered "very concerned" or "moderately concerned" about getting COVID-19
[c] Respondents who reported that the COVID-19 vaccine is "completely safe" or "very safe"
[d] Respondents who reported the COVID-19 vaccine is "very important" or "somewhat important" to protect yourself against COVID-19
[e] "Non–food system essential workers" included healthcare, social service, preschool or daycare, K-12 school, other schools and instructional settings, first response, death care, correctional facility, non-food manufacturing facility, public transit, and United States Postal Service. NIS Adult COVID Module (NIS-ACM) Hard Copy Questionnaire: Q3/2021 (cdc.gov)
[b-d] Vaccination status/intent was not a prerequisite for questions about attitudes, and respondents could answer regardless of vaccination status
[f] Cells with denominator $n < 30$ are suppressed.
¶ Statistically significant at $p < 0.05$ compared with the referent group (Differences within worker group)
§ Statistically significant at $p < 0.05$ compared with the referent group (differences compared with non–food system workers).

Appendix B.

Table B1. At-a-Glance of Statistically Significant Differences: Overall % of Food System (FS) Workers Reporting Vaccine Uptake, Intent, Attitudes/Beliefs, and Experiences, Compared with Non–Food System (NFS) Workers, National Immunization Survey Adult COVID Module, April 22–November 27, 2021

Vaccine Outcome and Direction of Finding	AFFH	FMF	FBS
Lower percentage (%) workers vaccinated with ≥1 dose	X	X	X
Higher % workers reachable		X	X
Higher % workers reluctant	X		
Lower % workers report concern about getting COVID-19	X	X	X
Lower % workers report the vaccine is important for protection	X	X	
Lower % workers report the vaccine is safe	X		
Higher % unvaccinated workers report trouble getting appointment online			X
Higher % unvaccinated workers report it is hard to get to vaccination sites			X

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Table B2. At-a-glance of Statistically Significant Differences: Similarities between Food System (FS) and Non-Food System (NFS) Worker Sociodemographic Subgroups for COVID-19 Vaccine Coverage and Intent, and Concern about Getting COVID-19, May-November 2021

Vaccine Outcomes	Vaccinated ≥1 Dose	Unvaccinated, Reachable	Unvaccinated, Reluctant	Concerned about getting COVID-19
Worker Groups	**FS [AFFH, FMF, FBS] and NFS**			
FS and NFS Sociodemographic Subgroups with Significant Differences Compared with Workers in the Same Group	Significantly higher percentages of these FS and NFS workers reported having ≥1 dose compared to same worker group reference: • Asian workers compared to NH-W • Workers aged 40-65+ compared with 18-29	Significantly higher percentages of these FS and NFS workers were considered reachable compared to same worker group reference: • Workers aged 40-65+ compared with 18-29	Significantly higher percentages of these FS and NFS workers were considered reluctant compared to same worker group reference: • Workers residing in non-MSA compared with principal city MSA	Significantly higher percentages of these FS and NFS workers reported concern about getting COVID-19 compared to same worker group reference: • NH-B workers compared with NH-W • Hispanic workers compared with NH-W • Female workers compared with male • Workers aged 50-64 compared with 18-29 • Foreign born workers compared with non-foreign born • Workers with any comorbidities compared with none
	Significantly lower percentages of these FS and NFS workers reported having ≥1 dose compared to same worker group reference: • Uninsured workers compared with insured workers • Workers residing in non-MSA compared with principal city MSA		Significantly lower percentages of these FS and NFS workers were considered reluctant compared to same worker group reference: • Hispanic workers compared with NH-W • Workers aged 50-64 compared with 18-29 • Workers who had a Spanish interview compared with English interview	Significantly lower percentages of these FS and NFS workers reported concern about getting COVID-19 compared to same worker group reference: • Workers residing in non-MSA compared with principal city MSA

Table B3. At-a-Glance of Statistically Significant Differences: COVID-19 Vaccination Coverage and Intent, Overall and by Sociodemographic Characteristics, Food System (FS) Workers Compared with Non–Food System (NFS) Workers, May–November 2021

Vaccine Uptake and Demand Outcomes	Vaccinated ≥1 Dose	Unvaccinated, Reachable	Unvaccinated, Reluctant
FS Worker Group(s)	AFFH, FMF, FBS	FMF, FBS	AFFH
Overall, FS worker groups compared with NFS	Significantly **lower percent (%) of** AFFH, FMF, FBS workers were vaccinated with ≥1 dose	Significantly **higher % of** FMF or FBS workers were unvaccinated and reachable	Significantly **higher % of** AFFH workers were unvaccinated and reluctant
FS sociodemographic subgroups with significant differences compared with NFS [a]	*Lower % NH-W*	*Higher % NH-White*	*Higher %* NH-White
	Lower % those 30-39 years	Higher % Hispanic	Higher % male
	Lower % insured	*Higher % ages 30-39*	Higher % 18-29
	Lower % non foreign born	Higher % below poverty <75K	*Higher % 30-39*
	Lower % without comorbidities	Higher % male	Higher % 50-64
	Lower % residing in a non-principal city MSA	Higher % female	Higher % below poverty <75k
	Lower % residing in non-MSA	*Higher % insured*	Higher % above poverty ≥75k
		Higher % not foreign born	*Higher % insured*
		Higher % with comorbidities	*Higher % non foreign born*
		Higher % without comorbidities	*Higher % without comorbidities*
			Higher % reside in non-principal city MSA

[a] Results for uptake and reachable FS workers compared to NFS by sociodemographic groups are included if the significant finding for a subgroup was consistently noted for all worker groups described in corresponding overall results compared with NFS workers. Italicized subgroups in all three columns indicate those that were consistently noted for all three outcomes- uptake, reachable, and reluctant. For example, significantly lower percentages of FS workers were vaccinated compared with NFS workers, and significantly higher percentages of FMF and FBS workers were unvaccinated but reachable. Significantly lower percentages of NH-W FS workers were vaccinated, but significantly higher percentages of NH-W FMF and FBS workers were unvaccinated but reachable, whereas significantly higher percentages of NH-W AFFH workers were unvaccinated but reluctant.

Table B4. Overall Experiences and Difficulties with Getting the COVID-19 Vaccine among Food System (FS) and Non–Food System (NFS) Essential Workers, by Vaccination Status and Month of First Vaccination, or Month of Interview, National Immunization Survey Adult COVID Module, April 22–November 27, 2021

	Agriculture, Forestry, Fishing, or Hunting (AFFH)						Food Manufacturing Facility (FMF)						Food and Beverage Store (FBS)						Non-Food System [d] (§Ref)					
	n	Difficulty getting vaccinated [b]	Difficulty getting an appointment online [c]	Difficulty with not knowing where to get [bd]vaccinated	Hard to get to vaccination sites [e]	Sites are not open at convenient times [f]	*n*	Difficulty getting vaccinated [b]	Difficulty getting an appointment online [c]	Difficulty with not knowing where to get [bd]vaccinated	Hard to get to vaccination sites [e]	Sites are not open at convenient times [f]	*n*	Difficulty getting vaccinated [b]	Difficulty getting an appointment online [c]	Difficulty with not knowing where to get [bd]vaccinated	Hard to get to vaccination sites [e]	Sites are not open at convenient times [f]	*n*	Difficulty getting vaccinated [b]	Difficulty getting an appointment online [c]	Difficulty with not knowing where to get [bd]vaccinated	Hard to get to vaccination sites [e]	Sites are not open at convenient times [f]
		% (95% CI)						% (95% CI)						% (95% CI)						% (95% CI)				
Month of First Vaccine, Vaccinated (≥1 dose)																								
Overall (¶ref)	1,772	14.1 (11.0-17.9)	15.8 (12.7-19.4)	7.5 (5.6-10.1)	3.5 (2.2-5.4)	6.6 (4.5-9.4)	2,440	15.5 (12.8-18.5)	17.1 (14.5-20.0)	6.7 (5.1-8.9)	3.9 (2.7-5.7)	6.2 (4.7-8.1)	8,014	13.4 (12.0-15.0)	16.2 (14.7-17.8)	8.2 (7.1-9.4)	5.8 (4.9-6.9)	5.9 (5.0-6.9)	106,001	13.8 (13.4-14.3)	15.3 (14.9-15.8)	7.0 (6.7-7.3)	4.4 (4.2-4.7)	5.9 (5.6-6.2)
On or before Dec 2020	<30	.	.	.	.	.	<30	.	.	.	.	.	44	10.4 (2.8-31.8)	4.2 (1.1-14.7)	0.0 (.-.)§	2.2 (0.5-10.1)	0.9 (0.1-7.1)	10,995	4.4 (3.5-5.7)	3.7 (3.0-4.5)	1.7 (1.4-2.2)	1.3 (1.0-1.7)	2.1 (1.7-2.7)
Jan 2021	84	14.8 (5.8-33.2)	5.5 (2.4-11.8) §	4.0 (1.3-11.5)	3.3 (1.1-9.4)	2.0 (0.5-8.1)	63	14.9 (4.9-37.4)	7.5 (2.9-17.9)	4.4 (1.0-17.4)	0.2 (0.0-1.5) §	3.8 (0.7-18.0)	229	(5.7-16.9)	9.8 (5.5-16.7)	3.4 (1.6-6.8) §	4.9 (2.6-9.2)	5.6 (2.6-11.6)	17,135	10.6 (9.7-11.6)	12.7 (11.7-13.7)	6.0 (5.3-6.8)	3.6 (3.1-4.2)	4.7 (4.1-5.4)
Feb 2021	188	8.9 (4.8-15.9) §	17.6 (8.5-32.9)	6.9 (2.7-16.4)	6.7 (1.4-27.2)	10.7 (3.4-28.6)	191	29.4 (18.5-43.3) §	30.1 (19.2-43.8)	6.8 (3.0-15.0)	2.3 (0.6-9.0)	6.6 (2.7-15.6)	573	18.4 (13.5-24.5)	16.6 (12.1-22.4)	10.2 (6.8-15.0)	7.7 (4.7-12.4)	7.0 (4.3-11.1)	15,555	16.4 (15.2-17.5)	18.7 (17.5-19.9)	8.0 (7.2-8.9)	5.0 (4.4-5.7)	6.0 (5.3-6.8)
Mar 2021	591	18.5 (12.7-26.2)	21.1 (15.2-28.6)	10.0 (6.6-14.9)	4.2 (2.4-7.3)	6.6 (3.5-12.3)	806	15.3 (11.6-19.9)	19.9 (15.5-25.2)	7.3 (4.7-11.4)	4.6 (2.2-9.1)	6.9 (4.3-10.9)	2,224	15.5 (12.8-18.7)	23.4 (20.0-27.3)	9.6 (7.2-12.8)	6.5 (5.0-8.3)	5.1 (3.9-6.6) §	25,126	18.5 (17.5-19.5)	22.0 (20.9-23.0)	9.3 (8.6-10.1)	5.8 (5.2-6.4)	7.3 (6.6-8.1)
Apr 2021	485	15.2 (9.6-23.2)	14.9 (10.2-21.3)	8.6 (4.8-14.9)	3.4 (1.8-6.4) §	6.9 (3.6-12.9)	714	17.4 (11.6-25.2)	19.2 (14.0-25.6)	9.1 (5.5-14.9)	5.1 (2.9-8.6)	8.2 (4.9-13.5)	2,504	15.6 (13.0-18.7)	20.1 (17.1-23.3)	9.9 (7.9-12.3)	7.5 (5.5-10.1)	8.2 (6.1-10.8)	19,033	16.8 (15.8-18.0)	20.1 (19.0-21.3)	9.4 (8.5-10.3)	5.8 (5.1-6.7)	6.9 (6.2-7.7)
May 2021	199	8.9 (4.6-16.7)	12.9 (7.2-21.9)	4.7 (2.3-9.5)	0.6 (0.2-1.7) §	4.5 (1.9-10.2)	328	9.6 (5.3-16.8)	12.6 (7.4-20.7)	2.9 (1.6-5.2) §	1.6 (0.7-4.0) §	3.8 (1.9-7.3)	1,217	11.2 (7.5-16.3)	10.5 (8.0-13.8)	7.5 (5.0-11.1)	3.8 (2.5-5.9)	4.6 (3.0-7.0)	8,241	10.9 (9.6-12.4)	11.6 (10.3-13.0)	5.8 (4.9-6.8)	3.7 (3.0-4.6)	6.2 (5.2-7.3)
June 2021	65	6.3 (1.5-22.3)	4.7 (0.8-23.5)	1.1 (0.3-4.4) §	4.5 (0.9-20.3)	8.7 (2.4-26.8)	135	18.6 (10.2-31.5)	12.9 (5.4-27.8)	3.8 (1.4-10.1)	8.3 (2.3-25.5)	4.9 (2.0-11.7)	525	4.2 (2.7-6.5) §	5.8 (3.1-10.7)	5.2 (2.5-10.8)	5.0 (2.1-11.0)	2.6 (1.2-5.6) §	3,503	9.2 (7.5-11.2)	7.1 (5.4-9.1)	4.1 (3.0-5.6)	2.9 (1.9-4.4)	6.2 (4.7-8.2)
July 2021	47	0.0 (.-.)§	12.5 (3.0-39.9)	0.0 (.-.)§	0.5 (0.1-2.5) §	8.1 (1.1-40.1)	75	6.2 (1.8-19.5)	3.1 (0.8-11.7)	8.7 (1.4-39.8)	0.0 (0.0-0.3) §	0.9 (0.2-3.4) §	280	9.4 (4.7-17.8)	5.2 (2.2-11.6)	4.3 (1.4-12.0)	2.1 (0.6-7.4)	5.7 (2.5-12.8)	2,270	7.6 (6.1-9.5)	4.5 (3.3-6.0)	4.4 (3.1-6.1)	2.7 (1.8-4.1)	4.4 (3.3-5.9)
Aug 2021	51	21.2 (5.1-57.5)	2.2 (0.3-14.7)	0.0 (.-.)§	0.0 (.-.)§	1.4 (0.3-6.0) §	72	7.5 (2.8-18.8)	4.3 (1.2-13.7)	4.5 (1.3-14.0)	5.2 (0.9-24.0)	7.5 (2.8-18.9)	260	7.3 (4.0-13.0)	1.5 (0.8-2.8) §	1.9 (0.8-4.4)	2.9 (0.7-11.3)	4.7 (1.8-11.5)	2,471	10.4 (8.3-13.0)	4.6 (3.3-6.5)	2.9 (2.0-4.3)	2.0 (1.3-3.2)	4.3 (3.2-5.8)
Sept 2021	<30	.	.	.	.	.	32	6.6 (1.1-31.2)	0.4 (0.1-3.0) §	3.2 (0.4-20.4)	0.0 (.-.)§	0.0 (.-.)§	120	10.9 (4.8-22.9)	3.9 (1.1-12.4)	1.1 (0.2-5.3)	0.3 (0.1-1.1) §	2.3 (0.4-13.1)	1,264	10.4 (7.4-14.5)	2.9 (1.6-5.5)	1.9 (1.1-3.1)	1.4 (0.8-2.6)	4.3 (2.7-6.9)
Oct 2021	<30	.	.	.	.	.	<30	.	.	.	.	.	34	12.9 (4.7-30.5)	5.9 (1.2-25.1)	5.9 (1.2-25.1)	2.5 (0.3-16.4)	8.6 (2.4-26.8)	351	14.8 (9.4-22.6)	6.6 (3.2-13.1)	5.9 (2.7-12.5)	1.9 (0.8-4.7)	4.4 (1.7-11.2)

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Nov 2021	<30	.	.	.	.	.	<30	.	.	.	.	.	<30	.	.	.	.	.	57	11.0 (4.9-22.5)	0.5 (0.1-3.4)	0.8 (0.1-5.4)	1.9 (0.4-7.7)	12.8 (2.7-43.4)
Month of Interview, Unvaccinated																							
Overall	288	17.9 (10.2-29.3)	9.7 (5.6-16.3)	14.7 (7.9-25.7)	12.1 (6.3-22.1) ¶	18.2 (10.3-30.1) ¶	413	12.5 (8.4-18.2)	5.8 (3.8-9.0) ¶	9.1 (6.1-13.5)	6.1 (3.8-9.7)	10.5 (6.8-15.9)	1,470	16.6 (13.7-20.1)	10.2 (7.9-13.0) ¶§	10.4 (8.2-13.1)	11.6 (9.0-14.8) ¶§	14.1 (11.4-17.3) ¶	9,596	13.7 (12.5-14.9)	7.0 (6.2-8.0) ¶	8.8 (7.9-9.8)	7.5 (6.6-8.5)	12.2 (11.1-13.4)
May 2021	77	13.0 (5.7-26.9)	8.4 (3.0-21.8)	12.5 (5.4-26.0)	7.9 (2.3-23.5)	8.8 (3.9-18.7)	133	9.7 (5.0-18.0) §	7.9 (3.8-15.8)	9.2 (4.6-17.5)	5.6 (2.6-11.9)	5.3 (2.6-10.6) §	470	18.1 (13.0-24.5)	14.3 (9.8-20.6)	13.9 (9.5-19.8)	13.3 (8.5-20.4)	14.2 (10.0-19.7)	2,717	16.6 (14.3-19.1)	10.8 (9.0-12.9)	12.8 (10.8-15.2)	8.9 (7.1-11.1)	15.0 (12.8-17.5)
June 2021	51	34.9 (12.4-67.1)	9.0 (2.7-26.4)	27.8 (7.3-65.2)	9.9 (2.3-34.0)	38.7 (14.9-69.4)	63	16.4 (5.3-40.9)	3.2 (1.1-9.3)	3.7 (1.4-9.6) §	2.9 (1.1-7.6) §	22.9 (10.0-44.2)	207	10.3 (5.5-18.7)	6.0 (2.3-14.9)	4.9 (2.0-11.3)	11.0 (5.7-20.2)	11.3 (6.5-19.0)	1,409	13.1 (10.4-16.3)	6.4 (4.5-9.0)	8.9 (6.6-11.7)	7.4 (5.4-9.9)	12.1 (9.5-15.3)
July 2021	47	14.3 (3.2-45.6)	10.6 (3.1-30.4)	9.2 (2.3-30.3)	25.7 (8.4-56.7)	18.0 (4.9-48.0)	57	12.9 (4.8-30.2)	8.4 (3.6-18.8)	9.7 (3.6-23.9)	9.2 (3.1-24.4)	8.7 (3.0-22.9)	214	19.3 (12.6-28.5)	7.2 (3.7-13.7)	12.4 (7.3-20.2)	9.4 (5.6-15.5)	13.6 (8.3-21.4)	1,553	11.9 (9.5-14.7)	5.7 (4.1-7.9)	6.6 (4.9-8.9)	6.5 (4.7-9.0)	10.0 (7.9-12.6)
Aug 2021	35	14.9 (3.8-43.7)	20.8 (7.2-47.1)	20.5 (7.0-47.0)	14.9 (3.9-43.3)	22.4 (7.9-49.4)	37	6.5 (1.8-21.3)	10.8 (2.2-39.0)	14.5 (3.8-42.3)	5.7 (0.8-31.2)	18.9 (6.2-45.3)	181	12.8 (6.5-23.5)	9.2 (4.3-18.5)	9.2 (5.2-15.8)	9.9 (4.7-19.4)	13.8 (7.6-23.7)	1,255	12.8 (9.8-16.5)	5.3 (3.5-8.0)	7.2 (5.1-10.0)	6.6 (4.5-9.6)	10.7 (8.2-13.9)
Sept 2021	30	6.7 (2.1-19.0)	1.8 (0.2-12.3)	0.6 (0.1-4.6) §	0.6 (0.1-4.6) §	0.6 (0.1-4.7) §	43	15.3 (5.3-37.2)	1.1 (0.2-5.8) §	4.7 (1.3-15.6)	4.6 (1.3-15.5)	9.9 (3.5-25.0)	176	17.3 (9.8-28.9)	6.2 (3.1-12.3)	9.2 (3.6-21.6)	10.3 (5.7-17.8)	14.7 (8.0-25.7)	1,209	14.5 (11.3-18.3)	5.9 (4.0-8.8)	8.8 (6.3-12.2)	7.6 (5.4-10.7)	11.4 (8.7-14.9)
Oct 2021	36	29.0 (9.6-61.3)	12.8 (1.9-52.8)	26.1 (7.5-60.6)	13.2 (2.0-52.7)	16.7 (3.7-51.0)	58	20.2 (8.9-39.8)	1.3 (0.4-4.9) §	18.4 (6.5-42.1)	6.8 (1.0-33.9)	8.2 (1.5-33.9)	160	17.1 (8.7-31.0)	10.6 (4.0-25.0)	11.9 (5.0-25.9)	5.1 (2.5-10.1)	12.2 (5.1-26.4)	1,043	15.6 (11.7-20.4)	8.7 (5.7-13.0)	8.2 (5.6-12.0)	9.0 (6.0-13.2)	14.6 (10.3-20.2)
Nov 2021	<30	.	.	.	.	.	<30	.	.	.	.	.	62	27.3 (12.7-49.4)	19.3 (8.1-39.4)	8.8 (2.7-25.2)	26.2 (11.2-49.9)	24.8 (10.8-47.2)	410	8.7 (4.9-15.0)	3.8 (1.9-7.4)	5.1 (2.8-9.0)	6.2 (2.8-13.3)	10.7 (6.3-17.5)

[a] Weighted percents.

[b] Respondents who reported getting a COVID-19 vaccine is or would be 'very difficult' or 'somewhat difficult'

[c–f] Respondents could answer regardless of vaccination status; respondents who answered 'not at all difficult' to question listed in b were not asked this.

[d] "Non–food system essential workers" included: healthcare; social service; preschool or daycare; K-12 school; other schools and instructional settings; first response; death care; correctional facility; non-food manufacturing facility; public transit; and United States Postal Service; NIS Adult COVID Module (NIS-ACM) Hard Copy Questionnaire: Q3/2021: https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-ACM-Questionnaire-Q3-2021.pdf

Cells with denominator $n < 30$ are suppressed.

¶ Statistically significant at $p < 0.05$ difference between vaccinated and unvaccinated worker in the same group

§ Statistically significant at $p < 0.05$ difference between FS worker and NFS counterpart

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Strengthening nutrition incentive and produce prescription projects: An examination of a capacity building and innovation fund

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Abstract

The Gus Schumacher Nutrition Incentive Program (GusNIP), funded by the U.S. Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA), is a federal program designed to address financial barriers to fruit and vegetable (FV) purchases among consumers with a low income by using financial incentives. To further strengthen both nutrition incentive (NI) and produce prescription

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(PPR) GusNIP projects, the GusNIP Nutrition Incentive Training, Technical Assistance, Evaluation, and Information Center (NTAE) and its Nutrition Incentive Hub offer Capacity Building and Innovation Fund (CBIF) awards to GusNIP grantees and their partner organizations. The present study applies multiple methods to systematically understand the types of resources requested by CBIF applicants to expand the capacity and impact of their NI and PPR projects by rigorously analyzing the CBIF proposals submitted from 2020 to 2022. Applicants (N = 130) requested funds to build capacity and innovation around one or more domains: leadership and staffing (n = 72); communications (n = 67); diversity, equity, and inclusion (DEI; n = 57); and technology (n = 42). Three significant qualitative themes emerged around future needs: (1) staffing and technology to streamline applicants' projects; (2) training, resources, and funding to enhance DEI in their projects; and (3) improved NTAE support, including improvements to the CBIF funding mechanism. Findings from this study can increase awareness about the capacity building and innovation needs of NI and PPR projects for the NTAE, policymakers, and funders to consider when supporting healthy food financial incentive projects.

Keywords
nutrition financial incentive, produce prescription program, funding needs, capacity building, food insecurity, innovation, technical assistance center, U.S. Department of Agriculture National Institute of Food and Agriculture

Abbreviations

CAB	Community advisory boards
CBIF	Capacity Building and Innovation Fund
FFN	Fair Food Network
FINI	Food Insecurity Nutrition Incentive
FV	Fruit and vegetable
GSCN	Gretchen Swanson Center for Nutrition
GusNIP	Gus Schumacher Nutrition Incentive Program
HIP	Healthy Nutrition Incentives Pilot
NI	Nutrition incentive
NTAE	Nutrition Incentive Program Training, Technical Assistance, Evaluation, and Information Center
PPR	Produce prescription
RFA	Request for application
SNAP	Supplemental Nutrition Assistance Program
USDA NIFA	U.S. Department of Agriculture National Institute of Food and Agriculture

Introduction and Literature Review

To orient readers to key concepts throughout this paper, we will first describe healthy food financial incentives and then provide background on the funding mechanism and technical assistance center that supported this capacity building innovation grant program.

Healthy Food Financial Incentives

Healthy food financial incentive projects, including nutrition incentive (NI) and produce prescription (PPR) projects, can help address disparities in diet quality among populations with low income by increasing their purchasing power and access to fruits and vegetables (FV) (Engel & Ruder, 2020; Leng et al., 2022). Throughout this paper, both NI and PPR projects will be collectively referred to as "healthy food financial incentive projects." There is growing evidence that supports the effectiveness of healthy food financial incentives on increasing participant FV intake and food security (An, 2013; Atoloye & Durward, 2020; Moran et al., 2019; Parks et al., 2021) as well as support highlighting the economic benefits for local food economies and retailers (An, 2015; Basu et al., 2013; Choi et al., 2017; Dimitri et al., 2015).

Gus Schumacher Nutrition Incentive Program (GusNIP)

One promising federal program to support healthy food financial incentive projects and improve the diet quality among populations with low income is the Gus Schumacher Nutrition Incentive Program (GusNIP), funded through the U.S. Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA). GusNIP was appropriated

in the 2018 farm bill and provides federal funding to implement and evaluate healthy food financial incentive projects that aim to increase the purchase and consumption of FV among populations with low income. GusNIP builds on the success of prior federally supported healthy food financial incentive projects—namely, the Healthy Nutrition Incentives (HIP) Pilot, launched in 2011 and supported by the 2008 farm bill, and the Food Insecurity Nutrition Incentive (FINI) grant mechanism, appropriated in the 2014 farm bill. In the first three years of awards, GusNIP reached 37 states across the U.S. to support nutrition security, with a significant total investment of about US$100 million in 2019, 2020, and 2021 (Parks et al., 2019; USDA NIFA, n.d.). There are two main types of GusNIP projects. First, NI (or SNAP incentive) projects increase the value of Supplemental Nutrition Assistance Program (SNAP) benefits at the point of purchase. This is done by providing the shopper with matching funds to use at participating food retail sites, such as grocery stores and farmers markets, to purchase more FV. For instance, if a shopper spends US$10 worth of SNAP benefits on GusNIP-eligible FV, they get US$20 of GusNIP-eligible FV at participating sites (a 2:1 match). Of note, GusNIP NI-eligible FV are defined as FV in almost any form (fresh, canned, dried, or frozen, and whole or cut) and must not have added sugars, fats or oils, and salt.

Second, PPR projects prioritize participants (that is, patients) who experience low income, food insecurity, and have or are at risk for a diet-related chronic disease (e.g., diabetes or overweight). Participants are prescribed GusNIP-eligible FV by a healthcare professional, and these prescriptions can be redeemed at participating sites, including grocery stores, farmers markets, and other food retailers. No SNAP purchase is required for a participant to receive a PPR incentive. As opposed to NI-eligible FV, PPR-eligible FV are limited to fresh FV only.

GusNIP National Training, Technical Assistance, Evaluation, and Information Center (NTAE)

In addition to competitive grants for NI and PPR projects, an important component of the GusNIP program is the provision of support and resources for GusNIP grantees through the National Training, Technical Assistance, Evaluation, and Information Center (NTAE). Established in 2019, the NTAE is led by the Gretchen Swanson Center for Nutrition (GSCN) in partnership with Fair Food Network (FFN). GSCN and FFN are supported in their work by a coalition of partners, grocery and farmers market experts, and researchers and evaluators, collectively known as the Nutrition Incentive Hub. These partners serve as a coordinating center to assist active and prospective GusNIP grantees in navigating program implementation, reporting, and evaluation. Major goals of the NTAE and Nutrition Incentive Hub include providing technical assistance and implementation support to existing and prospective grantees, aggregating NI and PPR project data to demonstrate overall program impact, and conducting an internal process evaluation to improve the Nutrition Incentive Hub's functionality and processes.

There is a range of capacity levels across GusNIP grantees in terms of program implementation and evaluation experience and expertise. In public health practice, building capacity is related to a myriad of constructs: human, financial, and infrastructure resources; knowledge to develop strategies and resolve issues; leadership; diverse partnerships; project management; engagement with communities; and workforce capacity and competency to deliver the program (Baillie et al., 2009). These capacity constructs are unique to each project type. For example, to support a PPR project, cross-sector partnerships are required between healthcare, food and agriculture, funders, policymakers, and payers such as insurers. For NI projects, engagement with communities for local buy-in and implementation with people who use SNAP is beneficial. These factors require each project to build capacity in order to successfully implement and evaluate their projects. In many cases, building capacity requires additional funding that is beyond the scope of what a project initially proposed. Projects may also need additional funding to support the requirements of the GusNIP grant that were not anticipated at the time of award.

GusNIP NTAE Capacity Building and Innovation Fund (CBIF)

To support this identified need, the NTAE offers additional grant opportunities for GusNIP grantees and their partners through the Capacity Building and Innovation Fund (CBIF). For the purpose of the CBIF grant opportunity, capacity building is defined as *Initiatives that are designed to strengthen an organization's ability to implement a Nutrition Incentive or Produce Prescription project in their community. Capacity building is an investment in the effectiveness and future sustainability of a nutrition incentive program.* As described in the CBIF request for application (RFA), "innovation" is defined in the following ways:

- **General innovation** introduces something new to an organization to address a specific need within the NI or PPR project.
- **Transformational innovation** has a profound and lasting effect on the NI or PPR project's core structure or operations.
- **Groundbreaking innovation** introduces something few other organizations are doing with their NI or PPR projects. Groundbreaking innovation represents not just innovation within the organization, but within the NI and PPR environment at large.

Since the inception of CBIF in 2020, FFN has facilitated a semi-annual RFA; conducted rigorous, rubric-guided evaluation and scoring of each application; and awarded recipients based on their score. An overview of each round of the RFA can be found in Table 1.

With each CBIF application come changes to the RFA, based on feedback from previous applicants. In order for the funding opportunity to be more accessible to programs with varying grant-writing experience, the length and number of questions in the application has become shorter with each round. Many CBIF applicants are also GusNIP grantees, meaning that they have already completed an extensive federal grant application

Table 1. Themes, Goals, and Dollars (in US$) Awarded for Each Year of GusNIP NTAE CBIF Grant

Date	Funding Round	Funding Amounts	Focus Areas	Total Awarded	Number of Awards
May 2020*	Round 1 (COVID-19 Mini Grants)	up to $10,000	• Supported innovations and adaptations in rapid response to the COVID-19 pandemic • Grantees focused on protective equipment and hand-washing stations to comply with public health needs and standards	$300,000	31
Nov. 2020	Round 2	$5,000–$50,000	Invested in programmatic capacity and sustainability, inclusive planning and co-creation of projects, and organizational leadership and partners that center and elevate the voices of the communities served	$500,000	13
Dec. 2021	Round 3	$5,000–$50,000	Invested in community engagement, upgrading technologies, better internal tracking systems, and supporting local food economies	$400,000	9
Aug. 2022	Round 4	$5,000–$50,000	• Introduced separated Capacity Building and Innovation-focused RFAs • Partnered with reporting and evaluation team to conduct evaluation of CBIF applicants	$1,000,000	24

RFA = request for application; CBIF = Capacity Building and Innovation Fund
*May 2020 applications were not included in the dataset for this evaluation because of the uniquely focused COVID-19 RFA. These applications are noted in this table only as to provide a complete representation of the evolution of CBIF.

with information about their program goals and deliverables. Allowing applicants to repurpose existing narratives on their project decreases the burden of crafting the CBIF application, and developing questions where this information can be reused is a central goal of the CBIF development team.

The most significant change came in the 2022 RFA when the capacity building and innovation initiatives were separated into two RFAs: capacity building and innovation. Separating the two topics meant creating RFAs, rubrics, and review teams that were focused on the unique goals and characteristics of capacity building projects versus innovation-focused projects, which yielded a more streamlined process. Capacity building applications request support for projects that need additional assistance to maintain operations of their programs, whereas innovation applications request support for projects that were experimental and applied creative enhancements to existing work.

Purpose of Present Study

Although each CBIF awardee submits final documentation at the end of their grant period (e.g., impact and financial reports) to the FFN team, to date there has been no rigorous evaluation of the funding mechanism in terms of the requested needs of the applicants. While there is a growing body of evidence on the impacts of healthy food financial incentives on participants and local economies, understanding what is needed by NI and PPR practitioners to operate and evaluate their projects more effectively is understudied. The CBIF mechanism, designed to help GusNIP grantees optimize the implementation and evaluation of their projects, provides a unique opportunity to assess such needs. Therefore, the purpose of this study was to systematically evaluate the CBIF funding mechanism and answer the following research questions: (1) *What are the capacity building and innovation funding needs and requests of organizations who apply for NTAE CBIF funding?* and (2) *How can the NTAE and other technical assistance centers support NI and PPR projects?* Answers to these questions are applicable to the NI and PPR fields at large as there are many funders, policymakers, and program implementers who are external to GusNIP and can apply these findings to their own planning and programming. The authors chose to use the CBIF applications as the dataset to answer these questions because all applications (not only those funded) were available, and to our knowledge, this is the largest auxiliary funding mechanism (that is, funding can only be awarded to organizations with active NI or PPR grants) of its kind. Of note, the authors hope the findings presented in this paper can inform other (i.e., non-GusNIP) public health–focused technical assistance and evaluation centers to improve their services (e.g., Centers for Disease Control and Prevention technical assistance centers).

Applied Research Methods

To answer these research questions, FFN and GSCN collaborated to design a multiple-methods evaluative study. After the study authors met to discuss goals, research questions, deliverables, and analytic strategies, one author emailed former CBIF applicants to seek permission to include their previously submitted applications in the dataset; applicants were given the choice to opt their proposal in or out of this dataset. None of the applicants opted their CBIF applications out of the study.

Dataset

The dataset included submitted applications (N = 130) from three rounds of CBIF funding: 2020 (n = 45), 2021 (n = 43), and 2022 (n = 42). The first round of the 2020 RFA was for COVID-19 emergency response needs; therefore, these applications were omitted from this analytic dataset given their unique focus. However, to be inclusive and tell the complete story of the evolution of CBIF, these first-round 2020 applications for COVID-19 response are noted in Table 1, but they are omitted from the rest of the analysis. Although the RFA changed slightly from year to year, the core application item that was central to this analysis was: "*Please provide a brief description of how you propose to use the funds requested through this opportunity and how the funds you are requesting will build the capacity or innovation needs of your nutrition incentive or produce prescription project now and beyond the period of this grant."* The suggested response to this item was no more than 600 words. In total, applications ranged from 6 to 8

pages and included attachments for a budget. This research did not require institutional review board approval as it does not meet the requirements of human subjects research.

Qualitative Analysis

The lead qualitative researcher developed a deductive codebook based on language from the RFAs and the research questions. Next, using document-based thematic content analysis methods (Vaismoradi & Snelgrove, 2019), the researcher coded five applications with this codebook and added inductive codes during the process (Saldaña, 2012). Another researcher then independently coded the same five transcripts and added inductive codes as needed. Each transcript was independently double-coded by two researchers. If new codes were added, researchers re-coded all previously coded transcripts to include the newly added codes. After all transcripts had been double-coded, the lead researcher collapsed redundant codes, grouped like-codes, and named them (e.g., category names). Throughout this iterative process, salient themes emerged which provide clear cross-cutting answers to the research questions posed (Vaismoradi & Snelgrove, 2019). Researchers used Atlas.ti (Mac Version 8.1.1) to digitalize the analytic process (Paulus et al., 2014).

Quantitative Analysis

Several questions in the RFA were best analyzed quantitatively; therefore, two researchers abstracted data from the applications into a spreadsheet using a predetermined codebook. Variables that were summarized quantitatively include organization size; number of full equivalent (FTE) organization staff involved with the NI or PPR project; proportion of underrepresented groups (e.g., African American, American Indian, Alaska Native, Asian, Hispanic/Latino, Pacific Islander, refugee, immigrant) among the applying organization's leadership budget request for the application; and content areas of the proposed work (communications planning; community building and partnerships; diversity, equity, and inclusion (DEI); evaluation; financial management; fundraising; governance; leadership and staffing; professional development; strategic planning; technology; volunteer development). Descriptive results from these quantitative variables were calculated by the senior author on this project and were computed in Microsoft Excel.

Results

Both descriptive quantitative results and qualitative findings provide a detailed description of the CBIF applications included in this dataset.

Quantitative Results

We analyzed CBIF applications across three years of funding (2020, 2021, and 2022). Across 130 applications over three rounds of RFAs, there were a total of 87 unique applicant organizations, while 29 organizations applied more than once. The number of applications per grant year remained consistent with a range of 40-47 each year (Table 1). The size of the organizations that applied ranged from one to over 100 full-time staff members (Table 2). In addition, the number of full-time staff involved in implementing the healthy food financial incentive projects ranged from less than one to 20 (Table 2). The annual budgets for incentive programs were most commonly reported to be US$250,000–US$499,999 (n = 30; Table 2). Over a quarter of applications (28%) indicated their leadership is composed of at least 50% members of unrepresented groups (e.g., African American, American Indian, Alaska Native, Asian, Hispanic/Latino, Pacific Islander, refugee, immigrant; Table 2). The CBIF application began asking for demographic information about each organization's leadership in Round 2, November 2020. Applicants were asked to select which areas they wanted to build capacity in, and the most commonly selected topic areas were leadership and staffing (n = 72), communications (n = 67), DEI (n = 57), and tech nology (n = 42). Applicants were able to select more than one content area.

Qualitative Findings

Three salient themes emerged based on the CBIF applications and research questions. The first theme, "Applicants need staffing and technology to streamline their programs," focuses on the CBIF applicant's program goals, how they are proposing to actualize these goals with CBIF funding, and what they need to meet their goals (e.g., resources,

Table 2. Summary of CBIF Applications Quantitative Data

	N (%)
Size of organization (# of staff)	
Less than 1 FTE	7 (5.8%)
1–2 FTE	62 (51.7%)
3–5 FTE	39 (32.5%)
6–10 FTE	8 (6.7%)
11-20 FTE	4 (3.3%)
Percentage of leadership from underrepresented groups	
0%–24%	58 (45.3%)
25%–49%	35 (27.3%)
50–74%	23 (18.0%)
75%–100%	12 (9.4%)
Content areas proposed in CBIF applications[a]	
Leadership and staffing	72 (55.4%)
Communications	67 (51.5%)
DEI	57 (43.8%)
Technology	54 (41.5%)
Strategic planning	42 (32.3%)
Grant writing	28 (21.5%)
Professional development	28 (21.5%)
Evaluation	25 (19.2%)
Fundraising	25 (19.2%)
Financial management	24 (18.5%)
Community building	21 (16.2%)
Governance	7 (5.4%)
Incentive program annual budget	
<$100,000	26 (21.7)
$100,000–$249,999	29 (24.2%)
$250,000–$499,999	30 (25.0%)
$500,000–$999,999	14 (11.7%)
$1,000,000+	21 (17.5%)

[a] Note: applicants could select more than one content area, percentages shown are of applications
CBIF = Capacity Building and Innovation Fund, FTE = full-time equivalent staff position, DEI = diversity, equity, and inclusion

expertise). The second theme, "Applicants need training, resources, and funding to enhance DEI in their programs," focuses on capacity building needs requested by applicants that emphasize racial equity. The third theme, "Opportunities for the NTAE to strengthen support of GusNIP grantees and strengthen the CBIF funding mechanism," provides insight as to what resources are frequently requested by CBIF applicants and which of these resources could be offered through the NTAE as part of core services in the future for efficient capacity building available to a wider audience. Each theme is described in detail with exemplifying excerpts from the applications. Figure 1 provides a visual representation of themes and their supporting categories and codes.

Theme #1: In order to build capacity, applicants need staffing and technology to streamline their programs. Applicants requested CBIF funding to expand, sustain, and streamline their healthy food financial incentive projects. In order to do this, applicants requested a myriad of resources, the majority of which focused on staffing and technology. The staffing funding requests would primarily support hiring expert consultants and increasing FTEs specifically around positions related to leadership, implementation, and evaluation. Many applicants indicated that their sole need for capacity building and implementing innovative solutions to address challenges relied on increasing the FTE of their existing staff (such as increasing part-time staff to full-time). These existing staff members needed more time to engage in strategic planning, fiscal management, marketing, promotion and partnership development, fundraising, and grant writing, among others. One applicant requested:

> [Name of Organization] would use funding from this capacity building grant to increase allotted staff time for this program. With increased time, our staff will be able to reach more individuals through advertising and marketing campaigns, outreach to community partners to provide their clients education about using SNAP benefits to purchase boxes and include their locations as alternate box distribution sites, have a dedicated staff person at farmers' markets who will distribute boxes and be thoroughly trained to educate customers about CalFresh, and facilitate the onsite purchase of boxes with SNAP benefits, as well as seek grants for future funding.

Few applicants requested funding to hire an entirely new staff position, but many proposed to hire hourly workers such as program navigators (e.g., community health workers or *promotoras*) to help bolster patron engagement. Many also requested funding to hire expert consultants such as strategic-planning or fiscal-management experts. Finally, some requested funding for short-term

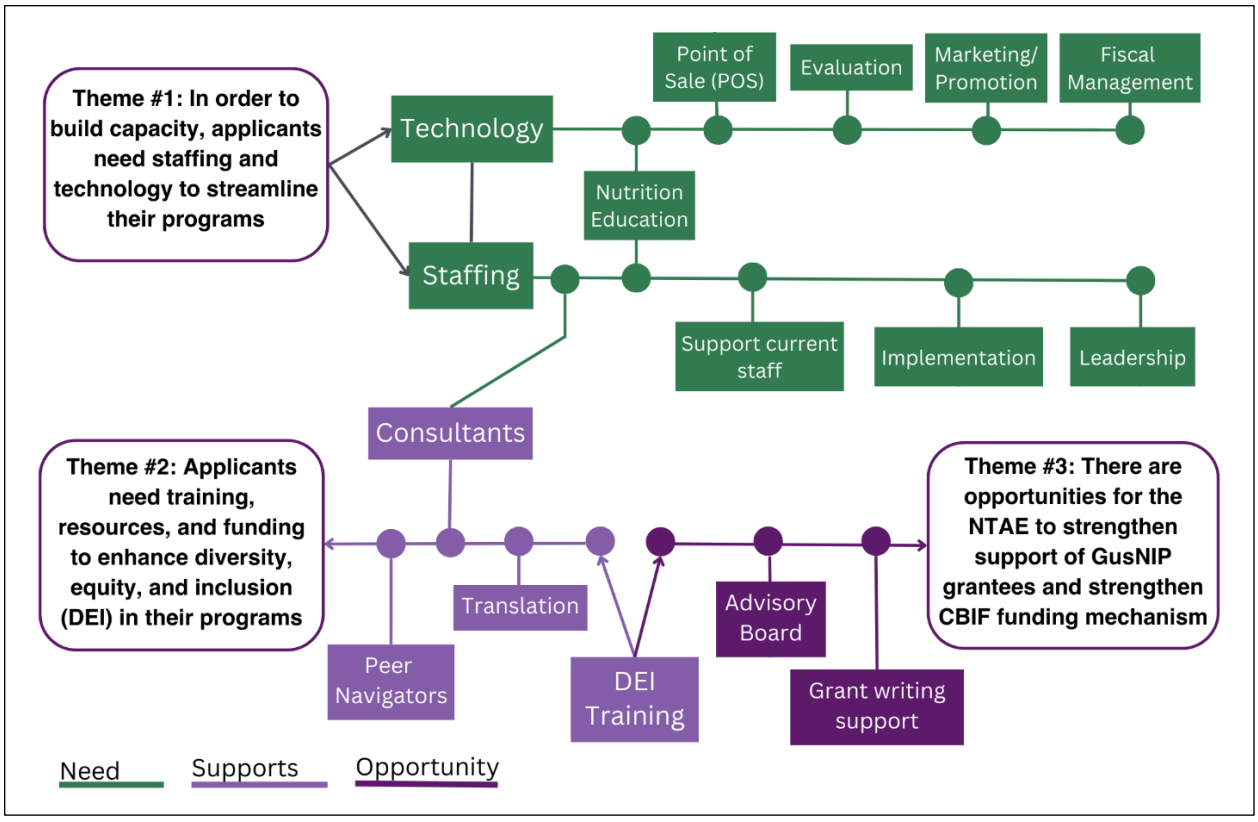
staff, such as grantwriters and fundraising consultants, presumably with the role to secure funding for longer program implementation during their brief tenure (usually 2–3 months) with the organization.

In addition to funding to bolster staffing, applicants requested support for technological advancements to expand, sustain, and streamline their programs. The technology funding requested would support upgraded point-of-sale (POS) and fiscal-management technology. POS technology is central to healthy food financial incentive projects because the incentive is earned and redeemed at the time of purchase after a shopper swipes their electronic benefit transfer (EBT) card. Technology for POS exchanges was the most frequently requested, given the limitations and time intensity of using paper or token-based voucher systems at point of sale. One applicant wrote:

> We are determined to pilot an electronic token redemption system [for incentives]. We are constantly dealing with token issues, including token loss and hoarding. In addition, we believe with an electronic system we would be able to better collect data from our SNAP participants. We would like to test an electronic system to improve our overall customer and community partner experience and it is our belief we will be able to adapt fully after working on a pilot. We have identified a technology consultant who will provide his time and expertise pro-bono but we need the financial support to pay for cloud services, swipe-able cards, card readers and salesforce integration.

Applicants also requested technology support that included fiscal management software, online nutrition education platforms, marketing and promotion (e.g., social media) tools, and evaluation resources. One clinic-based applicant wrote:

Figure 1. Visual Representation of Three Salient Themes and Supporting Categories and Codes for Each Theme



> [Name of Organization] respectfully requests [US]$50,000 from the Nutrition Incentive Hub to increase the capacity of our Produce Prescription project (PPR) to reach a higher volume of eligible [organization] patients who are experiencing food insecurity. … [Name of Organization] is very interested in applying for a future round of GusNIP funding from USDA NIFA. However, we have realized that it takes a significant amount of time to identify eligible patients, outreach to those patients, administer the pre-post survey, and biometric values, teach patients how to use the Produce Prescription Program, and trouble shoot technical difficulties. We also need to track and monitor usage and collect data. It is with this in mind that we are requesting additional funds to increase the capacity to reach our numbers, collect all necessary data, track usage, and support evaluation efforts.

Applicants operationalized "capacity building" in two distinct ways. Approximately half of the applicants focused on building capacity by increasing reach and program engagement (that is, attracting more shoppers). These applications requested more staffing, technology, and resources to enhance use of their programs and reach previously unengaged audiences, to add new grocery or farm-direct retailers to stimulate expanded reach and improved access, and to strengthen their marketing, promotion, and community partnerships to increase participation.

The other half of applicants indicated that their program is well-patronized by eligible participants; however, they were currently at budget capacity with their programs regarding incentive redemption and needed more staffing, technology, and resources to meet the demand of their participants and ensure that systems (e.g., fiscal, reporting) were updated and advanced enough as not to stymie program growth logistically.

Theme #2: Applicants need training, resources, and funding to enhance DEI in their programs.

In order to offer more reflective and responsive programming, many applicants requested funding to support DEI training for their staff through expert consultants and workshop opportunities, as exemplified by this applicant:

> As [Name of Organization] increases its investment in and innovation around local food access through programs like Market Match, the organization recognizes that it must pay particular focus to diversity, equity, accessibility, and inclusion with regard to its leadership as well as the makeup of the market vendors. With funds from the Nutrition Incentive Hub's Capacity Building & Innovation Fund, [Name of Organization] aims to create a diverse, equitable, and inclusive market environment for shoppers and vendors, and build the organizational (staff and board) capacity and competency to effect that change. Through this project, the [Name of Organization] board, staff, and vendors will access targeted diversity, equity, accessibility, and inclusion (DEAI) training with qualified professional consultants while also seeking guidance and support in further developing DEAI goals and strategies for the organization. We believe that through these trainings, [Name of Organization] staff will be able to view the market spaces and programs through a new lens with the goal of identifying and removing barriers to access. … The farmers market is often misrepresented as a place for only high-income shoppers, so working with community partners to engage shoppers has increased our participation numbers amongst shoppers that receive SNAP benefits and [Name of Organization] staff is committed to enhanced outreach and engagement efforts to continue increasing those numbers.

To enhance program engagement by community members who are eligible for healthy incentive projects, applicants also requested funding to support the development of multilingual program marketing and advertising resources (e.g., flyers, bus wraps), multilingual and multicultural hourly staff to serve as navigators for underreached populations (e.g., immigrant communities), and funding to pay incentive program users for consultation and advice on reaching members of their community

(e.g., hourly community ambassadors, hourly navigators, or stipends for community advisory boards [CAB]). One applicant wrote:

> This grant will be used to fund the design and launch of [Name of Organization] pilot Good Food Ambassador program, a targeted, peer-to-peer outreach program with the goal of increasing usage of the incentive program across the network. [Name of Organization] will onboard 10 Good Food Ambassadors, who will be SNAP recipients that reach the communities in which they live. Ambassadors will receive a monthly stipend and work 20 hours per month, conducting outreach and feedback work. They will split their time at markets giving informational tours to SNAP shoppers and conducting consumer surveys, in the office analyzing consumer feedback, and at community organizations (family service centers, places of worship, etc.). … The Good Food Ambassador Program will ensure sustainability of the Good Food Buck SNAP incentive program by increasing visibility and awareness of the program, empowering local communities, and centering the needs of the community in how the program takes shape. Ambassador's will form the critical bridge between the incentive program and SNAP users.

In general, programs that were not led or managed by majority underrepresented groups had more requests for DEI support and training than those that were led or managed by underrepresented groups. However, those that were led or managed by underrepresented groups often already prioritized working with diverse audiences as a core principle of all of their programming. For example, Latinx-led or operated organizations inherently prioritized working with Spanish-speaking participants and likely did not need to request such DEI support.

Theme #3: There are opportunities for the NTAE to strengthen its support of GusNIP grantees and strengthen the CBIF funding mechanism.

The third theme provides insight about how the NTAE can improve resources provided to GusNIP grantees and their partners. For example, since some applicants requested similar expert consultation, such as with DEI experts, the NTAE could incorporate partnerships with DEI consultants to support grantees as part of the existing NTAE suite of services and resources. Many applicants also requested grant-writing support. Although the NTAE offers consultation for incoming GusNIP applicants about responding to the USDA NIFA RFA, offering a robust grant-writing workshop for existing and incoming grantees may build capacity for existing grantees and allow new organizations to gain the needed confidence and support to apply for federal grants. One applicant wrote:

> [We need] grant writing support. GusNIP grants are incredible for supporting SNAP incentive programs, but they are administratively cumbersome and require extensive planning and support to secure matching dollars and to successfully develop, compose, and submit. [Name of Organization] works with a contract grant writer who has already started preparing for cash and in-kind match for a robust 2023 GusNIP proposal. The ability to support the grant writer outside of general administrative funds would be an asset to building the Double Up program.

Finally, in response to many applicants requesting funding to support a CAB that includes members of the audience they intend to serve, it may be prudent for the NTAE to engage a CAB. A CAB—composed of GusNIP grantees, their partners, potential applicants, applicants who were not funded, members of the audiences these programs serve, among others—may inform NTAE strategic planning and decision making. At the time of writing this manuscript, the NTAE is actively addressing these salient grantee requests.

Discussion

Together, these findings provide insight as to how the NTAE (and other non-GusNIP–specific technical assistance centers), funders, and policymakers can support organizations implementing healthy

food financial incentive projects. Due to GusNIP's broad reach across the United States, the results of this work shed light onto food system and community development needs across the nation in order to implement, maintain, innovate, and sustain healthy food financial incentive projects. In response to these findings, as well as ongoing conversations with GusNIP grantees and their partners through technical assistance, the NTAE has refined the CBIF RFA annually to better meet the needs of the applicants.

As charged by USDA NIFA, the NTAE iteratively responds to the needs of CBIF applicants by intentionally designing support in response to requests. For example, since almost half of the CBIF applications (43.8%) requested capacity building for DEI, the NTAE offered a DEI workshop for NTAE technical assistance partners in the summer of 2022, which was well received by attendees. Because of this positive response, the NTAE offered a learning cohort focused on community engagement as part of its suite of services for GusNIP grantees and their partners in the fall of 2022, thus alleviating the need for individual organizations to request funding for such a training. Additional equity-focused trainings and learning opportunities are currently in development and will be offered free of charge to GusNIP grantees and their partners. Further, per grantee guidance, the NTAE is actively working to engage a CAB to inform strategic planning and decision-making and is also systematically collecting feedback from GusNIP grantees and their partners about recommendations for improvement in the reporting and evaluation processes required by the NTAE.

One key area to strengthen the CBIF mechanism is to require applicants to include a sustainability plan in their applications; therefore, a sustainability section was required on the latest CBIF RFA. This may be an area the NTAE addresses in future offerings to support capacity building since strategic planning (32.3%) and fundraising (19.2%) were commonly identified as areas of interest. The CBIF mechanism is not intended to provide sustained funding year after year, but rather to support a key capacity building or innovation effort that can launch the grantee to sustained program improvements, expansion, and innovations. Researchers of health, governmental, and education programs have long been exploring research questions concerning what happens in organizations adopting public health programs and their communities after external funding stops (Scheirer & Dearing, 2011; Shediac-Rizkallah & Bone, 1998; Shelton et al., 2018). Research focused on the sustainability of public health programs is well aligned with healthy food financial incentive projects in that until sustainable funding (e.g., private insurers, Medicare and Medicaid, food retailers) is established, most healthy food financial incentive projects will continue to operate on grant-funded budgets with limited resources and funding cycles. When programs operate in such an environment, it is difficult to consider long-term sustainability infrastructure, given that some organizations are unsure if their program will continue operating after any given funding cycle ends. Further, building robust teams of well paid, well trained, and committed employees is challenging with unstable funding cycles.

As supported by the literature (Schell et al., 2013), to establish sustainable funding, the entire network of healthy food financial incentive project partners need to collaborate effectively. Effective collaboration includes conducting robust cross-program evaluation to establish an evidence base to assure funders of the programs' effectiveness on food security, local economies, and human health. Principles of dissemination and implementation science are well suited to address concerns of program sustainability and should guide future directions for this area of research (Estabrooks et al., 2018; Glasgow et al., 2012).

As previously stated, one of the NTAE's key goals is aggregating NI and PPR data to demonstrate overall program impact, and the best way to accomplish this is to measure all programs the same way. However, there are differences in evaluation capacity among grantees, and CBIF funding represents a key opportunity whereby grantees can grow their evaluation capacity, such as through increased staffing, expert evaluation consultants, or technology to automate data collection activities. Over half of the organizations (57.5%) that applied for CBIF funding are operated by 2 or fewer FTE staff, indicating that these are small and lower-

capacity organizations, and capacity building is needed. The support provided by CBIF is meant to help grantees to meet GusNIP requirements for reporting and evaluation and situate themselves for sustainable funding into the future. Further, evaluating public health programs by centering the needs, goals, and values of any given community is essential to equitable, community-based participatory research. These findings underscore the importance of public health nutrition program researchers and evaluators to consider equitable approaches to program evaluation (Hayward et al., 2021; Qato, 2022; Rink et al., 2020; Wallerstein et al., 2008). Future work could be designed to assess the results by applicant groups to understand trends in needs based upon similar community characteristics. This type of approach would help to tailor support provided by a national technical assistance and evaluation center.

It is important to contextualize the CBIF funding mechanism with historical and socio-cultural events. Notably, the first CBIF RFA was released in direct response to the COVID-19 pandemic and was therefore omitted from this dataset, since eligible budget items (e.g., face masks, hand sanitizer, support for transportation) were specific to the immediate needs due to the pandemic. Subsequent RFAs were also released during the COVID-19 pandemic and during a time when food insecurity in the U.S. dramatically increased and had gained unprecedented awareness among the general public and policymakers alike (Hake et al., 2020; Niles et al., 2020). Further, decentralized food systems were disrupted during the pandemic. Local food suppliers were elevated as crucial solutions for their communities (Béné, 2020; Galanakis, 2020), and encouragement for choosing locally grown and supporting local food producers and suppliers was high among food aid organizations and consumers (Huang et al., 2021; Thilmany et al., 2021). In addition to the impacts of COVID-19 on public health, the racial reckoning of 2020 triggered by the murder of George Floyd affected how organizations across the U.S. prioritized DEI within their leadership, staff, and patronage (Nguyen et al., 2021; Odoms-Young & Bruce, 2018). The intersection of COVID-19, food insecurity, and disproportionate health disparities and outcomes related to COVID-19 and food insecurity among African American, American Indian, Alaska Native, Asian, Hispanic/Latino, Pacific Islander, refugee, and immigrant communities (Gundersen et al., 2021; Jernigan et al., 2013; Odoms-Young & Bruce, 2018; Paremoer et al., 2021) further contextualizes the environment in which the CBIF RFAs were released and applications were framed.

Conclusions

This analysis of CBIF funding applications demonstrated that there were common themes across organizations that applied for CBIF awards. Although organizations varied in their size and structure, the salient needs in the context of a worldwide pandemic and growing racial unrest highlight common resources needed to advance healthy food financial incentive efforts and impact. This study found that CBIF applicants require additional staff time, technology, and resources to enhance program usage, reach new audiences, and strengthen community partnerships. They also require funding for DEI training for staff and experts in workshop facilitation, and require technical assistance in areas such as strategic planning and fiscal management. In order for healthy food financial incentive projects to continue to grow sustainably and to increase the reach and scope of their impact, strategic investments in the areas described in this paper could be beneficial. Other centers that offer technical assistance and evaluation to public health nutrition programs can draw on these findings to build out their own center programming.

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First you need the farmers: The microfarm system as a critical intervention in the alternative food movement

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Abstract

After more than three decades, the alternative food movement has developed multiple strategies, most of which are still struggling. This essay surveys the literature on six key alternative food movement (AFM) strategies, assessing their strengths and weaknesses before describing a novel strategy, the microfarm system, which is being implemented in north central Ohio. It argues that key omissions from most AFM scholarship and practices include sustained attention to training and supporting successful farmers, concerted efforts to help facilitate needed social networks or communities of practices around alternative food developments, and forwarding a set of ambitions that do not appreciate the scale of existing food systems nor the limits of alternative food systems' impact. It offers the microfarm system as an emerging approach to address these omissions.

Keywords

alternative food movement, urban agriculture, sustainable agriculture, community supported agriculture, farmers markets, food hubs, new-entry farmer training, beginning farmers, microfarming

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> The fundamental fact is that we no longer need many farmers.
> —*Paul Krugman, Twitter, March 21, 2019*

The alternative food movement (AFM) is mired in a crisis of identity. At the same time, it faces a series of existential challenges that must be met. We need more clarity about what the AFM is and how its parts function (or do not function) to better understand and to help realize its success. The AFM is defined by both practitioners and scholars as an "attempt to replace the dominant food system with one that is fair, health-promoting, and ecologically sound" (Hoey & Sponseller, 2018, pp. 595–596; Makita, 2022, p. 384; both citing Galt, 2013) and includes "efforts to respatialize and resocialize food production, distribution, and consumption in North America, Europe, and Australia" (Jarosz, 2008, p. 231). Makita (2022) describes it as "a variety of food-related social movements" that include "organic food, vegetarianism, Fair Trade, slow food, food justice, and food sovereignty" (p. 384). The hope is that the AFM can create robust alternative food networks (AFNs), defined as "oppositional, more socially sustainable, or simply more ethical spaces of food production and distribution" (Argüelles, 2021, p. 1385). These are ambitious goals that have emerged from heterogeneous and often grassroot efforts around the world since the 1970s. They have recently gained new momentum, capturing the attention of scholars, university researchers associated with the Cooperative Extension System, and governmental agencies (Argüelles, 2021; Calo, 2018; Oberholtzer et al., 2014).

Seeking to understand the AFM, scholars and practitioners have identified a menu of concepts and strategies to achieve its lofty goals. These include urban agriculture, sustainable agriculture, community supported agriculture (CSA), farmers markets, food hubs, and a spate of beginning or new-entry farmer training programs (Aucoin & Fry, 2015; Blay-Palmer et al., 2013; Carlisle et al., 2019; Galt, 2013; Makita, 2022; Nicholls et al., 2020; Niewolny & Lillard, 2010; Oberholtzer et al., 2014; Sulistyowati et al., 2023; Wardynski et al., 2018). But are they working? The following essay details scholarship around these strategies, exploring the achievements and shortcomings of the AFM, and then describes a new approach that might help refocus scholarship and practices in more strategic and effective ways.

The Alternative Food Movement's Multiple Faces

While the AFM enlists many strategies in its work, this review limits itself to six of the most popular approaches used today. They each overlap with others in their practice but are often thought about in silos. By bringing these six together under the rubric of AFM, we hope to emphasize their intersectionality.

Urban Agriculture

Urban agriculture is defined as "the growing of plants and the raising of animals within and around cities" (Oberholtzer et al., 2014, p. 1). Scholars agree that Detroit, Michigan, was the seedbed for the movement, tracing its origins to an effort in the 1890s to address "land vacancy stemming from neighborhood abandonment" (pp. 425–426), but noting its revival in the 1970s when Mayor Coleman Young launched the Farm-a-Lot initiative, whose approaches and ambitions would become a model for other cities in subsequent decades (Pothukuchi, 2015). Since the early 2000s, urban agriculture has become imbued with great hope and ambitions, promoted as a means of addressing public health, food insecurity, food justice, food sovereignty, economic development, ecological improvements, social capital generation, and the sustainable repurposing of abandoned lands, all aimed at lifting at-risk neighborhoods out of their marginalized conditions (Cohen & Reynolds, 2014; Daftary-Steel et al., 2015; Dixon et al., 2007; Grebitus, 2021; Moragues-Faus & Battersby, 2021; Santo et al., 2016). City government, policymakers, nonprofit organizations, university Extension, and urban planners have taken the lead in creating policy structures, training programs, planning strategies, and grant funding to support and sustain these efforts (Cohen & Reynolds, 2014; Halvey et al., 2021; Horst et al., 2017; Pothukuchi, 2015). The basic idea is simple and intuitive: if cities support the cultivation of food in urban spaces facing food insecurity, food

and poverty problems will be abated.

But urban agriculture has been neither simple nor unproblematic. Scholarship on the practice has ranged from studies identifying obstacles to successful urban farming to stinging critiques highlighting several unintended outcomes, as well as a growing sense that it has turned into a fool's errand. Many of the key obstacles have ranged from common small-scale farming challenges like access to credit, land, and sufficient markets to sell produce, to some unique challenges in urban settings such as contaminated land, access to water resources, land rent prices, unfriendly urban policies, and access to compost (Abdoellah et al., 2023; Cohen & Reynolds, 2014; Halvey et al., 2021; Oberholtzer et al., 2014; Santo et al., 2016; Whittinghill & Sarr, 2021). A cohort of geographers have brought a critical lens, condemning it for reinforcing "neoliberal" values, perpetuating inequalities by advancing mostly income-secure middle-class white practitioners, and contributing to the unjust elevation of land value in low-income neighborhoods through "eco-gentrification" (McClintock, 2018; Tornaghi, 2014; Walker, 2016). One assessment concludes that urban agriculture faces an "unattainable trifecta" when it aims to provide food, offer job training, and create income for at-risk households all at once because there is neither the necessary financial support to sustain farming, nor the required output of marketable food to sustain programming (Daftary-Steel et al., 2015). Moreover, as Horst et al. (2017) similarly concluded, "it is unreasonable to expect disadvantaged populations to cultivate their own food; they are already burdened by working extra jobs and the stress of poverty and are unlikely to have both the time and interest to spend gardening" (p. 281).

While data suggest that urban agriculture is growing as a practice *and* failing to deliver its most ambitious goals, scholars continue to study it in the United States and abroad in attempts to understand what can be done. Some look to its potential to provide food and ecosystem services and continue to see great promise globally (Benis & Ferrão, 2017; Nicholls et al., 2020; Payen et al., 2022). Others search for policy, planning, and training alternatives that might restructure the urban farming context in ways that favor the practice. These include food policy councils, better urban planning approaches, better-targeted training programs, and urban services that support and encourage urban farmers and farming (Cohen & Reynolds, 2014; Halvey et al., 2021; Horst et al., 2017; Oberholtzer et al., 2014; Panagopoulos et al., 2018; Whittinghill & Sarr, 2021). All of them conclude that urban agriculture is not yet living up to its promise, by failing to generate sufficient food, income, or diverse urban farmers in the places where it is being practiced (Dimitri et al., 2016; Horst et al., 2017).

Sustainable Agriculture

Sustainable agriculture or agroecology is frequently identified as an approach designed to counter the ecologically and socially damaging practices of the industrialized, capital-intensive agriculture that dominates food production today. It can be practiced at almost any scale, from small urban plots to large commercial farms, but it requires that farmers attend to more than just crop or animal outputs. They must understand the embeddedness of their farming activities within ecological and social systems that can be damaged by agriculture. Carlisle et al. (2019) call it "the most urgently needed work in the United States" (p. 1) because it counters the environmental damage, health and nutritional deficits, and rural poverty generated by the dominant agricultural practices. To this end, scholars and researchers focus on topics in containing and controlling fertilizer input, water conservation, and fossil-fuel use in attempts to develop strategies that reduce harm and negative impacts (Al Hamedi et al., 2023; Negi et al., 2022; Rashad et al., 2023; Singh et al., 2023). Most sustainable agriculture research is focused on reforming the existing industrial system with new ecologically friendly techniques (Rudnicki et al., 2023).

Sustainable agriculture intersects with the AFM insofar as it *also* focuses on small-scale or urban farming, attends to issues of farm labor, and contributes its insights to developing AFNs. In this arena, advocates seek to help existing AFM farmers improve their practices and to guide new-entry farmers toward enlisting these practices from the start (Carlisle et al., 2019). Combined with the AFM, sustainable agriculture provides guardrails

for alternative farming to create healthy and socially conscious practices. (Carlisle et al., 2019; Timmerman & Felix, 2015).

However, despite the growing demand from AFM farmers to engage in sustainable agriculture, scholars acknowledge that "the deck is stacked against their success" (Carlisle et al., 2019, p. 1). Structural issues in U.S. agriculture pose significant barriers to entry. These include the concentration of agriculture into ever-larger producers, a near absence of women (14%) and farmers of color (4%) producing in the system, and a lack of sustainable income (MacDonald et al., 2018; MacDonald & Hoppe, 2018; U.S. Department of Agriculture Economic Research Service [USDA ERS], 2019b; USDA National Agricultural Statistics Service [USDA NASS], 2019). These conditions make the transition to sustainable agriculture challenging in the existing system; launching an AFN within these constraints also foregrounds additional barriers such as the absence of social networks and lack of access to land, markets, capital, labor, tools, and water (Basche & Carter, 2021; Carlisle et al., 2019). While sustainable agriculture is beginning to make progress in the existing industrial model, some scholars detect an effort by industrialized producers to appropriate agroecology as a set of technical requirements *alone,* while leaving other harms of the existing system to continue (Giraldo & Rosset, 2018). For those entering sustainable farming for the first time on small-scale and urban farms, finding enough capital to "operate at a size sufficient to earn a profit" (Carlisle et al., 2019, p. 7) is a struggle (Calo, 2018). These barriers and risks suggest that sustainable agriculture represents more of a burden than a solution for the AFM and perhaps even a risk to its existence.

Community Supported Agriculture

Community supported agriculture (CSA) is a direct market intervention that has been in practice since at least the early 1990s (McFadden, 1991). While CSAs exist in many forms depending upon the farmer, customers, and geographic location, the basic structure is one where a farmer pre-sells their crops to a group of buyers who then receive "shares," usually in the form of a weekly box of fresh goods from the farm over the course of the season. In some instances, customers also share in the farm work, volunteering time over the season to contribute labor to the farm enterprise (Cone & Myhre, 2000). The CSA model has been adopted by many farmers because of its attractive features: "regular income, including knowing ahead of time the size of the market one is serving, and the income it will generate" (Galt, 2013, p. 356). It is attractive to consumers because it provides a direct connection to farmers and their produce and provides them with a sense that they are investing in local sustainable farming and offering support to the AFM (King, 2008; Makita, 2022; Sulistyowati et al., 2023).

Studies comparing the income from CSAs to wholesale or farmers markets found that CSA crops tend to garner the highest price (Hardesty & Leff, 2010). Moreover, the economic approach of CSAs transcends what many scholars see as a structural danger to AFNs—free market or neoliberal approaches to crop commodification—because they "decommodify food" (Cone & Myhre, 2000; Hinrichs, 2000). By removing the free market approach to food products, "farmers have more freedom to plant crops according to the season without fear of losing income and customers" (Sulistyowati et al., 2023, p. 834). From the outside, CSAs appear to have threaded a needle for the AFM by stimulating local direct markets in fresh produce, securing farmer income, and engaging consumers in more sustainable food production and practices (Cone & Myhre, 2000; King, 2008).

From the inside, farmer success and income depend almost entirely on the size of the farm and how much of it is committed to CSA shares: "The more the farm relies on CSA sales, the lower the earnings … and the less likely it is to be profitable" (Galt, 2013, p. 357). Large farms with CSAs included as a small part of their market find CSAs to provide valuable added profit, but farms of any size that are fully or mostly committed to CSA sales tend to struggle or fail. In fact, CSAs present formidable challenges to both farmers and consumers. Farmers face risks related to promising more than they deliver, struggling to maintain sustainable farming practices, complex farm management problems, and limited labor and skills to farm

effectively (Sulistyowati et al., 2023). CSA members are also challenged to find time to commit labor to the farm, to afford the steep upfront cost of membership, and to alter their own food consumption habits as harvest outputs change during the season (Sulistyowati et al., 2023). The result is that CSAs provide consumers with a sense of virtue in supporting local farmers, while these same farmers are effectively engaged in a form of "self-exploitation" by providing more crops than necessary at prices that do not cover the cost of production and CSA management (Galt, 2013).

Farmers Markets

Farmers markets are another AFM market intervention where, ideally, farmers gather collectively, usually at an urban location, to sell their produce directly to consumers. Like CSAs, farmers markets seek to shorten the food supply chain, cultivate a community around farming and food provisioning, and provide a dependable market for farm produce (Aucoin & Fry, 2015; Tchoukaleyska, 2013; Warsaw et al., 2021). Farmers markets have grown in popularity and geography and now by the dozen in every U.S. state, with a particular concentration east of the Mississippi River and around major U.S. cities (USDA ERS, 2013). There are just over 8,600 registered farmers markets operating in the United States today, a number that has held fairly steady since 2016 (USDA ERS, 2019a).

Considered a critical node in AFNs, farmers markets offer consumers a variety of fresh goods and provide farmers with social networks, direct contact with customers, and a friendly space in which to introduce new products and learn about changing consumer demand (Aucoin & Fry, 2015; Heying, 2010; O'Hara et al., 2022. A regional study in the state of Washington has demonstrated (somewhat ironically) that farmers markets have become more viable in the changing agricultural landscape, encouraged by the neoliberal turn in global food markets where commodity crop production shifting to new regions has left new spaces for small-scale farm producers in their wake (Jarosz, 2008). While often imagined and described as homogenous, research has revealed that farmers markets often exist under heterogeneous regulations and operate according to diverse values advancing different visions about which vendors belong and do not belong (Manser, 2022).

Farmers markets were estimated to have sold more than US$3 billion in produce by 2015, but studies show that these sales have tended to serve predominantly high-end customers and wealthy communities (Schoolman et al., 2023). These markets also often struggle to find enough local farmers; many markets have become overrun with non-produce vendors selling value-added products, non-food goods, and other kinds of services, diverting them from their contribution to AFNs (Aucoin & Fry, 2015). These markets have also fallen short in attracting Black farmers and vendors (Recinos, 2021). Many small-scale farmers are unenthusiastic about farmers markets due to the additional labor involved in packing and marketing crops in that setting, the competition in pricing among participating farmers, and the additional fuel costs transporting to and from the markets (Jarosz, 2008). Thus, while farmers markets provide a sense of virtue to those customers who make a small portion of their household food purchases once a week in this setting, they seem to be built on a fragile foundation and fail to achieve the loftier goals of the AFM.

Food Hubs

A food hub is defined as "a business or organization that actively manages the aggregation, distribution, and marketing of source-identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail, and institutional demand" (Barham et al., 2012, p. 4). A relative newcomer to the AFM, food hubs are now being studied for their potential to address food insecurity in urban food deserts, their contribution to developing social networks among farmers and practitioners, and their contribution to sustainability, among other issues, and they are showing some promising results (Avetisyan & Ross, 2022; Clark et al., 2019; Shariatmadary et al., 2023). But their greatest hope, according to the scholarship, lies in their promise to revitalize small-scale farming. By providing a consistent local or regional market for farm products, food hubs have the potential to strengthen farmers' access to produce markets beyond the interventions of CSAs

and farmers markets (Phillips & Wharton, 2016). By taking on the role of managing post-harvest sales and marketing activities, food hubs can perform a vital service that improves farmers' knowledge about market demand, and thus decreases the risk in knowing what to plant, at what time, and at what scale while also providing a reliable and consistent source of local and regional food to consumers (Hermiatin et al., 2022).

Since 2013, the Michigan State University Center for Regional Food Systems has been studying and surveying these businesses in the U.S. annually (Bielaczyc et al., 2023). Reaching 107 food hubs in 2021, the MSU survey has found that almost 75% of the responding food hubs have been in existence for less than a decade, and more than half of them operate in the upper Midwest or along the West Coast, with another third in the upper Great Plains and south Atlantic states. More than half are operating as nonprofit businesses (Bielaczyc et al., 2023). Three-quarters of these businesses sell directly to consumers or to a diversified market, with most of them ranging in annual sales from US$20,000 to US$1,000,000 (Bielaczyc et al., 2023). While 91% of the respondents reported break-even or better income, their reliance on grants appears to have been at least as important as food sales in these outcomes (Bielaczyc et al., 2023).

Shariatmadary et al. (2023) have concluded that there are 150 active food hubs in the U.S. aggregating local and regional crops for market sales. Nevertheless, scholars agree that food hubs "have the potential to drive transformative change by making multifaceted contributions to the social and environmental sustainability to the U.S. food system" (Shariatmadary et al., 2023, p. 2). But that potential is tenuous because food hubs, like any market business, only survive when they successfully sell more products than their cost of production, and "if they are unable to achieve this, they will likely close and have minimal positive economic or social impact" (Fischer et al., 2015, p. 97).

Beginning and New-Entry Farmer Training

Responding to the steady decline and rising age of farmers alongside a growing interest in the AFM, drawing nonfarmers into the profession, universities and nonprofit organizations have launched a legion of new-entry or beginning farmer training programs (Argüelles, 2021; Calo, 2018). These efforts tend to be praxis-oriented and exist outside of formal agricultural degree programs, offering a menu of knowledge-sharing and experiential activities designed to prepare a nonfarmer for the demands of farming (Argüelles, 2021; Niewolny & Lillard, 2010; Plana-Farran et al., 2023; Wardynski et al., 2018). To support these efforts, the USDA has launched the Beginning Farmer and Rancher Program, injecting more than US$150 million in federal funding into at least 250 projects around the country since 2009 (Obudzinski et al., 2017). While this funding represents a significant increase in USDA dollars into the new farmer training space, it is still under 4% of the total USDA Research, Extension, and Economics spending in any year (DeLonge et al., 2016). Moreover, only a handful of organizations around the country offer this programming on a consistent basis (Calo, 2018).

These efforts intersect with the AFM, usually focusing on the key values embraced by the movement that include sustainable farming, local food systems, social networks, small-scale and urban farming, and community food systems (Niewolny & Lillard, 2010; Wardynski et al., 2018). However, research has suggested that this approach to training suffers from several deficits. First, they tend to be "positioned at the margins of major research and education agendas" (Niewolny & Lillard, 2010, p. 76). Second, some scholars criticize an excess of what they term "knowledge deficit" approaches, which politicize and fail to acknowledge broader structural and social obstacles to the AFM (Calo, 2018). Finally, other scholars assert that key imaginaries—lack of farmers, farming heroes, and arguments about the social value of sustainable agriculture—motivate the AFM but fail to be effectively integrated in the trainings themselves, leading these programs toward "calculative, instrumental, and managerial practices" (Argüelles, 2021, p. 1398; Dinnie & Holstead, 2018). Like the other AFM interventions mentioned in this essay, beginning or new-entry farmer training programs are failing to deliver on the larger ambitions of the AFM.

Everything But the Farmers

As the summary above demonstrates, scholars evaluate the AFM mostly within the silos they are studying, and within each they are coming to similar conclusions. Hoey and Sponseller (2018) have put it best "they disagree about strategies that could fundamentally, and permanently, change how food is produced and accessed" (p. 596; see also Clendenning et al., 2016; Mount, 2012; Sbicca, 2015). Some focus on protecting various parts of the movement from appropriation by capitalist and neoliberal values (e.g., Calo, 2018; Galt, 2013; Giraldo & Rosset, 2018; Guthman, 2008; Hoey & Sponseller, 2018; McClintock, 2018; Sbicca, 2015; Tornaghi, 2014; Walker, 2016). Others seek to restructure planning and policy to better accommodate the needs and values of one part of the movement or another (e.g., Daftary-Steel et al., 2015; Grebitus, 2021; Halvey et al., 2021; Horst et al., 2017; Panagopoulos et al., 2018; Pothukuchi, 2015; Sulistyowati et al., 2023). Still others criticize land-grant colleges and other organizations for working with an industrial agriculture paradigm and failing to adjust and adapt their approaches to the real needs of the AFM, which usually includes a long menu of outcomes ranging from racial and gender equity to community-building and asset-provisioning (e.g., Iles et al., 2020, 2021; Niewolny & Lillard, 2010; Oberholtzer et al., 2014; Wardnynski et al., 2018). Many tend to focus their critique on the possibilities and failures of engaging the appropriate values in AFM activities (Argüelles, 2021; Gordon & Hunt, 2018; Iles et al., 2020; Manser, 2022; Plana-Farran et al., 2023; Timmerman & Felix, 2015). All of them ignore or elide the critical foundation for a successful AFM: successful farmers.

Nevertheless, we do get hints about farmers and farming that deserve more consideration. Carlisle et al. (2019) remind us that "in order to farm, new farmers must build up and sustain productive assets that enable them to grow crops or raise livestock, and bring these products to market" (p. 5). This is easier said than done, as Sbicca (2015) reports that "small-scale organic farmers face many financial difficulties" (p. 682) and Carlisle et al. (2019) further report that "new entry sustainable farmers face unique challenges" (p. 9). Farmers appear to persist nevertheless, according to Plana-Farran et al. (2023), "based on a long-term orientation that offers an identity and sense of pride in being lifelong farmers" (p. 2) rather than a desire to make a profit or become wealthy. Iles et al. (2020) uncovered this sentiment in one farmer she interviewed who stated, "It's a lifestyle. I think that appeals to us. We make a joke we heard one time about an Amish person that was being interviewed and he just talked and talked about farming, and finally the interviewer said, 'Well, what do you do for entertainment?' 'I farm.' We get that" (p. 29). But, as Iles et al. (2021) recorded from other farmers, loving the work is not enough: "we are not going to make bank and we know that. That is not the point of this. But we have to be above break even and that has to include our labor costs" (p. 361). Many scholars note that, just like all farmers in the U.S., AFM farmers rarely depend upon farm income solely to make ends meet, counting on off-farm employment for additional income and for health insurance benefits (Iles et al., 2021).

Farmers farm for the lifestyle and identity, not the profit, but without sufficient income to maintain themselves and their farms, these ambitions cannot be realized. Meanwhile, AFM scholarship has approached the various interventions, values, and goals of the movement as if they can be addressed *without* attention to making farming itself successful. When these scholars do note that farming is difficult, they do not then ask what might be done to address the challenges faced by the farmer but instead focus on structural deficits or the absence of certain AFM values in the efforts they study. More often they do not consider farms and farming at all, leaving it as the absent referent (Adams, 1990) in studies bewailing the infectious qualities of neoliberalism, the shortcomings of planning, training, and policy, or the short-sighted behavior of food consumers. Throughout this literature scholars seem to take successful farming as a given, assuming that *it just happens* and all that is needed to create the radical changes of the AFM is the proper set of values engaged through the correct structure cultivated through better policy and training. But for more than two decades, these assumptions have led to very little actual move-

ment for the AFM. In several areas the intervention offered little or nothing of need to the working farmers. Sometimes they even promote activities that hinder farmers. If the AFM hopes to make the kind of inroads into the food system it has imagined for itself, these conditions have to change. We have to put successful farming first.

The Microfarm Project

The remainder of this essay will detail an AFM intervention that has sought to put farming first. With the preceding literature review in mind, putting farmers first requires a holistic approach to a food system. As such, it includes university knowledge about the appropriate size and scale of the farming site, the development of aggregation and marketing through a food hub, facilitation of social networks through a local "community of practice," sufficient financing and secure land access for farm start-ups, and robust and sustained training in all aspects of commercial farming. For the past six years, the microfarm project has been building a local food system designed to put farmers first. This approach departs from many existing AFM efforts by making farmer success its primary value, by integrating knowledge-transfer activities in close communication with community and system needs, and by delivering a long-term engagement.

The Microfarm and Microfarming System

The microfarm project began by defining the smallest viable urban farming unit around two critical parameters: income and labor. The solution needed to be large enough for a farmer to earn a supplemental income of at least US$35,000 a year, but small enough to be worked with minimal additional labor. In the spring of 2017, student researchers and the lead author used specialty crop data—both yields per square foot and average market prices—to calculate how much of what mix of crops might produce the income goals. The result was a footprint between one-quarter and one-third of an acre (0.1–0.13 hectare), contained between 6,000 and 8,000 square feet of growing area in small-plot, high-yield beds, and contained high tunnel space covering almost half of the growing area in order to accommodate full-year production of crops in Ohio. According to the calculations, when such a site achieved maximal production—using every square foot, achieving efficient crop turnover, and growing a diversity of bulk and high-value crops—it could bring the financial returns aimed for and be manageable by 1.5 full-time equivalent positions (FTEs) a year. We called it a "microfarm."

The financial estimates assumed that all of the produce grown in the microfarm setting would find a market. For that to happen, the working microfarmer would have to cut into valuable farming time to undertake outreach and marketing activities that may not make those market connections secure and cut into potential profits from crop sales by taking time away from needed farm labor. Here, the solution was a farmer-owned cooperative. Also called a food hub, the farmer-owned cooperative would identify buyers, create crop plans for microfarmers, and aggregate and repackage their produce for buyers. Another set of calculations was run, assessing the minimum number of microfarms needed to support the farmers' businesses *and* provide sufficient cooperative income to sustain an aggregation and marketing cooperative. The answer was at least eight microfarms and ideally 10. On paper, such a system had the potential to establish successful urban farmers if they banded together cooperatively to aggregate and market their produce. The concept was turned into a simple graphic laid atop a map depicting the food deserts and low-income census tracks in Mansfield, Ohio, the small rust belt city where the lead author worked at a regional campus of The Ohio State University (OSU; Figure 1).

To help facilitate the development of such a system, the lead author applied for internal funding from OSU to construct a demonstration microfarm on the OSU-Mansfield campus in 2017. This farm would serve as a site to visualize the concept and test the crop production assumptions developed in the research classroom. During 2017 and 2018, several different crops were planted, sold to the campus cafeteria and the local community, and donated to food-insecurity institutions in the city.

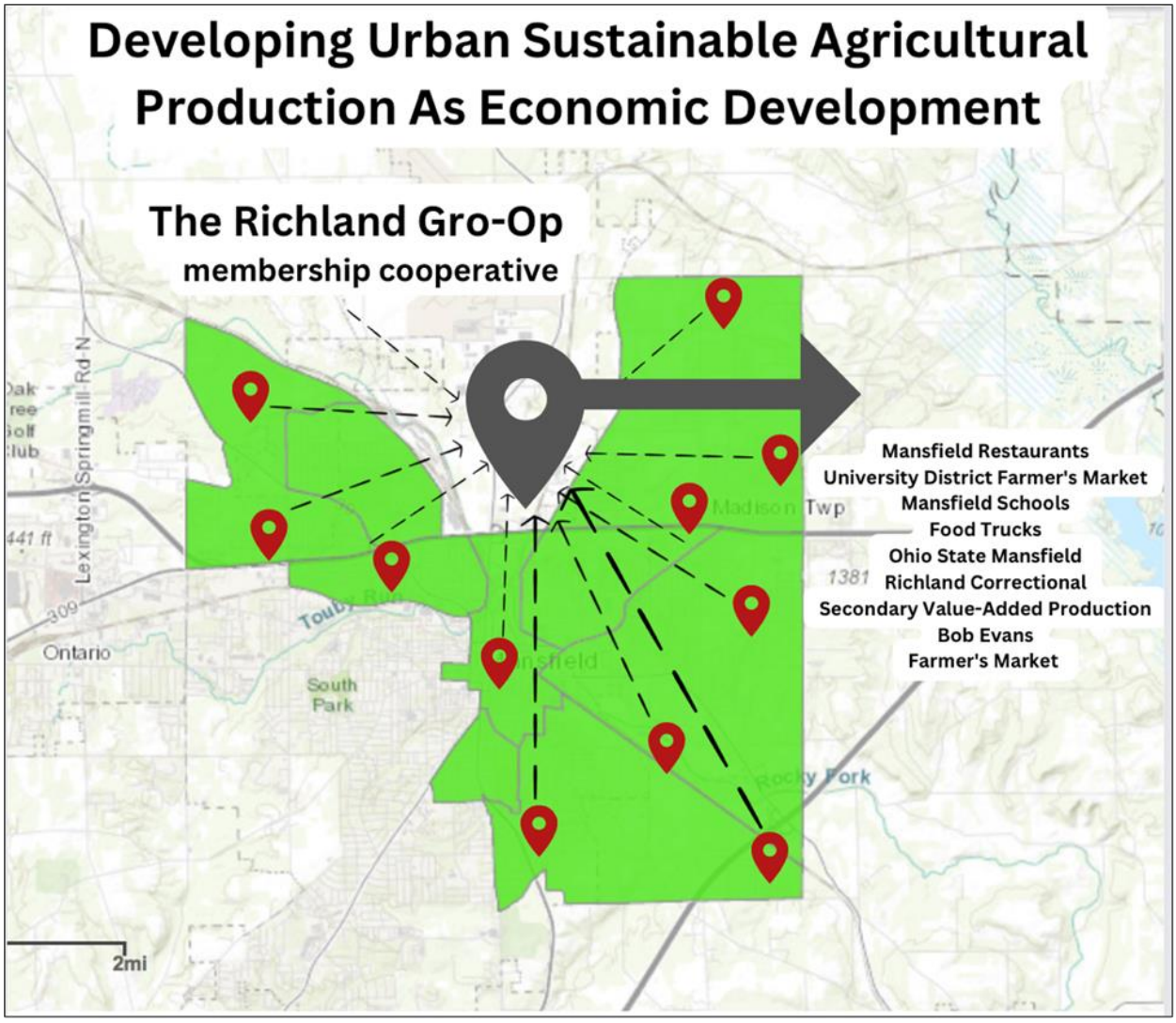
The Community Engagement Effort

Developing the microfarm system in the classroom is one thing. Implementing the concept in practice

is another. To work, it requires an engaged community. The lead author began meeting with individuals and institutions in Mansfield to uncover interest in local food systems, community and economic development, and social justice. He quickly identified the North End Community Improvement Collaborative (NECIC) as a key partner. NECIC had been engaged in asset-based community development in Mansfield since 2007 and had already identified local food as a critical community interest. NECIC had connected local residents to Cooperative Extension Master Gardener Volunteer training and had funded the development of more than a dozen community gardens around the city.

Together with OSU researchers, NECIC facilitated six months of engagement with local businesses, neighborhood residents, politicians, and institutions who might become partners and participants in a microfarm system effort in Mansfield. This engagement culminated in an Urban Farming Summit in late spring 2018, with over 100 attendees. At this event, the microfarm system was described, its needs from the community were explained, and the attendees participated in groups designed to identify specific assets, institutions, and social capital relevant to the concept. By the end of the event, we had codified the commitments of local dollars, institutional support, and interested farmers.

Figure 1. The Microfarm System Graphic Used for Outreach



Following this event, we assembled partnerships and local commitments together with university funding, research, and assets into a proposal submitted to the Foundation for Food and Agricultural Research (FFAR) Seeding Solutions in Urban Agriculture matching grant program. In December 2018, the proposal was awarded funding. A pilot microfarm system was launched in Mansfield in January 2019. The funding supported two years of engaged commercial horticulture training, paid for 10 microfarm "kits," subsidized personnel for a new farmer-owned cooperative, and supported a range of Extension education and social science research exploring the system implementation and its impacts on the surrounding neighborhoods.[1]

Implementation

The project aimed to accomplish three essential goals. The first was recruiting and training a cohort of new-entry farmers in commercial horticultural production. The second was focusing on creating a farmer-owned cooperative where the participating trainees could explore the challenges of marketing the crops grown during their training phase. The third was aiming to cultivate a community of practice both among trainees and among the various community institutions supporting and contributing to the effort to facilitate necessary social networks.

The farmer training program lasted three years. The first year began on the campus demonstration microfarm in small plots with relatively simple-to-cultivate crops like lettuce and radishes in a high tunnel. As each season progressed, the growing area grew and included more labor-intensive crops like tomatoes and cucumbers in the high tunnel and outdoor plots. In the second year, four microfarms were constructed on a leased brownfield[2] site in Mansfield's North End, and trainees were assigned increasingly larger growing areas as each growing season progressed. The purpose was to expose the trainees to increasingly challenging cultivation situations where they would progressively and collectively build their skills and experience. It was also believed that the experiences would begin to help aspirational farmers make an informed decision about their aptitude and interest in taking on a farming lifestyle. Employees of NECIC also participated in this training to afford them the institutional knowledge to become active growers.

Alongside the ongoing cultivation training, trainees learned cooperative development and management and formed a new farmer-owned business known as the Richland Gro-Op (RGO). They studied small farm business and financial management during the training, and each participant created a formal business plan for their future microfarm and then incorporated as a limited liability corporation (LLC). By the end of horticultural training, aspirational farmers were responsible for cultivating approximately half the square footage of a single microfarm. While much of the in-person training work was severely constrained by COVID-19 disruptions, the project advanced 10 farm businesses through the second year of implementation and moved all of them onto their own microfarm for the third year. Our goal was to locate all new farms on farmer-owned land or with secure and robust leases. For some trainees, this involved purchasing low-cost land bank properties in the city, while others already owned rural or peri-urban lands, and still others moved into the microfarms on the leased brownfield site at no additional cost.[3]

The training effort sought to enhance the work of community-based participatory research (CBPR) by focusing on establishing a community of practice engaged in the microfarm system (Hacker, 2017; Wenger, 1999). A community of practice is "a kind of community created over time by the sustained pursuit of a shared enterprise" (Wenger, 1999, p. 45). That is to say, a "community" emerges out of a social practice. A group becomes a community of practice insofar as it develops

[1] Due to COVID-19 disruptions, the social science component of the project had to be cancelled.
[2] A brownfield is a former industrial site whose development is impacted by real or perceived environmental threats. This property was a former pump-manufacturing plant that had been razed and remediated. It had no usable soil, but its grounds posed no dangers.
[3] NECIC acquired a five-year, US$1-a-year lease from Groman-Rupp Pumps, the site's owner, which is perpetually renewable as long as farming continues on it.

three key properties shared by its participants, including mutual accountability, a mutual engagement by all participants, and a communally negotiated joint enterprise. "As a locus of engagement in action, interpersonal relationships, shared knowledge, and negotiations of enterprises," Wenger (1999) argues, "such communities hold the key to real transformation—the kind that has real effects on people's lives" (p. 85).

In other words, the training process was not just about knowledge transfer and sharing of expertise; it was about cultivating a practice in an active community. It required that aspirational farmers and collaborating local institutions worked closely together throughout the training and faced the various challenges involved in commercial horticulture, small-farm business, financial management, and cooperative management together as their own particular, specific, and ongoing set of problems and not just as the extension of a university research effort. It is important to note that none of the knowledge shared throughout the training was new knowledge for Cooperative Extension; all of it existed in various departments for years and most of it had been offered through workshops and trainings multiple times. What distinguished this effort was the manner in which it *catalyzed* those various knowledge sets at the appropriate time and for the appropriate duration to serve the immediate problems faced by these aspirational farmers and their gathering community of practice when they needed it.

Preliminary Results

The implementation process was riddled with challenges, not the least being the COVID-19 disruptions during the second and third year of the grant. Challenges also stemmed from the complicated coordination necessary to translate a centralized crop plan developed by the cooperative into concrete planting and harvesting regimens on each farm. A failure to plant seeds or sustain transplants to meet the timing of harvest projections affected the whole system. Beyond accidents and neglect on individual farms, the cooperative also struggled with the difficult problem of marketing produce. The original plan to sell all of the bulk produce to one or two large buyers generated a price point too low to support the microfarms and sustain the cooperative. A secondary plan to reach supermarkets, restaurants, and multiple small-scale buyers also encountered challenges due to excessive time and labor requirements, also eroding profitability for farmers and the cooperative.

Many of the crop planning and marketing challenges were identified and met during the three-year grant period. We collected microfarm crop data (days to maturity, yields per square foot, etc.) and centralized that data for use by the cooperative. This allowed the cooperative manager to assign highly specific crop plans to all member farmers—what to plant, when, and at what square footage. The cooperative manager also developed a lengthy set of planning, communication, and production protocols providing sufficient oversight and some level of security that crop plans were being implemented effectively on member farms. Marketing was addressed in two ways. First, the marketing manager began to tap into emerging AFNs in Ohio. Finding buyers who already wanted the produce brought a higher price point and increased demand. Second, the cooperative sought to sell 80% of its produce to 20% of its buyers, creating secure sales of bulk produce at an average market price. The remaining 20% could be marketed at a higher-price point to multiple buyers. Both of these approaches left the cooperative and its farmers in a position to continue the system beyond the life of the grant, and they are now beginning their third year of operations independently (2024).

During the final year of the grant, NECIC secured additional funding from the community to help subsidize three additional years of operations for RGO (2022–2024), and this funding has allowed the cooperative to expand its marketing and add 11 new farms to the cooperative in 2024. During 2022, RGO sold just under US$100,000 in produce; in 2023 it expected sales to exceed US$200,000. Because of its successful market development and growing membership, it is estimating crop sales in excess of US$1,000,000 in 2024.

Additional funding was also secured from the USDA Sustainable Agriculture Research and Education (SARE) professional development pro-

gram to review and revise the training process for microfarmers. The review process included evaluating farmer success, interviews with all participants, and a peer review with Extension educators at OSU. Our most important insight from the review process was that different elements of the system were delivered in different curricular silos, often disconnected from other elements of the system and without clarity about how all of the pieces fit together. To remedy this, the curriculum was revised, creating a set of six lessons at the beginning of the course to provide an integrated view of the microfarm system and provide ongoing learning opportunities in the larger system during the experiential field training, including the crop plan, harvest projections, co-op reporting requirements, and Good Agricultural Practices (GAP) harvesting standards. Trainees are also guided through a more robust business plan process, including the development of a five-year financial plan for their future farm.

The authors offered the revised curriculum in Marion, Ohio, during 2022 and 2023. In that community, a similar outreach and engagement process was undertaken, led by the OSU-Marion regional campus, to identify community partners, recruit potential farmers, and host an urban farming summit. In Marion, the project existed without the substantial grant support that facilitated the pilot project in Mansfield and operated without an active community organization like NECIC. In its place, Marion City Schools became our key community partner, raising US$200,000 in implementation funding to facilitate the construction of a microfarm on its urban-located Marion Harding High School. The funding supported personnel to develop a workforce development pathway in agriculture and agricultural education at the school.

Because of the lessons learned in Mansfield and the existence of a nearby marketing cooperative (RGO) and nearby working microfarmers, trainees in Marion had market access for their training crops and mentors available throughout the program. Several of the Marion trainees had already made an effort at farming and owned rural property or nonprofit businesses that they were seeking to enhance by participating in the microfarm system. The authors chose to delay the creation of a cooperative in Marion until late in the second year of the program based on feedback from Mansfield that learning to operate a new farm business and develop and manage a cooperative at the same time had proved challenging and even onerous. However, without the ability to offer the Marion trainees access to financing to facilitate the purchase of a microfarm kit (at an average cost of US$50,000), many of the potential farmers began to grow nervous about their ability to move into commercial microfarming during the second year of training.

The training began with 16 aspiring farm businesses in the spring of 2022, including one team from the foodservice department of a nearby rural high school intending to integrate a schoolyard microfarm into its food provisioning practices. By the time the program moved from the classroom to the field, this number was reduced to 12. A key incentive offered in Marion was the ability to earn funds through the sale of training crops through RGO, but because of unexpected delays in the construction of the Marion Harding High School microfarm, trainees were limited to radishes, greens, and a small run of carrots during 2022, reducing this income potential significantly. By early 2023, the number of aspiring farm businesses in the program had fallen to eight. Throughout spring and early summer, trainees developed five-year financial plans for their farms and assumed responsibility for their portion of the crop plan for the season ahead. The increased time commitment combined with work and personal challenges reduced the number of farm businesses to six by mid-summer. Half of the six were farm owners who had begun market growing on their own sites alongside the increasingly intensive training program, and they found that the divided attention forced them to make difficult choices. This led to a neglect of program requirements when their own market harvests demanded their time. In July 2023, one of the remaining six launched a campaign for mayor of his small town and withdrew from the program. Then, quite suddenly, three of the remaining five determined that they had gained enough knowledge and possessed sufficient resources to turn to their own sites full-time. One of the three offered a farm job to one of the

remaining two, leaving the program with a single farmer in training to complete the course.

While the outcomes of the training program were disappointing, the partnerships in Marion created a permanent infrastructure to continue to advance microfarming opportunities there. The single remaining farmer will be provided space on the Harding microfarm site to incubate her microfarming business at no cost. Coursework developing at Marion Harding High School now offers a pathway for high school students to move into this same opportunity. RGO additionally has offered membership to the remaining farmer, connecting her to a crop plan and the security of market access it provides.

The lessons learned in Marion enhance an understanding of the microfarm system. In particular, it highlights the critical importance of securing local funding and financing prior to launching a training initiative and the need to communicate and demonstrate the difficulties of building marketing channels from the ground up; the aspiring farmers who pivoted to their own local sites saw no value in joining RGO and believe they can sustain their own operations through farm auctions and a spate of federal and state food-insecurity funding targeted at produce growers. Its success with Marion City Schools demonstrates that the system can be anchored in schools as well as community nonprofits to survive.

Conclusions

The AFM has struggled over the past few decades because it wants to do too much all at the same time, and thus often neglects the need for successful farming businesses. In truth, its ambitions to transform the entire food system are well beyond its reach. U.S. agriculture is a US$1.3 trillion enterprise, and an industrialized food system has been in operation globally for more than 150 years. In fact, if AFM scholars and activists did an honest assessment of their own food-provisioning practices, they would notice that they too are mostly dependent on industrialized food on a daily basis. For all of its environmental and social shortcomings, this system has fed and continued to feed the world and, while much of it needs the reforms offered by agroecology, it cannot be changed all at once or even substantially without also leading to mass famine and crisis.

Instead, the AFM should focus on what it *can* do and channel its energies toward doing that effectively. What it can do is build small local food systems that satisfy the growing demand from consumers for healthy local produce—not to replace the industrialized food system, but to tap into a sliver of its massive market to bring opportunities to small-scale and urban farmers who themselves work collaboratively and cooperatively. To do so, it has to retreat from some of its revolutionary goals and confront the limits its practices keep facing at this time. It has to recognize that small-scale and urban farmers cannot succeed and are not succeeding in isolation, and that new-entry and beginning farmers require a long-term and sustained engagement to acquire the skills and experiences needed to become successful farmers. It has to recognize that it is limited in its market opportunities, and it has to account for necessary financing and find available, affordable land for farmers. If farmers are going to earn a better-than-break-even income, they must focus on small local and regional AFNs that are themselves struggling to gain a foothold. Building from the bottom up robustly will not change the global food system, but it will offer local alternatives that work, change the lives of alternative farmers, and satisfy the demand for local produce. Farmers markets and CSAs have not delivered for farmers, but well-constructed food hubs based on robust farmer training and preparation just might.

The microfarm system approach offers such a pathway by creating an appropriate division of labor within a local food system, relieving small-scale and urban farmers of the excessive burdens of marketing and crop planning by reducing the uncertainties of the market. As RGO is beginning to demonstrate in Mansfield, separating marketing activities from farm work has facilitated a scalable cooperative that is now offering this opportunity to more farmers in the city and county. With a viable business model in place, participants in the microfarming system are liberated to pursue many of the other goals of the AFM, including sustainable agriculture, social justice initiatives, food literacy education, farm training for prisoners, farm-to-school

activities, and other community food projects that have the promise to improve our food systems one community at a time. 

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Understanding the emerging phenomenon of food forestry in the Netherlands: An assemblage theory approach

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Abstract

In the Netherlands, food forests have been appearing by the dozens since 2017, resulting in calls by Dutch national and local governments, as well as civil society organizations, for evidence of their parameters and profitability. This paper focuses on the former, mapping and analyzing food forestry (FF) in the Netherlands by drawing on assemblage theory. A survey, and unstructured interviews with five FF experts from the field, resulted in descriptive FF data as well as a map of 231 food forests. The main conclusion from the survey data from 109 participants is that food forests are incredibly diverse and versatile in terms of goal or orientation, although few initiatives focus on profitability. Some similarities include age, as most food forests were planted after 2017, and size, as most are between 0.5 and 2.5 hectares (ha), or between 1.2 and 6.2 acres. The demographics of practitioners, however, are rather homogeneous: university-educated individuals between 40 and 60 years old are the norm. Many practitioners state that the FF community at large has contributed to their access to knowledge and network, as well as their enthusiasm, sense of pride, and hope for the future regarding FF. Moreover, a shared ontological position, the distribution and exchange of knowledge, the institutionalization of FF, and infrastructural conditions both foster cohesion within the FF assemblage and embody exclusionary and disruptive processes. These complex relations confirm the importance of descriptive and contextualized evidence to support FF.

Keywords

food forestry, assemblage thinking, participatory action research

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Introduction

As climate change-induced precarity of food systems is starting to affect most of the world (Brondizio et al., 2019), the need for resilient forms of agriculture that can both provide climate change mitigation and adaptation strategies is higher than ever. A potential candidate is the land-use practice of food forestry (FF) (Park et al., 2017). A food forest is a land-use system that mimics the ecosystem of a natural forest, using edible and perennial plant species (Park et al., 2017). In Dutch food forests, examples of such species include the eastern American black walnut (*Juglans nigra*), figs (*Ficus carica*), aronia berries (*Aronia melanocarpa*), and wild garlic (*Allium ursinum*) (personal observation, 2023). Food forests maintain a higher biodiversity than industrial land-use systems, resulting in beneficial plant-plant interactions (Kumar & Nair, 2004; Park et al., 2017). FF therefore requires little to no external inputs, such as chemical fertilizers and pesticides (Kumar & Nair, 2004). Besides food production, FF can play a role in nature restoration and conservation efforts. The high level of biodiversity provides habitat for wildlife species, and due to the inclusion of perennial species food forests sequester more carbon than their industrial counterparts (Park & Higgs, 2018). FF also has a potentially important pedagogical role; it could help reconnect neighboring human communities to nature (Park & Higgs, 2018).

Rooted in the permaculture tradition (Mollison & Holmgren, 1978) and promoted by FF pioneer Martin Crawford (2010), FF is a recent phenomenon in Europe and North America (Albrecht & Wiek, 2021). In the Netherlands, food forests and FF-related organizations have surged in the last decade, which has been recognized by various actors within the Dutch national and provincial governments, as well as research institutes. Putting words into action, a number of actors signed an agreement in 2017 to promote the development of FF in the Netherlands: Green Deal Voedselbossen (Green Deal Food Forests) (Green Deal Voedselbossen, 2017a).

Green Deal Voedselbossen maintains a precise definition of FF: at least 0.5 ha in size, predominantly consisting of perennial species, with a canopy layer, a rich soil life, and at least three layers of vegetation between them (Green Deal Voedselbossen, 2020). The Green Deal acknowledges FF's potential to mitigate problems incurred by industrial agriculture, but calls for empirical evidence, in the form of statistics pertaining to ecological, social, and economic indicators, to corroborate this potential (Dorp & Stobbelaar, 2020; Green Deal Voedselbossen, 2017c). Correspondingly, the Green Deal was signed on the condition that more FF research would be conducted.

An increasing number of researchers have studied food forests recently. Some focus on one element of FF, such as its role in ecological restoration (Park et al., 2017; Park & Higgs, 2018). Others offer a thorough account of a specific case study, such as the community food forest in Parma, Italy (Riolo, 2019) and forest gardens on Swedish farms (Björklund et al., 2019). Albrecht and Wiek (2020) studied 209 food forests worldwide and found that while most of them scored well on sociocultural and environmental indicators, economic indicators lagged behind. This raises questions about the ability of FF to secure practitioners' livelihoods.

Existing research converges on the heterogeneity and versatility of FF practices, and emphasizes the importance of context, signifying both the ecological landscape and the socioeconomic and political landscape in which a food forest is established (Albrecht & Wiek, 2020; Park et al., 2017). In the case of FF, any generic conceptualization of a food forest might fail to account for the diversity on the ground, which limits its practical relevance. The diversity of FF practices calls for an approach that is sensitive to the nuances and intricacies of the different conditions in which food forests exist.

Respecting this sensitivity, this paper aims to map and analyze the emerging phenomenon of FF in the Netherlands in a descriptive manner, so as to emphasize the representation of individual cases. Assemblage theory (AT) provides a vocabulary that elucidates the wide variety of components that constitute the FF landscape and directs attention to the relations between them. This study aims to uncover how these components synergize and how their interactions contribute to or disrupt cohesion within the FF assemblage. This study takes an exploratory approach and sets the stage for further research on how FF is performed.

Theoretical Framework

AT was originated by Deleuze and Guattari (1980/1987), and other authors have since developed and refined the theory (DeLanda, 2016; Gabriel & Sarmiento, 2020; Sarmiento, 2020). The point of departure is socio-material wholes, or *assemblages*, referring to, for example, social phenomena, networks, or groups (Deleuze & Guattari, 1980/1987). AT views social phenomena as the coming together of many components which interact, producing *emergent properties*. DeLanda (2016) offers the example of a knight to illustrate this; the interaction between a person, a horse, and a weapon constitutes a more powerful whole than the sum of its parts.

Deleuze and Guattari categorize components as *segments of content* and *segments of expression*. While the former simply refers to material components of the assemblage, such as practitioners and food forests, the latter is less definable, but includes the representation of meaning in discourse (e.g., media coverage) as well as practices (e.g., events and gatherings) (DeLanda, 2016). Significantly, DeLanda (2016) emphasizes the relativity of scale. Components are in themselves assemblages, just as assemblages are components of other assemblages (Cameron & Hicks, 2013). DeLanda thus views society not as a coherent social field, but as a population of assemblages. In the case of FF, this phenomenon can be seen as an assemblage, composed of many component parts, such as individual food forests and practitioners.

DeLanda describes two more conditions of assemblages. New properties necessarily emerge from interaction between parts, so that an assemblage is always more than the sum of its parts. And emergent properties are contingent on interaction: when the interaction ceases, those properties cease to exist (DeLanda, 2016). To continue or expand emergent properties, the assemblage therefore needs to be retained. Emergent properties can manifest in tangible ways, such as gaining access to resources, or in nontangible ways. An important type of nontangible emergent property is what Massumi defines as *affects*: "ideological effects through non-ideological means" (Massumi in Roelvink, 2020, p. 428). Affects are experienced emotionally, but they also embody capacities, in the sense that for example the presence of hopefulness or optimism can favorably alter courses of action for those who experience it, thus altering the disposition of those involved (Anderson, 2014; Roelvink, 2020).

The degree to which an assemblage is unified or cohesive is determined by what *relations of dominance* (Sarmiento, 2020), interactions between segments that lead to increased cohesion. Interactions can also have disruptive effects, *relations of difference*, which can decrease cohesion or disband the assemblage altogether.

In short, an AT approach illuminates segments of content and expression in FF, their interactions, and the emergent properties these interactions generate. Moreover, examining the relations of dominance and difference at play provides an understanding of the current state of the FF assemblage.

Methods

This study is the first part of a broader participatory action research (PAR) project investigating social and economic possibilities for FF in the Netherlands at various scales (Kindon et al., 2007). For this particular study, a multi-method approach was used, with the research aim developed iteratively with the survey participants and a guidance committee (Table 1). To ensure reliability, validation strategies such as thick description and member checking (consulting participants) were used (Creswell, 2013).[1] The fieldwork was conducted mostly during 2022, but relevant fieldwork conducted for a different study (Roodhof & Veen, 2021) which started in 2020 was also taken into account.

Results

This section begins with an outline of the identified parts of the FF whole, distinguishing between tangible and nontangible parts: segments of content and expression, respectively. Subsequently, the interactions between these segments will be analyzed for emergent properties. Interactions can either contribute to the cohesion of the assem-

[1] For a more detailed description of thick description and member checking as validation strategies, see Creswell (2013).

Table 1. Overview of the Methods Used for this Research Project

Method	Description	Purpose	Timeline
Participant observation	Attending FF-related events and visiting food forests	Understanding FF and the context in which they occur	Fall 2020–Fall 2022
Online search	Entering the search query "voedselbos" (food forest) in Google and checking the results	Identifying food forests and practitioners in the Netherlands	Spring 2022
Snowballing	Checking the websites of FF organizations in the Netherlands and asking practitioners about other practitioners and food forests	Identifying food forests and practitioners in the Netherlands	Spring and summer 2022
Discussion session	An interactive discussion session with prospective survey participants (*N* = 29)	Iteratively developing the purpose of this study and aligning the content of the survey	Fall 2022
Survey	Closed and open questions (informed by AT) that address the parameters of food forests and practitioner experiences and perceptions	Generating descriptive data on food forests and practitioners in the Netherlands	Fall 2022
Guidance committee	Individual contact with five FF experts in the Netherlands and a two- hour group discussion	Aligning the goals of this research project with the needs of FF practitioners and improving the research quality and reliability	Summer and Fall 2022, Winter 2023

blage, thereby supporting its emergent properties; or they can challenge cohesion, disrupting emergent properties. The section ends with a discussion of relations of dominance and difference within the FF assemblage.

Segments of Content

Segments of content refer to the material components of assemblages. Through an online search as well as via snowball sampling, 231 food forests were identified, 108 of which are represented in this study by a total of 109 practitioners. Besides food forests and practitioners, an array of other segments of content are discussed: government institutions and actors, actors within the private sector, FF organizations and enterprises, key nodes within the FF network, and other individuals and groups related to FF. Below, each subcategory is addressed individually.

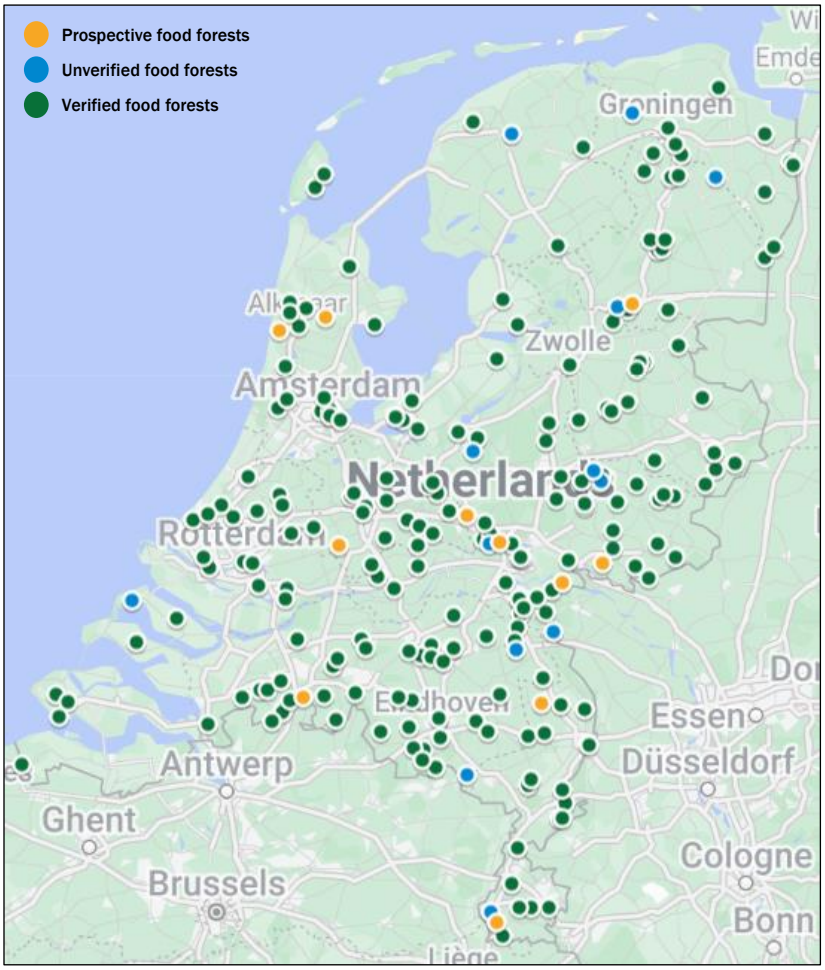
Food forests

Figure 1 shows a somewhat uneven distribution of the 231 FF initiatives, but it should be noted that this map is not exhaustive. For example, practitioner Femmeke Huigens indicated that she knows approximately 200 private food forests in the northeastern province of Drenthe alone, which could not be included due to privacy restrictions on their contact information (2022, personal communication). This number greatly deviates from the number of food forests displayed in Drenthe in Figure 1, suggesting that the actual total number of food forests may be considerably higher than 231.

The existence of 207 of these 231 initiatives was verified through either verbal or written communication with the initiator. The verified food forests are depicted in Figure 1 as green dots. The yellow dots indicate 11 prospective food forests, which have not been realized yet. Thirteen initiatives remain unverified (the blue dots, Figure 1). The prospective and unverified food forests demonstrate that this map is not definitive, but rather an indication of established food forests.

Of the 231 food forests discussed in the previous paragraph, 108 are represented in the survey. Table 2 summarizes their descriptive characteristics and shows that food forests are heterogenous in terms of the main goal or orientation of the food forest, business model, and means of financing. Most food forests are not limited to one orienta-

Figure 1. Map of Food Forestry Initiatives in the Netherlands by Type



tion, and it should be noted that while Table 2 reflects their main orientation(s), many have additional orientations. This shows that food forests are versatile, engaging in an array of activities that are not limited to food production.

The majority of food forests are not (yet) focused on generating income, as less than a quarter of the food forests represented in the survey are a for-profit or social enterprise. Most food forests in the study are nonprofit or for personal use. A possible reason is that many participants see FF as an experimental form of agriculture. The guidance committee mentions that few participants started practicing FF to earn money. For several, FF has eventually grown into full- or part-time jobs, but rarely did the practice begin as one (guidance committee, 2022, personal communication). This is also reflected in the means of financing, which for most food forests (partly) consist of personal assets.

In terms of size and age, the food forests are more similar: most are larger than 0.5 ha, with the majority between 0.5 and 2.5 ha. Most food forests were established between 2016 and 2020.

Practitioners

Table 3 shows that the survey participants share a number of similarities. The majority are Dutch, over 40 years old, and have a university or university of applied sciences degree. Many participants also have a form of employment outside of their food forest.

The characteristics pertaining to income and employment vary considerably. Nearly a quarter of participants indicated that their income was "not applicable," suggesting that they have other means of securing their livelihood. Approximately half of the participants that are employed have a job that is related to their food forest, but these participants are more likely to earn an income that is below average. This does not necessarily imply a precarious financial position; the guidance committee suggested that these practitioners often have savings or a spouse with an income. Accordingly, a secure financial position plays a key role in prospective practitioners' capacity to start a food forest (2022, personal communication). As FF requires considerable seed capital with no immediate returns, it is currently more accessible to those with the means to take a financial risk.

Food forestry experts

With the onset of FF in the Netherlands, a pool of FF experts has emerged: practitioners who engage in consultancy, education, and design services. These experts are key nodes in the FF assemblage,

as they actively recruit new practitioners and connect practitioners with one another. Five of these experts compose the guidance committee introduced in the methods section.

Visitors, volunteers, and others involved with the food forest

While the survey instrument for this research project only included questions pertaining to individual FF practitioners, participants and the guidance committee alike emphasize the importance of local networks and communities in which food forests are embedded. While some food forests are for personal use only, many function as social hubs and engage with many visitors, volunteers, and others.

Table 2. Descriptive Statistics of the Food Forests (*N* = 108)

Descriptive variable	Frequency % (*n*)
Size	
<0.5 ha	16.7% (18)
0.5–2.49 ha	58.3% (63)
2.5–4.49 ha	13.9% (15)
4.5–6.49 ha	5.6% (6)
6.5–8.49 ha	0.9% (1)
8.5–9.99 ha	0.0%
>10 ha	4.6% (5)
Start date	
<2000	1.9% (2)
2000–2010	2.8% (3)
2011–2015	8.3% (9)
2016–2020	61.1% (66)
>2021	25.9% (28)
Main orientation(s)[a]	
Education	52.8% (57)
Research or experimentation	44.4% (48)
Nature or biodiversity	26.9% (29)
Social or recreation	51.9% (56)
Production	50.9% (55)
Business model	
Nonprofit	30.6% (35)
Social enterprise	4.6% (5)
For-profit	19.4% (21)
Cooperative	2.8% (3)
Public	1.9% (2)
Own use	33.3% (36)
To be determined	3.7% (4)
Means of financing[a]	
Personal assets and/or savings	69.4% (75)
Public subsidies	40.7% (44)
Private investment	9.3% (10)
Donations or grants	30.6% (33)
Loans	1.9% (2)

[a] Participants were able to select more than one answer.

Table 3. Descriptive Statistics of the Participants of the Survey (*N* = 109)

Descriptive variable	Frequency % (n)
Gender	
Male	53.2% (58)
Female	45.0% (49)
Nonbinary	0.9% (1)
Don't want to say	0.9% (1)
Level of education	
Post-graduate degree	6.4% (7)
University degree	40.4% (44)
University of applied sciences degree	40.4% (44)
Vocational education	9.2% (10)
High school diploma	2.7% (3)
Other	0.9% (1)
Age	
<30	3.7% (4)
30–40	10.1% (11)
41–50	28.4% (31)
51–60	27.5% (30)
>60	30.3% (33)
Nationality	
Dutch	98.2% (107)
Belgian	0.9% (1)
Australian	0.9% (1)
Income[a]	
Below average	31.2% (34)
Average	22.0% (24)
Above average	23.9% (26)
Not applicable	22.9% (25)
Employment status	
Full-time employment	14.7% (16)
Part-time employment	18.3% (20)
Self-employed	21.1% (23)
Freelance employment	28.4% (31)
Unemployed	17.4% (19)
Employment food forestry-related	
No	42.2% (46)
Partly	22.0% (24)
Yes	18.3% (20)

[a] In 2022, the average income in the Netherlands was €38.000 before taxes.

Consumers

As food forests are a form of agriculture, food production for consumption is an important aspect. This study survey was not directed towards consumers, but participants stated that the consumption of FF products occurs in various ways: personal consumption, sharing, and product sales to individual customers, local businesses, or restaurants. Participant experiences with FF product sales are very diverse and highly context-dependent: 15% struggles to find customers, whereas 16% experiences no problems in this respect. Most food forests, however, are not yet productive and thus have little to be consumed.

Infrastructure

Another key segment of content is infrastructure, which includes laws and regulations and financial support. Infrastructural circumstances vary considerably by province or even municipality (guidance committee, 2022, personal communication). In some provinces and municipalities, subsidies have been made available for food forests and zoning laws have become more inclusive (guidance committee, 2022, personal communication). In most provinces, however, the current laws and regulations impose restrictions on food forests, because they maintain a strict separation between nature and agriculture and food forests fall within neither of those categories (Green Deal Voedselbossen, 2021). Besides problems with laws and regulations, participants expressed that subsidies and loans are difficult to obtain, as indicated in Table 2.

Upon discussing the survey results pertaining to infrastructure with the guidance committee, land and plant scarcity emerged as additional challenges (guidance committee, 2022, personal communication).

Education and research institutes

Several universities and research institutes engage with FF. Many students are interested and involved, contributing to FF research through their master theses or internship projects. They often do so in collaboration with the National Monitoring Programme Food Forests,[2] as discussed below.

Food forestry organizations, coalitions, and enterprises

Numerous organizations, coalitions, and enterprises have been established around food forests that play a crucial role in generating and distributing FF knowledge. The primary coalition is Green Deal Voedselbossen, which unites stakeholders from the public and private sector and initiated the National Monitoring Programme Food Forests, an organization that does longitudinal research, tracking approximately 35 food forests (Green Deal Voedselbossen, 2017a; 2017b). Another important organization is Voedsel uit het Bos, a citizen-science platform that unites hundreds of practitioners and asks them to provide data on their food forests (Voedsel uit het Bos, n. d.). Practitioners can also connect with each other. In addition, Stichting Voedselbosbouw is a platform that aims to facilitate FF in the agricultural sector, providing consultancy and design services, as well as offering FF courses and workshops (Stichting Voedselbosbouw, n. d.). Likewise, several FF practitioners have formed enterprises that offer workshops and trainings for other practitioners.

While many organizations, coalitions, and enterprises exist as part of the FF whole, there is no overarching authority that unites them. They often overlap in terms of jurisdiction, services offered, and topics discussed.

Food forestry networks

The social media platform Facebook is regularly used by practitioners in the Netherlands to connect and share information. In total, I identified nine networks fully or partially mediated on Facebook; some also have a separate website and/or newsletters. Five of the groups are regional and have between 140 and 1500 members. The other four are thematic (e.g., sharing food forest recipes) and have between 1700 and 35500 members.

[2] The National Monitoring Programme Food Forests adheres to UK spelling and grammar, which I retain when referring to this program.

Segments of Expression

The segments of expression, the nontangible component of the FF assemblage, that I identified suggest two subtypes: segments of expression internal to the existing FF assemblage and segments that go beyond it. Some segments are oriented both within and beyond the actualized FF assemblage.

Segments within the food forestry assemblage

Knowledge sharing and facilitation

The majority of participants designed their own food forest; a multitude of resources is available for those who choose to do so. The platforms Stichting Voedselbosbouw and Voedsel uit het Bos, as well as the website of Green Deal Voedselbossen, offer much open- source information FF practitioners can freely access. The platforms also have newsletters, promoting events and relevant courses and sharing knowledge. There are many courses, workshops, trainings, and consultancy services to which practitioners can resort. These often require a participation fee, but many are open to discussing options with practitioners who cannot afford it. Due to the rapid increase in the number of food forests in the Netherlands, however, consultants and designers struggle to keep up with the growing demand for such services (guidance committee, 2022, personal communication). Moreover, as FF is a grassroots phenomenon, available resources are dispersed and not subject to quality control (guidance committee, 2022, personal communication).

Events within the FF assemblage

There are many organized FF activities. Vertical activities, such as tours and courses, connect experts to new or prospective practitioners and other aficionados, and horizontal or assemblage-wide events foster network building and knowledge exchange among practitioners. One example is a workshop organized by a FF foundation with the aim of identifying bottlenecks in the development of food forests. Attendees included most of the experts central in the FF assemblage and many other practitioners from all over the Netherlands.

Segments beyond the food forestry network

Politics

While the Dutch government has expressed support for FF, support has yet to be fully integrated into laws, regulations, and available subsidies (guidance committee, 2022, personal communication). One barrier is lack of evidence concerning the scalability of food forests (Green Deal Voedselbossen, 2017b). While several large-scale production food forests exist, they are still in development and evidence about their profitability is yet to be produced. Nevertheless, evidence alone will likely be insufficient to increase government support for FF: the guidance committee emphasizes political will and the mindset of civil servants as additional conditions for support, which require further investigation (2022, personal communication).

Media exposure

Media exposure of food forests has steadily increased recently. In 2022, national major newspapers as well as regional and local newspapers have written about FF and related topics, introducing their readers to the concept. FF has also been presented on several radio talk shows, which invited FF experts to discuss their experience and perspectives (BNNVARA, 2021).

In addition to the mainstream media, Voedsel uit het Bos launched a podcast on Spotify, which publishes episodes about 50 minutes long every two weeks. In the episodes, the hosts invite a guest, often an expert, to talk about FF, potentially recruiting prospective practitioners and contributing to knowledge exchange among practitioners.

Events beyond the food forestry network

Events beyond the FF network actively seek out people who might not know about food forests or be skeptical about them. An example is the Floriade Expo, an international horticultural exposition organized every ten years in various Dutch cities. The 2022 edition included a food forest; the Expo was visited by 685,000 people, about three-fourths of whom were Dutch, and was well-received (Omroep Flevoland, 2022). The food forest designer also talked about FF on a national radio show, where he was invited as a guest twice in 2022.

Interactions and Emergent Properties

The interaction between the segments of content and expression leads to emergent properties (DeLanda, 2016). Using the survey, participants were asked to rate their experiences regarding their access to knowledge, access to networks, access to volunteers or employees, access to customers, and their experience with the overall circumstances for FF in the Netherlands. Moreover, participants were asked to rate their perceptions of the following affects: enthusiasm, sense of knowledgeability, confidence, sense of pride, hope for the future, and ability to cope with setbacks. These two lists, and the corresponding sets of questions, aimed to investigate the extent to which participants experience emergent properties of the FF assemblage. They had been composed based on participant observation and discussion with prospective survey participants.

The survey results indicated that participants most strongly experience the emergent property of access to knowledge, because of the approachability of experts, knowledge exchange within their network, the availability of courses and workshops, and the open-source information online. Participants nevertheless emphasized that FF is still in an early stage of development, with little organized knowledge. A recurring term used to describe this stage was "pionieren" (pioneering). Underpinning this notion is the shared belief that FF has by no means reached its "climax ecosystem" yet. Moreover, participants noted that there are many contradictory voices and that scientific knowledge about FF is scarce. Some participants emphasized that they knew little about how their food forest can secure their livelihood.

Participants experience the emergent property of access to networks to a slightly lesser extent, approximately half describing it as "good" or "very good." The primary benefit mentioned was a strong will among practitioners to share experiences and knowledge. While most participate in a network and appreciate it, some participants indicated that they would like to improve their network, but that they are unable to put in the necessary time to achieve this. Participants also mentioned that finding relevant contacts is especially difficult for outsiders or newcomers. A FF course could mitigate this, but survey participants list course fees as a participation barrier. Some participants asserted that FF is a bubble in which most practitioners share similar values and motivations. Correspondingly, participants who perceived their values as different indicated feelings of isolation. The next section further unpacks participants' perceptions of whether values are shared in relation to cohesion.

Experience of access to volunteers or employees and access to customers were more diffuse. Nearly half of the participants do not have a need (yet) for volunteers, employees or customers. Their food forests are often maintained by a small group of people, often acquaintances, family, or friends. Likewise, many food forests produce only for personal use. For many participants, however, the sale of produce will likely be a key goal in the future, once their food forests start producing higher yields. Of those who did indicate a need for volunteers, employees, or customers, experiences varied. Some participants are very content: volunteers independently find these food forests, and customers present themselves. Other participants, however, struggle to find customers or reliable volunteers. In addition, volunteers often lack expertise and require supervision. Thus access to volunteers, employees and customers might be less connected to the FF concept as a whole and more dependent on a food forest's development stage, management plan, and socio-geographical context.

Finally, experiences concerning the circumstances of FF in the Netherlands are varied, but on average participant experiences are positive. This could be explained by the affects that the FF assemblage generates, on the one hand: the majority of participants experience affects from their involvement with FF, most notably in terms of their hope for the future, their enthusiasm about FF, their sense of knowledgeability, and their sense of pride. These sentiments possibly alter practitioners' dispositions to cope with the current circumstances of FF, which could ultimately improve their ability to do so (Anderson, 2014; Roelvink, 2020). An example is the previously mentioned experience of "pionieren" shared among practitioners: practicing FF entails the excitement of being part of a new, grassroots movement that

gives a sense of purpose, while also having a sense of insecurity. However, the excitement and sense of purpose could help mitigate any anguish or perceived insecurity. On the other hand, three participants strongly expressed that they do not feel connected to FF at large nor do they see FF as a coherent whole in the first place, and therefore they do not experience any emergent properties.

Thus the survey shed light on participants' perceptions of emergent properties of the FF assemblage, pertaining to tangible benefits (e.g., access to knowledge) and nontangible benefits (e.g., enthusiasm). The majority of the participants were satisfied with their access to relevant knowledge and networks and experience notable affects resulting from the FF assemblage. However, likely due to the heterogeneity of food forests in terms of orientation and socio-geographical location, practitioners experience access and affect to different degrees. A minority of participants reject the idea of emergent properties altogether, as they do not perceive FF as a coherent whole, but rather as fragmented and unconnected.

Relations of Dominance and Difference

The interactions of the segments described in the previous section both generate and are simultaneously guided by the very nature of the interaction (Deleuze & Guattari, 1980/1987). Some interactions generate cohesion and foster emergent properties, and others work in the opposite direction, pulling apart the segments. Sarmiento (2020) calls these forces relations of dominance and difference, respectively. In this section, the relations of dominance and difference within the FF assemblage are analyzed. Five categories emerge from participant answers: recruitment, values, FF definitions, organization, and infrastructure.

Recruitment

A vital dominance relation involves recruiting new practitioners, which often occurs via readily existing networks, as more than half of the survey participants were introduced to FF through their personal networks. This aligns with the perception that the FF network is a "bubble," a somewhat homogeneous group of practitioners with specific ideas about the practice and which can be difficult to penetrate for outsiders. But not all participants were introduced to FF through their personal connections, suggesting that if such a bubble exists, it is expanding beyond readily established personal networks. A core but expanding group of FF enthusiasts plays an active role in recruiting these new practitioners, both locally (through connections with other local food networks) and translocally (through media and actively seeking out prospective practitioners in the agricultural sector) (guidance committee, 2022, personal communication). Recruitment has been quite effective, as the number of food forests and practitioners has grown substantially in the last five years. Practitioner John Vermeer states: "For a long time, we had to rebel against conventional agriculture, we were a niche. But now our numbers are growing, and the regime can no longer ignore us, which gives us a better position" (Vermeer, 2022, personal communication).

Recruitment can be both a relation of dominance and of difference. On the one hand, it strengthens the position of FF as a legitimate type of agriculture, as more people have been convinced (guidance committee, 2022, personal communication). On the other hand, more practitioners could also lead to greater diversity of values and opinions, leading to conflict among practitioners, to be addressed in the next section.

Value-driven cohesion

Another dominance relation is retention of practitioners through value-driven cohesion. Many survey participants experience strong cohesion with other FF practitioners: they see them as likeminded peers, who share values such as wanting to contribute to nature and society, and to prioritize access to healthy food. Participants typically engage with food forests other than their own, potentially contributing to perceived connectivity with other practitioners. Likewise, most participants partake in courses, activities and events, resulting in new connections and strengthening existing ones. Participants indicated that interaction and collaboration with other practitioners often leads to inspiration, motivation, and, more practically, to knowledge exchange. The role of organizations, local and regional governments, the media and experts that

promote FF is described as "verbindend," roughly translated as "creating a sense of unity." Those experiencing the strongest sense of cohesion are mainly survey participants avid about networking as well as experts. Particularly, the guidance committee views FF as a political project to transform agriculture at large, which creates a greater sense of togetherness (2022, personal communication).

Cohesion can also be considered a relation of difference, as a small number of participants indicate no experience of cohesion whatsoever. According to them, the lack of organization and institutionalization renders FF an isolated activity. Some practitioners express little interest in cohesion: to them, FF is merely a personal hobby. Others feel excluded by the previously mentioned "bubble" of FF practitioners. The distribution of cohesion within FF thus seems uneven.

While values unite many practitioners, values require further unpacking to understand how they can still promote relations of difference. The survey showed that many participants are driven by underlying conceptions about the human-nature relationships; i.e., that humans are part of nature and that food production and nature conservation are not mutually exclusive. Participants enact these values in different ways, however. Some want to persuade others of their ontological position, whereas others simply want to practice what they preach, and keep the preaching to a minimum. While participants often share an ontological position, the decision on how to act on that position sets them apart.

Definition(s) of food forestry

Most participants agree on a general definition of FF: it entails a sustainable form of agriculture in which both nature values and food production are at the forefront. Three-fourths of participants define FF in resonance with the definition set by Green Deal Voedselbossen (2020), and many expressed concern about FF being "hype"; that is, adopting the term without adhering to the basic terms set by Green Deal Voedselbossen. Contrarily, a few participants oppose a rigid definition, calling it exclusionary and pretentious.

The guidance committee strongly favors a clear definition to prevent ambiguity about the concept, which it fears would harm the reputation of FF as a serious type of agriculture, with government institutions, investors, and banks dismissing FF as an amateurish hobby (guidance committee, 2022, personal communication). The lack of a definition could also lead to a false sense of security due to misinformation: practitioners could obtain an inaccurate understanding of what it means to design, implement, and maintain a food forest (guidance committee, 2022, personal communication). More than half of the participants found maintenance of their food forest challenging, perhaps due to the previously mentioned hype, which posits FF as a silver-bullet solution. Consequently, practitioners might underestimate the work required for upkeeping a food forest and fail to do so effectively (guidance committee, 2022, personal communication). This could demotivate practitioners and spotlight unsuccessful FF projects, thus threatening the FF assemblage.

Organization or lack thereof

Many participants characterize the FF landscape as unorganized. This may be because it is a relatively young grassroots phenomenon (guidance committee, 2022, personal communication). However, opinions about this lack of organization vary considerably. Many see it as an asset, as it allows practitioners to adapt the FF concept to their individual situations, making the practice more accessible and thus supporting expanding the FF assemblage. Others, including the guidance committee, prefer a higher degree of organization to discourage misinformation about what practicing FF entails, thus prioritizing cohesion within, rather than expansion of, the FF assemblage to ensure its continuation.

Infrastructure

Infrastructure and related knowledge point to another relation of dominance (and difference). The provincial governments of Drenthe and Noord-Brabant implemented changes to support the development of FF (guidance committee, 2022, personal communication). In those provinces, the number of food forests is considerably higher than in provinces that have not implemented such changes, such as Noord-Holland (guidance committee, 2022, personal communication). While it is

unclear which came first, the number of food forests or supportive policies, the latter is a crucial relation of dominance. Flexible laws and regulations, such as inclusive zoning laws that allow for food forests, enable prospective practitioners to initiate projects. Many participants name laws and regulations pertaining to FF, as well as lack of financial opportunities (specifically subsidies and loans), as a severe challenge. These challenges have been ascribed to FF often falling through bureaucratic cracks: governments and banks do not recognize it as a form of agriculture, due to the sheer number of trees, but issues also arise when it is categorized as nature, as the dominant perception of nature does not involve food production (guidance committee, 2022, personal communication).

Lack of knowledge about legal and financial aspects of food forests exacerbates infrastructural limitations. More than half of the participants indicated that their financial position did not affect their food forest design, and three-quarters indicated that they did not beforehand consider laws and regulations, but most participants experienced infrastructural issues later on. This suggests that because practitioners did not consider infrastructure when designing their food forests, problems manifested in subsequent stages. This aligns with the findings by Björklund et al. (2019) that forest gardens, a similar land-use system to FF, were more likely to succeed if extensive analysis of the socio-geographic context was conducted beforehand.

This section has illustrated how the different sets of relations can simultaneously contribute to cohesion and to disruption of the FF assemblage. The main relations of dominance are recruitment through personal networks, events, and exposure in traditional and social media channels, shared values about the human-nature relationship, the Green Deal Voedselbossen definition of FF, and infrastructural support. The main relations of difference correspond to these relations of dominance, with three standing out. The same values that bind some practitioners together seem to exclude practitioners, or prospective practitioners, who do not share these values. Misinformation about FF practices can demotivate practitioners and harm FF's image as a legitimate form of agriculture. Lack of infrastructural support and knowledge pose key challenges to many practitioners.

Discussion and Conclusion

This study has aimed to create a thorough inventory of the FF practice in the Netherlands and analyze it through AT. The components of the FF landscape in the Netherlands were identified, as well as emergent properties resulting from their interactions, which can be characterized as relations of dominance and difference. It should be noted that the FF landscape is rapidly changing and therefore this study merely presents a snapshot in time, adding to the existing literature by zooming out from food forests as isolated entities, demonstrating their embeddedness in the personal networks of practitioners, local communities, and the FF landscape on a national level. This section presents the conclusions of this paper, with its limitations and recommendations for future research.

Participant observation and an online search, in combination with the survey, resulted in an extensive overview of the material elements of the FF assemblage. The following categories were identified: food forests, practitioners, buyers and retailers, government bodies, actors and companies in the private sector (banks, account managers, investors), education and research institutes, organizations and enterprises, and experts. A survey generated data from 108 food forests and 109 practitioners as well. The immaterial assemblage components—the segments of expression, such as linguistic expressions, practices, and activities—were also identified. These segments include knowledge sharing and facilitation, networks, events, politics, bureaucratic context, and media exposure. They often connect segments of content and are a means through which relations of dominance and difference manifest. All these make up the FF assemblage in the Netherlands.

Furthermore, survey participants experience notable emergent properties resulting from the FF assemblage, particularly relating to "pionieren": a shared disposition that combines excitement and hope for the future with a sense of insecurity. Due to the heterogeneity of food forests and their dispersed socio-geographical locations, participants

have varied experiences with access to customers, volunteers and employees.

This study found several trends or tendencies in how emergent properties are sustained or challenged that can be described as relations of dominance or difference. A preliminary observation is that the categories of "dominance" and "difference" are not mutually exclusive. Factors that promote cohesion within the FF assemblage, such as having a shared ontological position and political agenda, can also exclude (prospective) practitioners who do not share them. While institutionalization of FF, which is currently limited to a fixed definition of the practice set by Green Deal Voedselbossen, reduces misinformation and promotes legitimacy of FF in the eyes of government and private actors, it also excludes practitioners who do not adhere to the definition, which some participants describe as "pretentious" or "elitist." Interactions between practitioners and infrastructure, such as laws and regulations and financial opportunities, have resulted in both productive collaborations and frustration. Bureaucratic categories impose limitations on FF, although these conditions have changed in certain provinces and municipalities. This illustrates that infrastructure cannot be reduced to bureaucracy: political will and agency of civil servants, bank managers, and practitioners affect the trajectory of infrastructural circumstances. This corroborates Wiek and Albrecht's (2021) argument about the importance of FF practitioner entrepreneurial skills for effecting favorable changes.

The use of AT as a lens to study FF in the Netherlands has yielded a nuanced overview of the FF landscape, vital to conceive a better understanding of the phenomenon. While food forests are heterogeneous, a significant common denominator is their multifunctionality. AT has also illuminated the complex nature of emergent properties resulting from interactions between the different segments, and it has pointed towards relations of dominance and difference which support or challenge these emergent properties. While this study focuses on practitioners and their experience, an AT approach also sets the stage for a focus on the more-than-human, such as technology or trees.

Moreover, AT emphasizes the relativity of scale, important in the case of FF. For this study, a national scale was maintained to examine the parameters of the FF whole in the Netherlands. Social wholes, however, are always a component of a larger assemblage, as they are composed of segments which are assemblages themselves. This applies to the FF practice, which is highly influenced by the permaculture movement (Mollison & Holmgren, 1978) and forest gardens (Crawford, 2010), which originate outside of the Netherlands. FF can thus be seen as a segment of a larger, supranational assemblage, as well as in themselves assemblages, consisting of practitioners, trees, materials, tools, and so forth. A further exploration of FF through AT, focusing on different scales or other socio-geographic locations could result in a more complete picture.

Several questions arose during this study suggesting limitations to be addressed in future research on FF. While AT has been useful to describe practitioners' current strategies and challenges regarding infrastructure, it has not led to insights about underlying power dynamics between practitioners and infrastructural actors. Research at the level of particular food forests is necessary to examine these. The extent to which practitioners are empowered or could be empowered to alter existing dynamics is another question to explore. And while this study has identified many segments of content and expression (e.g., food forests, infrastructure, events, and consumers), research at a smaller scale is needed on how food forests are incorporated into the daily lives of individuals, such as consumers. Future research could also investigate the specific activities in which practitioners engage, as well as the strategies practitioners employ to maintain and advance their food forests.

While this study has not provided scientific evidence for the scalability and productivity of FF as called for by participants and the guidance committee alike, it has taken a first step in understanding what this evidence could entail. Understanding scalability and productivity requires focus on (diverse) economic practices in production-oriented food forests with a for-profit business model, and implies a positivist approach to studying the parameters of FF. However, due to the heterogeneity of food forests in the Netherlands, and

with few food forests having reached their climax ecosystems, few generalizations can be made. Therefore, there is a discrepancy between the type of evidence practitioners want and the type of data that can be generated. This study has attempted to start bridging this gap, an attempt that will have to be continued in future research. Research can include rich descriptions and thorough understandings of different types of food forests, in terms of size, age, and orientation. In other words, a focus on the particular, rather than the generic, might best demonstrate the potential of food forests. 

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Democratizing food systems: A scoping review of deliberative mini-publics in the context of food policy

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Abstract

Deliberative mini-publics (DMPs) have attracted growing attention from both researchers and practitioners in recent years. Their purpose is to assemble random groups of citizens, representing a cross section of society, in order to engage in discussions about policy issues and formulate recommendations. During these sessions, participants are exposed to contrasting perspectives from experts and engage in respectful internal deliberations, facilitated by organizers, before arriving at a carefully considered joint policy position on the topic at hand. DMPs are grounded in the belief that citizen involvement and input are essential if policy reforms are to be perceived as legitimate by the public. In the agri-food domain, they represent an innovative way to rebuild public trust in the food system, allowing citizens to reshape food policy in alignment with their values and concerns. In this study, we conducted a scoping review of the literature to assess the contexts in which food-related DMPs emerge, as well as their organizational characteristics, procedural qualities, and results. We identified a total of 24 case studies, revealing significant diversity between DMPs in terms of their policy themes, formats, and recruitment and decision-making procedures. In terms of results, participants reported that attending the DMP had been a positive experience and had increased their awareness of, and ability to engage in, food policy debates. However, only a handful of DMPs led to documented policy reforms. We argue that greater emphasis should be placed on post-deliberation activities and dialogues

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if DMPs are to make a meaningful impact and contribute to the democratization of food systems.

Keywords
deliberative mini-public, scoping review, food policy, food system, democracy

Introduction and Literature Review

As a universal need that shapes our daily lives and is deeply anchored in personal and cultural identities, food matters to people in a way that other issues do not. Food has a direct impact on our well-being and that of those around us, which means that it is often the focal point of debates and controversies in modern democratic societies (Ankeny, 2016). In today's world, consumers are forced to navigate the complexities of the global food system, with its array of options and associated risks. At the same time, there is growing distrust in this system and mounting criticism of its detrimental effects on human health, workers, farmers, communities, and the environment (Berglund et al., 2021; Thompson et al., 2020). As a result, the current orientation of the food system, which prioritizes productivist goals over community and social values, has fueled citizen discontent with the way food is produced, marketed, and sold (Albrecht et al., 2013; Mundler, 2022).

Food systems encompass a range of activities, from production and processing to distribution and consumption. Consequently, food policy inherently involves intricate technical considerations and complex trade-offs. This often results in decisions being made by experts and government regulators, leaving little room for citizens' voices and opinions to be heard (Ramos-Gerena, 2023). Fundamentally, such an arrangement assumes that citizens are incapable, under the right conditions, of understanding complex subjects and engaging in meaningful, well-informed dialogues, despite evidence to the contrary (Burgess, 2012). Furthermore, it overlooks the fact that "ordinary" citizens often assess and evaluate risks differently than experts and regulatory officials (Houghton et al., 2008). Therefore, incorporating the viewpoints of citizens is crucial when formulating policies so that decisions align with public preferences (Ankeny, 2016).

Scholars have emphasized the importance of creating new spaces that can preserve or rebuild public trust in the food system by giving people a greater say in policymaking (Ankeny, 2016; Candel, 2022; Thompson et al., 2020). It is argued that such mechanisms can facilitate the democratization of food governance by allowing citizens to deliberate and formulate policy recommendations that reflect their values and priorities. The growing interest in citizen-centric spaces reflects a broader movement among theorists and practitioners seeking solutions to the "democratic malaise" endemic in modern societies. As researchers have noted, this malaise can be attributed to governance systems, both in the food sector and elsewhere, that contribute to apathy, depoliticization, and a disconnect between citizens and power centers (Harris, 2019).

In response to this phenomenon, various innovations have been proposed to enhance deliberative democracy, which rests on the notion that involving citizens in policymaking is essential for decisions to be perceived as legitimate by society (Goodin & Dryzek, 2006). Among the proposals put forward, deliberative mini-publics (DMPs) are perhaps the most celebrated and have received the most attention (Dryzek, 2002; Jacquet & van der Does, 2021). DMPs explore citizens' perspectives by creating spaces in which laypeople can engage in structured deliberations on a particular topic and issue recommendations. By establishing a two-way dialogue between policymakers and the public, DMPs have the potential to deepen societal involvement and interest in policymaking and generate innovative solutions. They can also enhance political legitimacy because they allow those most affected by the decisions—the citizens themselves—to provide their input (Harris, 2019).

Real-life DMPs are diverse, ranging from citizens' juries to consensus conferences and deliberative polls.[1] They also differ in certain organizational

[1] Deliberative mini-publics (also sometimes called deliberative processes) is the umbrella term used to describe various citizen-centric forums that follow the main organizing principles outlined in this introduction. The full list of forums that fall within this category is presented in the methodology section.

aspects, such as the number of participating citizens, their duration, and the decision-making protocols used. However, despite these variations, all DMPs share two common features (Burgess, 2012; Curato et al., 2021). First, as their name suggests, they function as mini-publics, meaning that a group of citizens is randomly selected to represent a microcosm of society. Second, they involve a process of deliberation, defined by Fearon (1998, p. 63) as a "particular sort of discussion, one that involves the careful and serious weighing of reasons for and against some proposition." Within this framework, participants reach their conclusions after listening to differing viewpoints from experts and engaging in reasoned and open discussions on the issues presented (Curato et al., 2021). This requires participants to consider opposing perspectives, justify their preferences to others, evaluate the arguments presented by experts, and remain open to changing their positions after moments of group deliberation and personal reflection (Dryzek, 2002; Harris, 2019).

DMPs also differentiate themselves through their emphasis on inclusivity and reasonableness (Burgess, 2012). Inclusivity is promoted because each citizen has the same opportunity to be selected for participation. Put differently, DMPs are open to anyone potentially affected by an issue and do not favor those who are politically engaged, better educated, or wealthy. Furthermore, each participant is expected to have the same opportunities and resources to influence the proceedings and recommendations (Burgess, 2012). DMPs also prioritize public "reasonableness," which is achieved when citizens justify their views, listen respectfully to others, and demonstrate a willingness to alter their preferences when presented with stronger arguments or new information (Dryzek, 2002). The focus on reasonableness aligns with the primary objective of DMPs, which is to elucidate the "right" preferences of citizens (Burgess, 2012). These are preferences that have withstood the rigors of deliberation and dialogue and were formulated within a "context of good information" (Offe, 2014, p. 435).

Researchers have argued that food policy could benefit from the use of novel, democratic approaches, such as DMPs (Ankeny, 2016; Thompson et al., 2020). In recent years, literature reviews have been conducted that provide an overview of research on DMPs (Curato et al., 2021; Jacquet & van der Does, 2021; Organisation for Economic Co-operation and Development [OECD], 2020) or that focus on case studies of DMPs from a single country or the field of healthcare (Safaei, 2015; Street et al., 2014). However, no effort has been made to consolidate the literature on DMPs specifically related to food policy. Our study addresses this gap by examining the characteristics and results of such forums. In doing so, we hope to generate insights that can inform the organization of future food-related DMPs and strengthen food democracy. To this end, we conducted a scoping review of the literature, guided by the following four research questions:

RQ1: Where and how frequently have DMPs on food policy been organized?

RQ2: How and why were these DMPs convened? This question addresses the policy issues discussed, the profiles of organizing stakeholders, and the methods for recruiting citizens and experts, as well as the decision-making protocols, among other factors.

RQ3: Do DMPs effectively capture and disseminate citizens' views on food policy, and do they result in documented policy changes or other outcomes?

RQ4: What were the strengths and weaknesses of each DMP and what lessons were learned that could improve the organization of future food-related DMPs? This question looks at the quality of the proceedings.

The rest of the article is organized as follows. We describe our research methodology, after which we present and discuss our results. Lastly, we draw conclusions from the findings, explore the implications and limits of our study, and offer suggestions for future research on citizen participation in food policymaking.

Applied Research Methods

Based on insights from Munn et al. (2018) and Arksey and O'Malley (2005), we opted for a scoping review as the most suitable search protocol. A relatively novel type of knowledge synthesis, scoping reviews are useful for determining the nature

and extent of research on a particular topic (Peters et al., 2015; Tricco et al., 2018). They differ from systematic reviews because they do not formally assess the methodological quality of the included studies or the risk of bias (Munn et al., 2018). Scoping reviews are a valuable tool for exploring research topics that have not been extensively reviewed or for integrating studies from various disciplines (Peters et al., 2015; Terstappen et al., 2013). This was appropriate for our purposes, given the absence of prior literature reviews on food-related DMPs and the numerous fields that food policy covers, including health, nutrition, science, the environment, and economics. Our choice was also motivated by the fact that scoping reviews are well suited for investigating open-ended research questions (Peters et al., 2015), such as the ones we posed in the preceding section.

To be considered for inclusion, a study had to present primary research and meet the following criteria:

- The study addressed DMPs related to food policy.
- The study was published between 2002 and 2022. This timeframe was chosen after reviewing OECD data on the number of DMPs (not just those specific to food policy) conducted annually in member countries since 1979 (OECD, 2022). The data indicated a sharp and sustained increase in the frequency of such forums since the mid-2000s. Although our scoping review was not limited to OECD member countries, the trend provided a useful indication of the relevant search period.
- The study was written in English or French. We considered studies in French because literature reviews should ideally consider publications in languages other than English (Lefebvre et al., 2022).[2]
- The results were published in a peer-reviewed article or the gray literature (working/conference papers, theses, and reports). We chose to include gray literature under the assumption that not all DMPs resulted in the publication of peer-reviewed articles.

We did not limit our search to a particular geographic area, since such a restriction could lead to the omission of critical findings. In total, six databases were searched: Web of Science, CAB Abstracts, Business Source Premier, Sociological Abstracts, ABI/Inform Global, and CAIRN. These databases were chosen following consultations with a university librarian and were selected for their multidisciplinary coverage and ability to generate broad search results.

The keywords used in our search query referenced various types of DMPs. Not all citizen gatherings can be classified as DMPs, which involve randomly recruiting participants, the use of structured deliberations, and the formulation of policy recommendations. Therefore, it was crucial that the search terms be limited to forums that adhere to these key organizing principles of DMPs. To this end, we conducted an initial literature search in order to compile a list of forums previously identified by researchers as falling under the umbrella term DMP (Ankeny, 2016; Harris, 2019; Jacquet & van der Does, 2021; OECD, 2020). The full list included: "citizens' assembly," "citizens' jury," "citizens' panel," "reference panel," "community panel," "consensus conference," "planning cell," "citizen deliberation meeting," "G1000," "citizens' council," "citizens' summit," "citizens' forum," "citizens' dialogue," "citizens' workshop," "citizens' hearing," "worldwide view," "Europe wide view," "citizens' initiative review," "permanent deliberative body," "permanent deliberative forum," "deliberative event," "deliberative poll," and "deliberative survey."[3] Each term was separated by the Boolean operator OR and truncated to account for alternative endings. We then combined these terms (using the Boolean operator AND) with the following truncated keywords to narrow

[2] French was included because all authors are fluent in the language. Furthermore, as members of a French-language university, we were able to access a specialized database of French publications through the university library system.
[3] For the last three terms, "Deliberative" was used on its own to account for other possible terms, such as "deliberative workshop" or "deliberative meeting."

the search to DMPs addressing food policy: "food*" OR "agri*" OR "agro*" OR "farm*."

Before starting the scoping review, we tested the search terms using the Web of Science database. Subsequently, we removed two keywords that were initially included, "consum*" (for "consumption," "consumers," etc.) and "produc*" (for "production," "producers," etc.), as their inclusion led to a significant increase in search results without yielding any relevant studies. Additionally, we searched for gray literature using Google Scholar and a modified search query[4] and, based on the recommendations of Haddaway et al. (2015), imported the first 200 results from Google Scholar for screening.

A total of 1,130 search results[5] were obtained, downloaded to EndNote, and subsequently exported to the Covidence software program for screening and analysis. The flow chart in Figure 1 illustrates the identification and sorting process. Covidence automatically identified and eliminated most duplicates (n = 305), and we manually removed any remaining duplicates (n = 45). The titles and abstracts of the remaining 780 records were then reviewed to exclude obviously irrelevant studies that did not meet our inclusion criteria. This procedure reduced the pool of potential studies to 191, each of which then underwent a full-text review. Following this step, 23 studies were added to the final sample.

We then reviewed the reference sections of the 23 studies to identify any relevant publications that might have been missed in the previous database search. This led to the inclusion of eight additional studies. As a final check, we browsed the project archives of 11 institutes that organize DMPs and identified one more publication that met our inclusion criteria.

Upon reviewing the 32 retained studies (comprising 23 from database searches and nine from reference and project archive searches), we identified eight instances where two separate studies reported on the same DMP (in all cases by the same author). To avoid biasing the results, we merged these studies, designating one as the primary reference. This consolidation yielded a final count of 24 distinct case studies.

Guided by our four research questions, we created a data extraction template in Covidence (see Appendix A). Template headings were structured to collect information on each DMP's (a) context, (b) organizational characteristics, (c) outcomes, and (d) procedural qualities. We extracted information by manually transcribing relevant passages from the study into the text field under each heading[6] and then transferred the extracted data to an Excel spreadsheet for content analysis. The information collected for each heading was thematically evaluated, and codes were developed using an inductive approach. The results of this analysis are presented in the following section.

Results and Discussion

Context and Trends

We begin by exploring the main temporal and geographic trends found in the final sample. Figure 2 charts the number of publications since 2002 and highlights a growing literature on DMPs in the context of food policy. The increase in studies since 2016 is particularly notable compared to the previous two time periods. This pattern mirrors the broader surge of interest in DMPs as a way of engaging citizens in policymaking, including on topics unrelated to food and agriculture.

However, the case studies were geographically concentrated in certain regions and countries (see Table 1). Europe hosted a total of 10 DMPs, while Australia hosted six. On the other hand, North America hosted only one, while Asia and Africa organized four and three, respectively. Of those that took place in Africa and Asia, only four occurred in developing countries. Certain organizational activities are typically associated with DMPs (designing citizen recruitment strategies, hiring experts and trained facilitators, publishing reports

[4] Since Google Scholar does not support truncation, we used exact search terms. Google Scholar also has a word limit, which required the use of a shorter search query.

[5] The last search was conducted on July 30, 2022.

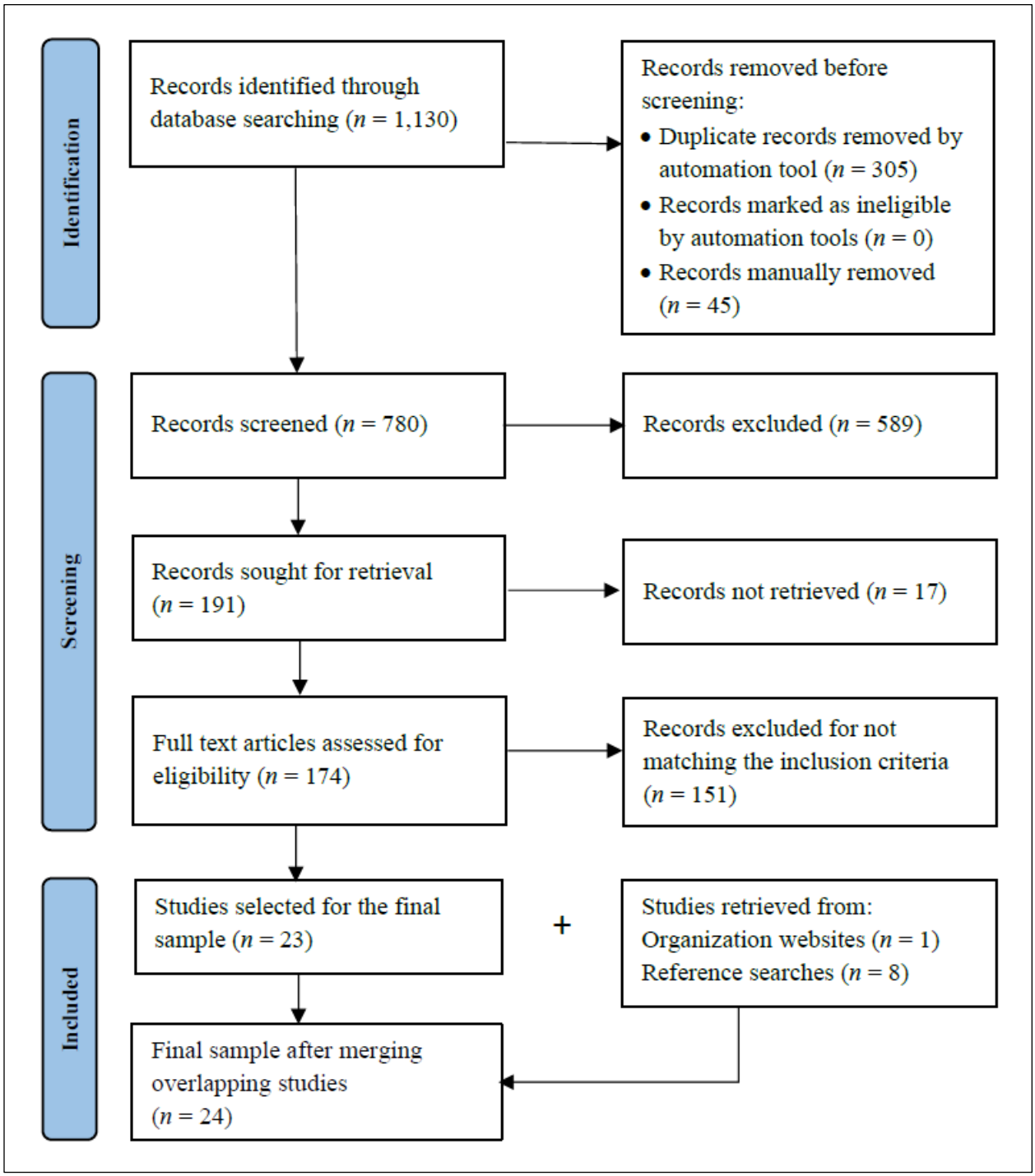
[6] If a study lacked information related to a specific heading, the corresponding text field was left empty.

outlining citizens' recommendations, etc.). While these activities are intended to protect the quality and legitimacy of the proceedings, they make it difficult to organize and fund such forums in low-income countries (Ross, 2022).

Composition of DMPs and Policy Themes

Appendix B provides information on each DMP, specifically the organizational format adopted, the number of participants, the policy theme addressed, and the country and administrative level

Figure 1. Sorting and Identification Process



concerned. In most cases (n = 15), DMPs were organized as citizens' juries. These forums typically consist of 10 to 25 participants who meet over a short period (often one or two weekends) for deliberation and decision-making (Ankeny, 2016). Another five studies featured consensus conferences, which are similar to citizens' juries in terms of duration and number of participants, but often incorporate preparatory workshops before the main event. Three additional studies focused on citizens' assemblies, which tend to be longer and involve more participants than citizens' juries and consensus conferences. Finally, in one study, the DMP was described as a deliberative polling exercise. Unlike other formats, where participants formulate recommendations at the end of the event, deliberative polls capture the opinions of citizens at different stages of the proceedings in order to track changes in viewpoints after key moments of deliberation or when new information is presented. From an administrative standpoint, most of the DMPs (n = 17) addressed food-related issues under the jurisdiction of national policymakers.

Figure 2. Frequency of Publications (2002–2022)

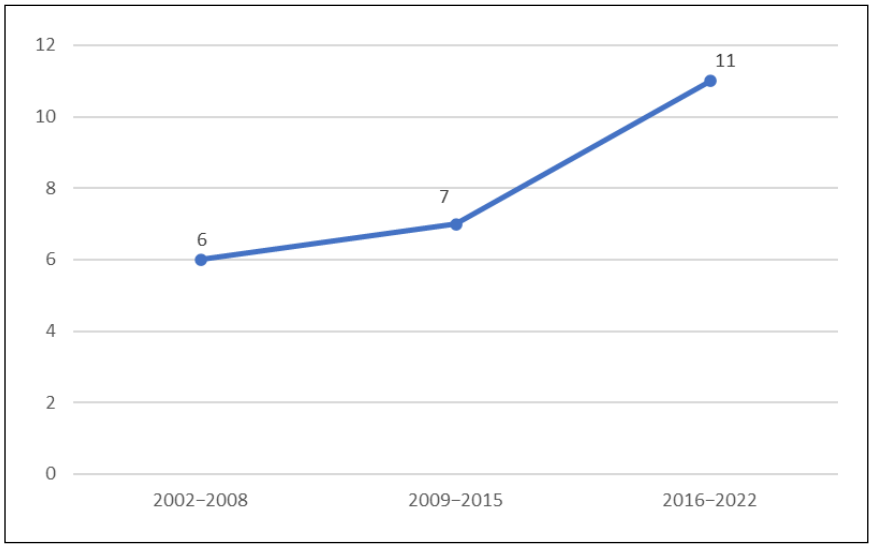


Table 1. Breakdown of Deliberative Mini-Publics (DMPs) by Region and Country

Country/Region	Frequency[a]
Europe	
United Kingdom	4
Germany	1
France	2
The Netherlands	1
Ireland	1
Switzerland	1
Norway	1
Italy	1
Africa	
Ghana	1
Mali	2
Asia	
Taiwan	1
India	1
Japan	2
North America	
Canada	1
Oceania	
Australia	6

[a] The total number of DMPs (26) exceeds the number of studies (24) because, in one article (Miele et al., 2011), DMPs were conducted in three countries.

In practice, there was some overlap between organizational formats. For example, three citizens' juries incorporated deliberative polling techniques (Henderson et al., 2013; Moretto et al., 2014; Withall et al., 2016). Additionally, while citizens' juries are typically designed for smaller groups of participants, four of the citizens' juries in our sample recruited 45 or more citizens.

Most DMPs involved the same group of individuals gathering at a single location, except in two cases where sessions were organized across multiple regions or countries (Miele et al., 2011; Van Lieshout et al., 2017). Typically, the DMPs assembled fewer than 20 people, mainly because most were organized as citizens' juries or consensus conferences. However, even in smaller DMPs (≤ 20 participants), organizers often divided attendees into groups to facilitate deliberations before reconvening for a plenary session. On average, the dura-

tion of a DMP was four days,[7] although some included preparatory sessions before the main event.

Based on the policy topic(s) discussed, we organized DMPs into six thematic categories: (a) food technology and research, (b) agriculture and the environment, (c) health and nutrition, (d) food security, (e) farming methods and land policy, and (f) food marketing (see Table 2).

When a study could be grouped into more than one category, we determined the best fit. Although most of the DMPs focused primarily on food and agriculture-related topics, in certain instances, the food policy issues debated were part of broader discussion themes, such as combating climate change (Devaney et al., 2020; Giraudet et al., 2022; Schol, 2021).

The first theme, *food technology and research*, emerged as the most prominent category in terms of the number of case studies. Citizens' recommendations on this topic varied. Some called for the prohibition or imposition of a moratorium on genetically modified organisms (GMOs) or nanofoods (Policy, Ethics and Life Sciences Research Centre [PEALS], 2003; Pimbert & Barry, 2021; Schol, 2021; Skorupinski et al., 2007). In contrast, other DMPs rejected GMO bans but advocated for mandatory labeling systems on food packages (Joly et al., 2003; Yamaguchi, 2010). Many of the recommendations called for greater accountability from regulatory agencies and scientists and for more research on the health and environmental impacts of GMOs (Joly et al., 2003; Nishizawa, 2005;

Table 2. Breakdown of Deliberative Mini-Publics (DMPs) by Thematic Area

Theme	Publication
Food Technology and Research Key themes: assessing the risks and benefits associated with genetically modified organisms (GMOs) and nanofoods; regulating food technology research; public oversight and accountability; GMO and nanofood labeling systems	PEALS (2003) Nishizawa (2005) Joly et al. (2003) Schol (2021) Yamaguchi (2010) Skorupinski et al. (2007) Pimbert and Barry (2021) Pimbert et al. (2010) Fan (2015)
Agriculture and the Environment Key themes: impact of agriculture on climate change; taxing greenhouse gas emissions from farming; promoting local agriculture; minimizing food waste	Giraudet et al. (2022) Devaney et al. (2020)
Health and Nutrition Key themes: taxing unhealthy foods; combating childhood obesity; comparing government and industry health rating systems for food packages; regulating food advertising	VicHealth (2016) Street et al. (2017) Moretto et al. (2014) Henderson et al. (2013) Anaf et al. (2018)
Food Security Key themes: Improving food access for marginalized populations; exploring livelihood strategies and trade-offs between food production and environmental goals	Timotijevic and Raats (2007) Chen (2021)
Farming Methods and Land Policy Key themes: animal welfare; urban food planning; evaluating the merits of intensive agriculture; comparison of organic and conventional agriculture	Hanson (2018) Van Lieshout et al. (2017) Pimbert and Wakeford (2002) Miele et al. (2011) Barnes et al. (2009)
Food Marketing Key themes: country-of-origin labeling; empowering consumers to make informed food choices; food marketing strategies	Withall et al. (2016)

[7] In some studies, citizens met for the entire day; in others, the meetings lasted half a day.

PEALS, 2003; Yamaguchi, 2010). In some DMPs, participants favored agroecological practices over GMO use and emphasized the importance of involving farmers in setting agricultural research priorities (Nishizawa, 2005; PEALS, 2003; Pimbert et al., 2010; Schol, 2021).

The second category, *agriculture and the environment*, covers two DMPs, conducted in France (Giraudet et al., 2022) and Ireland (Devaney et al., 2020), both of which focused on mitigating greenhouse gas emissions. In the Irish DMP, attendees overwhelmingly approved a proposal to tax greenhouse gas emissions from agriculture. Meanwhile, in the French DMP, citizens recommended shortening food chains, minimizing food waste, reforming agricultural education, regulating food additives, and promoting organic farming. However, unlike in Ireland, citizens in the French DMP (who had a say in the discussion topics) decided to remove carbon taxes from the agenda, as it was considered too politically controversial.

In the third category, *health and nutrition*, DMPs explored strategies to promote healthy eating. In most cases, participants recommended increasing taxes on obesogenic foods (Anaf et al., 2018; Moretto et al., 2014; VicHealth, 2016). However, in one DMP, there was disagreement among participants about which product categories, other than sugar-sweetened drinks, should be subject to increased taxation (Moretto et al., 2014). Some DMPs supported a ban on "junk food" advertising (Street et al., 2017; VicHealth, 2016), while others advocated for stricter marketing regulations (Anaf et al., 2018; Henderson et al., 2013). Nevertheless, a strong consensus emerged across all DMPs on the need for a mandatory health rating system on food packages (Anaf et al., 2018; Moretto et al., 2014; Street et al., 2017; VicHealth, 2016). Additional recommendations included offering financial incentives to encourage healthy food purchases among low-income households (VicHealth, 2016) and reforming zoning laws to improve access to healthy foods (or restrict access to unhealthy foods), particularly around schools (Street et al., 2017; VicHealth, 2016). Citizens also proposed incentivizing farmers to improve community access to healthy foods (Street et al., 2017) and developing programs to educate children and the general public about nutrition and healthy food choices (Anaf et al., 2018; Street et al., 2017; VicHealth, 2016).

Fourthly, two DMPs sought ways to promote *food security* by increasing the availability of nutritious food for vulnerable populations. The first DMP, conducted in the United Kingdom and focused on the needs of seniors, concluded that food security could be improved through stricter enforcement of existing standards, as well as regulatory changes to align food retail practices with public health goals (Timotijevic & Raats, 2007). In the second DMP, organized in rural Ghana, citizens decided that increasing the supply of food safe for human consumption (i.e., free from water and soil contaminants) required the introduction of new municipal policies to promote environmentally friendly agriculture (Chen, 2021).

In the fifth category of DMPs, centered on *agricultural methods and land policy*, citizens explored their preferences for various land use systems. Overall, the recommendations emphasized the importance of conserving farmland and promoting agricultural sustainability. In one DMP, participants proposed amending municipal laws to protect fertile land in peri-urban areas and to maximize spaces for urban food production (Hanson, 2018). In other instances, citizens favored small-scale and environmentally friendly livestock farming (Van Lieshout et al., 2017), advocated for stricter welfare standards for farm animals (Miele et al., 2011), or supported farming systems that combined aspects of conventional and organic agriculture (Barnes et al., 2009).

In the final category, *food marketing*, we identified a single case study (Withall et al., 2016) in which citizens discussed ways to improve the effectiveness of a country-of-origin labeling system so that consumers could make more informed food choices.

In terms of funding, most of the DMPs (n = 15) received financial support from a government or quasi-government agency. Other funding sources included academic/research institutes (n = 3) and nonprofit organizations (n = 3). In four cases, the funder could not be identified, and two DMPs were jointly funded by two entities. None of the studies provided a

detailed breakdown of how the funds were spent. However, in some cases, participating citizens received a per-diem allowance.

In most DMPs (n = 15), multiple stakeholder groups participated in organizing the proceedings. Researchers were the group of organizers most frequently cited (n = 16), followed by public agency officials (n = 12), nonprofit or civil society associations (n = 11), independent consultants or consultancy firms (n = 5), and food industry representatives (n = 3). Although 10 studies did not provide details on the experts recruited to make presentations, the remaining sample indicates that DMP organizers engaged a wide range of specialists to present opposing viewpoints on the policy issue discussed. These experts were drawn from public agencies (n = 10), academia (n = 10), organizations representing the food industry (n = 9), and nonprofit associations (n = 11).

Stratified random sampling was used by all DMPs that described their citizen recruitment methods (n = 20). Although DMPs are not intended to be statistically representative of the population, this sampling strategy serves to ensure a diverse representation of citizens from various backgrounds. Among the recruitment criteria applied were age (n = 15), sex (n = 18), employment status or type of occupation (n = 10), geographic location (n = 9), income or socioeconomic status (n = 6), education (n = 3), and political affiliation (n = 2). Furthermore, some organizers considered factors such as urban and rural residency (n = 2), consumer profiles (e.g., vegetarians, health-conscious consumers; n = 1), or family status (e.g., parents with young children; n = 1).

Rather than being organized as isolated events, the DMPs were often part of broader consultations with citizens and stakeholders. These parallel societal dialogues took various forms, such as focus groups or public meetings, and frequently involved a larger number of participants than the DMP itself (Giraudet et al., 2022; Hanson, 2018; Miele et al., 2011; Pimbert et al., 2010; Yamaguchi, 2010). Other forms of consultation included conferences and informational workshops (Miele et al., 2011; Timotijevic & Raats, 2007; Van Lieshout et al., 2017), as well as the use of consumer surveys (Schol, 2021) and newspaper polls (VicHealth, 2016). These outreach measures were designed to generate public interest in the DMP.

Interestingly, some DMP organizers gave the citizens a say in the organization of the proceedings. This usually occurred during preparatory sessions, during which participants were tasked with formulating questions for the experts. In some cases, participants were consulted on which experts they wanted to hear from (Fan, 2015; Joly et al., 2003; Schol, 2021; Skorupinski et al., 2007; VicHealth, 2016) or were allowed to decide how the policy issue would be framed (Hanson, 2018; Joly et al., 2003; Pimbert & Barry, 2021; Skorupinski et al., 2007). In three DMPs, members of the public were also invited to submit proposals, ideas, or opinions through an online portal, which were then compiled and presented to DMP participants for consideration (Devaney et al., 2020; Giraudet et al., 2022; VicHealth, 2016).

In total, 16 studies described the decision-making protocol that was followed. The protocol adopted the most frequently was the majority vote (n=13), which often involved multiple rounds of voting that culminated in a final decision. In other cases, participants ranked policy proposals according to their perceived importance rather than voting on each item separately (Chen, 2021; PEALS, 2003; Street et al., 2017). Some DMPs also included minority statements along with the majority opinion (Anaf et al., 2018; Skorupinski et al., 2007; VicHealth, 2016).

Post-Deliberation Outcomes and Activities

Most of the studies (n = 17) described the activities that took place after the DMP was completed. Organizers used various means to disseminate the DMP's recommendations to food policymakers and the public. The method most frequently cited was the publication of a report summarizing the citizens' proposals (n = 9). In six cases, the organizers communicated the proposals to government representatives, but it was not clear whether a report was written. Two DMPs went beyond policymakers and shared their recommendations with other stakeholders, including food industry representatives, community leaders, and scientists (Schol, 2021; VicHealth, 2016). In some instances (n = 7), organizers also held press conferences or

published news articles to increase public awareness of the DMP and its verdict.

Most studies did not specify whether food policymakers responded to the recommendations or reported no response ($n = 16$). In this subset, a median of two years had transpired between the conclusion of the DMP and the publication of the study. This suggests that, in many cases, not enough time had elapsed for policy reforms to have been officially documented. Regardless of the reason, only eight studies reported receiving an official government response. Of these, five indicated that policymakers had committed to either fully or partially implementing the citizens' recommendations (see Table 3).

However, as shown in Table 3, several studies described additional results. For instance, post-surveys indicated that citizens in some DMPs reported a better understanding of the topic discussed or increased confidence in their ability to engage in food policy debates. The participants also mentioned that the presentations by scientists had made them less distrustful of experts. Likewise, interactions with citizens provided invited experts with valuable information on how to communicate with the public on potentially contentious food issues. Lastly, two DMPs conducted in the Global South galvanized civil society groups to collaborate and initiate policy dialogues aimed at reshaping food sovereignty and agricultural research priorities.

Quality of the Proceedings

In the following subsection, we evaluate the strengths and weaknesses of the DMPs as documented in the literature. We also explore the lessons learned from these proceedings that could inform the organization of future DMPs on food policy.

Measures to Safeguard the Proceedings

DMPs are meant to enable citizens to hear from experts with contrasting viewpoints, a practice observed in all case studies that described their expert recruitment strategy. Some organizers introduced additional mechanisms to guarantee fairness and transparency, such as establishing planning committees composed of stakeholders representing various professional interests (Nishizawa, 2005; PEALS, 2003; Pimbert & Barry, 2021; VicHealth, 2016). In two DMPs, experts were requested to leave the room, either by participants or organizers,

Table 3. Documented Outcomes of the Deliberative Mini-Publics (DMPs)

Type of documented outcome	Description	Publication
Policy Reforms	Ban on GMOs; improved monitoring of the long-term impacts of GMO crops	Nishizawa (2005) Pimbert and Barry (2021)
	Regulatory adjustments in livestock management; implementation of herd size caps	Van Lieshout et al. (2017)
	Enactment of legislation or government action plan to curb greenhouse gas emissions from agriculture	Devaney et al. (2020) Giraudet et al. (2022)
Other Outcomes	Improved citizen awareness and understanding of food policy issues	Timotijevic and Raats (2007) Barnes et al. (2009) Henderson et al. (2013) Fan (2015) Hanson (2018) Schol (2021)
	Greater self-confidence and ability to participate in food policy discussions	Timotijevic and Raats (2007) Fan (2015) Pimbert and Barry (2021)
	Establishment of trust between citizens and experts	Miele et al. (2011) Schol (2021)
	Enhanced collective organization	Pimbert et al. (2010) Pimbert and Barry (2021)

during key moments of deliberation in order to create a space where citizens could express themselves freely (PEALS, 2003; VicHealth, 2016). Additionally, 10 DMPs divided participants into subgroups so that marginalized or less vocal members could engage more openly in discussions. Some also promoted transparency by arranging for media observers to be present during the proceedings (Devaney et al., 2020; Pimbert & Barry, 2021) or by live streaming or videotaping the event (Devaney et al., 2020; Fan, 2015).

Evaluation of Participants' Experiences

However, in other procedural aspects, the results were mixed. During post-surveys, which not all DMPs conducted, a majority of participants reported that the DMP had been a positive experience (Anaf et al., 2018; Fan, 2015; Hanson, 2018; Henderson et al., 2013; Nishizawa, 2005; Timotijevic & Raats, 2007) or mentioned that interactions with other participants had been constructive and respectful (Chen, 2021; Timotijevic & Raats, 2007). On the other hand, observer testimonials highlighted instances of conflict, such as interruptions or power imbalances among participating citizens, with certain individuals or groups, such as men, dominating the discussions (Fan, 2015; Giraudet et al., 2022; Pimbert et al., 2010; Timotijevic & Raats, 2007; Yamaguchi, 2010). The proceedings could also be affected by unequal relationships between experts and citizens or between organizers and citizens. For example, in some DMPs, participants were observed deferring to the invited experts, or the experts themselves displayed patronizing attitudes (Pimbert & Barry, 2021; Skorupinski et al., 2007; Yamaguchi, 2010).

Clarity of the Information

Post-surveys (or post-evaluations) indicate that many DMPs were successful in ensuring that the information presented by experts was clear and jargon-free and that participants had ample time to familiarize themselves with the issues (Anaf et al., 2018; Fan, 2015; PEALS, 2003; Pimbert & Barry, 2021; Timotijevic & Raats, 2007; VicHealth, 2016). However, other studies concluded that insufficient time had been allocated for presentations and deliberations (Henderson et al., 2013; Moretto et al., 2014; Street et al., 2017; Timotijevic & Raats, 2007) or that citizens should have received prior instruction on the difference between advocacy and academic viewpoints (Giraudet et al., 2022).

Citizen Representation

Some studies also highlighted instances of unbalanced representation among recruited citizens. Self-selection bias can manifest during DMP recruitment since participation is voluntary. As a consequence, certain events attracted citizens who were already well-informed about the topic (Hanson, 2018) or who had higher levels of educational attainment (Fan, 2015; Timotijevic & Raats, 2007). These findings suggest that, without inclusive outreach strategies, DMPs run the risk of recruiting participants who are wealthier or more politically engaged, potentially excluding "average" citizens or those of lower socioeconomic status. In some cases, the composition of the participants also suffered from a lack of ethnic diversity (Henderson et al., 2013; Timotijevic & Raats, 2007).

Impartiality

Most surveyed participants agreed that the proceedings had been fair, that the organizers were trustworthy, and/or that the panel of experts was balanced (Fan, 2015; Giraudet et al., 2022; Henderson et al., 2013; Nishizawa, 2005; Skorupinski et al., 2007; Timotijevic & Raats, 2007). However, some DMPs were targeted by outside interference or discrediting campaigns (Hanson, 2018; Pimbert & Barry, 2021) or struggled to attract certain types of experts—scientists, food industry representatives, and so forth—despite having sent out invitations (Giraudet et al., 2022; Moretto et al., 2014; Nishizawa, 2005; PEALS, 2003; Pimbert & Barry, 2021; Schol, 2021). In some instances, this led to speculation that the final verdict could have been different had certain stakeholders not been absent, either during the entire process or at critical moments (Anaf et al., 2018; Schol, 2021).

Documented Lessons

The evidence suggests that, for citizens to provide informed and meaningful verdicts, the food policy theme or question presented should be clearly defined, using neutral terms and plain language

(Moretto et al., 2014; VicHealth, 2016). Some studies also stressed the importance of allowing citizens to explore more than one policy question rather than limiting deliberations to a single question (Joly et al., 2003; PEALS, 2003). Ultimately, the number of questions presented will depend on the duration of the DMP and the nature and complexity of the topic. Organizers should also understand that the choice to use single or multiple questions, by shaping the discussions, is likely to influence the overall verdict and the number of recommendations made (Moretto et al., 2014). Similarly, the nature of the recommendations will depend on whether the food policy topic was framed as a problem or whether organizers used unbiased terms (Timotijevic & Raats, 2007; Van Lieshout et al., 2017).

When recruiting citizens, it is important to include underrepresented groups, such as youth and seniors (Devaney et al., 2020; Henderson et al., 2013). However, the use of stratified random sampling may not be enough to achieve inclusivity, especially if certain groups, even after being identified and selected, are more likely to withdraw (Timotijevic & Raats, 2007). Organizers should also consider gender when recruiting experts, as the delivery of, and response to, presentations can vary depending on the presenter's gender. Equitable gender representation in this regard could help reduce irrelevant differences between presentations that could unduly influence the verdict, allowing participants to focus on the arguments made (Henderson et al., 2013).

According to Moretto et al. (2014), DMP organizers should also ensure that enough time is available for experts to make their presentations and for citizens to ask follow-up questions and engage in discussions. When DMPs take place over multiple days, citizens have reported gathering their own evidence between meetings from friends or newspapers, for example, and these "private" deliberations enhance the quality of subsequent sessions (PEALS, 2003; Schol, 2021). On the other hand, Henderson et al. (2013) argue that DMPs should not continue for longer than is necessary for citizens to reach an informed verdict.

A consistent theme across many of the studies was the need to establish safeguards to protect the integrity of the DMP. Indeed, organizers should never perceive themselves as so independent that they can forgo the creation of an arms-length, multistakeholder oversight panel (PEALS, 2003; Pimbert & Wakeford, 2002). Ultimately, for food-related DMPs to gain acceptance, the proceedings must be viewed as credible, fair, representative, and not influenced by interest groups (Giraudet et al., 2022; Pimbert et al., 2010). The organizers should also engage with representatives from the food industry, civil society groups, and the media to communicate the purpose of the DMP in advance and address any negative perceptions. This is important since a DMP can be derailed if potential detractors view the event as ideologically driven or doubt the ability of citizens to understand complex food policy issues. Through outreach, organizers can increase the likelihood that hesitant groups or institutions will agree to participate as experts, thus ensuring a balanced panel of presenters. For Pimbert et al. (2010), inviting skeptical groups to participate as observers can also be an effective way to address concerns.

Other findings suggest ways in which future DMPs could have a greater impact on food policy. For instance, Devaney et al. (2020) highlight the importance of securing a clear, agreed-upon commitment from the government to follow up on the proposals made. In the absence of such guarantees, the implementation of citizens' recommendations can become marred by uncertainty and confusion (Giraudet et al., 2022). Concrete outreach strategies are needed to prevent this from happening and to generate trust and buy-in among policymakers and the general public (Devaney et al., 2020). Organizers should also consider keeping participants engaged once the DMP has concluded, for instance, by communicating the results of their work (Devaney et al., 2020; Giraudet et al., 2022).

A final point to consider is that food-related DMPs are embedded within broader political, cultural, and social contexts. In other words, the environment in which a DMP takes place can significantly influence the types of proposals put forward, as well as the response of policymakers (Nishizawa, 2005). For example, the DMPs conducted in East Asia issued recommendations that did not overtly challenge the government's position on GMOs and nanofoods. This outcome was attributed to cultural

taboos around publicly expressing strong opinions and a technocratic decision-making style that leaves little room for bottom-up policy initiatives (Fan, 2015; Nishizawa, 2005; Yamaguchi, 2010). Consequently, as a tool for bringing about reforms in food policy, DMPs may be more successful in certain cultural settings than in others.

Conclusion

DMPs have received increasing attention as a way to involve citizens in food policymaking. Our review found that such forums cover a wide range of topics, from agricultural biotechnology to healthy eating and land use planning. From a governance perspective, most of the DMPs addressed national policy issues, with only a few focusing on local or regional food concerns. Most of the DMPs were publicly funded, although in most cases it is unclear whether the impetus to organize the DMP originated from the authors of the study or the funding agency. Organizing stakeholders included academics, nonprofits, government officials, and, to a lesser extent, representatives of the food industry.

Our findings highlight the importance of equitable citizen and expert recruitment methods in upholding the legitimacy of DMPs. Many organizers used stratified sampling techniques to include citizens with diverse life experiences, profiles, and values. Some DMPs also incorporated preparatory sessions, workshops, and public consultations, allowing citizens to prepare questions for the experts or determine the framing of issues. We argue that such measures help generate buy-in from participants and prevent DMPs from becoming venues in which citizens are simply passive recipients of information. The DMP organizers also made concerted efforts to ensure that the invited experts reflected different perspectives on the topic in question. At the same time, there was limited discussion of the content of the presentations. Consequently, we cannot determine the extent to which these contrasting viewpoints were evidence-based.

The DMPs enhanced the awareness and capacity of citizens to participate in food policy debates. However, only 20% of the studies indicated that policymakers followed up with the recommendations. Various factors might explain this. Firstly, as previously mentioned, some studies might have been published before any policy changes occurred. Secondly, there is the difficulty of establishing whether reforms can be attributed to a DMP or larger societal or stakeholder dialogues. Thirdly, many of the DMPs were organized early in the policymaking cycle and primarily aimed at exploring whether a particular topic should be put on the political agenda. In other words, none of the DMPs asked participants to provide input on upcoming legislation, such as proposals for new taxes, certification standards, or regulations. Lastly, it appears that some DMPs were conducted as academic exercises to understand citizens' preferences rather than to engage in post-deliberation dialogues with public authorities about the findings.

Whatever the underlying reasons, the general lack of results raises questions about the ability of DMPs to democratize food systems through policy reforms that reflect citizens' values and priorities. It also echoes larger criticisms about the divide between deliberative civic engagement and the world of policymaking (Collingwood & Reedy, 2012). Based on the limited number of case studies that reported policy changes, we argue that in the future, DMP organizers should proactively develop a well-structured plan to communicate the recommendations made to relevant stakeholders. Equally important is the need for policymakers to publicly commit to reviewing the recommendations before deliberations even begin.

The results of our study have certain limitations that should be noted. Firstly, the scoping review was restricted to case studies of DMPs published in English or French. As a result, we may have missed findings from food-related DMPs published in other languages. Future research could potentially expand our sample size by including additional languages. Also, there may be DMPs that we did not account for because the proceedings were not published in the scientific or gray literature. Finally, the studies found were mainly intended for researchers rather than practitioners, which means that they often do not offer specific guidelines on how to organize DMPs. However, practitioners interested in launching future food-related DMPs should consult two studies,

VicHealth (2016) and Pimbert and Barry (2021), as both provided a highly detailed explanation of their methodology.

Ultimately, given the limited policy impact observed, future research should focus on strategies to bridge the gap between DMPs and food policymaking. Consideration should also be given to organizing DMPs later in the policymaking cycle when different solutions are being debated rather than convening citizens to discuss whether an issue should be put on the agenda. Finally, since most of the DMPs were held in industrialized countries, researchers should examine the barriers that prevent the more widespread use of such forums in developing countries and propose solutions.

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Appendix A.

Table A1. Factors Considered for Analyzing Deliberative Mini-Publics (DMPs)

1. Context

- Publication year
- Year the DMP took place
- DMP location

2. Composition and Theme of the DMP

- Organizational format
- Policy theme addressed
- Administrative level concerned (municipal, regional, national, supranational, etc.)
- Commissioning (funding) authority
- Stakeholder(s) involved in organizing the DMP
- Recruitment and profile of expert witnesses
- Recruitment and profile of citizens
- Total number of participating citizens
- Duration of the proceedings
- Parallel public consultation(s)
- Citizen involvement in organizing the DMP
- Decision-making protocol(s)
- Recommendations or decisions reached

3. Post-Deliberation Outcomes and Activities

- Dissemination of recommendations to policymakers and the public
- Public authorities' response to recommendations
- Additional reported outcomes (impacts other than policy reforms)

4. Quality of the Proceedings

- Documented strengths of the DMP
- Reported challenges or weaknesses of the DMP
- Documented lessons learned

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Appendix B.

Table B1. Deliberative Mini-Publics (DMPs) Categorized by Number of Participants, Format, Policy Theme, Country, and Administrative Level

Publication	Number of Citizen Participants	Deliberative Model	Policy Theme	Country	Policy Level
Pimbert and Wakeford (2002)	19	Citizens' Jury	Eliciting citizens' preferences for different food system scenarios; small-scale agriculture; use of GMO crops and pesticides	India	Regional
PEALS (2003)	N/A	Citizens' Jury	Evaluating the merits of GMO crops and research; regulatory oversight	United Kingdom	National
Joly et al. (2003)	14	Citizens' Assembly	Regulating sales of GMO foods; GMO labeling; institutional oversight and responsibility	France	National
Nishizawa (2005)	18	Consensus Conference	Government oversight of biotechnology; identification of future GMO research priorities	Japan	National
Timotijevic and Raats (2007)	10	Citizens' Jury	Modifying food retail practices to support seniors; improving food access; nutrition	United Kingdom	National
Skorupinski et al. (2007)	28	Consensus Conference	Assessing the production and marketing of GMO foods; deciding the future of biotechnology research	Switzerland	National
Barnes et al. (2009)	12	Citizens' Jury	Evaluating preferences for organic vs. conventional agriculture; regulating organic farming	United Kingdom	National
Yamaguchi (2010)	10	Consensus Conference	Nanofood applications and risks; labeling standards; worker safety; fostering openness and transparency in nanofood development	Japan	National
Pimbert et al. (2010)	42	Citizens' Jury	Identifying agricultural research priorities; democratizing the governance of food and agricultural research	Mali	Supranational
Miele et al. (2011)	11	Citizens' Jury	Exploring citizens' views on farm animal welfare; organic and conventional livestock farming; designing animal welfare assessment protocols	Italy; United Kingdom; Norway	Supranational
Henderson et al. (2013)	17	Citizens' Jury	Regulating food and drink advertising aimed at children; combating childhood obesity	Australia	National

Moretto et al. (2014)	13	Citizens' Jury	Assessing the merits of taxation on obesogenic foods and drinks; creating a health rating system for food packaging; improving nutritional information	Australia	National
Fan (2015)	20	Consensus Conference	Evaluating GMO practices; protecting consumer interests; labeling policies	Taiwan	National
VicHealth (2016)	78	Citizens' Jury	Prioritizing government, industry, and community responses to obesity; financial incentives; taxation on obesogenic foods; health rating system for food packages	Australia	Regional
Withall et al. (2016)	14	Citizens' Jury	Country-of-origin labeling; informed consumer choice; promoting local food	Australia	National
Van Lieshout et al. (2017)	7	Citizens' Jury	Evaluating the future of intensive agriculture; livestock production; animal welfare; landscape and environmental conservation	The Netherlands	National
Street et al. (2017)	20	Citizens' Jury	Fighting childhood obesity; taxation of unhealthy foods; health labeling; nutrition education; advertising bans; farm subsidies; zoning laws for fast food outlets	Australia	National
Hanson (2018)	58	Citizens' Jury	Developing urban food production; land use planning	Canada	Municipal
Anaf et al. (2018)	15	Citizens' Jury	Government regulation of the fast-food industry; taxation of obesogenic foods and drinks; consumer information standards; fast-food advertising	Australia	National
Devaney et al. (2020)	99	Citizens' Assembly	Combating climate change; taxing agricultural greenhouse gas emissions; land use diversification; organic agriculture	Ireland	National
Schol (2021)	16	Consensus Conference	Nanofood applications; risk appraisals; adoption of nanofood labels and standards	Germany	National
Pimbert and Barry (2021)	45	Citizens' Jury	Evaluating the risks and merits of GMO foods; identifying agricultural research priorities; use of local seed varieties	Mali	National
Chen (2021)	208	Deliberative Poll	Improving food security for marginalized populations; livelihood strategies; environmentally friendly agriculture	Ghana	Municipal
Giraudet et al. (2022)	159	Citizens' Assembly	Reducing greenhouse gas emissions; shortening supply food chains; reducing food waste; promoting agroecological practices	France	National

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Public assistance, living environments, and food insecurity: A comparative community case study

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Abstract

Food insecurity continues to affect certain segments of the U.S. population at the household and individual levels even when the economy is experiencing growth. This recognition has led to the design and implementation of food assistance programs, such as the Supplemental Nutrition Assistance Program, targeting food hardship in low-income families. This is in addition to other types of government assistance, such as housing subsidies and public housing, as low-income households and individuals face similar challenges in housing security. Concern over "concentrated poverty" in traditional public housing environment has contributed to a shift toward mixed-income developments, envisaged to improve the living conditions and economic opportunities of public-housing residents. This paper provides a comparative assessment of food insecurity in traditional and mixed-income public housing communities. It also examines the effect of nonhousing public assistance on food insecurity and the temporal relationship between the timing of food hardship and the receipt of assistance. Administering a modified version of the U.S. Department of Agriculture (USDA)'s Household Food Security Module to the majority of residents in the two communities, the researchers found negligible differences in food insecurity between recipients and nonrecipients of government assistance. Nevertheless, government assistance appeared to improve the probability of being food secure as it interacted with living environments, suggestive of greater beneficial effect in the environment of mixed-income housing. The results show that the number of households experiencing reduced food intake was lowest in the first two weeks and highest during the fourth week of the month.

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food security, government assistance, mixed-income housing, public housing

Introduction

Achieving food security, conceptualized as "access by all people at all times to enough food for an active, healthy life," continues to challenge a substantial number of U.S. households, even during periods of economic growth and low unemployment (Coleman-Jensen et al., 2022; Gundersen & Ziliak, 2018; Nord, Andrews, & Winicki, 2002). The extent of food security and insecurity in the U.S. is measured using the Household Food Security Survey Module (FSSM). The module is designed to obtain "information on a variety of specific conditions, experiences, and behaviors that serve as indicators of the varying degrees of the severity of the condition" (Bickel et al., 2000, p. 9) from household direct responses to a series of 18 questions. The 18 survey questions reflect different severity levels of household food insecurity ranging, for example, from worrying about running out of food (least severe) to skipping meals or going without food all day (most severe). The survey responses from each respondent collectively generate a single score on the household food security scale.

The scale classifies the extent of food security or insecurity as described by respondents into four categories which, originally, were food secure, food insecure without hunger, food insecure with moderate hunger, and food insecure with severe hunger. Since 2006, the categories have been food security (high and marginal), low food security, and very low food security.[1] The construction of the scale reflects and underscores household financial resource constraints as the ultimate cause of food insecurity. Although food insecurity is primarily related to poverty status (e.g., Alaimo et al., 1998), the food security scale is believed to provide more comprehensive information about the sense, occurrence, and degree of food deprivation than can be known through traditional income and poverty measures, since it additionally reflects related household conditions, events, behaviors, and subjective reactions.

The 2021 household food security report indicated that the household food insecurity rate over the 1998–2021 period ranged from 10.1% (in 1999) to 14.9% (in 2011), with an average of 12.1%. These figures represent the percentage of households who "were, at times, unable to acquire adequate food for one or more household members because they had insufficient money and other resources for food" (Coleman-Jensen et al., 2022, p. 7).[2] The very low food security category represents a more severe range of food insecurity characterized by a reduction in food intake by some household members and a disruption of eating patterns at times during the year. The percentage of households experiencing very low food security ranged from 3% in 1999 to 5% in 2021, with an average of 4.2%. In 2021, the year for which the most recent data were available at the time of writing, 13.5 million U.S. households, or 10.2% of households, were food insecure at some point during the year. Of these, 5.1 million households (3.8%) were experiencing very low food security.

A closer look at the disaggregated data reveals that some segments of the population are more vulnerable to food insecurity than others. For example, in 2021, 19.8% of non-Hispanic Black households and 16.2% of Hispanic households were food insecure, more than twice the 7% rate for non-Hispanic whites. According to a study by Myers and Painter (2017) based on the 1999–2010 waves of the National Health and Nutrition Examination Survey, the white/nonwhite divide is observed regardless of nativity status: both Blacks

[1] The USDA Economics Research Service notes the comparability of the old and new labels: "High food security (old label = Food security): no reported indications of food-access problems or limitations. . . . Marginal food security (old label = Food security): one or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake . . . Low food security (old label = Food insecurity without hunger): reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake. . . . Very low food security (old label = Food insecurity with hunger): reports of multiple indications of disrupted eating patterns and reduced food intake" (USDA ERS, 2023, "Ranges of food security," paras. 2–7).

[2] Unless otherwise noted, the source of data on food security status in this section is Coleman-Jensen et al., 2022.

and Latinos are significantly more food insecure than their foreign or native-born white counterparts. Viewing groups based on household composition, the food insecurity rate was 7.4% for married-couple families and 24.3% for households with children headed by a single female (i.e., "female-head, no spouse"). As to be expected, the food insecurity rate was the highest, at 32.1%, for households with incomes below the federal poverty line. The corresponding figure for households with incomes below 185% of the poverty threshold was 26.5%.

There is a general recognition that food insufficiency poses long-lasting challenges to nutrition, health, and social policy. Consequently, there is growing interest in assessing the prevalence of food insufficiency in the U.S. among various segments of the population. These include single female–headed families, children, the elderly, food-assistance recipients, ethnic minorities, immigrants, and other potentially vulnerable groups (Alaimo et al., 1998; Carlson et al., 1999; Himmel Green et al., 2000; Kasper et al., 2000; Myers & Painter, 2017; Polit et al., 2000; Tarasuk & Beaton, 1999; Alaimo et al., 1998[3]). The present study seeks to assess the effects of government food assistance on food insecurity events in low-income households in two different public housing communities. Additionally, it explores the implications of living environment for the prevalence and frequency of food insecurity events. More specifically, the study's objectives are to address two sets of related questions:

1. What is the relationship between food insecurity events and receipts of government assistance including the Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps? How often does a food insecurity event occur? When does it occur? For how long does it occur? How severe is it?
2. Are recipients of nonhousing public assistance, such as SNAP and Temporary Assistance for Needy Families (TANF), living in traditional public housing communities worse (or better) off than those living in mixed-income communities with respect to the events and degree of food insecurity?

As mentioned earlier, the study focuses on low-income households residing in two public housing communities: traditional public housing (TPH) and mixed-income housing (MIH) communities. The data used for the analysis are primary data collected by conducting a modified FSSM survey in the abovementioned two communities. The remainder of this paper is organized as follows. The second section provides a brief review of the literature related to food assistance and food security. The third section provides an overview of the sampled communities and describes the food security status of households. The fourth section assesses the relationship between nonhousing public assistance receipt and food insecurity events. The fifth section explores the implications of living environments (traditional versus mixed-income housing) for food security and investigates the relationship between the timing of the receipt of nonhousing public assistance and food insecurity events. The final section summarizes the findings and implications.

A Review of the Related Literature

The effects of food assistance on food insecurity among low-income households in the U.S. has been a subject of extensive empirical investigation. The first part of this section provides a brief and selective review of the literature focusing on the effect of SNAP on household food security.[4] The second part outlines the arguments for mixed-income housing relative to traditional public housing as a background to our exploration of the possible effects of living environment on food security.

Food Assistance and Food Security

As the brief review below reveals, the empirical evidence on the effect of food assistance on food

[3] See, for example, Gunderson & Ziliak, 2018 for a review of food security research in the United States.
[4] See Barrett (2002), e.g., for theoretical and empirical issues related to food security and food assistance programs and Nord (2009), Gundersen and Ziliak (2018), and Schanzenbach (2023) for a review of food insecurity research in the United States.

security in the U.S. is mixed, with neutral, negative, and positive effects reported. Gundersen and Oliveira (2001) reported that the probability of food insufficiency is the same between food stamp recipients and nonrecipients. Similarly, Huffman and Jensen (2008) found no evidence that food participation in the food stamp program reduced food insecurity. Based on an analysis of longitudinal data, Gibson-Davis and Foster (2006) reported that receiving food stamps did not lower the probability of being food insecure, but it lessened the severity of being food insecure, according to some variations of the model. On the other hand, Jensen (2002) and Wilde and Nord (2005) found a positive correlation between food stamp participation and food insecurity.

In contrast, a number of authors, such as Borjas (2004), Yen et al. (2008), Nord (2009), Ratcliffe et al. (2011), Mabli et al. (2013), Mykerezi and Mills (2010), Mabli and Ohls (2015), and Schmidt et al. (2016), have reported results suggesting that food assistance reduces food insecurity. Most recently, Schanzenbach (2023) concluded in an overview of recent research that many empirical studies reporting participation in SNAP have found that increased benefits improved food security, health, and other indicators of well-being. However, as the brief review above shows, there are studies with results suggesting that food assistance is not effective in improving food security or even worsens it. The differing results may, in part, be explained by differences in specification, estimation methods, and sample composition. A key estimating issue commonly mentioned is the endogeneity of participation in food assistance programs and the self-selection effect arising from the possibility that food-insecure households or those who would otherwise be food insecure would likely participate in the program. An econometric analysis that fails to address these estimation issues could lead to a misleading conclusion by seeming to show a positive relationship between program participation and the extent of food insecurity.

Traditional Low-Income versus Mixed-Income Housing

Government programs such as subsidized housing or public housing have long been in place as an attempt to alleviate housing insecurity experienced by low-income households.[5] Public housing in the U.S. was "established to provide reasonable, transitional housing to poor individuals and families" (Bowly, 1978, as cited by Chaskin and Joseph, 2011, p. 209). However, rather than being transitional, as Chaskin and Joseph (2011) noted,

> by the 1980s public housing in many cities came to exemplify concentrated urban poverty and the social problems associated with it—high levels of crime and violence, deteriorating housing and physical infrastructure, weak institutions, poor services, social isolation, racial segregation, joblessness, and welfare "dependency" among them. (p. 209)

The observed worsening problems over the years associated with concentrated poverty and neighborhood disinvestment led to a series of public housing policy initiatives including the HOPE (Homeownership and Opportunity for People Everywhere) series of programs. The HOPE VI program, enacted in 1990, is described as "the major federal initiative driving the transformation of distressed public housing development nationwide" (Popkin et al., 2002, p. 1-1). With the launching of the program, "public-private partnerships have emerged as the dominant model to leverage private sector know-how, private funds, and market principles to create, own and operate sustainable, affordable housing in a mixed-income setting" (Glover et al., 2017, p. 4).

The concept of mixed-income housing encompasses "either developments with both market-rate and subsidized housing units or the development of affordable housing in mid- to upper-income communities—in essence, project-defined or neighborhood-defined mixed-income communities" (Glover et al., 2017, p. 3). Indistinguishable from any housing community at a market rate,

[5] Public housing refers to housing owned by a housing authority, while subsidized housing refers to housing owned and operated by private owners.

mixed-income housing is expected to provide low-income families with better living environments that are conducive to restoring hope and opportunity. Chaskin and Joseph (2011) identified four theoretical propositions for the potential benefits accruing to low-income households living in a mixed-income community.[6] One of them is access to social capital, creating the potential for instrumental relational networks (social interaction) between low-income families and non-poor residents in mixed-income housing and leading to improved access to information on, and connections for, employment opportunity and better jobs. "Role modeling" by higher-income residents "that will have a positive influence on the behavior and aspirations of their poor neighbors" is a second hypothesized benefit of living in a mixed-income environment (Chaskin & Joseph, 2011, p. 210).

The third channel through which the potential benefit of living in a mixed-income community is the presence of order and social control, which high-income residents help maintain in the neighborhood and which is expected to reduce criminal activity and increase the sense of security, thereby benefitting low-income co-residents. Fourth, higher-income residents, with their influence on local governments and the private sector, are in a better position to attract more investment, infrastructure, retail stores, government services, amenities, and other socioeconomic activities, leading to improvements in neighborhood environment and living conditions. Summarized in terms of economic outcomes, mixed-income housing is hypothesized to increase access to better employment, higher-paying jobs, infrastructure, retail stores, and private investment activity in surrounding neighborhoods, hence improving the living conditions of low-income residents.

The abovementioned benefits of moving to or living in a mixed-income development for low-income households are generally theoretical, which lend themselves to an empirical investigation. However, to our knowledge, the effect of living in a mixed-income development on food security among low-income residents has received little or no empirical attention, although one could draw implications for it from the few studies conducted with respect to economic outcomes, such as employment, wages, and socioeconomic status. The evidence on the latter is reported to be mixed (Glover et al., 2017; Boston, 2005; Chaskin & Joseph, 2011; Levy et al., 2013; Popkin et al., 2002, and the references therein). In view of the hypothesized outcomes and the lack of relevant empirical evidence, this study explored the implications for food security by comparing the experiences of households residing in traditional public housing and mixed-income communities.

Study Sites, Sample Description, and Methodology

Two sites were used for this study: one traditional low-income housing (TPH) and one mixed income community (MIH), both located in Atlanta, Georgia.[7] Atlanta was the first city in the country to design, develop, and implement a strategy of establishing mixed-income/mixed-financing housing communities by inviting private investors in public housing (Newman, 2002; Boston, 2005; Glover et al., 2017).[8] In 1994, the Atlanta Housing Authority (AHA), took a hard look at its public housing units in preparation for the 1996 Centennial Summer Olympic Games (Newman, 2002). It placed 50% of its housing stock under private management and began to outsource the rest to private investors. The mixed-income/mixed-financing strategies allowed AHA to obtain approval from the federal Department of Housing and Urban Development (HUD) to demolish all public housing facilities, and to seek effective private development partners

[6] For details, see e.g. Popkin et al., 2002; Joseph, 2006; Chaskin and Joseph, 2011; Levy, McDake, and Bertumen, 2013; Glover, Carpenter, and Duckworth, 2017; and the references therein.

[7] The traditional public housing in the study was University Homes, which has since been demolished, and the mixed-income housing was the Village of Castleberry. The description of the study sites in this and the following paragraph is based on the demographics data summary obtained from the management offices of University Homes and Village of Castleberry.

[8] These communities are referred to as mixed-income/mixed-finance since these communities are composed of families of varied income levels and are being developed with funding from public and private equity, private debt, and tax credit sources (Newman, 2002).

to design communities to serve families of varied income levels and demographics. (AHA, 1999). This initiative led to the development of a number of mixed-income communities in the city in the subsequent years, one of which is the study site of the present investigation.

The traditional low-income public housing community site of this study had 500 apartment units, of which 493 were occupied. The community housed a total population of 1,201, with an average age of 24 years—half under 18 years of age, and 65% female. Single heads of households constituted the overwhelming majority in the community (97%). The annual household income averaged $7,449 in this community, with a mean household size of 2.4 members. Roughly one third of heads of households and more than a quarter of adults aged between 18 and 54 were unemployed. Twenty-nine percent of households in the community had one or more disabilities, 30% received Social Security benefits, and 21% received temporary assistance for needy families.

At the time of the survey, 182 low-income households living in the mixed-income community were receiving a housing subsidy and were available to complete the survey. The total number of low-income residents was 365, including 163 children (45%) and 264 females (72%). Ninety-seven percent of household heads were single, and 50% were unemployed. Forty-six percent of adults between 18 and 54 years of age were unemployed. In a community where the mean family size was 2.4, the average household income stood at $11,493. One out of five households had persons with disabilities and a lower proportion received Social Security benefits (14%) and TANF (9%).

The study sample was randomly drawn from households residing in the two communities described above. Enumerators were then trained and assigned to specific households for final face-to-face interviews. We were able to obtain clean data for 322 households, which constituted the sample size of the present study. The sample accounted for 48% of the residents of the two communities at the time of the survey. Table 1 presents the basic profile of the sample. A slight majority of the survey respondents were households with children, having an average of two and a count of 383 children under 18 years of age. A typical family had fewer than two dependents, totaling 412 in the sample. Family size ranged between one and seven, the former accounting for a third of the sample and the latter found in only two households. The ages of heads of household ranged between 19 and 91 with a mean of 44 years for the entire sample. Heads of families with children were on average 23 years younger than were households with no children.

Table 1. Selected Sample Profile by Household Child Status and Type of Community

		Children		Community	
Characteristic	Full Sample	With	With No	Traditional Public Housing (TPH)	Mixed-Income Housing (MIH)
Number of Households					
Total	322	179	143	251	71
% of Total	100	55.6	44.4	78	22
Mean Age of Household Head	44.3	34.1	56.9	46.7	35.6
Mean Number of Children	1.2	2.1	0.0	1.2	1.2
Mean Number of Dependents	1.3	2.2	0.1	1.3	1.4
Mean Household Size	2.5	3.4	1.3	2.4	2.6
Female-Headed Households (%)*	85.4	93.3	75.5	86.9	80.3
Government Assistance Recipients (%)*	60.9	62.6	58.7	70.1	28.2

* Figures represent % of the relevant sample and subsamples.
Note: Government assistance refers to nonhousing assistance including food stamps, Temporary Assistance for Needy Families (TANF), Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and Supplemental Security Income (SSI).

Most of the households in the sample were female-headed (85%); the corresponding figure for households with no children was 10 percentage points lower. Of the 383 children in the sample, only 16 lived in male-headed households. Nearly two-thirds of the survey respondents reported receipt of some type of government assistance in addition to a housing subsidy, with receipt more frequently reported by households with children than by households with no children. Dichotomizing the sample between the two communities indicated that they shared similar attributes with respect to family size, number of children, and dependents. However, the two communities differed substantially in their participation in government assistance programs. The proportion of households in MIH receiving government assistance is far lower than the proportion of households in TPH. Householders in MIH were on average younger than those in TPH were, with a slightly lower proportion of female headship. To sum up, the sample is composed of 322 households, disproportionately female-headed, with 383 children, 412 dependents, and a head count of 792.

This study used the modified form of the Household FSSM. The standard U.S. food security scale is measured based on a 12-month reference period, although it can be adjusted for shorter reference periods (Bickel et al., 2000). As the focus of this study was low-income families who are likely to experience frequent and severe food insecurity, it was important to measure and understand the severity of food insecurity not only within the conventional 12-month reference period, but also within a single month. The adjusted 30-day reference period allowed us to examine food insecurity events in relation to the timing of receiving food and other forms of public assistance. The relevant questions in the FSSM were modified so a 30-day reference period could be used. Furthermore, in line with the other objectives of the study, additional questions that elicited information on the timing of food hardship and the receipt of government assistance were included in the survey. The statistical analysis in this study was descriptive, involving interpretive tabular and cross-tabular classificatory analysis using means and frequencies along a vector of household characteristics.

Household Food Security Status of Respondents: Summary of Findings

As indicated previously, one of the purposes of this paper was to investigate the prevalence and degree of food insecurity among the study population. To this end, the present section summarizes the findings on food security status in three parts. First, we present and describe the frequencies of responses to the 18 standard questions and then provide a synopsis of findings on household food security and insecurity. The last subsection focuses on instances of very low food security among children.

Household Food Security Scale Questions: An Overview of the Responses

Table 2 presents the 18 standard FSSM questions asking whether or not certain conditions occurred and the percentage of households affirming that they experienced these conditions. We observed that 63% of the respondents worried that their food would run out before they got money to purchase more, and 57% indicated that the food they bought did not last. A smaller, but still sizable, proportion of the respondents viewed the quality of their food as inadequate. Thus, in approximately two out of five households, adults felt that they could not afford to eat balanced meals and had to feed their children a few kinds of low-cost food. Adults cut the size of their meals or skipped meals in one out of five families; and 70% of them did so for at least three days during the month. In 30% of the sample, adults ate less than they felt they should, although this figure dropped by half (to 15%) when participants were asked if they ever were hungry but did not eat.

Nine percent of the respondents experienced weight loss for lack of food. The same proportion did not eat for a whole day; two-thirds of respondents missed eating at least three days during the month. Events of reduced food intake and the consequences thereof were relatively few among children. Eleven percent of the relevant sample cut the size of children's meals. The incidence of children skipping meals was even less prevalent, at 5%. The majority of the children who had to skip meals for lack of food did so for three days or more in the course of the month. Eight percent of families with children reported very low food security

(VLFS) among children but reported fewer events of not eating for a whole day.

Also presented in Table 2 is a dichotomous view of the sample by child status and type of community. Households with no children expressed a slightly stronger perception of food hardship than families with children (in seven out of 10 items), although the observed difference is for the most part negligible. A considerable difference emerged from partitioning the sample according to the type of living community. Families in TPH affirmed all but a couple of items at a higher rate than did their counterparts in MIH. A differential of at least 60% is observed in their affirmation rates to 11 of the 18 questions. For example, the proportion of households in TPH in which adults and, in some cases children, (a) cut the size of or skipped meals, (b) ate less than they felt they should, (c) lost weight, and (d) did not eat for whole day, was at least 70% higher than the same rates in MIH. This suggests that food distress was more prevalent in the former community. In summary, the data show that the perception of inadequate food supply is more prevalent than the perception of low food quality, and the latter is more prevalent than instances of reduced food intake for adults and children.

Household's Food Security Status: Summary of Findings

The preceding section described the frequencies of affirmative responses to the survey questions. These item frequencies across households are useful, individually and in subgroups, for assessing the

Table 2. Percentage of Affirmative Responses to Household Food Security Survey Module (FSSM) Questions

QN	In the last 30 days:	Households Affirming (%)				
		Full Sample	Children		Community	
			With	With no	TPH	MIH
	Stage 1 Questions					
Q2	Worried whether food would run out.	63	64.2	61.5	63.7	60.6
Q3	Food bought just did not last.	57.1	54.7	60.1	56.6	59.2
Q4	Could not afford to eat balanced meals.	40.7	33.0	50.3	41.8	36.6
Q5	Relied on only a few kinds of low-cost food to feed the children.	41.3	41.3	N/A	42.9	37.0
Q6	Could not feed the children a balanced meal.	26.8	26.8	N/A	29.3	19.6
	Stage 2 Questions					
Q7	The children were not eating enough.	19.6	19.6	N/A	21.1	15.2
Q8	Adult(s) in the household cut size of meals or skipped meals.	21.8	19.6	24.6	24.0	14.1
Q8a	Adult(s) cut or skip meals, 3 or more days.	15.2	15.1	15.4	16.7	9.9
]Q9	Ate less than felt he or she should.	29.8	25.7	35.0	33.1	18.3
Q10	Hungry but did not eat.	14.9	13.4	16.8	16.3	9.9
Q11	Lost weight because there was not enough food.	9.0	6.7	11.9	10.0	5.6
	Stage 3 Questions					
Q12	Adult(s) did not eat for a whole day.	8.7	9.5	7.7	9.6	5.6
Q12a	Adult(s) did not eat for whole day for 3 or more days.	5.9	7.3	4.2	6.4	4.2
Q13	Cut size of child's meals.	10.6	10.6	N/A	12.0	6.5
Q14	Child skipped meals.	4.5	4.5	N/A	5.3	2.2
Q14a	Child skipped meals 3 or more days.	2.8	2.8	N/A	3.0	2.2
Q15	Child hungry but could not afford more food.	7.8	7.8	N/A	9.0	4.3
Q16	Child did not eat for a whole day.	2.2	2.2	N/A	2.3	2.2

Notes: QN denotes the serial number of the questions as they appear in the Household FSSM. Figures represent percent of the relevant sample. TPH = Traditional public housing; MIH = Mixed-income housing

various manifestations and events of food deprivation. However, to determine the extent and severity of food insecurity, we need the aggregated value of these frequencies across the survey questions for each respondent. Accordingly, we derived a food security scale based on the number of affirmative responses as per USDA's guideline (Bickel et al., 2000). We then classified the sample into the three categories of food security outlined above. Table 3 summarizes the findings by family attributes.

Of the respondents in the full sample, 48% were food-secure, with no or minimal perception or experience of food hardship during the reference period. The other 52% were food insecure, with lower percentages of respondents expressing the higher degrees of food deprivation. The food-insecure households were food insecure at least in the sense that they "were uncertain of having, or unable to acquire, enough food to meet basic needs of all their members" at some time during the month (Nord, Andrews, & Carlson, 2002, p. 3). Of the food-insecure group, 31%, representing 16% of the entire sample, experienced very low food security (VLFS), representing 16% of the entire sample.

The disaggregated data reveals no strikingly different profile from the one just described. Households with children appear to be more food secure than do households with no children. Male-headed families faced a greater probability of LFS than female-headed families did. Families with multiple adults experienced lower food security than families with one adult. Living alone or with others in a household seemed to matter little in regards to the probability of being food secure, except in the case of VLFS, which multiple-member households were more likely to experience. Lastly, Table 3 divides the responses to the food security scale into two cohorts according to the age of the heads of households, with the sample mean age of 45 serving as the cutoff point. The table shows that households headed by persons older than the sample mean age were, on average, more food insecure than were households headed by younger ones.

Table 3 also presents a measure of food insufficiency, based on the pattern of responses to the first screening question of the FSSM. Respondents were classified as food insufficient if they "sometimes" or "often" did not have enough to eat. Although this measure is weaker because it is based on less information than the food security measure, it is nonetheless juxtaposed for comparative purposes and as a complementary indicator of food hardship. According to this indicator, the overwhelming majority of the survey respondents were food sufficient. Seventeen percent of the sample expressed food insufficiency.

In contrast, 52% were food insecure as gauged by the pattern of their responses to the 18 survey questions. Regardless of household characteristics, the proportion of food-insecure households invariably exceeded that of food-insufficient families. However, the proportion of the sample classified as VLFS approximates the food insufficiency figure

Table 3. Food Security and Sufficiency Status by Selected Household Characteristics

Category and Outcome (%)	Full Sample	Children		Members in Household		Adults in Household		Sex, Household Head		Age, Household Head	
		With	With no	One	Two+	One	Two+	Female	Male	Under 45	45 & Over
Food Secure	47.8	50.3	44.8	47.6	47.9	49.0	44.0	48.4	44.7	52.0	42.6
Food Insecure	52.2	49.7	55.2	52.4	52.1	51.0	56.0	51.6	55.3	48.0	57.4
LFS	36.0	33.0	39.9	38.1	35.0	34.8	40.0	35.6	38.3	34.1	38.3
VLFS	16.1	16.8	15.4	14.3	17.0	16.2	16.0	16.0	17.0	14.0	19.1
Food Insufficient	16.8	13.4	21.1	19.0	15.7	15.0	23	16.4	19.6	12.8	22.1
Sample Size	322	179	143	105	217	247	75	275	47	179	141

Notes: Figures, except sample size, represent (within-group) percentages of the relevant sample size.
The sample size of the "Age, Household Head" category is 320 due to two missing observations.
LFS and VLFS stand for low food security and very low food security, respectively.

reported for the full sample. This demonstrates that the majority of households in the category of LFS did not characterize their food supply as inadequate at the time. However, questions such as Q2 and Q3 suggest that the sense of the inadequacy and insecurity of the food supply was increasingly evident over a longer horizon.

In summary, a slight majority of households suffered food insecurity. The probability of being food insecure was similar among the various subsamples, although some differences emerged when viewed by degree of insecurity. Thus, individuals living alone, multiple-adult households with no children, and families headed by males and by persons older than the sample mean age faced a slightly higher prevalence rate of LFS than their respective counterparts. The incidence of VLFS was higher among multiple-member families with children and among households headed by older persons than among their respective comparators.

The findings suggest a high prevalence of food insecurity, including VLFS, within the study population, which is not surprising for a sample drawn from low-income housing communities whose residents are generally very poor and more disadvantaged than other households in the low-income category (Zedlewski, 2002, and the references therein). In any case, the results do not seem to underestimate the prevalence and severity of food insecurity. The average rate of food insecurity in the nation during the year of the study's survey was around 11% (Nord, Andrews, & Carlson, 2002). The corresponding number for the category of VLFS was 3%, which is far less than the 16% recorded for our sample. Looking at groups sharing certain similar characteristics, at the national level the rate of food insecurity was about 21% in Black non-Hispanic households, and 6% experienced VLFS. Of households with incomes below the poverty line, the food insecurity rate was 37%, still lower than the rate found for our sample. VLFS was experienced by 13% of of households with incomes below the poverty line, which is closer to the corresponding figure in our sample.

Placing our findings in sharper perspective, 41% of low-income households (with an income below 130% of the poverty line) in the Black community were food insecure. Nord, Andrews, and Carlson (2002) found that 34% of low-income families from the South and from central cities in metropolitan areas were food insecure. These percentages, albeit closer, still represent a lower prevalence rate of food insecurity than found in our study. On the other hand, our findings are comparable to the results of some specific investigations carried out not long before the present study. For example, an investigation of food security among poor, female-headed families reported a food-insecurity rate of 49%, about 15% with hunger. Households with hunger among children were around 5% of the sample (Polit et al., 2000).

A comparative view of our results should consider the fact that our study uses a sample drawn from low-income housing communities where rental payments were subsidized. By living in subsidized housing, households avoid the additional expenses that they would otherwise incur to pay full rents, possibly reallocating the monies to augment their food budgets and thereby abate food insecurity.

Government Assistance and Living Environment: Implications for Food Security

Most of the various groups constructed along household attributes exhibited similar patterns of prevalence and degree of food insecurity. As previously mentioned, 61% of the sample reported receiving nonhousing government assistance in the month prior to the interview period,[9] and 78% resided in a traditional low-income public housing community. This section assesses the implications of these differences in government assistance and living environment for food security along two dimensions. First, the separate and interactive effects of government assistance and living environment on the degree of food security scale are examined, followed by an assessment of the temporal relationship between instances of food hardship and receipt of public assistance.

[9] Henceforth, we use government assistance and public assistance interchangeably to refer to nonhousing government assistance, which includes social security benefits, TANF (welfare), and food stamps, as reported by respondents.

Government Assistance, Living Environment, and Food Security Status

This subsection compares (a) the food security status of recipients of nonhousing public assistance with nonrecipients, and (b) food security status of residents in traditional public housing. In addition, the interactive effects of government assistance and living environment are described.

Government Assistance and the Degree of Food Security

Various forms of public assistance, especially SNAP (formerly food stamps), are expected to alleviate food insecurity and hunger and to enhance the food security status of recipients. To investigate whether public assistance exerted the desired and expected favorable effect on the food security status of the sampled households, the "with–without" comparative approach was employed, with nonrecipients serving as the control group (Nord, Andrews, & Winicki, 2002). Table 4 records the results of this comparison.

Fifty-seven percent of households who received government assistance were food insecure, with 17% experiencing VLFS. The corresponding figures for nonrecipients were somewhat smaller. Recipients affirmed VLFS among children at more than twice the rate of nonrecipients. Although the differential is hardly sizeable, recipients appeared to be less food secure, or more insecure, than households who did not receive government assistance.

The foregoing comparison assumes that the two groups are otherwise homogenous. This, however, is not the case, as a look at the third panel of Table 4 shows. Summarized in that panel are some of the distinguishing features that are apparently pertinent to household food condition and on which data were available. The group who received government assistance included a slightly higher proportion of families with children than the group of nonrecipients which, in turn, included a higher percentage of households with at least two adults. More strikingly, among nonrecipients, the proportion of families with employed members is roughly five times the rate among recipients. The corresponding factor of differential with respect to the rate of employment is four. The size of differential aside, the observed difference in employment between recipients and nonrecipients is to be expected, as employed individuals are less likely to satisfy eligibility requirements for receipt of public assistance.

Controlling for these household characteristics somewhat magnified the intergroup difference previously described (Figure 1). Compared to nonrecipients, the prevalence of food insecurity among recipients was lower in one-member households and in families with no children and higher in households where there were at least two members, two adults, and one or more wage earners. On the other hand, the

Table 4. Household Food Security and Selected Household Characteristics by Receipt of Government Assistance

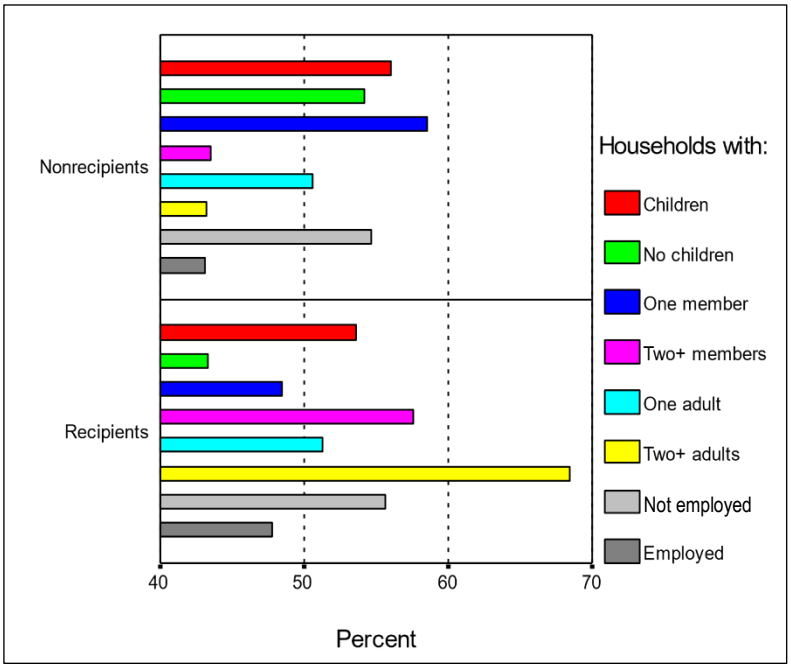
	Public Assistance	
Category	Recipients (%)	Nonrecipients (%)
Food security status		
Secure	45.4	51.6
LFS	37.2	34.1
VLFS	17.3	14.3
Child's food condition[a]		
No child classified as VLFS	92.9	97.0
Child classified as VLFS	7.1	3.0
Selected household characteristics		
Households with children	57.1	53.2
Households with two or more adults	19.4	29.4
Households with one or more persons employed	11.9	57.6
Adults employed	11.3	47.9
Sample	**196**	**126**

[a] The child food security subscale is calculated from the responses to the eight child-referenced items in the survey that ask about the conditions and experiences of children (Nord & Bickel, 1999; 2002).
Notes: Sample size refers to the number of households in the dichotomous classifications of each column. Other figures represent percentages of households (in one case, of adults in households) in the relevant group with the specified attributes, indicated in the column captions.

food insecurity rate of the two groups was roughly equivalent among households with children, with one adult, and with no employed member.

With respect to intragroup differences, among those who did not receive government assistance, a higher rate of food insecurity occurred among households with (a) one member than with two or more, (b) no wage earners than with employed adults, and (c) one adult than with two or more adults. Among recipients, households with children and with no employed adults were found more food insecure than their counterparts with contrasting attributes. The food insecurity rate in the presence of multiple members and adults was higher among recipients than nonrecipients. The continued experience of food insecurity in spite of government assistance or lack of substantial difference in the rate of food insecurity between recipients and nonrecipients is consistent with other studies reviewed above, which reported neutral or perverse effect of food assistance (e.g. Gibson-Davis & Foster, 2006; Gundersen & Oliveira, 2001; Jensen, 2002; Wilde and Nord, 2005).

Figure 1. Prevalence of Food Insecurity by Receipt of Government Assistance



Living Environment and Degree of Food Security

Does living environment in the sense of residing in a TPH versus an MIH community affect the degree of food insecurity? In other words, are residents in TPH better or worse off than are residents in MIH in their food-security condition? A comparison of the food security status of the two groups of residents indicates that the prevalence of food insecurity was nine percentage points higher in TPH than MIH (Table 5). The intercommunity differentials across the three levels of food security slightly, but consistently, exceed those observed between recipient and nonrecipient groups compared earlier.

The finding that mixed-income residents were relatively more food secure could plausibly be due to intercommunity differences other than those pertaining to the neighborhood and living environment. As Table 5 shows, the two communities differed in a number of household characteristics. Higher proportions of families with children and multiple-member households resided in TPH than in MIH. The employment rates of adults and the percentage of families with at least one employed member are three times higher in MIH than in TPH, consistent with one of the hypothesized outcomes of living in a mixed-income community with respect to employment opportunity. TPH housed a far greater proportion of households (70%) who received government assistance than did MIH (28%). Residents in MIH received higher incomes than did their counterparts in TPH, although the average annual household income levels in both communities were below the federal poverty level.[10]

[10] The poverty threshold in 2001 when the survey was conducted was US$14,255 for a three-member, one-child household (U.S. Department of Health and Human Services [HHS], n.d.). The average family size and number of children for our sample are 2.5 and 1.2, respectively (see Table 1).

Table 5. Household Food Security and Selected Household Characteristics by Type of Living Environment

Category	Community (%)	
	Traditional	Mixed-income
Food security status		
Secure	45.8	54.9
Low food security	37.1	32.4
Very low food security	17.1	12.7
Child's food condition		
No child very low food security	94.0	95.7
Child very low food security	6.0	4.3
By selected household characteristics		
Households with children	53.0	64.8
Households with two or more adults	20.0	35.2
Households with one or more persons employed	20.6	62.0
Adults employed	17.5	53.5
Households receiving government assistance	70.1	28.2
Average annual household income	$7,449	$11,493
Sample	251	71

Notes: Except for average annual income and sample size, all figures represent % of households (in one case, of adults in households) in the relevant group with the specified attributes, indicated in the column captions.
Average annual household income figures were obtained from management offices of the communities and pertain to the resident population from which the sample was drawn.

Figure 2. Prevalence of Food Insecurity by Type of Community (Traditional Public Housing vs. Mixed-Income Housing

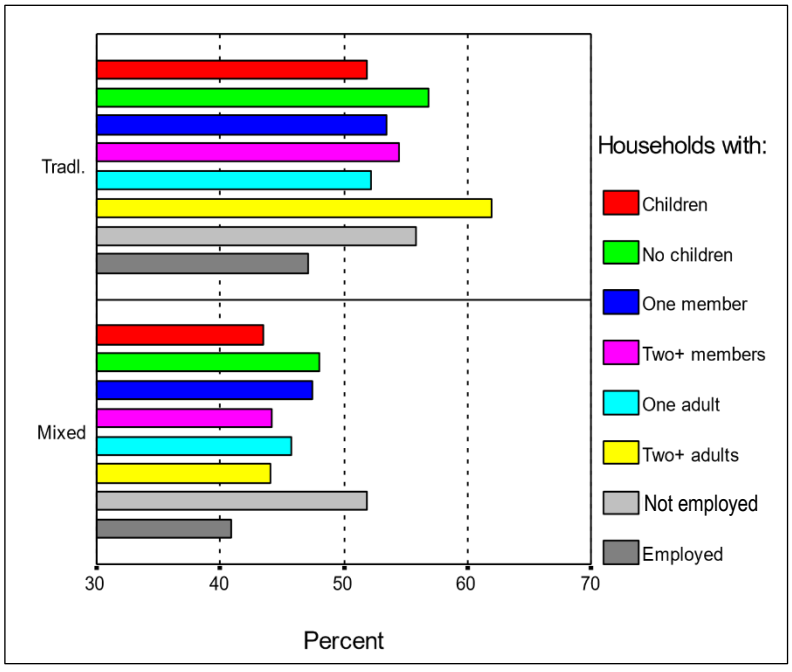


Figure 2 portrays the intra- and intercommunity differences in the prevalence of food insecurity based on most of the household characteristics identified above. Within-community differences in the probability of food insecurity were minor except between subgroups based on employment status (in both communities) and on the number of adults in a household (in the traditional community). On the other hand, differences between the two communities for a given level of household attribute were relatively large. In each category and regardless of the level of attribute considered, the prevalence rate of food insecurity in TPH exceeded that in the MIH community. For instance, residents of the traditional community were on average more food insecure than those in MIH regardless of the employment status of household members. Households with at least one employed member were less food insecure than households with no employed members; and among the latter, those residing in MIH appeared to be less food insecure than their counterparts in the other community, probably reflecting wage differentials among the two groups of employed residents.

The Interactive Effect of Government Assistance and Living Environment

The rates of participation in government assistance programs in the two communities were diametrically different: 70% in TPH and 28% in MIH. Likewise, the distribution of recipients between the two communities was lopsided, with only 10% of them living in the MIH community. Having

Table 6. Government Assistance, Living Environment, and Employment Status

Household Category by Status of Employment and Receipt of Government Assistance	Community					
	Traditional Public Housing			Mixed-Income Housing		
	Total in Row Category	Category as % of Community	Food-Secure as % of Category	Total in Row Category	Category as % of Community	Food-Secure as % of Category
Not employed, nonrecipient	40	15.9	45.0	13	18.3	46.2
Not employed, recipient	159	63.3	43.9	14	19.7	50.0
Employed, nonrecipient	35	13.9	54.3	38	53.5	57.9
Employed, recipient	17	6.8	47.1	6	8.5	66.6
Total	251	100	45.8	71	100	54.9

Note: "Not employed" refers to households with no employed members.

assessed the separate effect of government assistance and living environment, next we explored whether the two factors interacted with each other in influencing the prevalence of food insecurity among the study sample. To that end, we compared the prevalence rate of food insecurity in the two communities, given employment and participation status in government assistance programs. The following subsection explores intercommunity differences among recipients.

Comparative results emerging from the three-way classification in Table 6 include the following. First, the single largest category in the TPH community comprised government-assisted households with no working adult (63%). In contrast, roughly one half of the respondents in the MIH community were nonrecipients who reported employment income. Second, those who reported receipt of both government assistance and wage income constituted the smallest category in the two communities. Third, in the TPH community, the probability of being food secure was the highest among households with employed adult(s) who did not receive government assistance. In the MIH, on the other hand, those who received assistance and wage income were more food secure than were households in the other categories.

Fourth, given employment status, recipients of government assistance in the TPH community were generally less food secure than nonrecipients were. This contrasts with the experience of MIH residents for whom, given employment status, receipt of government assistance was associated with higher probability of food security. Fifth, in all categories, mixed-income housing residents enjoyed a higher probability of food security than do their counterparts in the traditional community, although the differential with respect to nonrecipient categories, with or with no employed adult, is negligible. Among recipients of public assistance, the probability of food security was invariably higher among MIH residents, with a gap of 20 or six percentage points depending on the status of employment.

One might surmise from these comparative results that the effect of government assistance on the food security status of public housing residents depended more on differences in the living environment than on employment status. It appears that, given the status of employment, the living environment interacted with participation in government assistance program in influencing the probability of being food insecure. Figure 3 depicts this possible interactive effect by controlling for selected household characteristics in addition to employment status. Clearly, intracommunity differences emerging from dividing the sample into groups based on selected household attributes are rather insubstantial in the TPH except regarding the number of adults. In contrast, the prevalence of food insecurity varies considerably within the MIH across the designated subgroups. Comparing the two communities for a given category of household characteristics, recipients of government assistance in TPH were more food insecure than those in MIH in all categories except in one-adult families with children.

In summary, there is no clear evidence that

government assistance influenced the probability of being food secure in the study population at the aggregate level. However, the living environment effect magnified the potential positive impact of government assistance. The type of living environment seemed to have a relatively noticeable effect on the prevalence of food security, even after controlling for certain household attributes that might affect the relationship between the two variables.

The Timing of Reduced Food Intake and Receipt of Government Assistance

This subsection addresses the temporal relationship between the timing of food hardship events and the receipt of government assistance including SNAP. The type of food hardship considered in the forthcoming discussion is reduced food intake. For our purpose, we focus only on four survey items, which, when affirmed, are indicative of reduced food intake, for which we added follow-up questions about timing as part of the survey instrument.

Table 7 lists said items and their associated frequencies, representing the number of respondents who reported the specified food hardship and identified the week when they encountered the hardship. In 50 households (16% of the sample), adults cut the size of or skipped meals. For 62% of these households, this occurred during the last week of the month. For 56% of households with adults who were hungry but did not eat, the stated hardship took place in the fourth week. Similarly, the majority of the reported instances of adults going without eating the whole day and children skipping meals both happened during the last week of the month. Table 7 reveals a consistent pattern in which the number of households experiencing reduced food intake was lowest in the first two weeks and highest on the last week of the month. Thus, the incidence of hunger has a time dimension to it, varying from one week to the next predictably.

The pattern in Table 7 may be due wholly or in part to the timing of government assistance. To test this hypothesis, we focus on the link between reduced food intake by adults and whether they received government assistance (Table 8). As shown in Table 8, 71 households, representing 22% of the total sample, had one or more adults who cut the size of or skipped their

Figure 3. Prevalence of Food Insecurity Among Recipients of Government Assistance by Type of Community (Traditional Public Housing vs. Mixed-Income Housing)

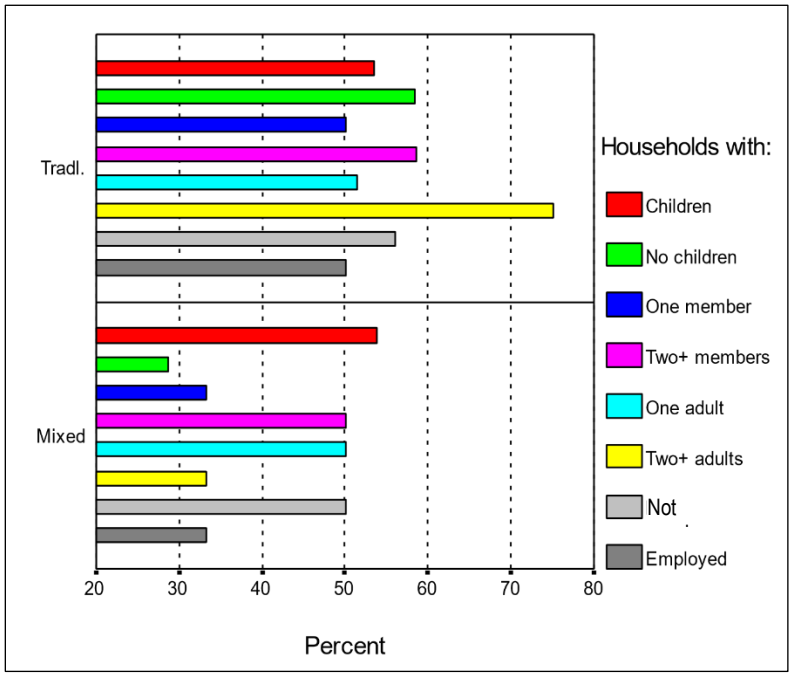


Table 7. Number of Households Experiencing Reduced Food Intake by Week of Occurrence

	Week of the Month			
Type of Food Hardship	First Two Weeks	Third Week	Fourth Week	Total
Adult cut size of, or skipped, meals	5	14	31	50
Adult hungry but did not eat	8	12	25	45
Adult did not eat for whole day	4	7	13	24
Children skipped meals	0	3	5	8

meals; were hungry but did not eat; or went without eating for a whole day for lack of food. Adults in most of the households (61, or 86%) experienced reduced food intake during the third or fourth week of the month. Sixty-two percent of the households under consideration received government assistance, which approximates the percentage obtained for the whole sample.

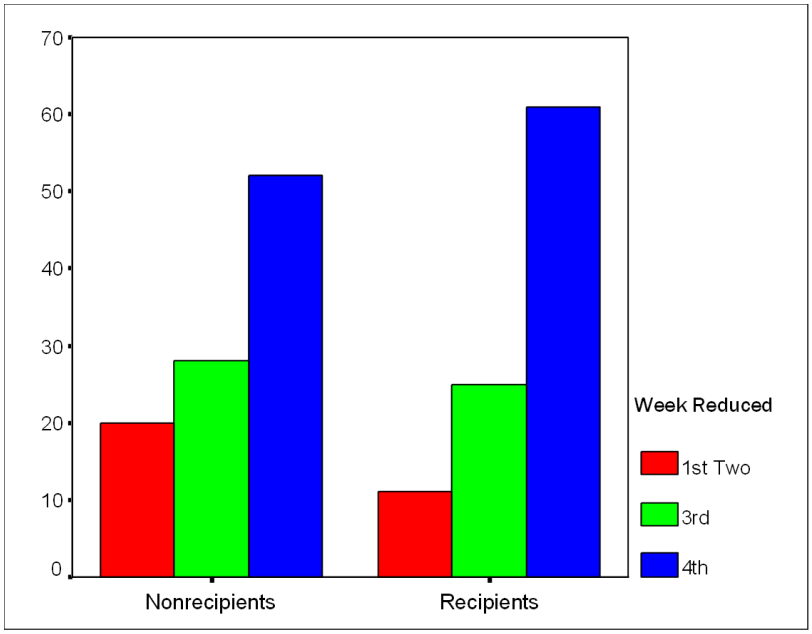
Although the occurrence of food hardship exhibited the same pattern in both groups, its profile over time is much steeper in the recipient than in the nonrecipient group. The number of recipient households with reduced food intake in the last week of the month is more than five times that recorded for the first two weeks. The corresponding increase for the nonrecipient group was by less than a factor of three (Figure 4).

To examine the temporal relationship between the timing of food hardship and of the receipt of assistance, we focus exclusively on recipients of government assistance. As shown in Table 9 and Figure 5, 80% of those who received government assistance received it in the first two weeks of the month and the remainder during the third week. No household reported receiving assistance during the last week of the month. This was the week when the majority of the relevant sample (61%) experienced reduced food intake. The proportion of households suffering reduced food intake progressively increased as the percentage of households receiving assistance decreased from the first half to the latter weeks of the month (see shaded percentage figures in the last row and column of the table). Food hardship was most prevalent when no assistance was received and least prevalent when assistance was received the most. This suggests a negative temporal relationship between the event of food hardship and the receipt of government assistance.

Table 8. Number of Households with Adults Experiencing Reduced Food Intake by Week of Occurrence and Receipt of Assistance

Week of the Month	Recipients	Nonrecipients	Total
First Two Weeks	5	5	10
Third Week	12	8	20
Fourth Week	27	14	41
Total	44	27	71

Figure 4. Households with Adults Experiencing Reduced Food Intake, by Nonrecipient vs. Recipient of Government Assistance (Number)



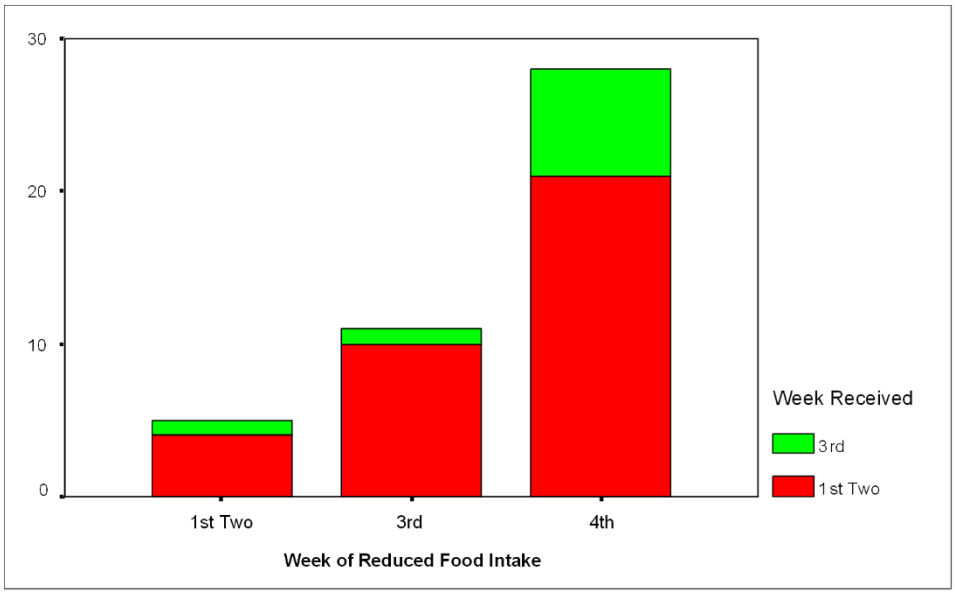
Summary and Concluding Remarks

This paper assessed the extent of food insecurity and investigated the implications of public assistance and living environment for the degree of food insecurity in a case study of two public housing communities. A little more than half of the sample experienced food insecurity, and a smaller proportion experienced VLFS. Albeit marginally in the majority of cases, food insecurity was higher among households without than with children; multiple-adult than single-adult families; male-headed than female-headed households; households headed by persons under the sample mean age than older persons; recipients of government assistance than nonrecipients; and traditional low-income than MIH residents. Overall, the findings suggest a high prevalence of food insecurity,

Table 9. Households Reporting Reduced Food Intake and Receipt of Government Assistance by Week of Occurrence

	Week When Assistance Was Received (%)				
Week of Food Hardship	First Two Weeks	Third Week	Fourth Week	Total (%)	Total (%)
First Two Weeks	5	1	0	6	13.6
Third Week	10	1	0	11	25.0
Fourth Week	20	7	0	27	61.4
Total	35	9	0	44	100
Total (%)	80	20	0	100	N/A

Figure 5. Number of Households Reporting Reduced Food Intake and Receipt of Government Assistance by Week of Occurrence



including VLFS, among the study population, although this is not surprising for a sample drawn from low-income communities.

The absence of a strong relationship between government assistance and food security status is, on the surface, contrary to conventional expectation. In general, while some households may have become food secure because of government assistance, others may have remained food insecure in spite of it. One common explanation offered for this finding is the process of self-selection whereby those households who receive government assistance do so because they are, in the first place, demonstrably more needy and more food insecure than those who do not qualify to receive assistance. This may partly explain why 64% of the food-insecure households were recipients of government assistance. Since belonging to either category is not the result of a randomized process, it is difficult to isolate the effect of government assistance on the degree of food security. That said, however, the fact that a number of households remained insecure in spite of government assistance might speak to the inadequacy of the assistance they received. Perhaps, for the assistance to make a dent on food insecurity, there may be a threshold of assistance required. The amount and kind of assistance, the frequency of receipt, and recipients' perception of its continuity all affect the efficacy of government assistance in alleviating food insecurity.

Although the average effect of government assistance on food security status was not measurable from these data, it was far from irrelevant, as disaggregated data indicated. Some recipients felt a higher degree of insecurity during the week of the month when they did not receive assistance than during the week when assistance was disbursed. Furthermore, government assistance improved the probability of being food secure in the environment of MIH. Whether independently of or interactively with government assistance, the type of living environment seemed to affect food security condition. Living in MIH appears to improve the chance of being food secure, even after considering

some household attributes that might affect the relationship between the two variables.

The inherent caveats of the household food security scale constrain the interpretation of the results of the study. Note that a household's classification as food secure does not necessarily mean that the household affirmed none of the survey items. Moreover, the food security scale does not fully reflect coping strategies. For example, it recognizes the strategy of substituting low-cost foods for preferred foods, but it does not encompass all the strategies commonly employed by low-income families. Households who somehow make ends meet using coping strategies not included in the survey instrument, such as cutting non-food expenses, could conceivably be misclassified as food secure (see, for example, Bezuneh & Yiheyis, 2020). Their sense of insecurity would probably surface if references were made to other coping mechanisms besides those included in the standard survey instrument. Coping mechanisms are likely to rise in variety and frequency for low-income families as their incomes further decrease. Furthermore, the food security scale captures neither the nutritional intake nor the safety of food eaten. Respondents could be classified as food secure while consuming nutritionally deficient food. This is important when attempting to make a causal connection between food security and health status of respondents. Despite its shortcomings, the food security scale is a valuable measure, and our study largely validates it in its modified format.

Another point of caution in the interpretation of the results of our study is its sample size. A related shortcoming is the paucity of cross-sectional units for our empirical investigation of the food-security effects of differences in living environment (traditional versus mixed-income communities). The sampling of additional study sites from each type of community would have provided more robust findings and stronger generalizations about the effect of living environment on food insecurity. Therefore, the results reported in this study, although informative, can only be taken as suggestive. A more definitive and conclusive assessment of the environmental effect on food security requires research based on a larger sample drawn from multiple sites of each type of living environment.

With the aforementioned caveats of the present study in mind, we can draw a few tentative conclusions with policy implications. First, despite receipt of government assistance, a substantial percentage of the sample remained food insecure. This may be partly due to the inadequacy of the amount and/or the ineffectiveness of the type of assistance received, suggesting that increasing the amount and/or tailoring the type of assistance provided would be appropriate policy measures to enhance food security. Second, the incidence of food hardship occurred much more frequently during the last week relative to the first two weeks of the month. This coincided with the reported timing of the receipt of government assistance, giving rise to a lagged temporal relationship between the two events. This finding suggests that public assistance would probably reduce the concentration of events of food deprivation if it were disbursed at shorter intervals. Third, living in a mixed-income setting appeared to be associated with a lower degree of food insecurity, providing another justification for the shift in emphasis from traditional to mixed-income housing.

Acknowledgments

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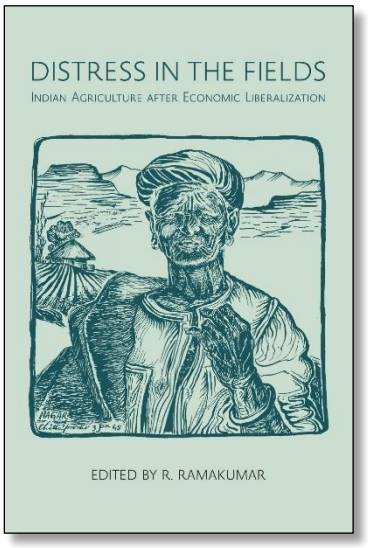
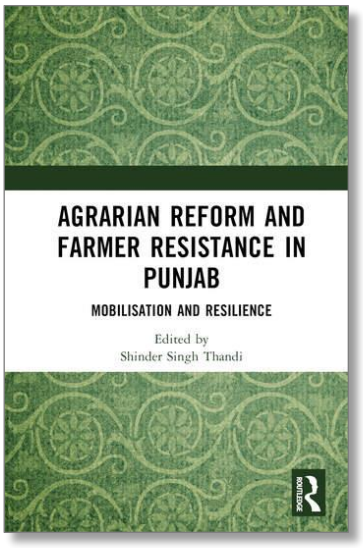
Harvesting perspectives: A comprehensive review of two pivotal works on Indian agrarian transformation





Book reviews by
Mallory Cerkleski*
Scuola Normale Superiore di Pisa

Reviews of
Distress in the Fields: Indian Agriculture after Economic Liberalization, edited by R. Ramakumar. (2022). Published by Tulika Books. Available as hardcover; 508 pages. Publisher's website: https://tulikabooks.in/catalog/product/view/id/22411

Agrarian Reform and Farmer Resistance in Punjab: Mobilization and Resilience, edited by Shinder Singh Thandi. (2023). Published by Routledge India. Available as hardcover and ebook. Publisher's website: https://www.routledge.com/Agrarian-Reform-and-Farmer-Resistance-in-Punjab-Mobilization-and-Resilience/Thandi/p/book/9781032291895

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As the Indian agricultural landscape continues to undergo transformative shifts, the need for nuanced literature addressing agrarian change becomes increasingly pronounced. In this review, we delve into two pivotal works—*Distress in the Fields: Indian Agriculture after Economic Liberalization*, edited by R. Ramakumar, and *Agrarian Reform and Farmer Resistance in Punjab: Mobilization and Resilience*, edited by Shinder Singh Thandi. As a scholar of agriculture, food systems, and history, I bring to the forefront a critical evaluation of these books, positioning them within the broader context of agrarian evolution in India.

In a world where success is often measured by the relentless pursuit of growth, and in which right-leaning governments champion the narrative of

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neoliberalism, the consequences are a widening gap in inequality, regardless of the metric employed. India, a land teeming with diversity, is a relatively new unified state, presenting an ever-shifting reality that defies easy categorization. Amid this complexity, we can discern specific themes that shed light, at least on a surface level, on the various dynamics at play. This review delves into the content and analysis of two books, exploring themes such as agrarian history, economic liberalization, mobilization, and resistance. Beyond these, it seeks to underscore how food and agriculture in India can illuminate broader global issues, including colonialism, imperialism, and neoliberalism—themes that each of these books inexplicitly touches on. It aims in particular to spotlight how these realities impact the most vulnerable and essential segments of populations: those who provide us sustenance.

In the current landscape where the intersections of tradition and modernity are more apparent than ever, both these books offer distinct perspectives that demand our attention and scrutiny. While both books were released at nearly the same time, when reading them together it feels like one book may have germinated from the other. The collaborative work edited by Ramakumar is an extensive, technical, and meticulous guidebook. It quantitatively maps the landscape of Indian agriculture from 1991 onward. Functioning as a cornerstone, it lays the groundwork for a more profound comprehension of the second book, edited by Thandi, which serves as a crucial backdrop to the 2020/2021 farmers' protests. It offers deep insights into the hyperspecific context surrounding these events. It explores the farmer resistance that potentially led to or inspired these protests.

The State of the Field

Numerous scholars and scientists have remarked on the complexities of India's agrarian policies and systems, setting the stage for reform and change in the country's agricultural systems. Delving into the intricacies of agrarian change in India is not merely an academic pursuit but an exploration of a cornerstone of the nation's identity (Dutt, 2016). Agriculture, deeply rooted in India's socio-economic fabric, has undergone transformative shifts, and understanding these changes is imperative (Frankel, 2015). With a significant portion of the population dependent on agriculture, that sector's health is intricately tied to the nation's well-being (Chandra et al., 2013). The ecological consequences of agrarian practices and the impact of globalization on indigenous farming methods (Shiva, 2016) laid the foundation for the recent farmer protests, which form the backdrop of these two books. The complexities of land distribution, economic policies, and global influences are not abstract concepts but tangible forces shaping the destiny of millions. The agricultural sector in India is at a crossroads, facing challenges that resonate globally (Sen, 1983). Issues such as agrarian inequalities, land distribution, and the impact of economic liberalization have far-reaching implications. Therefore, the significance of these books is underscored by contemporary events, where the agrarian crisis is not confined to the pages of policy documents but spills into the streets, with farmer protests making headlines. The lens of these books is attuned to the pulse of the times, offering readers a deep understanding of the forces driving change and the resilience of those who cultivate the land.

Agrarian Insights: Navigating Historical Shifts and Contemporary Challenges

In *Distress in the Fields*, the exploration of historical context, from the pre-independence era to the 1990s liberalization, provides comprehensive insight into the current agrarian landscape. Analysis of the four distinct phases of Indian agricultural growth, especially the Green Revolution and subsequent policy shifts, lays a foundation for understanding the complexities of Indian agriculture in general. The author's use of quantitative data and surveys, covering a wide range of policies and issues, showcases commendable analytical depth. Through data-driven studies, the book provides valuable information covering various periods of reform in Indian agriculture. The volume's scientific approach, however, which are somewhat lacking in demographic and social data, may confine it to academic circles rather than reaching a broader audience.

This book critically examines the challenges posed by economic reforms after 1991, particularly the reversal of land reform laws and the stagnation

of public capital formation. Some chapters also touch on the three farm acts of 2020 implemented by Prime Minister Modi and their implications for Indian agriculture. These analyses provide valuable insights into the contemporary challenges faced by the sector. While these analyses tie into the second book in this review, they do not feel like a repetition or discounting, but rather a new and different perspective.

On the other hand, *Distress in the Fields* stands out for its contribution to agrarian studies. By offering a historical context, analyzing policy shifts, and emphasizing the adverse effects of liberalization, the book significantly advances the discourse on this topic. The critical examination of the impact on public capital formation, research, and extension provides a valuable foundation for future scholarship. Altogether, this book sets the appropriate scenario for understanding the consequences of rapid industrial change in Indian agriculture, pre- and post-independence, and is an important transitional text for the next book.

Agrarian Reform and Farmer Resistance in Punjab provides a comprehensive historical background, effectively tracing the roots of the 2020–2021 farmer protests in Punjab. The historical context offered in the first part of the book exhibits a deep understanding of the agrarian struggles, colonial influences, and significant events shaping India's agricultural landscape. The parallels drawn between past and present movements enrich the narrative, establishing a strong foundation for evaluating historical accuracy. The book provides analytical depth through a multidisciplinary approach. The use of theoretical frameworks, as highlighted in Chapter 2, aids in understanding the complexities of socio-economic and political factors influencing agrarian change. Notably, Chapter 6 emphasizes the interplay of federalism and the government's media campaign, revealing nuanced dimensions of the protest's impact. This book skillfully addresses contemporary challenges within the agrarian sector; the proposed eco-socialist vision introduces a novel perspective, contributing to ongoing debates about sustainable agricultural practices. The critical examination of the repealed farm laws and their potential implications, along with insights into contract farming and its impact on diversification, demonstrate a proactive engagement with the challenges faced by farmers. The analysis of the Sikh/Punjabi diaspora's role and the exploration of gender inclusiveness toward the end of the book expands the discourse beyond regional boundaries. The book not only provides a rich historical tapestry of the 2020–2021 farmer protests in Punjab but also engages deeply with contemporary challenges, offering a multidimensional perspective that transcends regional boundaries and contributes significantly to ongoing debates about sustainable agricultural practices.

Conclusion

As I navigated the pages of these two works, the synergistic relationship between the quantitative mapping of Indian agriculture and the in-depth exploration of farmer resistance became increasingly evident. While the book edited by Ramakumar lays the foundational quantitative groundwork, Thandi's volume acts as a complementary narrative, zooming in on the hyperspecific context of the recent protests. This interplay creates a dynamic and multifaceted understanding of agrarian change in India, showing the value of reading these works in tandem.

Both volumes contribute significantly to the broader discourse surrounding the impact of neoliberal economic policies on agriculture, echoing the global struggles against the forces of colonialism and imperialism. The contemporary relevance of these books cannot be overstated, especially in a world grappling with issues of social justice, economic inequality, and the consequences of global economic structures. The lens through which these works examine the intricacies of agrarian change in India resonates with broader struggles against systems of power, echoing the challenges faced by marginalized communities worldwide. Neoliberal policies, often touted as pathways to progress, are laid bare in the context of Indian agriculture, exposing them as the underlying mechanisms that perpetuate inequality.

These edited volumes are not only valuable resources for scholars and policymakers seeking a nuanced understanding of agrarian evolution in India, but they also contribute to the ongoing global conversations surrounding neoliberalism,

colonial legacies, and imperialistic structures. By connecting the specificities of Indian agrarian change to broader themes of economic injustice and resistance, these works serve as beacons illuminating the shared struggles faced by farmers and communities worldwide. In navigating these pages, readers are not just exploring the complexities of India's agricultural landscape; they are delving into a universal narrative of resilience, resistance, and the quest for a more equitable and just world.

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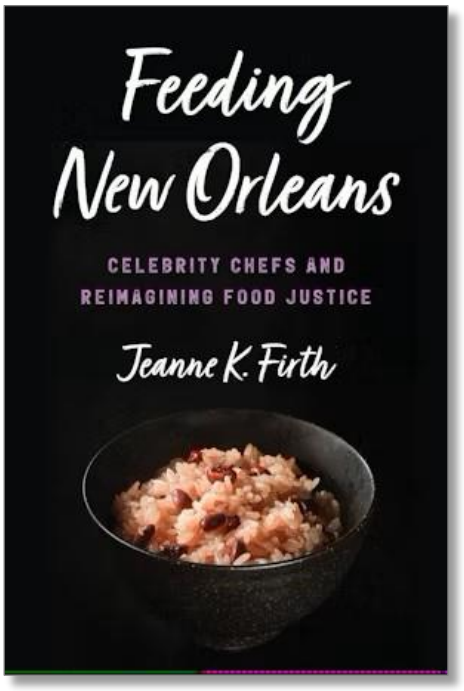
Celebrity chef humanitarianism and the possibility of a "giftless" future for the New Orleans foodscape



Book review by
Natasha Bernstein Bunzl *
New York University

Review of *Feeding New Orleans: Celebrity Chefs and Reimagining Food Justice*, by Jeanne K. Firth. (2023). Published by University of North Carolina Press. Available as hardcover, paperback, and e-book; 228 pages. Publisher's website: https://uncpress.org/book/9781469676333/feeding-new-orleans/

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A searing and classic anthropological question about the meaning of a "gift" undergirds Jeanne K. Firth's fantastic ethnography, *Feeding New Orleans: Celebrity Chefs and Reimagining Food Justice*: "Does a gift require inequality or unequal power relations?" (pp. 21, 169). Firth joins a vibrant scholarly conversation that goes back to the 1925 release of Marcel Mauss's *The Gift*. She traces how anthropologists, feminist scholars, philosophers, and critical theorist have developed theory around gift giving and exchange for decades, and then applies and builds on that theory in a unique ethnographic setting: charities run by celebrity chef philanthropists in New Orleans. She interprets her fieldnotes from charity events and her interviews with scholarship recipients and donors using this theory, illuminating how chef philanthropy has played an integral role in shaping "post–Hurricane Katrina" New Orleans. Firth reveals the way racism, classism, and sexism inform celebrity chef foundations. That said, the book does not only decry how inequality seeps into and is reproduced

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by chef foundations; it also explores how actors across the system both resist and reinforce these dynamics. Additionally, it explores how a focus on the land instead of individualized "heroes," social movements instead of corporations, and even cooks instead of chefs can create more space and opportunities for justice and liberation.

One of the book's greatest strengths is Firth's humility and precise attention to language. As an example, toward the end of the book, she recounts an interview with community chef Roseline and artist Sylvester in which they corrected her description of New Orleans as "post-Katrina." They say, "We call it 'post–levee breach.' It's important that people be as accurate as they can about circumstances that happened, specifically traumatic events so that you can root source it back and you can heal from it. If you're working from a falsity at the root, at the foundation, then you're not going to be able to heal yourself" (p. 122). This piece of wisdom from Sylvester may as well be a mantra throughout the book and to ethnographers across disciplines.

Populated by a diverse set of characters from celebrity chefs with and without foundations, to foundation workers, to community cooks, to activists, and to donors, this book depicts the ways that food has become a stage for performances of both charity and justice, appropriation, and resilience in the New Orleans food scene since the levee breach. Firth's book opens at Fêtes des chefs, a weekend of fundraising for the John Besh Foundation and their Chefs Move! Scholarship, which sends minority chefs to attend culinary school. John Besh, a central chef figure in Firth's story, "skyrocketed to stardom because he drastically expanded his corporation through post-disaster speculation" (p. 4). Besh exemplifies the opportunistic white saviorism that is the central object of Firth's critique, perhaps most pointedly when he throws a crawfish fundraiser for Chefs Move! at his plantation-style house. At the event, mostly white "donor/guests" revel in alcohol-soaked hospitality, and mostly Black winners of the scholarship stand on stage to receive the award with complicated feelings. Firth explores these feelings in interviews with various winners. "Why did it come to this?" one of the scholarship winners, Tajee, asks. Why he is in a position to accept this scholarship and these other people are in a position to fund it? The answer is because of a legacy of inequality fueled by racism.

By the time Firth is writing, Besh has experienced a serious fall from grace due to allegations of sexual harassment. Although this fact is revealed on page one, a couple of months in the story line and 80 pages of ethnography must pass before Besh becomes persona non grata in the foundation world. Before he is removed from marketing material at his own foundation, he is celebrated as generous, successful, and hospitable. Firth reminds her reader that although she focuses on the food world, the dynamic of celebrity humanitarianism pervades New Orleans across industries, where hordes of celebrities descended in 2005 looking to help or make a name for themselves as humanitarians after the disaster(s) of Hurricane Katrina. These "corporations, celebrities, and philanthropists have become [the] prominent development and humanitarian leaders of the 'new' New Orleans" that has used culinary tourism to market and "rebuild" itself (p. 4).

Firth, a white northerner with a complicated, deeply felt relationship to American agriculture, got to know the city as a development scholar and food justice practitioner. She spent five years working at Grow Dat Youth Farm, while also teaching international development at Tulane University. In 2015, she left Grow Dat to "critically reflect on the work that [she] had been immersed in" (p. 17); this reflection became *Feeding New Orleans,* making this book partially an autoethnography. Firth is interested in how Grow Dat, an organization that differs significantly from the many of the foundations that she focuses on, also came to be touched by the toxic culture of high-end dining. In an attempt to maintain some independence from outside foundations, Firth found herself hosting "dinners on the Farm" with celebrity guest chefs, and in doing so, witnessing the transformation of this youth-led radical urban farm into a site for wealthy, mostly white, "donors/guests" to enjoy rarified dining experiences. This example demonstrates how the phenomena of development humanitarianism and "causumerism" have spread throughout the city even into radical spaces one might expect to be

resistant to the "legacies of exploitation [and] exclusion" that define "gourmet culinary imaginaries" (p. 115).

After a self-reflexive introduction, chapter two sets the theoretical foundation for the book; Firth traces anthropological scholarship the gift exchange, and connects it to critical feminist scholarship, critical humanitarian studies, and studies of corporate social responsibility. She introduces Richey and Ponte's matrix of engaged and disengaged corporate social responsibility (CSR) which she will adapt specifically for restaurants in chapter six. This chapter would have been an exciting moment to bring a historical view of development, chef philanthropy, and food aid by citing Tom Scott-Smith's *On an Empty Stomach*. Chapters three through five focus in on New Orleans and look at different models for how chefs played an integral role in rebuilding the city after 2005. Chapter four specifically interprets Besh's crawfish boil fundraiser and its relationship to Southern hospitality, white supremacy, and the legacy of slavery and racism. Chapter 5 also looks at events, largely those of Grow Dat, her own organization. She compares two types of events they hosted: "Dinners on the Farm" (fundraisers run in conjunction with celebrity chefs), and "History of the Land workshops" (free events that aimed to offer education to the community). Chapter five ends by asking more broadly, why do some chefs start philanthropies and why have others resisted the pressure to join this dynamic? Chapter six returns to the CSR matrix, building on the proximate/distant and engaged/disengaged dichotomies and adding in embedded/disembedded. This new binary emphasizes the geographic component of the CSR. Firth concludes by offering practical next steps for chef practitioners and scholarly questions for future research. To her original question, the answer seems to be yes, giving is inextricable from inequality. So her challenge is: what does a future characterized by "giftlessness" look like?

This work is both theoretically ambitious and methodologically extensive. Firth's work speaks to scholars from anthropology, critical humanitarian studies, critical race theory, feminist theory, food studies, and organizational sociology, and it belongs on syllabi taught in any of their subjects. Furthermore, while the book belongs in any number of graduate or undergraduate courses, it also offers practical advice to workers in the food system who find themselves expected to participate in the cycles of humanitarianism and charity, such as the woman who owns two restaurants and who receives more than 500 solicitations for charitable donations in a single year. I have been waiting for a book to engage seriously with celebrity chef humanitarianism, and I look forward to seeing how scholars expand Firth's argument beyond the Bayou.

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A recipe for advocacy

Book review by
Bob Perry *
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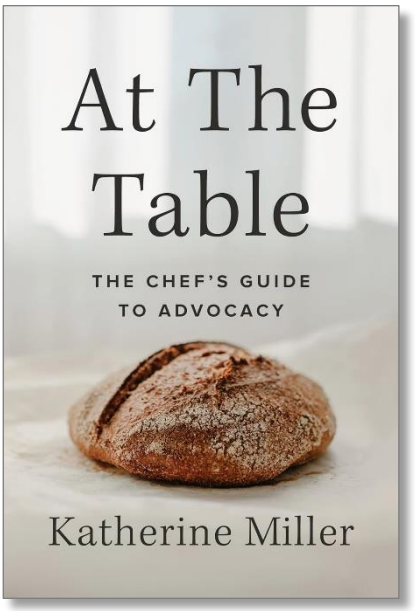

Review of *At The Table: The Chef's Guide to Advocacy*, by Katherine Miller. (2023). Published by Island Press. Available as paperback and e-book; 242 pages. Publisher's website: https://islandpress.org/books/table

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Before turning her attention to food and becoming a vice president of the James Beard Foundation, Katherine Miller advised left-leaning political campaigns and foundations on strategy and advocacy. We can be thankful she focused her attention on food and, while the title of the book suggests that it is a guide for chefs, anyone in the good food space can learn her methods of advocacy.

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Miller begins by explaining how chefs sometimes do not realize that they have influence and access that most people do not because of the nature of their work. Everyone eats and influential people usually like to eat well. Using your access in an intimate setting to highlight the issues you care about is powerful. A chef's platform can also garner publicity against those you disagree with—remember in the last presidential administration when members of the cabinet were refused service at several high-end restaurants.

One of the best pieces of advice she gives is learning to say no. Chefs constantly get asked to contribute their time, labor, and gift certificates, among other asks. Not only can this be a financial strain on businesses that are usually marginal at best, but can dilute your impact on the mission you

most care about. The same goes for farmers and food producers: they are often asked for donations for special events when they should be paid for their products and efforts.

Throughout the book, Miller gives examples of chefs who have used her methods to advance their causes, ranging from local food, sustainability, gender equity, food access, and childhood hunger, to many others. It is these real-world examples that reinforce her methods, and these methods are applicable to any cause.

COVID-19. It is hard to think back now on how disruptive it was for everyone and almost everything. Miller explains how many of the chefs she worked with and trained during the James Beard Foundation's Chef Bootcamps for Policy and Change used their newfound knowledge, along with the Chef Action Network, to lobby politicians to support the restaurant industry. She also examines how in its wake, paying a minimum wage became almost nonexistent in restaurants, with almost no one offering less than US$15 an hour now.

This is a great book for anyone advocating for anything; her methods work, especially for those in the good food space. This is not a self-help book but a true guide. I cannot recommend it highly enough.

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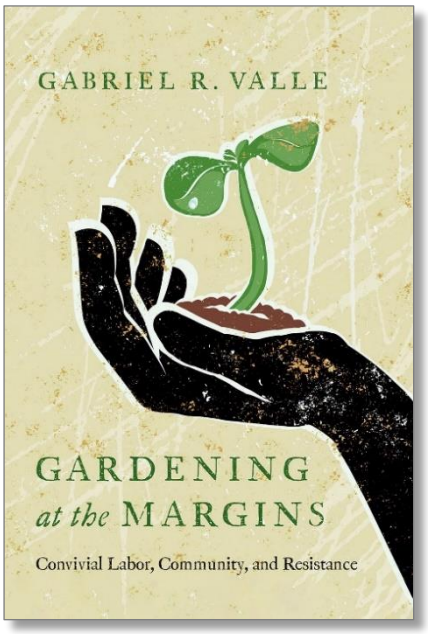
Contending food sovereignty with cultivating kinship through community gardens



Book review by
Review by Max Sano *
Washington, D.C.

Review of *Gardening at the Margins: Convivial Labor, Community, and Resistance*, by Gabriel R. Valle. (2022). Published by University of Arizona Press. Available as hardcover and Ebook; 240 pages. Publisher's website: https://uapress.arizona.edu/book/gardening-at-the-margins

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Gabriel R. Valle's *Gardening on the Margins* underscores the importance of engaging in anthropological research through community building in a way that resonates with my entry into food systems research. In embedding himself in Santa Clara Valley, he had the chance to meet with members of the La Mesa Verde community, many of whom are community gardeners who entered community gardening not just out of necessity to meet their needs but also through an "ethic of care," which the author defines as "caring for others and the relationships that caring creates … make us human" (p. 8).

As Valle accurately points out, "the current neoliberal food system has the tendency to separate people from their very means of production. This process is damaging to our environments, our communities, and our bodies" (p. 10). The objectives of food sovereignty were laid out in 2007 through the Declaration of Nyéléni in Mali, the culmination of bringing together hundreds of community movements from across the globe to rally together to address the devaluation of their livelihoods and the interconnectedness to nature that is increasingly lost in the reigning neoliberal economic order. The declaration states in part that,

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> Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime, and directions for food, farming, pastoral and fisheries systems determined by local producers. (para. 3)

In the United States, food sovereignty acts as a fulcrum for self-determination, especially in urban areas where access to arable land is a privilege in and of itself. In *Gardening at the Margins*, Valle explores the concept of convivial labor concerning individual agency, particularly in working-class communities in the Santa Clara Valley of California. These communities aspire to regain a semblance of control over their relationship to the land and what they consume amidst the rising cost of living and gentrification resulting from the Silicon Valley boom of the last three decades. According to Valle's research and the scholarship he cites, "people in the most unlikely of places use labor to create escapes from the oppressive nature of industrial capitalism" (p. 13).

In some of Valle's interviews with community gardeners such as Jessica, the labor and energy dedicated to land stewardship and gardening were "not [viewed] as political acts but as acts of enjoyment" (p. 140). Jessica, with roots in both Indigenous and European heritage, lives in East San Jose as a community gardener who "does not exist by merely being in relation to those in her sharing network; instead, she is her relationships, and she holds herself accountable to others who also make that social bond. Unlike the Western notion of individualism, the good life that Jessica pursues cannot be accomplished alone, but only as part of a 'complex whole'" (p. 106).

Gabriel touches upon the legacy of grassroots activation within working-class communities and communities of color to establish semi-autonomous institutions and structures to build self-sufficiency and comradery through the production of culturally appropriate food. As Monica White points out in her book *Freedom Farmers* (2019), agricultural cooperatives in Southern states throughout the post–Civil War era have influenced the contemporary food justice movement nationwide. The resilience of Black landowners, sharecroppers, and domestic workers in establishing autonomous food systems was made possible by a theoretical framework known as collective agency and community resistance (CACR). Coined by White, CACR is a form of everyday resistance that is less combative and more accessible since it can be initiated by individuals or small groups in any community. Drawing on influences from "feminist, collective, community, and political dimensions" (White, 2019, p. 6), people in a community build a collective consciousness rooted in the food system they create; in turn, this food system provides a safe space to educate themselves on the realities of their political situation and mobilize without fear of state retribution.

For example, the Freedom Farm Cooperative (FFC) was established in the 1960s by the political organizer and former sharecropper Fannie Lou Hamer. Freedom Farm was created for three primary purposes: providing affordable, safe housing; establishing an entrepreneurial incubator for new business owners and training undereducated workers; and meeting the nutritional and dietary needs of people through an independent food system. Collaborative gardening was a cornerstone of the FFC approach.

The CACR framework is a helpful model for viewing Valle's analysis of the La Mesa Verde community. I did not see this framework explicitly mentioned by Valle; however, I took a step away from this book with a broader understanding of what labor means in the context of food production and food sovereignty. Not only that, but I realized how "radical" the act of finding joy and investing time and energy in work that enriches the soil, the soul, and the source of nutrition for food is. Food sovereignty means addressing the impact of what Valle describes as the "metabolic rift initiated by settler colonialism … contribut[ing] to our alienation from nature" (p. 84).

After reading this book, I felt inspired by the resilience of a community that redefines kinship with the land and mutual accountability despite the structural barriers prioritizing convenience over comradery and agency to decide the food we consume.

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